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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
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Memphis Depot
Dunn Field

Remedial Investigation Report
Sections 1 through 18

DEFENSE LOGISTICS AGENCY

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CH2MHILL

U.S. Army Engineering
and Support Center, Huntsville

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Remedial Investigation Report
for
Dunn Field of the Memphis Depot
Memphis, Tennessee

Prepared by CH2M HILL

July 2002

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Acronyms

1,1,1-TCA	1,1,1-trichloroethane
1,1,2,2-PCA	1,1,2,2-tetrachloroethane
1,1,2-TCA	1,1,2- trichloroethane
1,1-DCA	1,1-dichloroethane
AIC	Agency Information Consultants
AOC	areas of concern
BCT	BRAC Cleanup Team
BEHP	bis-2-(ethylhexyl)phthalate
bgs	below ground surface
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
CAIS	Chemical Agent Identification Sets
CCl4	carbon tetrachloride
CEHND	Center of Expertise, Huntsville Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CETEC-OD	U.S. Army Topographic Engineering Center – Operations Division
CL	Low plasticity clay
CLP	Contract Laboratory Program
cm/sec	centimeters per second
COC	Chemicals of concern
COPC	Chemicals of Potential Concern
CVOCs	Chlorinated VOCs
CWM	Chemical Warfare Materiel
DANC	Decontaminating Agent Non-Corrosive
DDD	Dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DLA	Defense Logistics Agency
DNAPLs	dense non-aqueous phase liquids
DoD	Department of Defense
DQE	data quality evaluation
DQOs	data quality objectives
ED	exposure duration
EE/CA	Engineering Evaluation/Cost Analysis
EF	exposure frequency
EISOPQAM	Environmental Investigation Standard Operating Procedure
EPA	U.S. Environmental Protection Agency
ESE	Environmental Science & Engineering, Inc.
FFA	Federal Facilities Agreement

FID	Flame Ionization Detector
FR	Federal Register
FS	Feasibility Study
FSP	Field Sampling Plan
ft	feet or foot
GC/MS	gas chromatography/mass spectroscopy
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HQ	hazard quotient
HSA	hollow-stem auger
HY	HydroPunch®
IA	Installation Assessment
ICP	Inductively Coupled Plasma
ID	inside diameter
I-H	Heavy Industrial
I-L	Light Industrial
IRA	Interim Remedial Action
IRP	Installation Restoration Program
IT	International Technology
kg	kilogram
LCS	laboratory control standard
MCLs	maximum contaminant levels
MDL	method detection limit
MF	modification factor
mg/kg	milligrams per kilogram
mgd	million gallons per day
MI	Main Installation
ML	low-plasticity clayey silt
MLGW	Memphis Light Gas and Water
MNA	Monitored Natural Attenuation
MS/MSD	Matrix spike/matrix spike duplicate
MSCHD	Memphis-Shelby County Health Department
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	no further action
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NWI	National Wetland Inventory

O&M	Operation and maintenance
OE	ordnance and explosives
OHM	Oil Handling Materials, Inc
OPD	Office of Planning and Development
ORNL	Oak Ridge National Laboratory
OU	Operable Unit
OVA	Organic Vapor Analyzer
OVA/PID	organic vapor analyzer/photoionization detector
PAH	Polynuclear aromatic hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
Parsons	Parsons Engineering Science, Inc. or Parsons ES
PCA	tetrachloroethane, as in 1,1,2,2-tetrachloroethane
PCBs	pesticides/polychlorinated biphenyls
PCE	Tetrachloroethene
PDB	polythylene diffusion bag
PID	photoionization detector
POTW	publicly owned treatment works
PRGs	Preliminary Remediation Goals
PVC	polyvinyl chloride
PZ	piezometer
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAB	Restoration Advisory Board
RBC	risk-based concentrations
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RH195	1,3-dichloro-5,5-dimethylhydantoin
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPD	relative percent difference
SS-2	surface soil sample
SP	poorly sorted sands and gravels
SVOCs	semivolatile organic compounds
SWMUs	solid waste management units
TCE	trichloroethene
TCE	trichloroethylene
TDEC	Tennessee Department of Environment and Conservation
TEC	Topographic Engineering Center
TOC	Total organic carbon
total 1,2-DCE	Total 1,2-dichloroethene

UF	uncertainty factors
µg/L	micrograms per liter
USACE	U.S Army Corps of Engineers
USAEHA	U.S Army Environmental Hygiene Agency
USAESCH	U.S. Army Engineering Support Center, Huntsville
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USC	United States Code
USCS	Unified Soil Classification System
USFS	U.S. Fish and Wildlife Service
USFWS	U S Fish and Wildlife Service
USGS	U.S. Geological Survey
VC	Vinyl chloride
VOCs	volatile organic compounds

TAB

Section 1

1.0 Introduction

The Memphis Depot (formerly known as the "Defense Distribution Depot Memphis, Tennessee" and referred to in this report as the "Depot") is located in southeastern Memphis, Tennessee. The Depot originated as a military facility in the early 1940s Its initial mission and function was to provide stock control, materiel storage, and maintenance services for the U.S. Army (Memphis Depot Caretaker, 1998). In 1995, the Depot was placed on the list of Department of Defense (DoD) facilities to be closed under the Base Realignment and Closure (BRAC) Storage and distribution of materiel for all U S military services and some civil agencies continued until the Depot officially closed in September 1997.

On October 14, 1992, the Depot was placed on the National Priorities List (NPL) by the U.S. Environmental Protection Agency (EPA), bringing the facility within the Superfund program. As a result of its status as an NPL site, the Depot entered into a Federal Facilities Agreement (FFA) on March 6, 1995. The signatories to that agreement, the Defense Logistics Agency (DLA), EPA, and the Tennessee Department of Environment and Conservation (TDEC), agreed that investigating and remediating all applicable sites at the Depot would proceed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), i.e., Remedial Investigation/Feasibility Study (RI/ FS), proposed plan, Record of Decision (ROD), Remedial Design (RD), and Remedial Action (RA).

As part of the Depot's environmental cleanup program, an RI/FS is being conducted at Dunn Field. Surface and subsurface soil, sediment, intermittent surface water, and groundwater were investigated at Dunn Field, which is located adjacent to and north of the Depot's Main Installation (MI). The RI/FS process at Dunn Field will provide sufficient information regarding the environmental impacts from former hazardous materials disposal activities to identify appropriate cleanup alternatives.

Historical records, historical aerial photographs, and employee interviews regarding burial or surface disposal areas and other areas of concern provided the basis for identifying locations to be investigated. During the 1980s and the early 1990s, groundwater monitoring wells were installed and groundwater, surface soil, and subsurface soil were sampled to determine the environmental impact of past activities at Dunn Field In 1995, EPA and TDEC approved the *Final Generic Remedial Investigation/Feasibility Study Work Plan* (CH2M HILL, 1995c), which addressed application of the RI/FS process across the Depot. Also in 1995, the regulatory agencies approved the *Operable Unit 1 Field Sampling Plan (FSP)* (CH2M HILL, 1995e) to define specific sampling and characterization activities to be performed within Dunn Field. The goal of the 1995 FSP was to characterize the environmental impacts from past disposal practices and to identify and characterize specific disposal pits and trenches. Based on data collected as part of the ongoing RI, an interim ROD was developed in 1996 for Dunn Field and early action was taken in 1998 to contain the spread of groundwater contamination in the fluvial aquifer from Dunn Field westward.

In 1998, additional information was gathered about the location of disposal areas and other areas of concern at Dunn Field. This information was developed from several sources:

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- Results from geophysical investigations performed to locate metal objects and areas of disturbed soil performed by Parsons Engineering Science, Inc (Parsons), under contract with the U.S. Army Engineering and Support Center, Huntsville (USAESCH) to characterize suspected chemical warfare materiel (CWM) disposal areas;
- Results of surface soil and groundwater sampling activities performed by OHM Remediation Services Corporation, under contract with the U.S. Army Corp of Engineers (USACE) - Mobile District, during installation of the groundwater extraction system at Dunn Field; and
- Results from passive soil gas surveys conducted by CH2M HILL, under contract with the USAESCH, to identify areas where the soil has been impacted by vapors from volatile organic compounds (VOCs).

This RI report was originally submitted by CH2M HILL for review in March 2000. However, as a result of the potential detection of dense non-aqueous phase liquids (DNAPLs) in groundwater samples collected on March 14, 2000, from a monitoring well located near the western boundary of Dunn Field, the document was recalled. Addendum II to the RI/FS FSP was prepared for additional RI activities on the west-central portion of Dunn Field and areas immediately west (offsite) of Dunn Field (see Section 1.1.2).

CH2M HILL completed the Addendum II investigation in 2001, and has reviewed the available information, completed the comparisons to historical information, and produced this Revision 0 RI report, which presents results from implementation of both the original FSP and both addenda

1.1 Purpose and Scope of Remedial Investigation

This RI was completed to satisfy the requirements of CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). As noted above, EPA placed the Depot on the NPL in October 1992 Subsequently, the Depot was obligated to conduct an RI/FS under CERCLA and the NCP The purpose of the RI/FS is to determine the nature and extent of contamination, to evaluate the risk to human health and the environment, and to identify a range of possible cleanup alternatives. To place this RI report in context, the following describes the CERCLA process used to evaluate the Depot and to select a remedy to mitigate environmental contamination at Dunn Field.

- Since 1995, a series of investigations have been conducted at Dunn Field to obtain samples of surface and subsurface soil, sediment, groundwater, and surface water to assess the level of contamination that exists at Dunn Field and to define the horizontal and vertical extent of contamination in each medium. This RI report summarizes the results of the various Dunn Field investigations and presents interpretations of those results.
- As part of this RI, a **Baseline Risk Assessment [BRA]** was prepared to assess the potential risks to human health and the environment represented by contaminants at the site. The BRA incorporates conservative assumptions regarding exposure of affected individuals under various land use scenarios. The findings of the BRA are included in this RI report.

- A **Feasibility Study (FS)** develops and presents a range of remedial alternatives to address the contaminants identified in the RI and evaluates the probable performance of each alternative in comparison to a set of criteria established by the EPA. The FS is intended to present an unbiased and non-judgmental evaluation of the candidate remedial alternatives In some cases, additional environmental data are collected or reassessed during the preparation of the FS in order to understand the applicability of a particular remedial technology, or to identify a better way to remediate a particular area of contamination.

- Following publication of the FS, the cognizant regulatory (EPA and TDEC) and lead agencies for the Depot (DLA) will evaluate the remedies presented in the FS. A **Proposed Plan** will then be prepared documenting the remedy(ies) proposed by those agencies and the rationale for the selection of the proposed remedy(ies). The Proposed Plan may "pick and choose" among the evaluated alternatives for various locations at Dunn Field. The Proposed Plan will be presented to the City of Memphis community and the public, who will be offered the opportunity to comment on the proposed remedy(ies).

- After public comments on the Proposed Plan are received, the regulatory and lead agencies will take all comments into consideration, re-evaluate their selection of the proposed remedy(ies) for Dunn Field, and publish a **Record of Decision (ROD)** documenting the final remedy(ies) selected for Dunn Field. The Responsiveness Summary of the ROD includes all the public comments, as well as responses to each. The remedy(ies) documented in the ROD will then be implemented at Dunn Field through the RD and RA phases.

To facilitate the investigation of this relatively large and complex site, the Depot was divided into two areas: the MI and Dunn Field. The MI RI/FS has been conducted and the final reports are part of the Administrative Record. The results are discussed in the *Memphis Depot Main Installation Remedial Investigation Report* (CH2M HILL, 2000a), *Memphis Depot Main Installation Groundwater Feasibility Study Report* (CH2M HILL, 2000b), *and Memphis Depot Main Installation Soil Feasibility Study Report* (CH2M HILL, 2000c) The *Memphis Depot Main Installation Proposed Plan* (CH2M HILL, 2000d) was presented to the public in August 2000 and the *Memphis Depot Main Installation Record of Decision* (CH2M HILL, 2001a) was completed and signed by DLA and TDEC in February 2001. EPA signed the ROD in September 2001

Dunn Field is a 64-acre rectangular area that joins the MI on the north, across Dunn Avenue, and has been designated Operable Unit (OU) 1. This *Dunn Field Remedial Investigation Report* addresses the nature and extent of contamination at Dunn Field and the risk to human health and the environment. This RI focuses on the Dunn Field area of the Depot, historical activities at the site, the environmental setting, environmental data collection, sample analyses, and data evaluation; and the human health and ecological risk assessment conducted for this site using data obtained during the RI field investigations The report was prepared in accordance with published guidance for conducting a RI under CERCLA (EPA, 1988).

This report was completed by implementing the appropriate tasks from the standard RI/FS task list defined by EPA (EPA, 1988) EPA identified the tasks required to provide consistent reporting and to more effectively monitor RI/FS projects. The following summarizes the tasks carried out to complete this RI:

- **Project planning** involved defining the type and extent of site investigations needed to characterize Dunn Field. This process identified the need to investigate areas of Dunn Field and the surrounding areas that were not previously investigated and to fill data gaps identified at previously investigated areas. The task also included identifying the methods to be used in this work. The final plans generated for the RI at Dunn Field include the following.
  - OU-1 Field Sampling Plan (CH2M HILL, 1995e)
  - Screening Sites Field Sampling Plan (CH2M HILL, 1995b)
  - Generic Quality Assurance Project Plan (CH2M HILL, 1995a)
  - Generic Remedial Investigation/Feasibility Study Work Plan (CH2M HILL, 1995c)
  - Hazardous and Toxic Waste Health and Safety Plan (CH2M HILL, August 1995)
  - Field Sampling Plan for OU-1 Addendum [I] (CH2M HILL, March 1999)
  - Field Sampling Plan Addendum II for Dunn Field (OU-1) (CH2M HILL September 2000)
  - Amended Sampling and Analysis Plan [III] Soil Sampling from CWM Excavations 24-A, 24-B, and 1 for HTW (CH2M HILL, March 2000)
  - Sampling and Analysis Plan for Evaluation of Biodegradation of VOCs in Groundwater at the Memphis Depot (CH2M HILL, March 2000)

- **Field investigations** were conducted from 1995 through 2001 to characterize the contamination in soil, groundwater, surface water, and sediments at Dunn Field and the surrounding areas for sites needing investigation. Samples of the four media were analyzed and results were validated in the field or laboratory to determine if the data were adequate for their intended use. The field data were then evaluated to develop knowledge of the nature and extent of contamination.

- **Risk assessments** were conducted for selected areas of Dunn Field as outlined in the *Risk Assessment Approach Memo* (CH2M HILL, July 1999) and later amended during December 2000 BRAC Cleanup Team (BCT) meeting, by using the field data to assess the risk to human health and the environment. Wherever unacceptable risks are identified, an FS will be conducted to identify effective remedial solutions to mitigate these risks.

1.1.1 Dunn Field RI Field Sampling Plan Addendum [I]

The original Dunn Field FSPs outlined the investigation of each specific site but, after review of geophysical survey and soil gas survey data, delineation of each site for a focussed investigation was deemed not possible (*Final Field Sampling Plan for OU 1 Addendum [I]*, CH2M HILL, March 1999). The geophysical investigation and passive soil gas survey indicated that soil contamination and disposed items within Dunn Field did not, in all cases, correspond to boundaries of known or suspected burial sites Over much of Dunn Field, the Final FSP Addendum for OU1 (CH2M HILL, March 1999) shifted the field investigation from the site-specific basis of the original FSPs to an approach that consolidated individual sites into areas of similar contamination. The following three areas were defined (see Table 1-1):

- **<u>Northeast Open Area</u>** - The Northeast Open Area (approximately 20 acres) consists of the grassy area with a number of interspersed mature trees in the northeast quadrant of Dunn Field containing Areas G and H identified in the OU 1 FSP Addendum and encompassing the following sites (see Table 1-2 for further details)
  - Site 19 (Former Tear Gas Canister Burn Site);
  - Site 20 (Asphalt Burial Site),
  - Site 21 (XXCC-3 [stabilized impregnite] Burial Site),
  - Site 50 (Dunn Field Northeast Quadrant Drainage Ditch),
  - Site 60 (Pistol Range Impact Area and Bullet Stop);
  - Site 62 (Bauxite Storage); and
  - Site 85 (Pistol Range Building and Temporary Pesticide Storage Building).

  The Memphis Depot Redevelopment Plan (The Pathfinders, *et al.*, 1997) identified this area as future public open space for recreational purposes.

- **<u>Disposal Area</u>** - The Disposal Area (approximately 14 acres) consists of the pits and trenches in the northwestern quadrant of Dunn Field, and corresponds to Areas A through F identified in the OU 1 FSP Addendum This area encompasses the following sites (see Table 1-2 for further details)
  - Site 1 (Mustard and Lewisite Training Set Burial Site [CWM Site])
  - Site 2 (Ammonia Hydroxide and Acetic Acid Burial Site)
  - Site 3 (Mixed Chemical Burial Site)
  - Site 4 and 4 1 (Petroleum, Oil and Lubricant [POL] Burial Site)
  - Site 5 (Methyl Bromide Burial Site A)
  - Site 6 (Eye Ointment Burial Site)
  - Site 7 (Nitric Acid Burial Site)
  - Site 8 (Methyl Bromide Burial Site B)
  - Site 9 (Ashes and Metal Burial Site)
  - Site 10 (Solid Waste Burial Site)
  - Site 11 (Trichloroacetic Acid Burial Site)
  - Site 12 and 12.1 (Sulfuric and Hydrochloric Acid Burial)
  - Site 13 (Mixed Chemical Burial)
  - Site 14 (Municipal Waste Burial Site B)
  - Site 15 (Sodium Burial Site)
  - Site 15.1 (Sodium Phosphate Burial Site)
  - Site 15.2 (14 Burial Pits)
  - Site 16 (Unknown Acid Burial Site)
  - Site 16.1 (Acid Burial Site)
  - Site 17 (Mixed Chemical Burial Site C)
  - Site 18 (Plane Crash Residue)
  - Site 22 (Hardware Burial Site)
  - Site 23 (Construction Debris and Food Burial Site)
  - Site 24-A (Bomb Casing Burial Site [CWM Site])
  - Site 61 (Buried Drain Pipe)
  - Site 63 (Fluorspar Storage)
  - Site 64 (Bauxite Storage)
  - Site 86 (Food Supplies)

The past disposal methods within the Disposal Area included subsurface disposal of hazardous and nonhazardous materials, including potential CWM constituents. The individual disposal sites are further discussed in Section 10. Historical information concerning the location of the disposal sites is included in Section 1 4 The anticipated land use within this area is light industrial (The Pathfinders, *et al.*, 1997).

- Stockpile Area - The Stockpile Area (approximately 30 acres) encompasses the former aboveground bauxite and fluorspar storage areas (Sites 62, 63, and 64) on the eastern and southwestern portions of Dunn Field. Past practices in this area were generally aboveground storage of mineral ores and other materials Site 24-B, located in the southwestern corner of Dunn Field, is the chlorinated lime slurry pit used for the neutralization of the contents of the 29 bomb casings used to transport mustard agent (the bomb casings were buried in Site 24-A in the Disposal Area). According to the Archives Search Report (ASR) (USACE, January 1995) a former Flame Thrower Test Area is located on the eastern half of Dunn Field in the northern portion of the Stockpile Area. The ASR also documents the possible burial of 86,100 pounds of containerized CC-2 (impregnite) material in a 40-foot long trench in the southwest quadrant of Dunn Field in 1947. Impregnite (unstablized [CC-2] and stabilized [XXCC-3, stabilized with zinc oxide]) was used for impregnating or permeating protective clothing after laundering to protect personnel against the action of vesicant-type chemical agents. This portion of the Stockpile Area was later used for the storage of bauxite (Site 64).

  Refer to Table 1-2 for further details on the sites in this area. The anticipated land use within this area is also light industrial (The Pathfinders, *et al.*, 1997).

1.1.2 Dunn Field RI Field Sampling Plan Addendum II

The first version of the draft final Dunn Field RI report was submitted on March 9, 2000; however, the document was recalled after elevated concentrations of TCE and 1,1,2,2-PCA were discovered in groundwater samples collected earlier from monitoring well MW-70. On March 17, 2000, the BCT concluded that the draft final RI should be revised following additional RI activities because of (1) the potential for DNAPL presence and (2) the potential need to re-evaluate source areas at Dunn Field. As a result of this decision, the RI FSP Addendum II was developed. This addendum described proposed additional investigation activities at the west-central area of Dunn Field, including:

- Establish nature and horizontal and vertical extent of the potential DNAPL and resultant dissolved contaminant plume associated with MW-70 in saturated and unsaturated zones;
- Identify DNAPL sources within the soil/disposal areas at Dunn Field, including, if DNAPL is found, assessment of specific areas where DNAPL may have been released and the vertical and horizontal distribution within the unsaturated zone; and
- Evaluate DNAPL and dissolved phase transport in the vicinity of MW-70, including orientation of underlying clay confining and perched units, groundwater gradient and flow direction in areas of concern, and additional transport parameters.

During the RI field work, additional groundwater sampling measures were implemented at several of the monitoring wells installed during the Addendum II field effort. These measures included collection of groundwater samples using polyethylene diffusion bag (PDB) samplers at selected wells for the purpose of establishing the vertical contaminant profile in the fluvial aquifer.

The additional RI field investigation activities commenced in October 2000 and were completed in February 2001. This Dunn Field RI report is inclusive of all Addendum II field efforts and resultant analytical data.

1.2 Report Organization

Sections 1.0 through 7.0 provide introductory and background information on the Depot and Dunn Field, as well as an explanation of the approach used to collect field data and conduct the RA Sections 8.0 through 13.0 address the nature and extent of contamination and the risk to human health by Area, specifically, these sections discuss the following:

- Contamination and risks associated with each of the 3 Areas;
- Fate and transport of the chemicals of potential concern (COPCs) in each Area;
- Human health and ecological RA for each Area, and
- Conclusions for each Area.

Groundwater at Dunn Field is discussed in Sections 14.0 (Nature and Extent of Contamination in Groundwater), 15.0 (Baseline Risk Assessment for Groundwater) and 16.0 (Contaminant Fate and Transport in Groundwater). Overall RI conclusions and references are presented in Sections 17 0 and 18.0, respectively

Volume 2 contains appendices that present supporting material such as data output, soil boring logs and monitoring well construction details

1.3 Background Information

1.3.1 Location and Description

The Depot, located in Memphis, Tennessee (Figure 1-1), consists of approximately 642 acres and includes the MI, which includes open storage areas, warehouses, military family housing, and outdoor recreational areas, and Dunn Field, which includes mineral storage and the former waste disposal area. The major features of the Depot are shown in Figure 1-2 The Depot lies approximately 5 miles east of the Mississippi River and just northeast of the Interstate 240-Interstate 55 junction in the south-central portion of Memphis, approximately 4 miles southeast of the central business district and one mile northwest of Memphis International Airport (Figure 1-1). Airways Boulevard borders the MI portion of the Depot on the east and provides primary access to the MI. Dunn Avenue, Ball Road, and Perry Road serve as the northern, southern, and western boundaries of the MI, respectively.

Dunn Field, comprising 64 acres of undeveloped land, is immediately adjacent, across Dunn Avenue, to the north-northwest portion of the MI. Dunn Field is bounded by the Illinois Central Gulf Railroad and Person Avenue to the north, Hayes Road to the east, and Dunn Avenue to the south Dunn Field is partially bounded to the west by· (1) Kyle Street; (2) Memphis Light Gas and Water (MLGW) powerline corridor (which bisects Dunn Field); (3) undeveloped property; and (4) a commercial trucking facility (Figure 1-2)

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Based on information obtained from Depot records and interviews with former Depot military personnel, Dunn Field was used intermittently for burial of waste. Disposal records and interviews with facility personnel indicate specific instances when some of the burial occurred. The earliest records of burial date back to 1946 with the disposal of German bomb casings containing mustard agent that were neutralized and buried in the western portion of Dunn Field (Sites 24-A and 24-B).

1.3.2 Land Use

Most of the Dunn Field surface is unpaved. Specifically, about two-thirds of the area is grassed, and the remaining area is covered with crushed rock and paved surfaces. Dunn Field was used for bulk mineral storage and waste disposal. Based on information obtained from Depot records and interviews with former Depot military personnel, ordnance and explosives (OE) and CWM disposal occurred at Dunn Field, in addition to the hazardous and nonhazardous material disposal. The OE disposal generally consisted of detonating and/or burning of such wastes. For purposes of the RI and RA, Dunn Field is divided into three separate areas· Northeast Open Area, Disposal Area, and Stockpile Area (Figure 1-3).

1.3.3 History

The Depot originated in the early 1940s. Its initial mission was to provide stock control, storage, and maintenance services for the Army Engineer, Chemical, and Quartermaster Corps (Memphis Depot Caretaker, 1998). During World War II, the facility served as an internment center for 800 prisoners of war and performed supply missions for the Signal and Ordnance Corps. From 1963 until closure in September 1997, the facility served as a major field installation for the DLA for shipping and receiving a variety of materials (U.S. Army Toxic and Hazardous Materials Agency [USATHAMA], 1982).

The Depot received, warehoused, and distributed supplies common to all U.S. military services and some civil agencies located primarily in the southeastern United States, Puerto Rico, and Panama. Stocked items included food, clothing, electronic equipment, petroleum products, construction materials, and industrial, medical, and general supplies. Approximately 4 million line items were received and shipped by the Depot annually; total shipments amounted to about 107,000 tons of goods per year. In-stock inventory at the facility was worth more than $1 billion The Depot employed approximately 1,486 civilians and 9 military personnel; its annual payroll was $41 million (Law Environmental, 1990a). The Depot was officially activated on January 26, 1942, as the Memphis General Depot. Since that time, the Depot mission and function has been related to the receipt, storage, and distribution of various commodities to the Armed Forces and civilian agencies, when required (USATHAMA, 1982).

Disposal activities at Dunn Field began in July 1946 when 29 mustard-filled German bomb casings were destroyed and buried (Sites 24-A and 24-B). Three railcars were identified as containing leaking munitions and were transferred to the Memphis General Depot for proper handling. A total of 24 500-kilogram (kg) and 5 250-kg bombs were destroyed (USACE, 1995) After draining and destruction operations were completed, all mustard-contaminated items (wood, clothing, etc) were placed into the slurry pit and burned.

During the early to mid-1950s, Chemical Agent Identification Sets (CAIS) were allegedly disposed of and buried at Dunn Field at Site 1 in the Disposal Area. The CAIS set contained small glass ampoules of diluted mustard, lewisite (a vesicant chemical agent), chloropicrin, and phosgene, which were stored in sealed cylindrical metal containers (PIGS). CAIS stocks found to be leaking or broken during periodic inspection were reportedly buried at Dunn Field (USATHAMA, 1982). The damaged CAIS may have been broken up and neutralized with chlorinated lime, however, reports indicate that on at least five or six occasions the sets were placed into the pits intact (USACE, 1995).

The CWM disposal pits were located in the Disposal Area and the Stockpile Area (Site 24-A and 24-B). The remains of destroyed or partially destroyed OE were also buried in pits in the Disposal Area. Reports indicate that a 3.2-inch mortar rounds, smoke pots, hand grenades (smoke), and other unspecified OE were buried in these pits (USATHAMA, 1982 and USACE, 1995b). Sections 1.4.12 and 1.4.13 present additional information on the investigation and removal of CWM from Dunn Field.

In addition to the chemicals and ordnance described above, other chemicals associated with the use of chemical agents such as Decontaminating Agent Non-Corrosive (DANC) were buried in Dunn Field The decontaminant DANC disposed of at Dunn Field is an organic N-chloroamide compound in solution with 1,1,2,2-tetrachloroethane (PCA) DANC typically contained 90 percent to 95 percent 1,1,2,2- PCA Chlorinating compound number 1 (an N-chloroamide) and 1,3-dichloro-5,5-dimethylhydantoin (RH-195) were used as organic chlorinating compounds in DANC. Food stocks, paints, acids, herbicides, and medical waste were also destroyed or buried in pits and trenches at Dunn Field (CEHND, 1997).

1.3.3.1 Regulatory History

The Depot was issued a Resource Conservation and Recovery Act (RCRA) Part B permit (No. TN4 210-020-570) by EPA Region 4 and the TDEC on September 28, 1990 Subsequently, in accordance with Section 120(d)(2) of CERCLA, Title 42, Section 9620(d)(2) of CERCLA, and Title 42, Section 9620(d) (2) of the United States Code (USC), EPA prepared a final Hazard Ranking System (HRS) Scoring Package for the facility. Based on the final HRS score of 58.06, EPA added the Depot to the NPL by publication in the *Federal Register* (FR), 57 FR 47180 No. 199, on October 14, 1992.

As noted above, the Depot entered into an FFA on March 6, 1995. The signatories to that agreement, DLA, EPA, and TDEC, agreed that investigating all applicable sites would proceed under the CERCLA process for remediation.

In July 1995, the Depot was also placed on the BRAC list, indicating that the facility was to be closed and converted to potentially different ownership and uses. The BCT was developed to implement BRAC requirements, which include identifying methods for expeditious property transfer and reuse Therefore, in addition to meeting CERCLA requirements, environmental restoration at the facility must also comply with specific requirements for property transfer in accordance with Public Law 501-510 under Title XXIX, enacted in 1990

1.4 Previous/Associated Studies

In conformance with DLA environmental programs, several technical studies have been conducted at Dunn Field. The remainder of this subsection describes the studies generally, while key findings are presented in the appropriate Area section.

1.4.1 Installation Assessment

In 1981, DLA and USATHMA conducted an Installation Assessment (IA) to identify previously used waste disposal areas and waste management practices pursuant to the Installation Restoration Program (IRP) (USATHMA, 1982). The IA indicated that some past waste management practices were not compatible with waste management practices in use at the time of the inquiry. The study identified areas where hazardous materials might have been used, stored, treated, or disposed of at the Depot. Based on the findings of this assessment, USATHMA recommended that DLA conduct a field survey.

1.4.2 Geohydrologic Study

In 1982, the U.S. Army Environmental Hygiene Agency (USAEHA) conducted a geohydrologic study (USAEHA, 1982) to characterize the geohydrologic setting and to identify and monitor sources of potential groundwater contamination. The study identified two areas as having the potential for groundwater contamination: one was on the MI (PCP Dip Vat Area) and the other was Dunn Field.

1.4.3 Environmental Audit

In 1985, USAEHA conducted an environmental audit (USAEHA, 1985) of the Depot's waste management and disposal practices.

1.4.4 RI/FS

In 1989 and 1990, the Depot initiated an RI/FS of several known and suspected sources of contamination. This study was performed by Law Environmental through a contract with the USAESCH. The final work plan for this effort was presented to EPA in April 1989. The study was performed in two phases, referred to as Phase I (primarily activities in 1989) and Phase II (primarily activities in 1990). The final RI report (Law Environmental, 1990a) was submitted in August 1990, and the final FS report (Law Environmental, 1990b) was submitted in September 1990 The study indicated that the fluvial aquifer under Dunn Field was contaminated and that additional investigation was needed to fully identify contaminant source areas and to delineate the contaminant plume.

1.4.5 RCRA Facility Assessment

In January 1990, EPA Region 4 conducted a RCRA Facility Assessment (RFA) (EPA, 1990) at the Depot through a contract with A.T. Kearney, Inc. The RFA identified 49 solid waste management units (SWMUs) and 8 areas of concern (AOCs) at the Depot (a total of 57 sites). Of these, 12 SWMUs and 4 AOCs required no further action (NFA). Twenty-eight SWMUs and three AOCs required further investigation in the form of confirmatory sampling and analysis. Four SWMUs and one AOC were identified as needing RFI characterization.

1.4.6 Groundwater Monitoring Study

In 1993, Environmental Science & Engineering, Inc. (ESE) performed a groundwater monitoring study using existing monitoring wells at the Depot (ESE, 1994). The study was conducted to assess changes in groundwater quality since the Law RI was completed in 1990. Groundwater samples were collected from 35 existing monitoring wells on- and offsite. The results indicated that all groundwater samples with concentrations exceeding federal and State of Tennessee maximum contaminant levels (MCLs) had been collected from the fluvial aquifer.

1.4.7 Electromagnetic and Magnetic Surveys at Dunn Field

In 1993, the U. S. Army Engineer Waterways Experiment Station conducted a geophysical investigation of the western portion of Dunn Field. Six areas were investigated to determine the location of buried trenches, pits, drums, and other sources that may be contributing to the contamination of the upper aquifer. The final technical report (GL-94-8) was published in March 1994 The report concluded that there are potential burial sites in five of the six areas surveyed. Based on this data, CH2M HILL conducted field observations on August 18, 1995 The observations indicated many surface irregularities and depressions, suggesting possible burial sites in the northwest quadrant of Dunn Field (the Disposal Area). Many of the irregularities and depressions appeared to correspond with the mapped waste areas while others did not. Engineers from CH2M HILL revisited Dunn Field in October 1995, and mapped the irregularities and depressions noted during the visits. The results of the mapping confirm that many of the field-identified depressions and irregularities correspond well with previously mapped burial sites on Dunn Field, and there were some that did not. Three (3) figures generated from the mapping of the irregularities and depressions on the western portion of Dunn Field are included in Appendix A-4. In addition, Memphis General Depot Drawing No. 16.4D, Location of Materials Buried in Dunn Field, dated January 19, 1956 (last revised September 17, 1984), is also provided in Appendix A-4 as a historical source of information pertaining to the location of the disposal sites on the western portion of Dunn Field.

1.4.8 1995 OEW/CWM Archives Search Report

In 1994, the USACE, St. Louis District conducted a site inspection and archives search of the of the Memphis Depot The final report, dated January 1995, compiles information obtained through historical research at various archives and records holding facilities, interviews with persons associated with the site or its operations, an personal visits to the site. This report identified burial sites on Dunn Field thought to contain destroyed or buried CWM, and other burial/disposal locations (non-CWM related)

1.4.9 Sediment Sampling

Sediment samples were collected from 18 offsite drainage pathway locations in October 1995 to assess the presence of contaminants in sediment from operations at the Depot (EDAW, January 1996). Seven samples associated with Dunn Field were collected as part of the sampling event Polynuclear aromatic hydrocarbon (PAH) compounds were detected at all sediment sampling locations, but exceedances of background and screening criteria were noted at only three sampling locations. Lead was the only metal detected above screening criteria throughout the sampling stations. Dichlorodiphenyldichloroethane (DDD), dichlorodiphenyltrichloroethane (DDT), and dichlorodiphenyldichloroethene (DDE) were detected at numerous sampling locations at concentrations that exceeded background values or the National Oceanic and Atmospheric Administration (NOAA) sediment screening criteria.

1.4.10 Historical Environmental Aerial Photographic Analysis

In September 1998, the U.S Army Topographic Engineering Center - Operations Division (CETEC-OD) completed a Historical Environmental Aerial Photographic Analysis of Dunn Field for the USAESCH. The Terrain Analysis Branch of the CETEC-OD was tasked with searching for and collecting historical photographic records and ancillary data relative to Dunn Field. In addition, the focus was to locate former chemical burial sites at Dunn Field through photo-interpretation of historical images. Four types of photographs were available for use during the photographic analysis·

- Stereo-paired photography from 1946, 1953, 1963, and 1990,
- Oblique aerial photography from 1951 (March, May, and October), 1952 (February and June), 1955, 1957, and 1958;
- Non-stereo photo maps from 1949, 1950, and 1959; and
- A non-dated aerial photo believed to be from 1947 or 1948.

The report found that during the period studied (1945-1990), only the northeast quadrant of Dunn Field included tree cover. The now abandoned pistol range was also located in the northeast section where the terrain is slightly elevated. About half of Dunn Field was found to be covered with grass, while the remaining areas were either paved, graded, or covered by bulk mineral piles. Significant findings included areas in the northwest quadrant, southwest quadrant, and an incinerator, which was located south of the former pistol range and was detected in 1957 and 1958 aerial photographs

Areas in the northwest quadrant included a large triangular-shaped section that matches the locations of multiple burials of waste materials from 1955, and a well-defined light-tone quality area near Kyle Street that matches the locations of multiple (1968 and 1969) burials of chemical and medical waste.

Areas in the southwest quadrant included two areas of disturbed ground, an unidentified rectangular feature, and a cleared area that may match locations of burial operations, which are suspected to have occurred in July 1946 and February 1947.

1.4.11 Interim Groundwater Remedial Action

In August 1995, an Interim Remedial Action (IRA) ROD was submitted for a groundwater removal action at Dunn Field by CH2M HILL (CH2M HILL, January 1996a). The ROD provided the basis of design for the components associated with the IRA for Dunn Field. The ROD was finalized in January 1996 and was signed in April 1996 The Dunn Field interim ROD presents the selected IRA for hydraulic control of the contaminant plume in groundwater beneath Dunn Field via groundwater extraction and discharge to the publicly owned treatment works (POTW) or municipal sanitary sewer. Contaminants identified as those of potential concern include VOCs, such as solvents used for cleaning mechanical parts, and metals. The IRA is not intended as a permanent solution, however, it is intended to be compatible with the final remedy.

The final design for this IRA was completed by CH2M HILL in August 1997, and included the installation of seven groundwater extraction wells, one pre-cast concrete building, an underground conveyance system, flow measurement and control systems, and associated civil, electrical, and instrumentation/controls work. The extraction system was constructed by OHM/International Technology (IT) from January 1998 through October 1998. The interim groundwater extraction system began operation in November 1998 and continues to operate as of the date of this report. Operation and maintenance (O&M) activities have been conducted since the system went online, including quarterly groundwater sampling events in 1999 and 2000 to monitor the quality and effectiveness of the system Semiannual groundwater sampling is being conducted in 2001. OHM/IT developed as-built drawings for the groundwater extraction system under separate submittal in April 1999. In 2000, design of the extraction system was improved with the addition of four extraction wells and associated electrical, mechanical, and instrumentation/controls components The new extraction wells were brought on-line in the first quarter of 2001. The system is continuing to extract groundwater as of the date of this report.

1.4.12 CWM/OE Investigation and Engineering Evaluation/Cost Analysis (EE/CA)

Parsons completed a CWM/OE investigation in 1998 and 1999. An Engineering Evaluation/Cost Analysis (EE/CA) was also performed by Parsons in June 1999 to: (1) assess whether CWM contamination was migrating from the CWM disposal pits at Dunn Field; (2) analyze risk management alternatives; and (3) recommend feasible CWM remedial alternatives for contaminants found to be present.

A non-intrusive geophysical investigation was performed on the western half of Dunn Field between February and July 1998. The objective of the geophysical investigation was to delineate the former disposal pits/trenches so that they may be avoided during intrusive activities. Samples of soil and groundwater were then collected. No CWM-related compounds were detected in the background samples. Forty-three soil samples and six groundwater samples were collected for CWM site characterization purposes. Most of the soil samples were obtained in the 0- to 15-foot depth interval of each boring. Three OE related compounds (2,4,6-trinitrotoluene, HMX and RDX) were detected or estimated in site surface soil samples. Two OE related compounds (2,4,6-trinitrotoluene and RDX) were detected or estimated in subsurface soil samples Several metals were detected in both surface and subsurface samples. Based on the analytical results from the samples, no migration of CWM or breakdown products from the pits or trenches has occurred.

As part of the EE/CA document, a streamlined risk evaluation was conducted for the areas directly adjacent to suspected CWM burial pits, and included a human health risk assessment (HHRA) and an ecological preliminary risk evaluation. Potential exposure of both current and future human receptors to groundwater and soil at Dunn Field was evaluated in the HHRA Chemicals of concern (COCs) identified from the HHRA included lead in surface soil; lead, chromium, and iron in mixed surface and subsurface soil (0 to 11 feet); and nitrobenzene, aluminum, iron, and manganese in groundwater. Based on the risk analysis and the fact that these COCs are not CWM-related, none were identified as COCs to be remediated at Dunn Field. Therefore, adverse effects to current and future human receptors resulting from exposure to site media are not expected to occur in the areas directly adjacent to the suspected CWM burial pits at the Dunn Field

An ecological site characterization and soil screening were conducted at Dunn Field Constituents in surface soil and mixed surface and subsurface soil exceeded existing regulatory criteria in some cases. According to the ecological site characterization, it is highly unlikely that wildlife populations would be sustained at Dunn Field or in the surrounding area No significant impacts to ecological populations are expected from CWM or CWM breakdown products in the areas surrounding the trenches and pits associated with CWM at Dunn Field.

Although samples were not collected directly beneath or within the suspected CWM burial trenches/pits, the assumption was made that CWM may be present in these areas and, if so, would be toxic to human and ecological receptors. Based on current and anticipated future uses at the site, further assumptions were made that the wastes will result in an unacceptable risk if left in place and that removal actions are necessary to reduce or eliminate the potential CWM risk. Four alternatives were evaluated.

1. No action
2. Institutional controls
3. Capping
4. Excavation and removal of CWM

The recommended alternative for the three identified areas of concern at Dunn Field was Alternative 4, excavation and removal of CWM.

1.4.13 CWM Removal Action

UXB International, under contract with USAESCH conducted remedial measures from mid-2000 to mid-2001 at Sites 1, 24-A, and 24-B to reduce or eliminate the potential CWM risk posed by these wastes. The CWM remedial actions at these sites are documented in the *Final Chemical Warfare Materiel Investigation/Removal Action Report*, dated December 2001, prepared by UXB International, Inc. The conclusions from this report are as follows:

- Site 1 - This site was suspected of containing CAIS containing small quantities of diluted agent. Historical documents suggested the CAIS might have been placed in PIGS (metal containment vessels exclusively used for CWM). Beginning in May 2000, The entire target area was excavated, but neither CAIS nor PIGS were recovered. However, 24 jars labeled as "HS" (sulfur mustard) were recovered, but they were tested to be free of CWM. No CWM or CWM contaminated soil was found within the investigation area of Site 1. In August 2000, the removal action was complete at Site 1.
- Site 24-A -This site is the confirmed burial location for 29 bomb casings that were used to transport mustard agent from Germany to the U.S. after World War II. The bomb casings were buried at this location after being drained into a neutralization pit. Beginning in August 2000, all 29 bomb casings were recovered at this site. No mustard or other CWM was discovered at this site, however, 900 cubic yards of soil contaminated with mustard degradation by-products were transported and disposed offsite. In November 2000, the removal action was complete at this site
- Site 24-B -This site is the confirmed location of the neutralization pit for the contents of the 29 bomb casings. Beginning in November 2000, 19 cubic yards of mustard contaminated soil and 14 cubic yards of soil contaminated with mustard degradation by-

products were transported and disposed offsite. In March 2001, the removal action was complete at this site.

Tables

TABLE 1-1
Dunn Field Area Descriptions
Rev 0 Memphis Depot Dunn Field RI

	Name	Environmental Media Addressed	Anticipated Land Use	Description
1	Northeast Open Area	Surface and Subsurface Soil, Sediment, Surface Water	*The Memphis Depot Redevelopment Plan* (The Pathfinders et al , 1997) identified this area as future public open space for recreational purposes	Approximately 20 acres of land located in the northeast quadrant of Dunn Field This area is mostly grass covered, interspersed with lightly wooded areas, that contains Areas G and H identified in the OU1 FSP Addendum, as well as Site 21 (XXCC-3 Burial Site), Site 50 (Dunn Field Northeast Quadrant Drainage Ditch), and Site 60 (Pistol Range Impact Area and Bullet Stop) A former incinerator, which was located south of the former pistol range, was detected in the review of the 1957 and 1958 aerial photographs
2	Disposal Area	Surface and Subsurface Soil, Sediment, Surface Water	The anticipated land use within this area is light industrial (The Pathfinders et al , 1997)	Approximately 14 acres of open land located in the northwest quadrant of Dunn Field This area corresponds to Areas A through F identified in the OU 1 FSP Addendum The past disposal methods within the Disposal Area were subsurface disposal of hazardous and non-hazardous materials, including CWM Site 1 (Mustard and Lewisite Training Set Burial Site) and 24-A (Former Bomb Casing Burial Site)
3	Stockpile Area	Surface and Subsurface Soil	As with the Disposal Area, the anticipated land use within this area is light industrial (The Pathfinders et al , 1997)	Approximately 30 acres of open land located in the southeastern and southwestern portions of Dunn Field, contained aboveground bauxite and fluorspar storage areas Sites 62, 63, and 64 Past practices in this area were generally aboveground storage of mineral ores and other materials Site 24-B, which is the chlorinated lime slurry pit used for the neutralization of the contents of the bomb casings buried in Site 24-A, is located in the southwestern corner of Dunn Field The Archives Search Report (USACE, January 1995) states that a former flamethrower test area is located on the eastern half of Dunn Field in the northern portion of the Stockpile Area, and burial trench with 86,100 pounds of CC-2 (impregnite) in the southwest quadrant of Dunn Field

Note Groundwater data from the onsite (beneath the 3 areas referenced above) and offsite groundwater wells are also presented and discussed in this RI report.

TABLE 1-2
List of Dunn Field (OU 1) Sites
Rev 1 Memphis Depot Dunn Field RI

INSTALLATION RESTORATION SITES NUMBER	DSERTS SITE NUMBER(a)	PRIORITY LEVEL(b)	SITE TYPE	SITE DESCRIPTION
Northeast Open Area				
19	19	C	SS	Former Tear Gas Canister Burn Site
20	20	C	SS	Probable Asphalt Burial Site
21	21	C	SS	XXCC-3 Impregnite Burial Site (300,000 Pounds)
50	50	C	SS	Dunn Field Northeastern Quadrant Drainage Ditch
60	60	C	SS	Pistol Range Impact Area/Bullet Stop
62	62	C	SS	Bauxite Storage
85	85	C	RI	Old Pistol Range Building 1184/Temporary Pesticide Storage
Disposal Area				
1	1	Remediated	CWM	Mustard and Lewisite Training Sets Burial Site (1955)
2	2	C	RI	Ammonia Hydroxide (7 Pounds) and Acetic Acid (1-Gallon) Burial Site (1955)
3	3	B	RI	Mixed Chemical Burial Site (Orthotoluidine Dihydrochloride) (1955)
4	4	A	RI	POL Burial Site (13, 55-Gallon Drums of Oil, Grease and Paint)
4 1	90	A	RI	POL Burial Site (32, 55-Gallon Drums of Oil, Grease and Thinner)
5	5	C	RI	Methyl Bromide Burial Site A (3 Cubic Feet) (1955)
6	6	C	RI	40,037 Units of Eye Ointment Burial Site (1955)
7	7	A	RI	Nitric Acid Burial Site (1,700 Quart Bottles) (1954)
8	8	A	RI	Methyl Bromide Burial Site B (3,768 1-gallon cans) (1954)
9	9	C	RI	Ashes and Metal Burial Site (Burning Pit Refuse) (1955)
10	10	B	RI	Solid Waste Burial Site (Near MW-10) (Metal, Glass, Trash, etc)
11	11	B	RI	Trichloroacetic Acid Burial Site (1,433, 1-ounce Bottles) (1965)
12 & 12 1	12	B	RI	Sulfuric Acid and Hydrochloric Acid Burial (1967)
13	13	A	RI	Mixed Chemical Burial (Acid, 900 Pounds, Unnamed Solids, 8,100 Pounds)
14	14	C	RI	Municipal Waste Burial Site B (Near MW-12) (Food, Paper Products)
15	15	B	RI	Sodium Burial Sites (1968)
15 1	91	B	RI	Sodium Phosphate Burial (1968)
15 2	92	B	RI	14 Burial Pits Na2PO4, Sodium, Acid, Medical Supplies, and Chlorinated Lime
16	16	B	RI	Unknown Acid Burial Site (1969)
16 1	93	B	RI	Acid Burial Site
17	17	B	RI	Mixed Chemical Burial Site C (1969)
18	18	C	Proposed NFA	Plane Crash Residue
22	22	C	Proposed NFA	Hardware Burial Site (Nuts and Bolts)
23	23	C	Proposed NFA	Construction Debris and Food Burial Site
24-A	24	Remediated	CWM	Bomb Casing Burial Site (29 Bomb Casings used to Transport Mustard Agent)
61	61	C	SS	Buried Drain Pipe
63	63	C	Proposed NFA	Fluorspar Storage
64	64	C	Proposed NFA	Bauxite Storage (1942 to 1972)
86	86	C	RI	Food Supplies
Stockpile Area				
24-B	24	Remediated	CWM	Neutralization Pit for the Contents of the 29 Bomb Casing used to Transport Mustard Agent
62	62	C	SS	Bauxite Storage
63	63	C	Proposed NFA	Fluorspar Storage
64	64	C	SS	Bauxite Storage (1942 to 1972)
--	--	B	--	CC-2 Impregnite Burial Site (86,100 Pounds in 1947)

Notes

SS	Screening Site
RI	Remedial Investigation
NFA	No Further Action
CWM	Chemical Warfare Material
Na2PO4	Sodium Phosphate
POL	Petroleum Oil and Lubricants
XXCC-3/CC 2	Stabilized/Unstabilized Impregnite for Impregnating Clothing Used to Protect Personnel against the Action of Vesicant-Type Chemical Agents

(a) Defense Site Environmental Restoration Tracking System (DoD Database)

(b) Priority levels were established for Installation Restoration Sites Number/DSERT Site Number Areas where remedial action (RA) will be required with some investigatory effort to determine extent of area Levels are as follows A - Highest Priority B - Medium Priority C - Lowest Priority (no RA likely) Designation is based on described quantity of material, potential hazard to human health and the environment and form of material (solid or liquid)

Figures

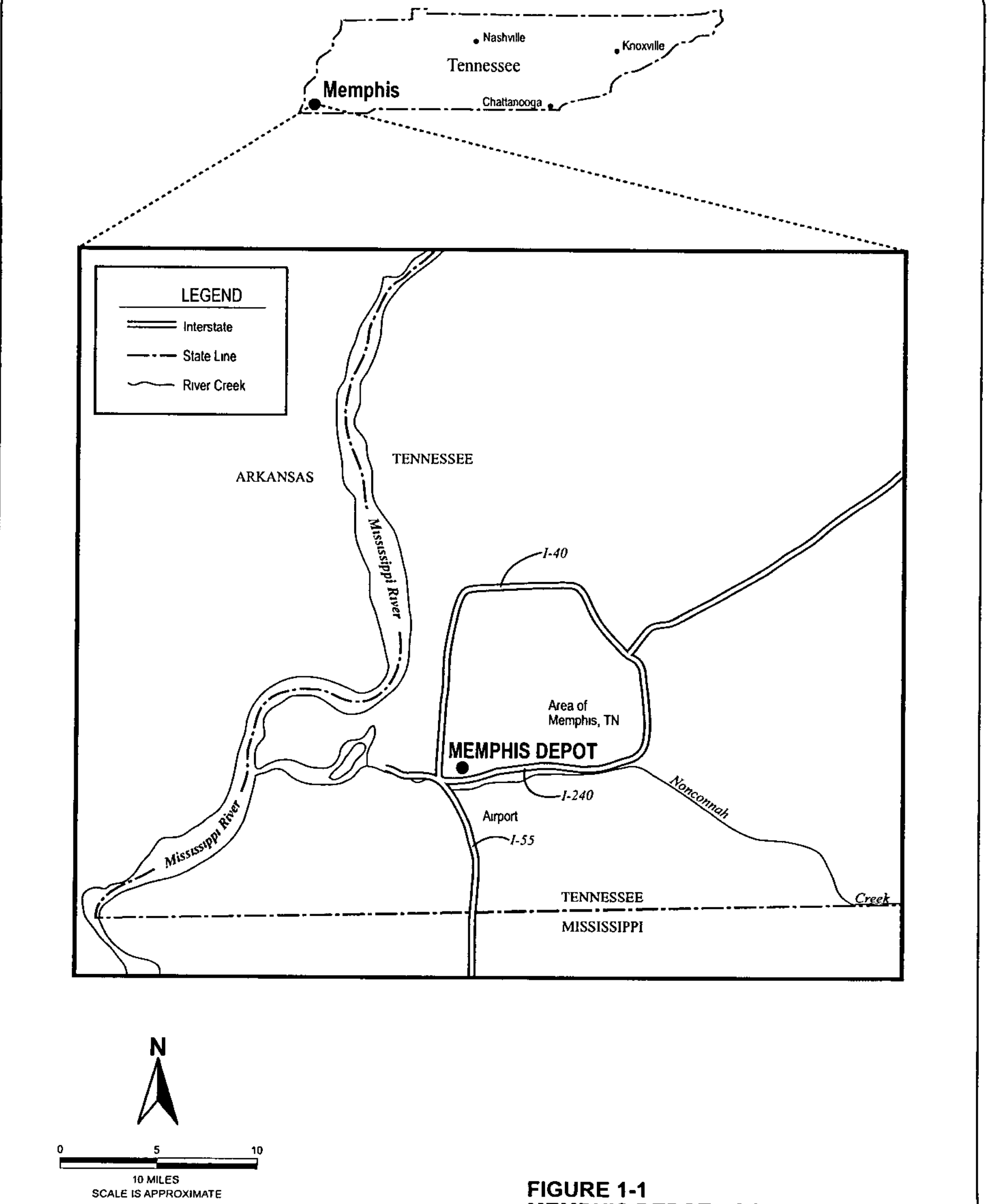

FIGURE 1-1
MEMPHIS DEPOT LOCATION IN THE MEMPHIS METROPOLITAN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

N

LEGEND

Site Boundary

0 500 1000 Feet

SCALE IS APPROXIMATE

FIGURE 1-2
MAJOR FEATURES OF
THE DEPOT (Aerial Photo Date: 1997)
Rev.0 MEMPHIS DEPOT DUNN FIELD RI

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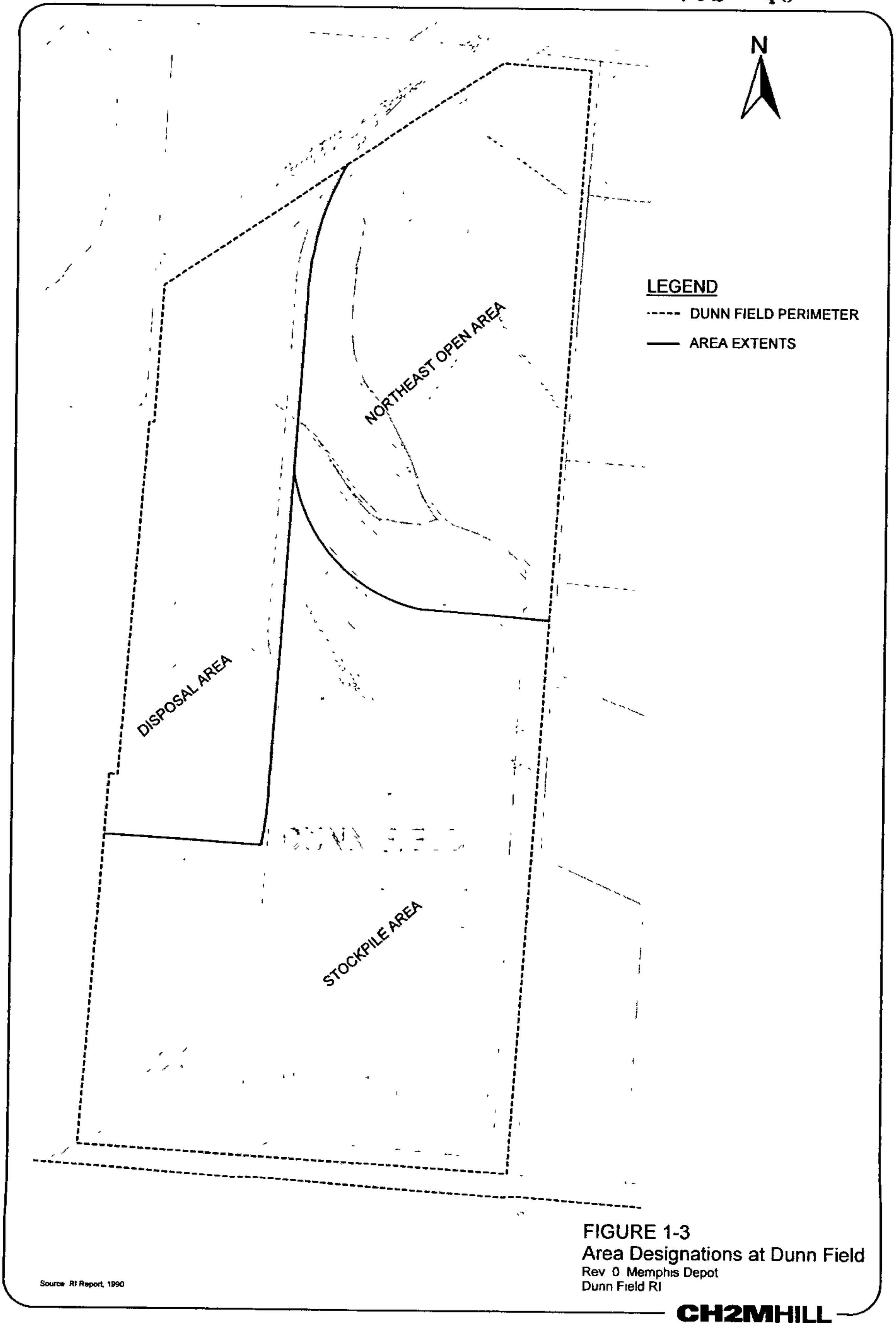

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Source RI Report, 1990

FIGURE 1-3
Area Designations at Dunn Field
Rev 0 Memphis Depot
Dunn Field RI

CH2MHILL

TAB

Section 2

2.0 Physical Characteristics of Dunn Field

This discussion on the environmental setting of Dunn Field provides an overview of the historical and current site conditions, regional climate, regional water bodies, geologic and hydrogeologic characteristics, soil types, and terrain, all of which may influence contaminated site media over time. Information presented herein is useful in identifying the potential for contaminant migration and attenuation. This information was also used to identify human and environmental (ecological) receptors; with a potential for exposure under current and future conditions due to potential migration of site contaminants.

Dunn Field surface features (natural and man-made) and their relationship to surrounding areas were investigated using:

- Onsite visual reconnaissance from 1995 to present;
- U.S. Army Corps of Engineers (USACE) Topographic Engineering Center (TEC) historical (comparative) aerial imagery;
- U.S. Geological Survey (USGS) 7.5-Minute Series Topographic Quadrangle maps; and
- Installation topographic maps prepared by the USACE, Mobile District, dated February 1989

Figure 2-1 presents Dunn Field and adjacent areas as displayed on USGS topographic map quadrangles. Currently, the only aboveground structures at Dunn Field include 11 well heads, control building, and meter/by-pass station associated with a groundwater extraction system, the abandoned pistol range building, and a high-tension power line corridor. The groundwater extraction system is present along the western side of Dunn Field, with the underground conveyance system extending along the western and northern boundaries of Dunn Field to the intersection of Preston Street and Hays Road. Groundwater extracted through this system is pumped to the City of Memphis sanitary sewer system for subsequent treatment at the City of Memphis Sewage Treatment Plant, there are no groundwater treatment operations at Dunn Field.

2.1 Climate and Meteorology

Information describing Dunn Field's meteorological conditions was obtained from various USGS reports and from the *Climatic Atlas of the United States* (NOAA, 1983).

Dunn Field is located in the West Tennessee Climatic Division of the United States (NOAA, 1983) This division experiences a typical continental type of climate with humid, warm summers and cold winters. The Memphis area receives an annual average of 50 inches of precipitation (30-year period of record). Total annual rainfall was reported to vary from 30 54 inches (1941) to 76.85 inches (1957). Normally, precipitation is heaviest during the winter and early spring. A second, less significant rainfall period develops as thundershowers during late spring and early summer. The one-year, 24-hour rainfall value for the Dunn Field area is reported to be 3 4 inches in the *Rainfall Frequency Atlas of the United States* (U S. Department of Commerce, 1961) Figure 2-2 provides the average and

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actual monthly precipitation measured at the Memphis International Airport since January 1996.

The net annual precipitation available for groundwater recharge, which is derived from gross annual precipitation less evaporation and runoff, is estimated for the Memphis area to be 9 inches, based on NOAA (1983) data. The estimate of net precipitation does not take into account evapotranspiration, which varies considerably according to season. The estimate was performed in a manner consistent with 40 CFR Part 300, Appendix A, during the 1990 RI (Law Environmental, 1990a).

2.2 Surface Water

The entire Depot is located on two quadrangles - the photorevised 1973 Southwest Memphis, Tennessee-Arkansas and the 1983 photorevised Southeast Memphis, Tennessee. Dunn Field lies entirely on the Southwest Memphis quadrangle, along the east-central boundary of the quadrangle. Dunn Field's surface elevations range from 316 ft National Geodetic Vertical Datum (NGVD) in the southwest quadrant of Dunn Field to 276 ft NGVD in the northeast quadrant. The southern half of the northeast quadrant is typically higher in elevation than the remainder of the site. The northeast corner of Dunn Field is dominated by a valley or swale that trends southeast to northwest. There are two smaller swales in the west-central portion and southwest portion of Dunn Field.

Surface water hydrological information provides an overview of the potential for contaminated media at or near the land surface within Dunn Field to reach ditches, streams, or other water bodies by processes of overland flow. There are no perennial flowing streams or creeks within the boundary of Dunn Field. Typically, surface drainage of Dunn Field occurs by overland flow via swales, ditches, concrete-lined channels, and a storm drainage system Where undisturbed surface soils are exposed, they are predominantly grassed, fine-grained, semi-cohesive materials. These areas may be more conducive to rapid runoff. Paved and built-up sections of Dunn Field may generate even larger amounts of runoff. Stormwater is directed into a series of storm drains that transport stormwater in pipes that discharge from various points around the Dunn Field perimeter. Stormwater runoff from the neighborhood east of Dunn Field drains to the concrete-lined ditches in the Northeast Open Area of Dunn Field, which then drain into Cane Creek. Figures 2-3a and 2-3b depict the Dunn Field and surrounding area surface drainage pattern.

Drainage channels in neighboring areas drain either to Cane Creek, northwest of Dunn Field, or to Nonconnah Creek, south of Dunn Field. Cane Creek drains to Nonconnah Creek at a point several miles southwest of Dunn Field. Nonconnah Creek empties into Lake McKellar (CH2M HILL, 1995c).

Dunn Field's surface elevations (276 to 316 ft NGVD) are well above the average Mississippi River alluvial valley flood levels (185 to 230 ft NGVD). Furthermore, the field's landmass is at least level with or slightly higher than surrounding offsite properties. The nearest 100-year floodplain is south of Dunn Field at Nonconnah Creek. Therefore, it is unlikely that Dunn Field would be subject to inundation, even for short periods of time (CH2M HILL, 1995c).

2.3 Geology

2.3.1 Regional Geology

2.3.1.1 Physiography

The Memphis area is located on the boundary of two major subdivisions of the Atlantic Coastal Plain physiographic province The geologic formations present at the surface and major physiographic provinces in the Memphis area are shown on Figure 2-4. The western Memphis urban area lies within the Mississippi Alluvial Plain subdivision, which is characterized by fluvial depositional features including geologically youthful, recently deposited point bars, natural levees, and abandoned channels.

Dunn Field and eastern Memphis are situated within the Gulf Coastal Plain subdivision. This area, characterized by dissected loess-covered uplands, generally lacks distinct features. The erosion-controlled land surface appears nearly level to markedly rolling, and the visual perspective offers little spatial variation. Local slopes range from level to approximately 10 percent Dunn Field elevations average 300 feet NGVD. Locally, relief is attributed to erosion or stream channel development and seldom exceeds 30 feet.

Generally, Gulf Coastal Plain drainage systems are well developed, and the region is classified as being in a late youthful stage of dissection. Uplands tend to be low with respect to major streams, and valleys are relatively shallow. Most principal streams have low gradients and occupy broad alluviated and terraced valleys (e g., Nonconnah Creek). Secondary streams have developed narrow V-shaped valleys in fine-grained soils.

2.3.1.2 Geologic Setting

The Memphis area is geologically situated within a major structural feature termed the "Mississippi Embayment " This area is described as a youthful to mature, belted coastal plain. The principal river in the area is the Mississippi River; the major tributaries are the Wolf River, the Loosachatchie River, and Nonconnah Creek, according to Graham and Parks (1986)

The Mississippi Embayment is a structural reentrant extending into the North American craton from the Gulf of Mexico north to Cairo, Illinois. The embayment is a wedge-shaped, down-warped structure composed of stratified sediments and begins inland as a thin accumulation of clastic materials, thickening substantially at the Gulf of Mexico. Late and post-Cretaceous strata fill the trough. Formation of the Mississippi Embayment began at the end of the Mesozoic era with the onset of renewed subsidence of the underlying Reelfoot rift. The axis of the trough (N50°E) roughly parallels the current course of the Mississippi River.

Cyclic Pleistocene glaciation has been directly or indirectly responsible for the origin, character, and distribution of virtually all of the Quaternary deposits and formations in the Mississippi Embayment. Although continental ice sheets did not actually extend into the Lower Mississippi Valley area, they were responsible for reworking preglacial drainage and creating the southward-trending river and valley, which subsequently carried large volumes of glacial meltwater and outwash Equally important controls were exerted by cyclic glaciation in the form of major changes in base levels of erosion and deposition and the form of climatic changes (Saucier, 1974)

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The New Madrid seismic zone is located at the northern end of the Mississippi Embayment and is the most seismically active area in the central and eastern United States. At least two great earthquakes occurred in this area in 1811 and 1812, and more than 2,500 microearthquakes have been recorded since 1974. Johnston and Nava (1985) have estimated a recurrence interval for great earthquakes in the Memphis area to be 425 to 675 years, with a recurrence interval of 70 years for moderate earthquakes.

2.3.1.3 Geologic Units

Recent work by Kingsbury and Parks (1993) and Parks and Carmichael (1988) provides insight into the geologic and hydrogeologic setting associated with the Dunn Field. Table 2-1 summarizes regionally important post-Cretaceous geologic units and their hydrogeologic significance Figure 2-5 shows a general geologic cross section of the Memphis area from Parks (1990). The geologically youngest strata in the Memphis area (from the Quaternary and Tertiary periods) are composed of loosely consolidated deposits of marine, fluvial, fluvioglacial, and deltaic sediments. In Tennessee, unconsolidated sediments (Cretaceous through Quaternary) reach their maximum thickness at Memphis, where they range from 2,700 to 3,000 feet.

Several locally significant geologic units are underlying or near Dunn Field. These formations are: Alluvium, Loess, Fluvial (Terrace) Deposits, Jackson Formation/Upper Claiborne Group, Memphis Sand, Flour Island Formation, Fort Pillow Formation, and Old Breastworks Formation. Those formations significant to the Memphis Depot area are described in the following paragraphs.

The Memphis Depot area is commonly underlain by Quaternary-age loess, which comprises the uppermost soil horizon where it is undisturbed or not backfilled with other materials Loess is typically a semi-cohesive eolian deposit composed of silt, silty clay, silty fine sand, and mixtures thereof. Loess mantles the ground surface over wide areas of the central United States and usually occurs above fluvial (terrace) deposits Within the central U.S., the loess deposits along bluffs overlooking the Mississippi Alluvial Plain are the thickest. Maximum thickness is reported to be about 65 feet; this unit thins considerably toward the east. Locally, the loess may contain thin, discontinuous, fine sandy layers enclosed within silts and silty clays

Underlying the loess are Quaternary- and possibly Pliocene-age fluvial deposits that occur beneath uplands and valley slopes of the Gulf Coastal Plain and are remnants of ancient alluvial deposits of either present day streams or an ancient drainage system. Fluvial deposits in the greater Memphis area consist primarily of sand and gravel with minor lenses of clay and thin layers of iron oxide cemented sandstone or conglomerate. These fluvial deposits range from zero to over 100 feet in thickness. Formation thickness is highly variable because of erosion surfaces at both top and base According to Graham and Parks (1986), fluvial deposits may be locally absent. However, these deposits represent the upper aquifer at Dunn Field, hereafter referred to as the "fluvial aquifer."

The Late Eocene Jackson Formation and upper part of the Claiborne Group lie beneath the fluvial (terrace) deposits. The upper Claiborne consists of the Jackson, Cockfield, and Cook Mountain Formations. According to Kingsbury and Parks (1993), the Jackson and the Cockfield Formations cannot be reliably subdivided because of lithologic similarities in the subsurface of the Memphis area The thickness of the Jackson Formation varies within literature describing the formation Kingsbury and Parks (1993) report a range of zero to 50 feet, while Parks and Carmichael (1988) report a thickness ranging from zero to 150 feet Where the Jackson Formation is present, the Cockfield may be from 235 to 270 feet in thickness. In other places, extensive erosion has caused the thickness to be highly variable. In most areas of the Memphis Depot, clay layers within the Jackson or Cockfield Formation constitute the base of the unconfined fluvial aquifer, however, there are areas where these clay layers are absent.

In most of Memphis, the Cockfield Formation consists of sand, silt, clay, and lignite, and is considered part of the upper confining unit for the Memphis aquifer. In some areas, the Cockfield Formation contains sands that comprise the Cockfield aquifer. (Kingsbury and Parks, 1993). The Cockfield Formation is typically composed of clay and silt in the upper part and sand in the lower part, although locally this may be reversed (Parks and Carmichael, 1988). Lignite beds, up to 10 feet in thickness, occur in the clays, silts, and sands. The base of the Cockfield Formation is faulted and dips to the west at a rate of 10 to 40 feet per mile. The Cockfield aquifer normally is confined, but locally may contain water that is unconfined (Parks and Carmichael, 1988). The Cockfield aquifer provides water for some public and industrial uses.

The Cook Mountain Formation is the lower confining unit to the Cockfield and generally consists of clay, silt, and sand. Kingsbury and Parks (1993) report a thickness range of zero to 50 feet in the Memphis area, while Parks and Carmichael (1988) report a thickness ranging from zero to 150 feet over the west Tennessee area. The Cook Mountain, Cockfield, and Jackson Formation sequence serves as the upper confining unit to the Memphis aquifer.

According to Kingsbury and Parks (1993), fine to very coarse sand, with lenses of clay, silt, and lignite comprising the Memphis Sand were deposited during the Early and Middle Eocene time when streams carried extensive quantities of sand and gravel into the Mississippi Embayment area. The Memphis Sand is composed primarily of thick-bedded, white to brown or gray, very fine-grained to gravelly, partly argillaceous and micaceous sand Lignitic clay beds constitute only a small percentage of total thickness. The Memphis aquifer comprises the Memphis Sand. The Memphis Sand ranges from 500 to 890 feet in thickness, and the depth to the top of the Memphis aquifer in the area ranges from approximately 120 feet to 300 feet bgs. It is thinnest in the northeastern part of the Memphis area in northwestern Fayette County, Tennessee, and thickest near the Mississippi River in southwestern Shelby County, Tennessee, (Nyman, 1985). The City of Memphis obtains its drinking water from this aquifer. The base of the Memphis aquifer dips to the west at a rate of 20 to 50 feet per mile.

Graham and Parks (1986) present several lines of evidence to suggest that the Jackson Formation/Upper Claiborne Group is not laterally continuous throughout the Memphis area In some areas, the Memphis Sand is directly overlain by the alluvial or fluvial deposits, permitting downward vertical leakage from shallow water-bearing zones into the regional Memphis aquifer.

Cross-sections, based on discovery wells located near the Memphis Depot, presented by Kingsbury and Parks (1993) provide information about the regional geology of the Memphis area. The cross-sections include lithologic logs from discovery wells Sh J-104, which is less than 2 miles due west of Dunn Field and Sh:J-167, which is about 2 miles southwest of the southwest corner of Dunn Field (Figure 2-6) The lithologic log for well Sh:J-104 shows an approximately 75-foot thickness of loess and fluvial deposits, underlain by a 40-foot thickness of the Cockfield Formation. The Cook Mountain Formation is approximately 75 feet thick in this well and is underlain by the Memphis aquifer at elevation 46 feet above mean sea level (msl). The Memphis aquifer is several hundred feet thick at this well location. The lithologic logs for Sh·J-167 show an approximate 100-foot thickness of loess and fluvial deposits followed by approximately 70 feet of the confining Cook Mountain Formation; the Memphis aquifer begins below the confining Cook Mountain Formation at an elevation 85 feet above msl The Cockfield Formation was not found in this boring.

2.3.2 Dunn Field Geology

This section focuses on the stratigraphy and geology at Dunn Field, based on lithologic logs from soil borings drilled within and adjacent to Dunn Field. The geology was investigated by reviewing published geologic information, previous work (Law Environmental, 1990a), and results of field investigations performed by CH2M HILL in the winter of 1996, fall of 1998, spring and summer of 1999, and fall and winter of 2000.

Stratigraphic definitions used in this report are based on local interpretations of stratigraphy and may not exactly correspond to definitions published in previous reports for the Memphis Region.

The four uppermost stratigraphic units underlying Dunn Field are (in descending order):

- loess, including surface soil;
- fluvial deposits;
- Jackson Formation/Upper Claiborne Group (the Jackson [if present], Cockfield, and Cook Mountain Formations); and
- Memphis Sand.

Each of the units is further discussed in the following sections. Figure 2-7 presents a reference and summary of the lithologies associated with the deepest monitoring wells and soil borings at the Memphis Depot

2.3.2.1 Loess

The uppermost geologic unit at or near ground surface at Dunn Field is loess deposits, consisting of brown to reddish brown low-plasticity clayey silt (ML) or low-plasticity silty clay (CL). Portions of the loess may also be described as fine sandy clayey silt. Based on data from the monitoring well installation effort, the loess is continuous throughout the entire Memphis Depot area. The loess deposits range from 10 feet thick at MW-55 (southwest of Dunn Field) to 36 feet thick at MW-74 (western boundary of Dunn Field) and are on average about 20 to 30 feet thick The silts and clays that comprise the loess deposits are shown in Figures 2-8a through 2-8m. Figure 2-8a, which depicts a west-east oriented cross-section across the northern portion of Dunn Field, shows that the loess deposits are on average 28 feet thick from east to west across Dunn Field. The loess thickens slightly to 32 feet west of Dunn Field in the area of MW-76 before thinning to 17 feet at MW-44; these wells are located 1,550 feet west and 2,100 feet northwest of Dunn Field, respectively.

Figure 2-8b presents a southwest to northeast oriented cross-section of the southern portion of Dunn Field. In this view, the loess deposits are consistently 28 feet thick across Dunn Field However, the loess deposits thin to approximately 16 feet at MW-58 along the southwestern boundary of the site. The loess thickness increases though to approximately 30 feet about 165 feet southwest of this point at MW-56. Further southwest and on to the MI, the loess deposits are thin to approximately 10 feet at MW-55 but are 30 feet thick at MW-19, which is located about 1,425 feet southwest of the Dunn Field boundary.

To the west of Dunn Field, the loess deposits are on average approximately 20 feet thick (see Figure 2-8l). In comparison to the thickness measurements along the eastern boundary of Dunn Field, the loess appears to thin towards the west, however, there are variations in thickness throughout the unit and the loess can be found to be thicker than 28 feet west of Dunn Field.

2.3.2.2 Fluvial Deposits

Fluvial deposits underlie the loess and were encountered at all drilling locations on and around Dunn Field. The fluvial deposits are commonly underlain by a thick clay unit of the Jackson Formation/Upper Claiborne Group. The unit is composed of two generalized layers that can be identified throughout the subsurface of the Dunn Field area (as shown in Figures 2-8a through 2-8m):

- Reddish brown silty sandy clay to a clayey sand; and
- Yellow brown, orange brown, and red, poorly to well graded (less than 5 percent silt or clay), fine- to coarse-grained sand and orange brown gravelly sand to sandy gravel.

The upper layer is a silty, sandy clay that transitions to a clayey sand deposit. This layer represents a transition zone between silt-dominated loess and sand and gravel of the fluvial aquifer. Within the Dunn Field boundaries, this layer ranges from about 3 feet thick at MW-56 (southwest corner of Dunn Field) to 20 feet thick at MW-58 (southwest corner of Dunn Field).

Underlying this upper layer is a second unit composed of layers of sand, sandy gravel, and gravelly sand The sand layers generally have a bright orange to dark red coloration and range from poorly graded to well graded, fine- to coarse-grained, and very well sorted to poorly sorted quartz grains. The unit trends downwards to layers that are poorly graded and are tan to brownish yellow. Overall, the sand layers show a coarsening downwards into a gravelly sand, with chert being the primary gravel constituent Gravel sizes range from small pebbles (1/2 inch) up to gravel at an average diameter of 4 inches. Interbedded within the sandy lithologies are clay layers that range from thin laminations to thick discrete interbeds ranging from one inch to one foot. According to Selley (1982), the coarsening downward sequences and lateral facies changes over short distances are indicative of fluvial deposits.

This second unit has an average thickness of approximately 40 feet underneath Dunn Field and along the eastern and western boundaries, as shown on Figures 2-8a, 2-8b, and 2-8e. As shown on Figure 2-8c, east of Dunn Field the second sand unit at MW-53 is approximately 44 feet thick. This reduces to approximately 28 feet at MW-51, which is located offsite at the northern end of Dunn Field. West of Dunn Field, the thickness of the second sand unit varies widely, ranging from 36 feet at MW-41 to over 73 feet at MW-40. Based on Figure 2-8f, the sand unit at MW-40 is thicker because it appears to be part of an erosional trough.

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As described above, the fluvial deposits are commonly underlain by a thick clay of the Jackson Formation/Upper Claiborne Group. This unit is described within this report as a clay confining unit. However, as shown in Figures 2-8e, 2-8g, 2-8h, 2-8i, 2-8j, 2-8k, and 2-8l, the clay is not present and the second sand unit is underlain by another sand layer that is reportedly part of the Jackson Formation/Upper Claiborne Group.

Most samples collected for mechanical testing were taken from within the fluvial deposits. Geotechnical analysis confirmed the primary field classification as poorly sorted sands and gravels (SP). Grain size analysis of sands and gravels sampled near the base of the fluvial sand (about 5 feet above the Jackson Formation/Upper Claiborne clay confining unit) underlying Dunn Field, indicated that average gravel, sand, and silt/clay fractions were 15 percent, 79 percent, and 6 percent, respectively (CH2M HILL, 1997a). Sieve analysis data collected during the 2000 field investigation showed a strong correlation with this data. The average gravel, sand, and silt/clay fractions were 13 percent, 84 percent, and 3 percent, respectively.

2.3.2.3 Jackson Formation/Upper Claiborne Group

The Jackson Formation/Upper Claiborne Group was encountered at most of the monitoring well and soil boring locations at Dunn Field. Within the uppermost zone of this Group, a clay unit was encountered directly below the fluvial deposits at most locations. Regionally, much of this uppermost unit (also known as a confining unit) is represented by a distinct stiff, gray, low- to high-plasticity lignitic clay separating shallow water-bearing zones from underlying major aquifers (Nyman, 1985) Locally, the clay unit mimics the regional characteristics and is represented by an orange to gray coloration. Clayey soils interpreted as part of the Jackson Formation/Upper Claiborne Group were penetrated underneath the Dunn Field area in soil borings, STB-6 and -7, and monitoring wells, MW-36, -37, and -67. Where present, the maximum known thickness of this confining unit was 92 feet in MW-36.

The upper clay unit of the Jackson Formation/Upper Claiborne Group is, based on boring log data, continuous underneath the Dunn Field boundary except for a gap that appears between monitoring wells MW-56 and MW-34 (and extends to the south, into the MI) at the southwestern boundary of Dunn Field Offsite there are gaps in the clay the west (at MW-43) and northwest (at MW-40) of Dunn Field. These gaps are windows down to the upper part Jackson Formation/Upper Claiborne Group or the intermediate aquifer underlying the fluvial deposits.

The intermediate aquifer, which is an informal reference used in thtis report to signify the uppermost aquifer beneath the fluvial deposits, is located within the Jackson Formation/Upper Claiborne Group or the Cockfield Formation and possibly in the upper part of the Memphis Sand Although observed to be confined by the uppermost clay in the Jackson Formation/Upper Claiborne Group, the aquifer also has been observed to be locally unconfined and in contact with the fluvial aquifer

This absence of the clay confining unit may be attributable to post-Eocene erosion of the clay surface Kingsbury and Parks (1993, p. 6) indicate that local relief in the erosional surface comprising the base of the Tertiary Memphis Sand varies from 50 to 80 ft A 100-ft variation in the clay surface at the Depot (Figure 2-9) may be too extreme for erosional processes in the post-Eocene fluvial environment and, with limited data, this comparison is speculative Kingsbury and Parks (1993) also state that a similar orientation of areas where the clay confining unit is absent and other depressed clay features suggest erosional anomalies that could be fault-controlled. Normal faults in the Memphis area with vertical displacements range from 50 to 150 ft. Other possibilities for this absence include a depositional break.

2.3.2.4 Memphis Sand

Local stratigraphic data from the Allen Well Field, located approximately 1 to 2 miles west of Dunn Field, were evaluated to characterize the stratigraphy of the Memphis Sand (Kingsbury and Parks, 1993). At well Sh:J-104, the top of the Memphis Sand is at an elevation 46 feet msl. MW-67 is the only monitoring well completed in the Memphis Sand associated with Dunn Field. Soil boring logs indicate approximately 80 feet of alternating silt and clay layers from 21 to 101 feet msl Below the alternating silt and clay layers, a fine to medium grained, gray, sand occurs to the borehole termination depth of 0 5 feet msl. The screened interval of MW-67 ranges from 3 2 to 18.2 ft msl.

2.4 Soils

According to the *Soil Survey for Shelby County, Tennessee* (USDA, 1970), four distinct surface soil units have been mapped at Dunn Field. The distribution of these units relative to the installation is illustrated in Figure 2-10. A brief description of each unit follows:

- **Falaya Silt Loam (Fm).** This soil unit may have originally developed as a narrow strip of alluvium occupying a bench above a stream channel The unit has been mapped on a small portion of northern Dunn Field. The Falaya Silt Loam is generally described as a silt loam, with poor-to-moderate drainage, and possessing a shallow water table and typically low-to-moderate permeabilities.
- **Graded Land (Gr).** This soil unit has been artificially developed from silty native upland materials as a result of numerous land use changes throughout the installation's operational history. The unit generally consists of silty sandy clay or clayey sandy silt, and permeability is reported to be highly variable. It is significant to this study because it occupies more than 90 percent of Dunn Field's land area.
- **Memphis Silt Loam (MeB).** This unit has developed in silty native upland materials on low hilltops, benches, and adjacent gradual slopes. The unit is described as a silt loam or silty clay loam. The Memphis Loam is well drained and possesses low-to-moderate permeabilities. This unit is located in north Dunn Field.
- **Memphis Silt Loam (MeD_2).** This unit has developed in silty native upland material on intermediate slopes and benches and is described as a silt loam or a silty clay loam. The Memphis Silt Loam is deep and well drained, and possesses low-to-moderate permeabilities This unit is located in north Dunn Field.

Table 2-2 summarizes the engineering use data for each soil unit mapped in the Dunn Field area. USDA texture, Unified Soil Classification System (USCS) symbols, estimated permeability, and likely use constraints are described for each of the five soil units.

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2.5 Hydrogeology

2.5.1 Regional Hydrogeology

Information describing the groundwater conditions and resources of Shelby County was obtained from Wells (1933), Moore (1965), Terry et al. (1979), Graham and Parks (1986), and Kingsbury and Parks (1993). Information about fluvial aquifer water quality was derived from McMaster and Parks (1988).

2.5.1.1 Hydrogeologic Setting

The region's hydrogeologic setting consists of a series of thick, generally unconsolidated sedimentary units deposited in a broad trough or syncline (Mississippi Embayment). The trough's greatest depth is defined by its axis, which extends N50°E in an alignment generally following that of the Mississippi River. The trough dips southward along its axis. Large-scale sedimentary units deposited within this structural feature tend to thicken from east to west where they reach their greatest accumulation, at the axis, and tilt gently southward, following the trough's orientation.

Individual sedimentary sequences have been deposited in the trough, roughly following its physical orientation. The most permeable of these units are identified as aquifers and the least permeable are termed "confining units."

2.5.1.2 Principal Aquifers

The Memphis area is located within a region that includes several aquifers of local and regional importance These aquifers are identified in descending order from ground surface to the Memphis Sand:

- Alluvial and fluvial aquifers
- Intermediate aquifer
- Memphis aquifer

These aquifers correspond to the geologic units described previously. The alluvial aquifer's distribution is limited to the channels of primary streams; therefore, it does not occur at Dunn Field. The fluvial, intermediate, and Memphis Sand aquifers underlie the Dunn Field area and are discussed in following subsections.

2.5.2 Dunn Field Hydrogeology

Site-specific hydrogeologic conditions were investigated using physical inspection, test borings, groundwater quality data, monitoring well installation, and direct measurement of in-situ hydraulic properties (Law Environmental, 1990a). Figure 2-11 depicts the groundwater monitoring well locations across Dunn Field.

2.5.2.1 Fluvial Aquifer

The uppermost aquifer at Dunn Field is the unconfined fluvial aquifer, consisting of saturated sands and gravelly sands in the lower portion of the fluvial deposits. Recharge to this unit is primarily from the infiltration of rainfall (Graham and Parks, 1986) Discharge from the fluvial aquifer is generally directed toward underlying units in hydraulic communication with the fluvial deposits, or laterally into adjacent stream channels. The fluvial aquifer provides water for domestic and farm wells in rural areas (Kingsbury and Parks, 1993), but is not used as a drinking water source within the City of Memphis, including the area surrounding the Depot.

The low-permeability uppermost clay of the Jackson Formation/Upper Claiborne Group serves as the base of the fluvial aquifer at most locations. During the field work for this RI, six Shelby tube samples were collected from the top of the uppermost clay confining unit and were analyzed for triaxial permeability These samples indicated the clay has very low permeability, with maximum, minimum, and average hydraulic conductivities of 2.5x10^{-7}, 1.2x10^{-8}, and 6.4x10^{-8} cm/sec, respectively. Therefore, the uppermost clay in the Jackson Formation/Upper Claiborne Group, where present, constitutes a hydraulic barrier to downward migration of groundwater in the overlying fluvial aquifer.

Continuous core obtained from wells drilled using the rotasonic method indicate perched groundwater also exists in the vadose zone of the fluvial aquifer deposits usually above small clay lenses or laminae. However, these perched water zones are isolated, are probably ephemeral , and are not considered part of the regional water table of the fluvial aquifer.

Saturated thickness of the fluvial aquifer is variable across Dunn Field and is controlled by the configuration of the uppermost clay in the Jackson Formation/Upper Claiborne Group. Maximum saturated thickness ranges between 10 and 20 feet above the clay surface in Dunn Field. Groundwater flow directions within the unconfined fluvial aquifer are depicted on Figure 2-12A, based on measurements taken in November 2001. In general, the fluvial aquifer flows in a western direction, which follows the contours of the uppermost clay confining unit in the Jackson Formation/Upper Claiborne Group.

The configuration of the clay confining unit, and resultant potentiometric surface presented in this report, has changed from that previously published (CH2M HILL, 1997a) due to data obtained through the installation of MW-67, a 275 ft deep monitoring well set into the top of the Memphis Sand, as well as soil boring STB-14. During the drilling of these borings, the clay confining unit was encountered at higher elevations and, therefore, does not show a "depressed" potentiometric surface in this area, as previously reported. The generally western direction of groundwater flow across Dunn Field has not changed from that previously reported. However, cross-sections (Figures 2-8j and 2-8l) suggest the clay confining unit, in vicinity of MW-43 to STB-14 to MW-55, ending around MW-34 (west to east), creates a groundwater limited-flow boundary or area of "no significant saturated thickness" (NSST) (Figure 2-12A). An area of NSST is defined as an area where the surface of the upper clay confining unit intersects and exceeds the surface of the fluvial aquifer. These conditions "pinch out" the fluvial aquifer and create unsaturated conditions above the clay confining unit. Monitoring wells 41, 55 and 56 are located on the northern side of the NSST boundary and have fluvial aquifer thickness' of 1 39, 2.12, and 2.62 feet, respectively, as measured on January 10, 2001. In areas where the fluvial aquifer is thin (<1 feet), the hydraulic head cannot sustain a measurable water table if a steep top-of-clay gradient occurs. Like the NSST zones, fluvial deposits in the vicinity of MW-34, MW-40, and MW-43 are not saturated. In these areas, soil borings have confirmed the absence of a clay unit directly below the fluvial deposits, this absence allows recharge water to vertically percolate into the lower aquifer(s). Where the fluvial aquifer is present, the potentiometric surface surrounding MW-34, MW-40 and MW-43 indicates groundwater flow directed toward these

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areas. However, localized NSST zones around these areas where the upper confining clay is present likely impedes groundwater flow into lower aquifers

Prior to groundwater extraction, groundwater levels within the fluvial aquifer were generally observed to fluctuate over an elevation change of approximately one foot or, on average, 28 percent of the saturated thickness of the fluvial aquifer. These groundwater level fluctuations in the fluvial aquifer beneath Dunn Field were attributed to seasonal variations. However, based on depth to water measurements, water level elevations onsite and offsite have since decreased an average of 3.47 feet within the fluvial aquifer. The reduction in the saturated thickness of the fluvial aquifer may be attributable to the extraction of groundwater from the fluvial aquifer since 1998 as well as a reduction of the annual rainfall for the years of 1999 and 2000 For the most part, the degree of groundwater thickness reduction does not appear to have changed the general flow directions across Dunn Field, except in the areas near the groundwater recovery wells.

Area groundwater and surface water levels were compared to evaluate the possibility of groundwater discharge to surface waters at or near the Depot. Based on a generalized hydrogeologic cross section, groundwater elevations fall well below local stream base elevations in the vicinity of the Depot, therefore, the fluvial deposits do not appear to contribute to the stream base at this location. The higher elevation of both Cane Creek and Nonconnah Creek in relation to the groundwater table indicates that the water in the two creeks would most likely contribute water to the fluvial aquifer.

2.5.2.2 Intermediate Aquifer

The intermediate aquifer underlies the Memphis Depot and, based on soil borings installed during the RI investigation, this aquifer is separated from the fluvial aquifer by the clay confining unit; limited contact between the two aquifers occurs in areas near MW-34, -40, and –43 where the clay confining unit is absent. Based on the lithologic log of MW-67, the intermediate aquifer is composed of interbedded sand, silt, and clay.

Aquifer tests conducted during August 1997 indicate the hydraulic conductivity for the intermediate aquifer is similar to the fluvial aquifer with conductivities of 1.3×10^{-3} (MW-34) and 5.4×10^{-4} (MW-40) cm/sec. Away from the influence of recharge from the fluvial aquifer through areas where the clay directly underlying the fluvial deposits is absent, water level elevations in the intermediate aquifer are approximately 150 feet msl with a general westward flow toward the Allen Well Field (Figure 2-12B)

2.5.2.3 Memphis Aquifer

The Memphis aquifer is reported to underlie the entire Memphis area and is separated from the fluvial aquifer by the intermediate aquifer. The Memphis aquifer contains groundwater under strong artesian (confined) conditions Locally, extensive pumping has lowered water levels considerably. The top of the Memphis aquifer potentiometric surface at MW-67, the only well at the Depot that intersects the Memphis aquifer, is 151.59 feet msl. Flow in the unit is generally westward, toward the Allen Well Field, a major local pumping zone

The Memphis aquifer is reported to derive most of its recharge from its outcrop area. Located to the east of Memphis, this outcrop area forms a wide northeast-trending belt that extends from east of Shelby, Fayette, and Hardeman Counties northeast across much of western Tennessee.

2.5.3 Hydrogeologic Interactions

As noted above, Graham and Parks (1986) present evidence to suggest that the Jackson Formation/Upper Claiborne Group is not laterally continuous throughout the Memphis area In some areas, the Memphis aquifer is directly overlain by the alluvial or fluvial deposits, permitting downward vertical leakage from shallow water-bearing zones into the regional aquifer. Bell and Nyman (Graham and Parks, 1986) estimated the quantity of this downward leakage to be on the order of 2 million gallons per day (mgd). This estimate is drawn from a comparison of the potentiometric surfaces of the Memphis aquifer and the fluvial aquifer.

Vertical leakage through the Jackson Formation/Upper Claiborne Group may be possible where this unit is discontinuous, because of the significant positive head difference between the two aquifers. The clay confining unit also has interbedded, discontinuous lenses of permeable fine sand and lignite, which may promote downward leakage

2.5.4 Groundwater Flow Velocities

As discussed in Section 2.5.2.1, groundwater from the fluvial aquifer appears to be "pinched out" in several areas due to the surface elevation of the clay confining unit exceeding or equaling the elevation of the water table. In situations where the water table is slightly higher than the top of clay and the surface of the confining clay has a steep slope, capillary forces and lack of hydraulic head may cause available water to become "trapped" in soil pores. These conditions create a hydraulic barrier or NSST zone and, therefore, have no groundwater flow velocities. Within the fluvial and intermediate aquifers, groundwater flow velocities were calculated based upon data gathered from slug tests and aquifer pump tests. The range for groundwater velocity was estimated at 0.12 foot/day to 1 69 feet/day assuming the following parameters:

- Hydraulic gradient = ranges from 0.0017 foot/foot to 0.023 foot/foot along the western boundary of Dunn Field,
- Hydraulic conductivity = 22.11 feet/day [(based on the average hydraulic conductivity for the fluvial aquifer reported in the *Final Groundwater Characterization Data Report* (CH2M HILL, 1997a)]; and
- Effective porosity = 0.3.

Figure 2-13 presents the distribution of hydraulic conductivity data obtained by slug testing and summary statistics from wells located on Dunn Field. Slug test procedures used were those described by Law Environmental (1990a) and by CH2M HILL (1997a). In 1992, a pump test was performed by Environmental Science and Engineering (ESE)(1994) in the northwestern portion of Dunn Field (MW-3) to measure hydrogeologic parameters needed for design of the Dunn Field groundwater extraction system. The average hydraulic conductivity value obtained via pump testing of the fluvial aquifer, 3 5x 10^{-2}, is about an order of magnitude higher than the values obtained by slug testing .

2.5.5 Geochemical Characterization

2.5.5.1 Regional Water Quality

In a study of water quality of the fluvial aquifer in the Memphis area by McMaster and Parks (1988), samples from 28 wells were analyzed in 1986 and 1987 for selected trace inorganic constituents and synthetic organic compounds. During the study, seven additional wells were installed in Memphis Light, Gas, and Water (MLGW) wellfields. Figure 2-14 presents a map showing the locations of the Allen Well Field monitoring and production wells. Samples from these wells were analyzed for the same constituents. The authors concluded that water from the fluvial aquifer has low concentrations of dissolved solids, generally is moderately hard, and has low concentrations of iron. The MLGW field study indicated that all major and trace inorganic constituents in the fluvial aquifer were within the known range of values for natural, uncontaminated water. Synthetic organic compounds were not detected in any of these MLGW samples.

Dunn Field is located east of the Allen Well Field, one of six pumping centers owned and operated by MLGW. The Allen Well Field draws water from the Memphis aquifer, which is the potable water source for the City of Memphis and most of Shelby County. Studies in the vicinity of the Allen Well Field have implied that areas of hydraulic interconnection may exist in the clay confining layer overlying the Memphis aquifer, which may allow migration of contaminants from water table aquifers (Graham and Parks, 1986). Of the 33 Allen Well Field wells, 13 lie within one mile of Dunn Field (see Figure 2-14).

In 1988 and 1989, analyses of groundwater samples from wells within the Allen Well Field indicated no contaminants exceeding drinking water standards When analyzed during 1988, samples from wells 113, 114, 115, 117, 118, and 138, all of which lie within one mile of Dunn Field (see Figure 2-14), did not contain VOCs above laboratory detection limits. In 1988, MLGW detected low levels of chlorinated solvents in Allen Well Field wells 126, 127, and 128. At that time, MLGW officials believed the source of contamination was an industry located close to the three wells They did not consider Dunn Field a potential source because it was located more than a mile from the problem wells, and wells located closer to Dunn Field did not exhibit contamination. The wells were resampled in 1989 and continued to have detectable levels of chlorinated compounds. VOCs have been detected in samples from Well 126 in 1999 and 2000 as well. One of the three wells is no longer used (Well 127), while the other two are used only during periods of peak demand (Memphis/Shelby County Groundwater Control Board Meeting, 1993). MLGW officials continue to believe that the detection of VOCs in wells at the Allen Well Field is attributable to industries closer to the well field than Dunn Field.

Table 2-3 shows levels of contaminants detected in the Allen Well Field wells in comparison to these same constituents detected in Dunn Field monitoring wells Tables 2-4 and 2-5 show the analytical results for the operating production wells and the "IT-" series wells in the Allen Well Field. In addition, Table 2-4 contains data for the years 1999 and 2000. It is important to note that the Allen Well Field wells are screened in the Memphis aquifer and that the eastern-most wells (closest to Dunn Field) have not exhibited VOC contamination.

The USGS has also analyzed groundwater from selected wells in the alluvial and fluvial deposits in the Memphis area. One well, SH:J-171, is located near the Allen Well Field and is screened in the fluvial aquifer at a depth of 71 feet bgs. The results of analyses for dissolved metals and VOCs are summarized in Table 2-6 (Graham and Parks, 1986). No levels of metals or VOCs exceeded drinking water standards for contaminant concentrations. However, the metals data are not directly comparable to data from Dunn Field monitoring wells, because wells at Dunn Field were analyzed for total metals rather than dissolved metals.

2.5.5.2 Survey of Potential Sources of Offsite Groundwater Contamination

In December 1994, a tour of the facilities near the perimeter of the Depot was conducted with Ulysses Truitt, former Depot employee and current Restoration Advisory Board (RAB) member, and CH2M HILL staff. The objective of the tour was to identify industries that could be a source of organic compounds in groundwater or might be additional users of groundwater from the fluvial aquifer The tour revealed the following in the area surrounding Dunn Field: three manufacturing operations, three painting and body shop facilities, one uniform cleaning facility, two gas stations, and two reclamation and salvage facilities. The facilities are mapped and further described in Appendix A of the *Memphis Depot Main Installation RI Report* (CH2M HILL, January 2000) A records search conducted by Agency Information Consultants (AIC) and TDEC revealed that TDEC had records of 22 facilities within a 2-mile radius of the Depot.

2.5.6 Interim Groundwater Remedial Action

During the Law RI, monitoring wells were installed on and around Dunn Field. Several groundwater samples collected from monitoring wells at Dunn Field contained levels above regulatory limits for VOCs and metals. In 1993, ESE submitted an engineering report, *Removal Action for Groundwater,* for the Depot. This report was submitted to meet the requirements of the engineering evaluation/cost analysis (EE/CA) under CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for a non-time critical removal. The report evaluated a variety of technologies, previously presented in the 1990 RI/FS, that would treat contaminated groundwater in the fluvial aquifer to prevent possible human exposure.

In August 1995, CH2M HILL submitted an interim Record of Decision (ROD) for interim action of the groundwater at Dunn Field to the regulatory agencies for approval. The ROD provides the basis for the following major design components associated with the Interim Remedial Action (IRA) for Dunn Field.

- Installing recovery wells along the groundwater plume;
- Obtaining discharge permits for disposal of recovered groundwater to the T E. Maxson wastewater treatment plant or municipal sewer system;
- Operating the system of recovery wells until contaminant concentrations are reduced to acceptable levels or until the final remedy is in place; and
- Performing a chemical analysis to monitor the quality of the discharge in accordance with city discharge permit requirements

The design for the complete 13-well groundwater extraction system was finalized in August 1997. A phased installation was planned with the performance of the first seven wells used to evaluate placement of additional wells Installation of the first seven extraction wells and construction of the conveyance system and hookups to the City of Memphis sanitary sewer system were completed in October 1998. The layout of the extraction pumps and water conveyance piping is shown in Figure 2-15. The system became continuously operational in early November 1998. In October 2000, four additional extraction wells, RW-1, RW-1A, RW-1B, and RW-2, were installed and were connected to the existing extraction system in February 2001. Quarterly and monthly status reports on the system are published by the Operation and Maintenance (O&M) contractor and these reports placed into the Memphis Depot information repository.

Groundwater samples have been collected from the extraction system since the initial start-up. The samples have been analyzed for the chemicals listed in Table 2-7. The maximum and average chemical concentrations are compared to values permitted to be discharged to the City of Memphis sewer system. Generally, the maximum measured concentrations are about half of the permitted discharge values. Methylene chloride, bis(2-ethylhexyl)phthalate, and di-n-butyl phthalate concentrations periodically exceeded the permitted monthly maximum discharge levels for the City of Memphis. The concentrations are suspect, however, because these compounds are commonly associated with laboratory contaminants and plastics

Discharges from the system are summarized in Figure 2-16. The flow rate from the first seven wells at system startup was about 250 gallons per minute (gpm) but steadily declined to the current discharge of about 80 gpm. As additional wells have been brought on-line, the rate of decline has slowed, but has not stopped. Water levels in surrounding monitoring wells have been reduced by as much as 4 5 feet, indicating a general dewatering of the fluvial aquifer at Dunn Field

From November 4, 1998 through March 31, 2001, the system has pumped approximately 88,650,736 gallons of fluvial aquifer groundwater from Dunn Field. The mass of VOCs removed from each pumping well was estimated by multiplying the concentration of VOCs in each well's pumped groundwater, based on quarterly groundwater quality data, by the well's integrated discharge over the same quarter. The cumulative extraction rate for total VOCs, summed for currently active pumping wells, is shown on Figure 2-16. Through September 30, 2001, a total of 299.27 pounds of VOCs have been removed. Well-specific trend analysis of extracted VOC compounds is further discussed in Section 14.5.

The nature and extent of groundwater contamination at Dunn Field is presented in Section 14 in two distinct phases: pre- and post-groundwater extraction. Pre-extraction conditions are first presented to establish the baseline of contamination prior to implementation of the interim action. Changes to the nature of groundwater flow and the distribution of contamination due to the influence of the groundwater extraction system are discussed separately

2.5.7 Hydrogeology Summary and Discussion

The area's shallow aquifer is composed of the fluvial deposits, of which only the lower extent is saturated. Water levels associated with the fluvial aquifer are approximately 60 to 85 feet bgs and obtain recharge from the infiltration of precipitation. A fluvial aquifer water level map (see Figure 2-12A) was contoured using water levels recorded in November 2001. Groundwater elevations and lithologic profiles indicate a "no significant saturated thickness zone" south of Dunn Field in the vicinity of MW-34, STB-13, MW-18, MW-38, and STB-88, west around MW-43, and northwest around MW-40. These areas are suspected to have a hydraulic interconnection between the fluvial aquifer and the underlying intermediate aquifer and Memphis aquifer.

Depressions in the upper clay confining unit exist west of Dunn Field, near MW-44 and MW-79 influence the direction of groundwater flow. There are fewer wells east of Dunn Field, which limits the ability to evaluate the configuration of the clay surface in the vicinity of MW-45.

The upper clay in the Jackson Formation/Upper Claiborne Group often acts as a lower confining unit for the fluvial deposits, but this upper clay is absent in discrete areas south, southwest, and northwest of Dunn Field.

The Memphis aquifer is a regionally significant source of potable water in the Memphis area This hydrogeologic unit underlies Dunn Field at a depth of approximately 180 feet bgs and receives most of its recharge from an outcrop area, several miles east of Memphis. Some recharge is derived from overlying or hydraulically communicating units. An intermediate aquifer was identified within the Jackson Formation/Upper Claiborne Group or Cockfield Formation and possibly in the upper part of the Memphis Sand. Although observed to be confined by the uppermost clay in the Jackson Formation/Upper Claiborne Group, this aquifer has also been observed to be locally unconfined and in contact with the fluvial aquifer. VOC contamination within the fluvial aquifer at Dunn Field has not been detected within the Memphis aquifer at the Allen Well Field.

2.6 Land Use and Demographics

2.6.1 Offsite Land Use

Dunn Field is located in the southern portion of the City of Memphis in an area of widely varying uses. Figure 2-17 shows the land uses within a 3-mile radius of Dunn Field. To the north of Dunn Field are the rail lines of the Frisco Railroad and Illinois Central Gulf Railroad. A number of large industrial and warehousing operations are located along the rail lines in this area, including Kellogg Company; Laramie Tires, Lanigan Storage and Van Company; the Kroger Company; National Manufacturing Company, Incorporated; and United Uniforms. A triangular area immediately north of the Main Installation (MI), east of Dunn Field, and bounded by Dunn Avenue, Castilia Road, and Frisco Avenue, also contains several industrial firms. Formerly a residential neighborhood, the area is characterized by small commercial and manufacturing uses with a few single-family residences remaining

Airways Boulevard is the most heavily traveled thoroughfare in the vicinity and is developed with numerous small, commercial establishments, particularly from Dunn Field southward to the Airways Boulevard interchange with Interstate 240 Businesses along Airways Boulevard are typical of highway commercial districts and include convenience stores, liquor stores, restaurants, used car dealers, and service stations. Other commercial establishments are located to the north, south, and west of Dunn Field. Most are small groceries or convenience stores that serve their immediate neighborhoods.

Dunn Field is also surrounded by residential developments of varying age. Several large, multi-family developments are in the area, ranging from an older apartment complex

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(Castalia Heights Apartments) east of Dunn Field along Carver Avenue and Keltner Circle, to a newly constructed development (Orchid Manor) south of the MI on Ball Road.

Institutional uses include numerous small church buildings scattered throughout the residential neighborhoods. Several schools are located in the area:

- Alcy Road Elementary to the south of the MI;
- Norris Elementary, Dunn Avenue Elementary, Corry Junior High, Hamilton High, Hamilton Junior High, and Hamilton Elementary to the west;
- Magnolia Elementary to the northeast, and
- Charjean Elementary and Airways Junior High to the east.

Four cemeteries are located near Dunn Field. Baron Hirsch, located to the northwest on Rozelle Street; and Calvary, Forest Hill, and Temple Israel in the vicinity of Person Avenue and Bellevue Boulevard, to the west.

MLGW operates a large substation northwest of Dunn Field along Person Avenue. One neighborhood park (Lincoln Park) is located on Person Avenue just west of Dunn Field .

In Memphis and Shelby County, zoning controls and subdivision requirements are under the jurisdiction of the Office of Planning and Development (OPD). The Depot property itself is zoned Light Industrial (I-L). This designation extends to several contiguous parcels east of Dunn Field along Dunn Avenue, in the vicinity of the Kellogg plant westward past Rozelle Street. Several smaller areas adjacent to the I-L parcels are zoned Heavy Industrial (I-H).

Most of the remaining land in the vicinity of Dunn Field is zoned for single-family or duplex residential. However, several large parcels have been zoned to allow multi-family developments. These parcels include the Castalia Heights Apartments to the east of Dunn Field, and discrete areas located to the west of Dunn Field on Dunn Avenue near Lincoln Park; to the south of the Depot along Alcy and Ketchum Roads; and to the east of the Depot along Airways, Dwight, Pecan, and Ketchum.

2.6.2 Onsite Land Use

The onsite land use is likely to change to an altered, though still mostly industrial, use as a result of the BRAC process. A *Memphis Depot Redevelopment Plan* (The Pathfinders et al., 1997) has been developed evaluating several non-military use alternatives for the property.

One goal of the *Memphis Depot Redevelopment Plan* (The Pathfinders et al., 1997) is to create more jobs as part of the redevelopment plan The future alternative land use plan includes the following:

Park and recreational area, and

Light industrial, assembly, commercial, and distribution space with additional land for new development.

2.6.3 Population Demographics

The Census data from 1990 reported the Shelby County total population at 826,330, with 393,614 males and 432,716 females. The same data reported the Memphis City population at 610,337, of which males were 285,010 and females were 325,327 (U. S. Census, 1990).

The 1988 estimated median age for the areas surrounding the Depot is 29.5, with 25 percent of the population under the age of 15 and 11 percent over the age of 65. Females make up 54 percent of the population According to Table 2-8, which presents census block data from 1990, the neighborhood has a population of 23,637, with 45 percent males and 55 percent females (The Pathfinders et al., 1997). Most residents have lived in the area fewer than 5 years or more than 15 years (D&B Donnelley Demographics, 1989). Most neighborhood residents have a medium-to-low family income. Additional census data are provided in Table 2-9.

The future worker population is projected to have employment in light industrial work. The onsite activities would include facilities for educational and technical training, community services, parks and public recreation, and facilities for industrial and commercial enterprises

2.6.4 Water Use

There are no public water supply wells within Dunn Field. The water for the entire area is provided by MLGW and is obtained by pumping from the Memphis aquifer, which underlies the uppermost aquifer at the Depot.

The following summarizes the findings of the well survey conducted within a 2-mile radius of the Depot through the Environmental Data Resources, Inc. (EDR®) GeoCheck® Report (dated March 2002). A copy of this report is included in Appendix A-3:

- There are no private residential water wells within a 2-mile radius of Dunn Field,
- There are industrial production wells at 3 facilities located within 0.5 to 1 mile east and northeast of Dunn Field:
  - 3 wells at Swift & Company at depths of 443-, 220- and 459-feet BGS;
  - 2 wells at Frisco RR at depths of 371- and 386-feet BGS;
  - 1 well at Kellogg Company at a depth of 389-feet BGS,
- There are industrial production wells at 8 facilities located within 1 to 2 miles northwest, northeast and east of Dunn Field
  - 4 wells at Mid South Refrigeration at depths of 500-, 499-, 554- and 496-feet BGS;
  - 3 wells at Wesson Oil at depths of 501-, 500-, and 495-feet BGS,
  - 2 wells at Klinke Reed at depths of 510- and 510-feet BGS;
  - 2 wells at Railways Ice at depths of 390- and 380-feet BGS;
  - 1 well at Davis Coal at a depth of 278-feet BGS;
  - 1 well at Minnow Shop at a depth of 380-feet BGS
  - 1 well at MO PAC RR at a depth of 401-feet BGS,
  - 1 well at Kellogg Company at a depth of 389-feet BGS;

  - 1 well at Bittman Grocery at a depth of 529-feet BGS;
  - 1 well at Kellogg Company at a depth of 389-feet BGS;
- The Allen Well Field is the closest potable water supply (about 1 to 2 miles west of Dunn Field).

Dunn Field is located east of the Allen Well Field. The Allen Well Field draws water from the Memphis aquifer, which is the potable water source for the City of Memphis and most of Shelby County. The depth of the Allen Well Field wells range from 390- to 589-feet BGS.

2.7 Ecological Habitats

Dunn Field is essentially a maintained industrial site located within a highly developed (mixed residential, commercial, and industrial land uses) portion of the Memphis area. As such, the facility offers little or no natural habitat to support wildlife Industrial land uses are expected to continue into the future. The existing terrestrial and aquatic habitats are described below.

2.7.1 Terrestrial Systems

There are no natural terrestrial ecological habitats within the Dunn Field boundary. The entire facility has been either historically or recently disturbed, and the existing landscape features consist primarily of mowed grass with some patches of trees and/or shrubs. The open grassed areas, which cover at least 75 percent of the facility, are frequently mowed for landscaping and access purposes. Various large hardwood tree species (e.g. oak) occur in the northeastern portion of the facility where the groundcover is also mowed grass. A small overgrown area including young trees, shrubs, and vines occurs at Site 60 (Pistol Range Impact Area and Bullet Stop) in the Northeast Open Area.

A few urban adapted wildlife species observed at Dunn Field include eastern gray squirrel, red fox, northern mockingbird, American kestrel, boat-tailed grackle, European starling, mourning dove, common bobwhite, rock dove, and killdeer It is likely that other small mammals (e.g. mice, shrews, rabbits), birds (e.g. American robin, sparrows), and reptiles (e.g. five-lined skink, eastern garter snake) may also occur at the site. The entire facility is fenced and therefore reduces use by large mammals (e.g. whitetail deer) A few wild dogs have been observed roaming the Northeast Open Area. Overall the terrestrial habitat within Dunn Field is of poor quality and provides limited habitat value for terrestrial wildlife.

Land use within a one-mile radius of the facility is highly developed and is primarily residential or industrial. A few undeveloped and isolated forested areas also occur in the general area. Other areas are located south of the MI along Ball Road and Ketchum Road in the vicinity of the Orchid Manor Apartments and east of the MI on Dwight Street Large undeveloped forested and grassed areas associated with the floodplains of Nonconnah Creek and its tributaries occur at least one mile to the south and west of the facility.

2.7.2 Aquatic Systems

There are no aquatic habitats (e.g. impoundments, streams) on Dunn Field. Surface drainage of Dunn Field occurs by overland flow via swales, ditches, concrete-lined channels, and a storm drainage system. Onsite drainage pathways do not store water and are dry throughout most of the year, depending on seasonal rainfall Stormwater is directed into a series of storm drains that transport stormwater in pipes, which discharge from various points around the Dunn Field perimeter Via these alignments surface drainage is directed to Cane Creek to the north, which then flows southwest to Nonconnah Creek, approximately three-quarters of a mile south of Dunn Field. Nonconnah Creek drains into Lake McKellar, a Mississippi River tributary

Nonconnah Creek is classified under the Tennessee Water Quality Control Act as having defined uses. These uses include propagation and maintenance of fish and other aquatic species, watering of livestock and wildlife, and irrigation. The most stringent applicable criterion protects fish and aquatic life and stipulates that the waters shall not contain toxic substances that cause death or serious illness to aquatic biota.

2.7.3 Sensitive Environments

"Sensitive environments" are those areas that may require protection or special consideration at any site. Examples include wetlands, critical habitats for endangered or threatened species, and state or national preserves, parks, or recreational areas.

There are no sensitive habitats or protected species within Dunn Field. Although the *Selected Protected Animals* report (USACE, 1975) lists several protected animals as occurring in the Memphis area, no threatened or endangered species are known to inhabit or use Dunn Field or the area within one mile of the facility (Harland, Bartholomew, and Associates, Inc , 1988).

Information on wetland habitats near the facility was obtained from U.S. Fish and Wildlife Service (USFS) National Wetland Inventory (NWI) maps. The closest wetland habitats to Dunn Field are a large forested wetland located 0.25 mile to the north along Cane Creek, and a few isolated forested or emergent vegetation wetlands located 0.25 mile west. The next closest wetlands are located at least 1 mile away and are associated with the floodplains of Cane Creek and Nonconnah Creek to the west and south of Dunn Field, respectively. These floodplain wetlands generally include variably sized palustrine (vegetated) wetlands containing either emergent vegetation or deciduous forests adjacent to the creeks

No archaeological sites are known to be located within the immediate vicinity of Dunn Field, although the area was occupied by a variety of Native American groups An archaeological survey was conducted in 1997 and the results indicated no archaeological resources at Dunn Field (Prewitt & Associates, 1997). The *Environmental Assessment for BRAC 95 Disposal and Reuse for Defense Distribution Depot Memphis, Tennessee* (Tetra Tech, 1998) also includes a letter from the Tennessee Historical Commission stating that there are no archaeological resources at Dunn Field.

Tables

TABLE 2-1
Dunn Field Study Area Geologic Strata
Rev 0 Memphis Depot Dunn Field RI

System	Series	Group	Stratigraphic Unit	Thickness (feet)[b]	Lithology and Hydrologic Significance
Quaternary	Holocene and Pleistocene		Alluvium[a]	0 to 175	Sand, gravel, silt, and clay. Underlies the Mississippi Alluvial Plain and alluvial plains of streams in the Gulf Coastal Plain Thickest beneath the alluvial plain, where commonly between 100 and 150 ft thick: generally less than 50 ft thick elsewhere. Provides water to domestic, farm, industrial, and irrigation wells in the Mississippi Alluvial Plain
	Pleistocene		Loess	0 to 65	Silt, silty clay, and minor sand. Principal unit at the surface in upland areas of the Gulf Coastal Plain. Thickest on the bluffs that border the Mississippi Alluvial Plain; thinner eastward from the bluffs. Tends to retard downward movement of water, thus providing recharge to the fluvial deposits
Quaternary And Tertiary (?)	Pleistocene and Pliocene (?)		Fluvial Deposits (terrace deposits)	0 to 100	Sand, gravel, minor clay, and ferruginous sandstone Generally underlie the loess in upland areas, but are locally absent Thickness varies greatly because of erosional surfaces at top and base Provide water to many domestic and farm wells in rural areas.
Tertiary		Claiborne	Jackson Formation and upper part of Claiborne Group, includes Cockfield and Cook Mountain Formations (Capping Clay)	0 to 360	Clay, silt, sand, and lignite Because of similarities in lithology, the Jackson Formation and upper part of the Claiborne Group cannot be reliably subdivided based on available information. Most of the preserved sequence is the Cockfield and Cook Mountain formations undivided, but locally the Cockfield may be overlain by the Jackson Formation. Serves as the upper confining bed for the Memphis Sand
	Eocene		Memphis Sand ("500-Foot" sand)	500 to 890	Sand, clay, and minor lignite. Thick body of sand with lenses of clay at various stratigraphic horizons and minor lignite Thickest in the southwestern part of the Memphis area; thinnest in the Northeastern part Principal aquifer providing water for municipal and industrial supplies east of the Mississippi River; sole source of water for the City of Memphis

TABLE 2-1
Dunn Field Study Area Geologic Strata
Rev 0 Memphis Depot Dunn Field RI

System	Series	Group	Stratigraphic Unit	Thickness (feet)[b]	Lithology and Hydrologic Significance
			Flour Island Formation	160 to 310	Clay, silt, sand, and lignite. Consists primarily of silty clays and sandy silts with lenses and interbeds of fine sand and lignites. Serves as the lower confining bed for the Memphis Sand and the upper confining bed for the Fort Pillow sand
	Paleocene	Wilcox	Fort Pillow Formation ("1,400-Foot" Sand)	125 to 305	Sand with minor clay and lignite. Sand is fine to medium Thickest in the southwestern part of the Memphis Area; thinnest in the northern and northeastern parts Once the second principal aquifer supplying the City of Memphis, still used by an industry. Principal aquifer providing water for municipal and industrial supplies west of the Mississippi River.
			Old Breastworks Formation	180 to 350	Clay, silt, sand, and lignite. Consists primarily of silty clays and clayey silts with lenses and interbeds of fine sand and lignite. Serves as the lower confining bed for the Fort Pillow Sand, along with the underlying Porters Creek Clay and Clanton Formation of the Midway Group.

[a] Alluvium is shown here in the conventional position as the youngest stratigraphic unit Actually, it almost nowhere overlies the loess but may overlie any of the older stratigraphic units

[b] Note this is the thickness of the unit--not the depth below grade

Source Modified from Graham and Parks, 1986

? = Age not verified

TABLE 2-2
Dunn Field Soil Units
Rev 0 Memphis Depot Dunn Field RI

Map Symbol	Unit Description	USDA Texture (Major Fraction)	Typical Thickness (in.)	Unified Soil Classification System (Major Fraction)	Permeability (Estimated) (in./hr)	Construction or Use Constraints
Fm	Falaya Silt Loam	Silt loam or silty clay loam	60	ML, CL	0 63 to 2 0	Seasonal wetness and high water table, occasional flooding
Fs	Filled Land-silty	Silty fill (mixed)	36 to 60	ML	0 63 to 2 0	Uncertain
Gr	Graded Land	Silty sandy clay, clayey sandy silt	36	SP-SM, ML, CL	Varies	Uncertain
MeB	Memphis Silt Loam, 2 5 percent slopes	Silty loam or silty clay loam	108	ML, CL, ML-CL	0 63 to 2.0	Erosion potential
MeD_2	Memphis Silt Loam, 8 to 12 percent slopes, eroded	Silty loam or silty clay loam	108	ML, CL, ML-CL	0 63 to 2 0	Slopes, severe erosion hazards

Source Modified from USDA, Soil Conservation Service, 1970

Note ML -Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CL- Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
SP-Poorly graded sands gravely sands, little or no fines
SM-Silty sands, sand-silt mixtures

TABLE 2-3
Comparison of VOCs Found at Depot to VOCs found in Allen Well Field Wells
Rev 0 Memphis Depot Dunn Field RI

Chemical Name	Depot/Dunn Field Groundwater Concentrations (µg/L)		Depot/Dunn Field Groundwater Concentrations (µg/L)		Closed or Limited Pumping Wells, Allen Well Field				
	Maximum, 4/89	Well Location	Maximum, 1/90	Well Location	Well 126 (µg/L) 8/30/88	Well 126 (µg/L) 6/14/89	Well 126 (µg/L) 10/27/00	Well 127 (µg/L) 8/30/88	Well 128 (µg/L) 8/30/88
Volatile Organics									
Tetrachloroethene	210	MW-5	240	MW-10	ND	ND	ND	ND	ND
Carbon Tetrachloride	77	MW-6	52	MW-32	ND	ND	ND	ND	ND
Benzene	ND		ND		ND	ND	ND	22 00	0 17
1,1,1-Trichloroethane	9	MW-10	10	MW-10	ND	ND	ND	ND	ND
Chloroform	15	MW-6	33	MW-31	ND	ND	ND	ND	ND
1,1-Dichloroethane	3	MW-10	5	MW-29	0 11	ND	ND	2 86	0 08
1,2-Dichloroethene	ND		3	MW-10	ND	ND	2 9	1 94	ND
1,1-Dichloroethene	130	MW-10	160	MW-10	0.17	ND	ND	0 11	0 16
1,2-Dichloroethene	520	MW-11	1100	MW-31	0 17	0 15	ND	2 33	0.17
1,1,2-Trichloroethane	7	MW-6	12	MW-31	ND	ND	ND	ND	ND
Trichloroethene	1700	MW-12	5100	MW-12	1 10	0 95	14 9	0 13	ND
1,1,2,2-Tetrachlorethane	340	MW-12	1900	MW-12	ND	ND	ND	ND	ND
Acetone	34	MW-6	3500	MW-37	ND	ND	ND	ND	ND
Vinyl Chloride	ND		ND		ND	ND	ND	0.17	ND
1,2-Dichloropropane	ND		ND		0 92	0 72	2 2	ND	ND
2-Methyl-2-Pentanone	ND		8	MW-37	ND	ND	ND	ND	ND
Toluene	1	MW-27	ND		0 90	ND	ND	ND	ND

ND = non-detect, µg/L = micrograms per liter

TABLE 2-4
Analytical Results from the Allen Well Field Production Wells (1988 ~ 1989 and 1999 - 2000)

Rev 0 Memphis Depot Dunn Field RI

Well #	Date	Analytical Compound															
		Benzene	Carbon Tetra-chloride	Chloro-form	Dibromo-Chloro-methane	1,1-Dichloro-Ethane	1,3-Dichloro-benzene	1,2-Dichloro-ethane	1,1-Dichloroethene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-propane	Naphthalene	Tetra-chloro-ethene	Toluene	Trichloro ethene	1,2,3-Trichloro-propane	Vinyl Chloride
101	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
102	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
103	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
106	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
107	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

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TABLE 2-4
Analytical Results from the Allen Well Field
Production Wells (1988 – 1989 and 1999 - 2000)
Rev 0 Memphis Depot Dunn Field RI

		Analytical Compound															
Well #	Date	Benzene	Carbon Tetra-chloride	Chloro-form	Dibromo-Chloro-methane	1,1-Dichloro-Ethane	1,3-Dichloro-benzene	1,2-Dichloro-ethane	1,1-Dichloroe thene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-propane	Naphthalene	Tetra-chloro-ethene	Toluene	Trichloro ethene	1,2,3-Trichloro-propane	Vinyl Chloride
108	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
109	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	0 33	BDL	0 4	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
110	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
111	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
112	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 2-4
Analytical Results from the Allen Well Field
Production Wells (1988 – 1989 and 1999 - 2000)
Rev 0 Memphis Depot Dunn Field RI

		Analytical Compound															
Well #	**Date**	**Benzene**	**Carbon Tetra-chloride**	**Chloro-form**	**Dibromo-Chloro-methane**	**1,1-Dichloro-Ethane**	**1,3-Dichloro-benzene**	**1,2-Dichloro-ethane**	**1,1-Dichloroethene**	**Cis 1,2-Dichloro-Ethene**	**1,2-Dichloro-propane**	**Naphthalene**	**Tetra-chloro-ethene**	**Toluene**	**Trichloro ethene**	**1,2,3-Trichloro-propane**	**Vinyl Chloride**
113	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
114	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
115	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
117	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
118	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 2-4
Analytical Results from the Allen Well Field Production Wells (1988 – 1989 and 1999 - 2000)

Rev 0 Memphis Depot Dunn Field RI

		Analytical Compound															
Well #	Date	Benzene	Carbon Tetra-chloride	Chloro-form	Dibromo-Chloro-methane	1,1-Dichloro-Ethane	1,3-Dichloro-benzene	1,2-Dichloro-ethane	1,1-Dichloroethene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-propane	Naphthalene	Tetra-chloro-ethene	Toluene	Trichloro ethene	1,2,3-Trichloro-propane	Vinyl Chloride
122	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
123	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
124	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
125	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
126	1988	BDL	BDL	BDL	BDL	0 11	BDL	BDL	0 17	0.17	1 11	BDL	BDL	BDL	1 08	BDL	BDL
	1988	BDL	BDL	BDL	BDL	0.09	BDL	0 07	0 48	0.14	1.04	BDL	BDL	BDL	0 85	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1 27	0 93	BDL	BDL	BDL	6 46	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.9	2 2	BDL	BDL	BDL	14 9	BDL	BDL

TABLE 2-4
Analytical Results from the Allen Well Field Production Wells (1988 – 1989 and 1999 - 2000)
Rev 0 Memphis Depot Dunn Field RI

		Analytical Compound															
Well #	Date	Benzene	Carbon Tetra-chloride	Chloro-form	Dibromo-Chloro-methane	1,1-Dichloro-Ethane	1,3-Dichloro-benzene	1,2-Dichloro-ethane	1,1-Dichloroethene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-propane	Naphthalene	Tetra-chloro-ethene	Toluene	Trichloro ethene	1,2,3-Trichloro-propane	Vinyl Chloride
127	1988	10 8	BDL	BDL	BDL	2 08	BDL	2 93	0.11	2 31	BDL	BDL	BDL	BDL	0 13	BDL	0 52
	1988	BDL	BDL	BDL	BDL	2 76	BDL	3 53	0 28	2.06	BDL	BDL	BDL	BDL	0 12	BDL	0.41
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
128	1988	BDL	BDL	BDL	BDL	0 08	BDL	BDL	0 16	0 17	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
130	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
136	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
137	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 2-4
Analytical Results from the Allen Well Field Production Wells (1988 – 1989 and 1999 - 2000)

Rev 0 Memphis Depot Dunn Field RI

		Analytical Compound															
Well #	Date	Benzene	Carbon Tetra-chloride	Chloro-form	Dibromo-Chloro-methane	1,1-Dichloro-Ethane	1,3-Dichloro-benzene	1,2-Dichloro-ethane	1,1-Dichloroethene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-propane	Naphthalene	Tetra-chloro-ethene	Toluene	Trichloro ethene	1,2,3-Trichloro-propane	Vinyl Chloride
138	1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	1999	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: All results in micrograms per liter (ug/L)

TABLE 2-5
Analytical Results from the Allen Well Field
IT Series Wells (1988 - 1989)

Rev 0 Memphis Depot Dunn Field RI

		Analytical Compound															
Well #	Date	Benzene	Carbon Tetra-chloride	Chloroform	Dibromo-Chloromethane	1,1-Dichloro-Ethane	1,3-Dichloro-Benzene	1,2-Dichloro-Ethane	1,1-Dichloro-Ethene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-Propane	Naphthalene	Tetra-chloro-Ethene	Toluene	Trichloro-Ethene	1,2,3-Trichloro Propane	Vinyl Chloride
IT1	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT2	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT3	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT4	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT5	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT6	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT7	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT8	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 2-5
Analytical Results from the Allen Well Field
IT Series Wells (1988 - 1989)

Rev 0 Memphis Depot Dunn Field RI

Well #	Date	Analytical Compound															
		Benzene	Carbon Tetra-chloride	Chloroform	Dibromo-Chloromethane	1,1-Dichloro-Ethane	1,3-Dichloro-Benzene	1,2-Dichloro-Ethane	1,1-Dichloro-Ethene	Cis 1,2-Dichloro-Ethene	1,2-Dichloro-Propane	Naphthalene	Tetra-chloro-Ethene	Toluene	Trichloro-Ethene	1,2,3-Trichloro Propane	Vinyl Chloride
IT9	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT10	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT11	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT12	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IT13	1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

All results in milligrams per liter (mg/L)

NA = Not analyzed

BDL = Below detection limit

TABLE 2-6
Dissolved Metals and Volatile Organic Compounds
United States Geological Survey (USGS) Fluvial Well SH:J-171

Rev. 0 Memphis Depot Dunn Field RI

Depth (ft bgs)	Sample Date	Arsenic, Dissolved	Barium, Dissolved	Cadmium, Dissolved	Chromium, Dissolved	Lead, Dissolved	Mercury, Dissolved	Total VOCs
71	02/03/87	<1	92	2	4	<5	<0.1	<3

Source: USGS, 1988.

Table 2 7
Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System
Dunn Field, Memphis Depot, Tennessee
Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-01	ST-EFF-02*	ST-EFF-03	ST-EFF-04	ST-EFF-04A (Duplicate)	ST-EFF-05	ST-EFF-06	City of Memphis Industrial Wastewater Discharge Max Levels
Laboratory ID No			9810617-01	9810819-01	9811263-01	9811479-01	9811479-04	9811705-01	9812045-01	
Total System Effluent Sample Description			Week 1 of System Startup Testing	Week 2 of System Startup Testing	Week 1 of System Operation (O&M)	Week 2 of System Operation (O&M)		Week 3 of System Operation (O&M)	Week 4 of System Operation (O&M)	
Date Effluent Sample Collected			19-Oct-98	26-Oct-98	09-Nov-98	16-Nov-98		23-Nov-98	30-Nov-98	–
Instantaneous Flow Rate			230 GPM/331 200 GPD	155* GPM/223,200 GPD	199 GPM/286 560 GPD	169 8 GPM/244 512 GPD		158 8 GPM/228 672 GPD	145 0 GPM / 208 800 GPD	561 600 GPD
Totalized Flow			1,382,400 GAL	3,408,480 GAL	5,976,549 GAL	7 748,690 GAL		9 343 370 GAL	10 969 840 GAL	–
LABORATORY ANALYSES	DL	Units								*Monthly Ave / One Day Max*
pH (Method 150 1)	–	SU	5 6	5 9	5 8	5 6	5 9	5 6	5 8	5 5 to 10 0
TAL Metals (EPA 200 Series)										*mg/L*
Aluminum (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	ND	ND	ND	0 04 / 0 1
Barium (Method 200 7)	0 003	mg/L	0 104	0 107	0 109	0 118	0 117	0 112	0 124	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	ND	ND	ND	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	23	21 6	24 7	25 3	25	24 8	26 5	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 07	0 046	0 022	0 019	0 019	0 036	0 01	10 / 20
Lead (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	11 7	11 3	12 6	13	12 8	12 5	13	NS
Manganese (Method 200 7)	0 003	mg/L	ND	ND	ND	0 015	0 015	0 014	0 048	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	ND	ND	ND	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	ND	ND	ND	ND	ND	ND	ND	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 916	0 781	0 883	0 975	1 15	0 9	0 703	NS
Sodium (Method 200 7)	0 05	mg/L	27 8	28 3	27 7	27 9	28 7	26 6	26 1	NS
Zinc (Method 200 7)	0 01	mg/L	0 047	0 129	0 095	0 098	0 095	0 063	0 062	0 3 / 1 0
TCL Volatile Organics (Method 8260B)										*ug/L*
Carbon Tetrachloride	1	ug/L	2 9	4 3	3 06	3 27	3 38	4 07	3 22	20 / 40
Chloroform	1	ug/L	13 6	12 9	14 9	18 1	20 9	20 6	16 4	20 / 40
1,1-Dichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	NS
1,1-Dichloroethene	1	ug/L	11 6	5 42	9 99	13 9	15 6	20 3	14 6	50 / 100
Cis 1 2-Dichlorothene	1	ug/L	29 2	43 8	30	33 3	36 8	37 3	32 8	50 / 100
Trans 1 2-Dichloroethene	1	ug/L	5 96	9 27	6 68	7 47	7 92	8 42	7 47	50 / 100
Methylene Chloride	5	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20
1,1 2 2 Tetrachloroethane	1/50/100	ug/L	87 1	159	234	234	257	272	176	500 / 1000
Tetrachloroethene	1	ug/L	25 7	22 6	28 9	30	29 7	34 4	25 6	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	ND	ND	ND	20 / 40
1,1,1-Trichloroethane	1	ug/L	ND	ND	ND	ND	ND	1	ND	10 / 20
1,1 2-Trichloroethane	1	ug/L	1 81	2 82	1 59	1 46	1 5	1 3	1 1	50 / 100
Trichloroethene	1/50/100	ug/L	108	226	195	225	220	217	160	400 / 800
TCL Semi-Volatile Organics (Method 8270C)										*ug/L*
Bis(2-ethylhexyl)phthalate	10	ug/L	ND	**23.6B**	ND	ND	ND	**26B**	ND	10 / 20
Di-n-butyl Phthalate	5	ug/L	**91 2**	2 5J	ND	ND	ND	ND	ND	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20

NOTE. Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement
All analyses performed by Environmental Testing & Consulting Inc , Memphis TN
* = Recovery well RW-09 was not in operation at the time of sample collection
** = Recovery well RW-08 was not in operation at the time of sample collection
^ = Recovery well RW-03 was not in operation at the time of sample collection.
NS = no standard listed in the Industrial Wastewater Discharge Agreement
J = estimated value - presence of the compound was confirmed but less than the reported DL
J* = estimated value quality control recoveries outside acceptance ranges
ND = not detected
mg/L = milligrams per liter
DL = detection limit
GPD = gallons per day
A=Effluent meter zeroed out 03-Nov-99
B = analyte detected in associated method and/or equipment blank
ug/L = micrograms per liter
GPM = gallons per minute
91 2 = bold number indicates that value exceeds Discharge Max Levels
Data provide by Jacobs Engineering

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Table 2 7

Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System

Dunn Field, Memphis Depot, Tennessee

Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-07*	ST-EFF-07A* (Duplicate)	ST-EFF-08	ST-EFF 09	ST-EFF-HG-09A	ST-EFF-HG-05 (Duplicate)	ST-EFF-HG-09B	ST-EFF-HG-09C	City of Memphis Industrial Wastewater Discharge Max Levels
Laboratory ID No			9812764 01	9812764-02	9901688-01	9902564-01	9902702-01	9902702 02	9902756-01	9902775-01	
Total System Effluent Sample Description			Week 7 of System Operation (O&M)		Week 13 of System Operation (O&M)		Week 17 of System Operation (O&M)				
Date Effluent Sample Collected			18-Dec-98		26-Jan-99	22-Feb-99	23-Feb-99		24-Feb-99	25-Feb-99	--
Instantaneous Flow Rate			98 4* GPM/141 696 GPD		116 7 GPM/168,048 GPD	106 1 GPM/155 664 GPD	80 7 GPM**/116 208 GPD		79 2 GPM */ 114 048 GPD	104 2 GPM/150 048 GPD	561,600 GPD
Totalized Flow			14,448,100 GAL		20,527,972 GAL	24,668,250 GAL	24,817,070 GAL		24 924,750 GAL	25,017,630 GAL	--
LABORATORY ANALYSES	DL	Units									*Monthly Ave / One Day Max*
pH (Method 150 1)	–	SU	5 6	5 8	6 5	6 1	--	--	--	--	5 5 to 10 0
TAL Metals (EPA 200 Series)											*mg/L*
Aluminum (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	--	--	--	--	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	--	--	--	--	0 04 / 0 1
Barium (Method 200 7)	0 003	mg/L	0 114	0 118	0 119	0 109	--	--	--	--	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	--	--	--	--	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	25 2	26 3	27 1	23 1	--	--	--	--	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	--	--	--	--	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	--	--	--	--	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 020	0 014	0 044	0 151	--	--	--	--	10 / 20
Lead (Method 200 7)	0 08	mg/L	ND	ND	ND	ND	--	--	--	--	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	11 9	12 4	12 5	11 3	--	--	--	--	NS
Manganese (Method 200 7)	0 003	mg/L	0 097	0 101	0 175	0 049	--	--	--	--	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	ND	ND	ND	ND	--	--	--	--	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 808	0 818	0 927	0 951	--	--	--	--	NS
Sodium (Method 200 7)	0 05	mg/L	25 3	26 8	26 5	24 1	--	--	--	--	NS
Zinc (Method 200 7)	0 01	mg/L	0 115	0 081	0 048	0 065	--	--	--	--	0 3 / 1 0
TCL Volatile Organics (Method 8260B)											*ug/L*
Carbon Tetrachloride	1	ug/L	4 50	4 72	2 32	2 53	--	--	--	--	20 / 40
Chloroform	1	ug/L	10 1	10 3	9 95	6 64	--	--	--	--	20 / 40
1,1-Dichloroethane	1	ug/L	ND	ND	ND	ND	--	--	--	--	NS
1,1-Dichloroethene	1	ug/L	4 8	5 36	13 3	19 5	--	--	--	--	50 / 100
Cis 1,2-Dichlorothene	1	ug/L	43 4	46 7	34	36 2	--	--	--	--	50 / 100
Trans 1,2-Dichloroethene	1	ug/L	9 78	10 4	7 85	11	--	--	--	--	50 / 100
Methylene Chloride	5	ug/L	ND	ND	ND	ND	--	--	--	--	10 / 20
1,1 2 2-Tetrachloroethane	1/50/100	ug/L	175	189	60 1	46 8	--	--	--	--	500 / 1000
Tetrachloroethene	1	ug/L	11 8	13 4	17 9	16 5	--	--	--	--	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	--	--	--	--	20 / 40
1,1,1-Trichloroethane	1	ug/L	ND	ND	ND	ND	--	--	--	--	10 / 20
1,1,2-Trichloroethane	1	ug/L	ND	1 06	ND	ND	--	--	--	--	50 / 100
Trichloroethene	1/50/100	ug/L	183	196	116	144	--	--	--	--	400 / 800
TCL Semi-Volatile Organics (Method 8270C)											*ug/L*
Bis(2-ethylhexyl)phthalate	10	ug/L	**11.9**	**11 6**	ND	ND	--	--	--	--	10 / 20
Di-n-butyl Phthalate	5	ug/L	ND	ND	ND	ND	--	--	--	--	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	--	--	--	--	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	--	--	--	--	10 / 20

NOTE Compounds included in this table are those listed in SectNOTE Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement

All analyses performed by Environmental Testing & Consulting, IAll analyses performed by Environmental Testing & Consulting, Inc , Memphis, TN

* = Recovery well RW-09 was not in operation at the time of sam* = Recovery well RW-09 was not in operation at the time of sample collection

 = Recovery well RW-08 was not in operation at the time of sar** = Recovery well RW-08 was not in operation at the time of sample collection

^ = Recovery well RW-03 was not in operation at the time of sam^ = Recovery well RW-03 was not in operation at the time of sample collection.

NS = no standard listed in the Industrial Wastewater Discharge ANS = no standard listed in the Industrial Wastewater Discharge Agreement

J = estimated value - presence of the compound was confirmed U = estimated value presence of the compound was confirmed but less than the reported DL

J* = estimated value, quality control recoveries outside acceptanJ* = estimated value, quality control recoveries outside acceptance ranges

ND = not detected	B = analyte detected in associated method and/or equipment blank
mg/L = milligrams per liter	ug/L = micrograms per liter
DL = detection limit	GPM = gallons per minute
GPD = gallons per day	**11.2** = bold number indicates that value exceeds Discharge Max Levels

A=Effluent meter zeroed out 03-Nov-99

Data provide by Jacobs Engineering

Table 2-7

Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System

Dunn Field, Memphis Depot, Tennessee

Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-10	ST-EFF-11	ST-INF-11 (Duplicate)	ST-EFF-12	ST-EFF-13	ST-EFF-14	ST-INF-14 (Duplicate)	City of Memphis
Laboratory ID No				9904750-01	9904750-02	9905639-01	9907002-01	9907539-01	9907539-02	Industrial Wastewater
Total System Effluent Sample Description			Week 21 of System Operation (O&M)	Week 26 of System Operation (O&M)		Week 30 of System Operation (O&M)	Week 35 of System Operation (O&M)	Week 38 of System Operation (O&M)		Discharge Max Levels
Date Effluent Sample Collected			26-Mar-99	27-Apr-99		24-May-99	30-Jun-99	21-Jul-99		–
Instantaneous Flow Rate			94 3 GPM/135 792 GPD	105 3 GPM/151 632 GPD		87 9 GPM/126 576 GPD	81 3 GPM/117 072 GPD	80 9 GPM / 116 496 GPD		561 600 GPD
Totalized Flow			28,984 822 GAL	32,187,260 GAL		36,220,118 GAL	40,550 662 GAL	42 647 212 GAL		–
LABORATORY ANALYSES	DL	Units								Monthly Ave / One Day Max
pH (Method 150 1)	–	SU	5 7	6 6	6 2	6 0	5 9	5 8	5 9	5 5 to 10 0
TAL Metals (EPA 200 Series)										mg/L
Aluminum (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	ND	ND	ND	0 04 / 0 1
Barium (Method 200 7)	0 003	mg/L	0 106	0 108	0 114	0 11	0 107	0 101	0 099	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	ND	ND	ND	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	22 7	23	22 8	23 1	21 4	21	21 2	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 034	0 025	0 034	0 012	0 016	0 016	0 011	10 / 20
Lead (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	11 3	11 6	11 7	11 4	10 5	10 6	10 6	NS
Manganese (Method 200 7)	0 003	mg/L	0 04	0 029	0 03	0 031	0 027	0 014	0 059	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	ND	ND	ND	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	ND	ND	ND	ND	ND	ND	ND	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 861	0 728	0 859	0 844	0 767	0 835	0 806	NS
Sodium (Method 200 7)	0 05	mg/L	23 8	22 9	24 1	24 2	23 8	22 8	22 4	NS
Zinc (Method 200 7)	0 01	mg/L	0 069	0 04	0 045	0 047	0 028	0 028	0 03	0 3 / 1 0
TCL Volatile Organics (Method 8260B)										ug/L
Carbon Tetrachloride	1	ug/L	2 17	1 47	1 61	2 25	2 29	1 46	1 29	20 / 40
Chloroform	1	ug/L	5 59	6 63	7 15	4 54	9 3	8 46	7 93	20 / 40
1,1-Dichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	NS
1,1-Dichloroethene	1	ug/L	13 9	11 8	11 8	16 2	17 8	14 2	13 4	50 / 100
Cis 1,2-Dichlorothene	1	ug/L	37	37	37 2	42 8	48 3	34 1	32 5	50 / 100
Trans 1,2-Dichloroethene	1	ug/L	10 8	9 77	9 7	12 0	13 7	10 1	9 66	50 / 100
Methylene Chloride	5	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20
1 1,2 2-Tetrachloroethane	1/50/100	ug/L	29 3	38 9	39 2	56 1	76 4	65 1	59 8	500 / 1000
Tetrachloroethene	1	ug/L	18 7	12 9	13 6	16 1	17	14 6	13 3	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	1 58	1	ND	20 / 40
1 1 1-Trichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20
1 1 2-Trichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	50 / 100
Trichloroethene	1/50/100	ug/L	116	116	117	150	163	117	110	400 / 800
TCL Semi-Volatile Organics (Method 8270C)										ug/L
Bis(2-ethylhexyl)phthalate	10	ug/L	**24.4B**	ND	**14.1B**	**13 6B**	ND	ND	ND	10 / 20
Di-n-butyl Phthalate	5	ug/L	ND	ND	ND	ND	ND	ND	ND	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	ND	ND	ND	10 / 20

NOTE Compounds included in this table are those listed in SectNOTE Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement.

All analyses performed by Environmental Testing & Consulting IAll analyses performed by Environmental Testing & Consulting Inc., Memphis TN

* = Recovery well RW-09 was not in operation at the time of sam* = Recovery well RW-09 was not in operation at the time of sample collection

** = Recovery well RW-08 was not in operation at the time of sar** = Recovery well RW-08 was not in operation at the time of sample collection

^ = Recovery well RW-03 was not in operation at the time of sar^ = Recovery well RW-03 was not in operation at the time of sample collection.

NS = no standard listed in the Industrial Wastewater Discharge /NS = no standard listed in the Industrial Wastewater Discharge Agreement

J = estimated value - presence of the compound was confirmed U = estimated value - presence of the compound was confirmed but less than the reported DL

J = estimated value, quality control recoveries outside acceptanJ* = estimated value, quality control recoveries outside acceptance ranges

ND = not detected	B = analyte detected in associated method and/or equipment blank
mg/L = milligrams per liter	ug/L = micrograms per liter
DL = detection limit	GPM = gallons per minute
GPD = gallons per day	**91.2** = bold number indicates that value exceeds Discharge Max Levels

A=Effluent meter zeroed out 03-Nov-99

Data provide by Jacobs Engineering

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Table 2-7
Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System
Dunn Field, Memphis Depot, Tennessee
Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-15	ST-INF-15 (Duplicate)	ST-EFF-16	ST-EFF-17	ST-EFF-018	ST-EFF-116 (Duplicate)	ST-EFF-019	ST-EFF-117 (Duplicate)	City of Memphis
Laboratory ID No			9908593-02	9908593-01	9909614-01	9910519-01	9911451-01	9911451-02	9912495-01	9912495-02	Industrial Wastewater
Total System Effluent Sample Description			Week 43 of System Operation (O&M)		Week 47 of System Operation (O&M)	Week 51 of System Operation (O&M)	Week 55 of System Operation (O&M)		Week 59 of System Operation (O&M)		
Date Effluent Sample Collected			23-Aug-99		22-Sep-99	21-Oct-99	16-Nov-99		15-Dec-99		--
Instantaneous Flow Rate			74 7 GPM / 107,578 GPD		72 2 GPM/104 112 GPD	72 3 GPM/104 112 GPD	76 2 GPM/109,728 GPD		71 5 GPM/102 960 GPD		561,500 GPD
Totalized Flow			48,332 590 GAL		49,474,353 GAL	52,388,107 GAL	55 040,162 GAL		57,672,540 GAL		--
LABORATORY ANALYSES	DL	Units									*Monthly Ave / One Day Max*
pH (Method 150 1)	--	SU	5 7	5 7	6 0	5 7	6 1		5 9	5 7	5 5 to 10 0
TAL Metals (EPA 200 Series)											*mg/L*
Aluminum (Method 200 7)	0 06	mg/L	0 07	ND	ND	ND	ND	ND	ND	ND	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 04 / 0 1
Barium (Method 200 7)	0 003	mg/L	0 099	0 1	0 098	0 099	0 1	0 101	0 099	0 097	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	21 1	20 7	20 6	20 6	21 1	21 3	20 1	19 8	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	0 011	ND	ND	ND	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 1	0 093	0 088	0 018	0 025	0 034	0 019	0 015	10 / 20
Lead (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	10 6	10 6	10 3	10 7	10 5	10 6	10 3	10 2	NS
Manganese (Method 200 7)	0 003	mg/L	0 028	0 026	0 018	0 020	0 022	0 022	0 007	0 007	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	ND	ND	ND	ND	0 066	ND	ND	ND	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 798	0 79	0 852	0 926	1 16	0 82	0 84	0 764	NS
Sodium (Method 200 7)	0 05	mg/L	24 6	25 3	22 2	23 0	22 8	22 4	23 1	21 8	NS
Zinc (Method 200 7)	0 01	mg/L	0 033	ND	0 043	0 028	0 07	0 055	0 047	0 045	0 3 / 1 0
TCL Volatile Organics (Method 8260B)											*ug/L*
Carbon Tetrachloride	1	ug/L	1 21	1 18	2 05	2 22	1 77	1 69	1 18	0 18J	20 / 40
Chloroform	1	ug/L	9 38	9 78	9 88	8 30	7 41	7 49	8 81	6 4	20 / 40
1,1-Dichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,1-Dichloroethene	1	ug/L	17	18	19 3	16 6	16 6	16 7	15 7	10 2	50 / 100
Cis 1 2-Dichlorothene	1	ug/L	47 1	**50 2**	49 8	44 1	48 9	49 4	47	32 5	50 / 100
Trans 1,2-Dichloroethene	1	ug/L	14 6	14 9	14 5	13 0	12 7	13 0	12 6	8 4	50 / 100
Methylene Chloride	5	ug/L	**11 9**	**12 8**	ND	ND	ND	ND	ND	ND	10 / 20
1,1,2,2-Tetrachloroethane	1/50/100	ug/L	137	131	148	183	120	118	137	144	500 / 1000
Tetrachloroethene	1	ug/L	19 8	19 8	21 8	19 2	17 9	17 8	19 1	14 2	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	20 / 40
1,1,1-Trichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	0 61J	0 43J	10 / 20
1,1,2-Trichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	0 89J	ND	50 / 100
Trichloroethene	1/50/100	ug/L	207	218	214	208	177	181	174	134	400 / 800
TCL Semi-Volatile Organics (Method 8270C)											*ug/L*
Bis(2-ethylhexyl)phthalate	10	ug/L	ND	ND	**10 6B**	ND	ND	ND	ND	**13 7B**	10 / 20
Di-n-butyl Phthalate	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20

NOTE Compounds included in this table are those listed in SectNOTE Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement
All analyses performed by Environmental Testing & Consulting IAll analyses performed by Environmental Testing & Consulting Inc , Memphis TN
* = Recovery well RW-09 was not in operation at the time of sam* = Recovery well RW-09 was not in operation at the time of sample collection
** = Recovery well RW-08 was not in operation at the time of sa** = Recovery well RW-08 was not in operation at the time of sample collection
^ = Recovery well RW-03 was not in operation at the time of san^ = Recovery well RW-03 was not in operation at the time of sample collection
NS = no standard listed in the Industrial Wastewater Discharge ANS = no standard listed in the Industrial Wastewater Discharge Agreement
J = estimated value presence of the compound was confirmed lJ = estimated value - presence of the compound was confirmed but less than the reported DL
J* = estimated value quality control recoveries outside acceptanJ* = estimated value, quality control recoveries outside acceptance ranges

ND = not detected	B = analyte detected in associated method and/or equipment blank
mg/L = milligrams per liter	ug/L = micrograms per liter
DL = detection limit	GPM = gallons per minute
GPD = gallons per day	**91 2** = bold number indicates that value exceeds Discharge Max Levels

A=Effluent meter zeroed out 03-Nov-99
Data provide by Jacobs Engineering

Table 2-7
Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System
Dunn Field, Memphis Depot, Tennessee
Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-020	ST-EFF-021	ST-EFF-121 (Duplicate)	ST-EFF-022	ST-INF-022 (Duplicate)	ST-EFF-023	ST-EFF-024	EQB-024	City of Memphis
Laboratory ID No			0001169-01	0002422-01	0002422-02	0003418-01	0003418-02	0004399-01	0005400-01	0005400-02	Industrial Wastewater
Total System Effluent Sample Description			Week 63 of System Operation (O&M)	Week 68 of System Operation (O&M)		Week 72 of System Operation (O&M)		Week 76 of System Operation (O&M)	Week 80 of System Operation (O&M)	Week 80 of System Operation (O&M)	
Date Effluent Sample Collected			10-Jan-00	15-Feb-00		15-Mar-00		14-Apr-00	16-May-00	16-May-00	–
Instantaneous Flow Rate			^A^64 9 GPM/93 456 GPD	70 6 GPM/101 664 GPD		57 1 GPM/82 224		57 1 GPM/82 224 GPD	52 1 GPM/75 024 GPD	52 1 GPM/75 024 GPD	561 600 GPD
Totalized Flow			59 949,612 GAL	62,926,034 GAL		65,383,409 GAL		67,775 983 GAL	70,137,871 GAL	70,137 871 GAL	--
LABORATORY ANALYSES	DL	Units									*Monthly Ave / One Day Max*
pH (Method 150 1)	–	SU	7 0	6 1	5 4	6 1	5 8	6 1	5 9	6 0	5 5 to 10 0
TAL Metals (EPA 200 Series)											*mg/L*
Aluminum (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 04 / 0 1
Barium (Method 200 7)	0 003	mg/L	0 099	0 106	0 108	0 106	0 104	0 111	ND	ND	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	19 9	21 0	21 6	21 9B	21 8B	21 1B	21 4	20 8	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 021	0 114	0 036	0 155J*	0 029J*	0 048	ND	0 032	10 / 20
Lead (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	10 6	10 8	11 3	11 2	11	10 9	11 4	11	NS
Manganese (Method 200 7)	0 003	mg/L	ND	0 025	0 025	0 015	0 015	0 019	ND	ND	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 752	0 816	0 874	0 852	0 809	0 826	0 681	0 892	NS
Sodium (Method 200 7)	0 05	mg/L	22 8	22 7	23 5	24 6	23 5	22 9	23 3	22 3	NS
Zinc (Method 200 7)	0 01	mg/L	0 038	**0 305**	0 053	0 04	0 043	0 052	0 045	0 038	0 3 / 1 0
TCL Volatile Organics (Method 8260B)											*ug/L*
Carbon Tetrachloride	1	ug/L	1 14	1 71	1 67	1 56	1 5	1 63	0 87	ND	20 / 40
Chloroform	1	ug/L	8 34	6 51	6 58	7 76	8 36	7 60	7 59	7 76	20 / 40
1 1-Dichloroethane	1	ug/L	ND	ND	ND	ND	ND	0 47J	ND	ND	NS
1,1-Dichloroethene	1	ug/L	ND	13 8	14 1	12 8	13 5	ND	14 8	15 6	50 / 100
Cis 1,2-Dichlorothene	1	ug/L	48	43 8	43 7	42 6	43 1	**51 5**	**50 9**	**52 4**	50 / 100
Trans 1 2-Dichloroethene	1	ug/L	13 4	12 3	12 0	13 2	13 4	14 9	15 8	16 3	50 / 100
Methylene Chloride	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
1,1,2,2-Tetrachloroethane	1/50/100	ug/L	218	177	189	47 5	51 7	54 7	51	51 3	500 / 1000
Tetrachloroethene	1	ug/L	17 7	14 9	15 3	17 2	18	18	15 2	15 9	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	1 53J	ND	ND	ND	20 / 40
1,1,1-Trichloroethane	1	ug/L	ND	0 48J	0 48J	0 52J	ND	ND	ND	ND	10 / 20
1,1 2-Trichloroethane	1	ug/L	ND	0 80J	0 75J	0 66J*	0 97J	0 96J	ND	0 78	50 / 100
Trichloroethene	1/50/100	ug/L	189	177	179	115	121	189	124	129	400 / 800
TCL Semi-Volatile Organics (Method 8270C)											*ug/L*
Bis(2-ethylhexyl)phthalate	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
Di-n-butyl Phthalate	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20

NOTE Compounds included in this table are those listed in SectNOTE Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement
All analyses performed by Environmental Testing & Consulting IAll analyses performed by Environmental Testing & Consulting, Inc. Memphis, TN
* = Recovery well RW-09 was not in operation at the time of sam* = Recovery well RW-09 was not in operation at the time of sample collection
** = Recovery well RW-08 was not in operation at the time of sar** = Recovery well RW-08 was not in operation at the time of sample collection
^ = Recovery well RW-03 was not in operation at the time of sar^ = Recovery well RW-03 was not in operation at the time of sample collection
NS = no standard listed in the Industrial Wastewater Discharge ANS = no standard listed in the Industrial Wastewater Discharge Agreement
J = estimated value presence of the compound was confirmed U = estimated value - presence of the compound was confirmed but less than the reported DL
J* = estimated value quality control recoveries outside acceptanJ* = estimated value, quality control recoveries outside acceptance ranges
ND = not detected B = analyte detected in associated method and/or equipment blank
mg/L = milligrams per liter ug/L = micrograms per liter
DL = detection limit GPM = gallons per minute
GPD = gallons per day **1 2** = bold number indicates that value exceeds Discharge Max Levels
A=Effluent meter zeroed out 03-Nov-99
Data provide by Jacobs Engineering

702 89

702 90

Table 2-7
Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System
Dunn Field, Memphis Depot, Tennessee
Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-025	ST-EFF-026	EQB-026	ST-EFF-027	ST-EFF-028	EQB-028(DUPLICATE)	ST-EFF-029	EQB-029(DUPLICATE)	City of Memphis
Laboratory ID No			0006716-01	0007278-01	0007278-02	0008325-01	0009443-01	0009443-02	0010480-01	0010480-02	Industrial Wastewater
Total System Effluent Sample Description			Week 85 of System Operation (O&M)	Week 88 of System Operation (O&M)	Week 88 of System Operation (O&M)	Week 92 of System Operation (O&M)	Week 97 of System Operation (O&M)	Week 97 of System Operation (O&M)	Week 101 of System Operation (O&M)	Week 101 of System Operation (O&M)	
Date Effluent Sample Collected			23-Jun-00	13-Jul-00	13-Jul-00	11-Aug-00	19-Sep-00	19-Sep-00	18-Oct-00	18-Oct-00	--
Instantaneous Flow Rate			55 09 GPM/79,330 GPD	52 78 GPM/76 003 GPD	52 78 GPM/76 003 GPD	57 22 GPM/82 396 GPD	55 95 GPM/80 568 GPD	55 95 GPM/80 568 GPD	45 14 GPM/65 002 GPD	45 14 GPM/65 002 GPD	561 600 GPD
Totalized Flow			73,321,836 GAL	75,673,706 GALLONS	75,673,706 GALLONS	78,223,187	80,640,059 GALLONS	80,640 059 GALLONS	82,655,006 GALLONS	82,655,006 GALLONS	--
LABORATORY ANALYSES	DL	Units									*Monthly Ave / One Day Max*
pH (Method 150 1)	–	SU	5 7	7 7	8 4	6 1	5 8	6 1	6 0	6 0	5 5 to 10 0
TAL Metals (EPA 200 Series)											*mg/L*
Aluminum (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 04 / 0 1
Banum (Method 200 7)	0 003	mg/L	0 109	0 104	ND	0 111	0 115	0 117	0 108	0 109	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	21 8	21 3	0 067	21 7	22 8	23 1	21 1	21 4	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 094	0 029	ND	0 137	0 187	0 739	0 061	0 036	10 / 20
Lead (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	11 4	11	ND	10 8	10 9	11	10 3	10 5	NS
Manganese (Method 200 7)	0 003	mg/L	0 014	0 009	ND	0 011	0 010	0 010	ND	ND	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	ND	ND	ND	ND	0 03	**0 336**	ND	ND	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 829	0 836	ND	0 87	0 886	0 954	0 886	0 872	NS
Sodium (Method 200 7)	0 05	mg/L	22 0	23 7	3 2	23 8	23 2	23 4	23 7	25 4	NS
Zinc (Method 200 7)	0 01	mg/L	0 04	0 061	ND	0 045	0 118	0 084	0 094	0 074	0 3 / 1 0
TCL Volatile Organics (Method 8260B)											*ug/L*
Carbon Tetrachloride	1	ug/L	1 3	1 2	ND	1 82	2 31	2 12	1 57	1 65	20 / 40
Chloroform	1	ug/L	9 41	8 92	ND	7 96	9 24	8 30	9 69	8 54	20 / 40
1,1-Dichloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,1-Dichloroethene	1	ug/L	16 6	15	ND	13 2	17 6	17 1	18 8	18	50 / 100
Cis 1,2-Dichlorothene	1	ug/L	**62 7**	**54 4**	ND	44 5	50	46 5	**55 7**	**51**	50 / 100
Trans 1 2-Dichloroethene	1	ug/L	18 5	15 9	ND	11 6	13 4	11 5	16 0	14 8	50 / 100
Methylene Chlonde	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
1 1,2 2-Tetrachloroethane	1/50/100	ug/L	59 2	52	ND	42 7	61 4	60 3	61 3	58 7	500 / 1000
Tetrachloroethene	1	ug/L	14 5	13 8	ND	13 8	22 1	22 8	15 9	15 9	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	20 / 40
1,1,1-Tnchloroethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
1,1 2-Tnchloroethane	1	ug/L	0 93	0 669J	ND	0 66J	1 14	ND	ND	1 01	50 / 100
Tnchloroethene	1/50/100	ug/L	139	123	ND	148	152	159	101	102	400 / 800
TCL Semi-Volatile Organics (Method 8270C)											*ug/L*
Bis(2-ethylhexyl)phthalate	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
Di-n-butyl Phthalate	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	10 / 20

NOTE Compounds included in this table are those listed in SectNOTE Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement.

All analyses performed by Environmental Testing & Consulting (All analyses performed by Environmental Testing & Consulting, Inc , Memphis, TN

* = Recovery well RW-09 was not in operation at the time of sam* = Recovery well RW-09 was not in operation at the time of sample collection

** = Recovery well RW-08 was not in operation at the time of ser** = Recovery well RW-08 was not in operation at the time of sample collection

^ = Recovery well RW-03 was not in operation at the time of sam^ = Recovery well RW-03 was not in operation at the time of sample collection

NS = no standard listed in the Industrial Wastewater Discharge ANS = no standard listed in the Industrial Wastewater Discharge Agreement

J = estimated value - presence of the compound was confirmed IJ = estimated value - presence of the compound was confirmed but less than the reported DL

J* = estimated value quality control recoveries outside acceptanJ* = estimated value, quality control recoveries outside acceptance ranges

ND = not detected
mg/L = milligrams per liter
DL = detection limit
GPD = gallons per day
A=Effluent meter zeroed out 03-Nov 99

B = analyte detected in associated method and/or equipment blank
ug/L = micrograms per liter
GPM = gallons per minute
91 2 = bold number indicates that value exceeds Discharge Max Levels

Data provide by Jacobs Engineering

Table 2 7

Summary of Analytical Results for Total Effluent (through May 2000) of the Groundwater Recovery System

Dunn Field, Memphis Depot, Tennessee

Rev 0 Memphis Depot Dunn Field RI

Sample Identification Number			ST-EFF-030	ST-EFF-031	EQB-031	EQB-032	ST-EFF-033	ST-EFF-131 (Dup)	City of Memphis
Laboratory ID No			0011634-01	0012504-01	0012504-02	0101349-01	0105036-01	0105036-02	Industrial Wastewater
Total System Effluent Sample Description			Week 105 of System Operation (O&M)	Week 109 of System Operation (O&M)	Week 109 of System Operation (O&M)	Week 112 of System Operation (O&M)	Week 126 of System Operation (O&M)	Week 126 of System Operation (O&M)	
Date Effluent Sample Collected			21-Nov-00	20-Dec-00	20-Dec-00	16-Jan-01	01-May-01	01-May-01	–
Instantaneous Flow Rate			11 11 GPM/15 998 GPD	16 27 GPM/23,435 GPD	16 27 GPM/23 435 GPD	25 45 GPM/36 648 GPD	42 39 GPM/61 042 GPD	42 39 GPM/61 042 GPD	–
Totalized Flow			83 150 768 GALLONS	83 877,244 GALLONS	83 877 244 GALLONS	85 023 474 GALLONS	85 023,474 GALLONS	85 023 474 GALLONS	–
LABORATORY ANALYSES	DL	Units							*Monthly Ave / One Day Max*
pH (Method 150 1)	–	SU	5 8	6 5	7 3	5 8	Not Tested	Not Tested	5 5 to 10 0
TAL Metals (EPA 200 Series)									*mg/L*
Aluminum (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	1 / 2
Arsenic (Method 206 2)	0 003	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	0 04 / 0 1
Barium (Method 200 7)	0 003	mg/L	ND	0 117	ND	0 119	Not Tested	Not Tested	NS
Cadmium (Method 200 7)	0 005	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	0 01 / 0 02
Calcium (Method 200 7)	0 015	mg/L	20 1	23 4	ND	22 5	Not Tested	Not Tested	NS
Chromium (Method 200 7)	0 009	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	0 2 / 0 4
Copper (Method 200 7)	0 008	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	0 2 / 0 4
Iron (Method 200 7)	0 009	mg/L	0 053	0 211	0 012	0 322	Not Tested	Not Tested	10 / 20
Lead (Method 200 7)	0 06	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	0 15 / 0 3
Magnesium (Method 200 7)	0 04	mg/L	9 87	11 5	ND	11 6	Not Tested	Not Tested	NS
Manganese (Method 200 7)	0 003	mg/L	ND	0 009	ND	ND	Not Tested	Not Tested	NS
Mercury (Method 245 1)	0 0002	mg/L	ND	ND	ND	ND	Not Tested	Not Tested	0 001 / 0 002
Nickel (Method 200 7)	0 02	mg/L	0 026	ND	ND	0 038	Not Tested	Not Tested	0 1 / 0 3
Potassium (Method 200 7)	0 25	mg/L	0 839	0 978	ND	0 937	Not Tested	Not Tested	NS
Sodium (Method 200 7)	0 05	mg/L	23 1	21 8	0 072	23 1	Not Tested	Not Tested	NS
Zinc (Method 200 7)	0 01	mg/L	0 059	0 063	ND	0 121	Not Tested	Not Tested	0 3 / 1 0
TCL Volatile Organics (Method 8260B)									*ug/L*
Carbon Tetrachloride	1	ug/L	1 62	ND	ND	1 42	4 73	4 62	20 / 40
Chloroform	1	ug/L	7 68	7 15	ND	14 20	23 60	26 30	20 / 40
1,1-Dichloroethane	1	ug/L	ND	0 51J	ND	ND	ND	ND	NS
1 1-Dichloroethene	1	ug/L	16 7	14 6	ND	18 7	10 7	10 7	50 / 100
Cis 1,2-Dichlorothene	1	ug/L	54 6	18 2	ND	**59 2**	44 7	41 1	50 / 100
Trans 1,2-Dichloroethene	1	ug/L	ND	ND	ND	15 3	10 3	11 4	50 / 100
Methylene Chloride	5	ug/L	ND	ND	ND	ND	ND	ND	10 / 20
1,1,2,2-Tetrachloroethane	1/50/100	ug/L	29 7	ND	ND	178	59 3	57 7	500 / 1000
Tetrachloroethene	1	ug/L	18 3	20 7	ND	26	13 1	12 8	60 / 120
Toluene	1	ug/L	ND	ND	ND	ND	ND	ND	20 / 40
1,1,1-Trichloroethane	1	ug/L	ND	0 52 J	ND	ND	ND	ND	10 / 20
1,1 2-Trichloroethane	1	ug/L	1 05	ND	ND	2 19	1 14	0 97 J	50 / 100
Trichloroethene	1/50/100	ug/L	99 3	57 6	ND	89	130	136	400 / 800
TCL Semi-Volatile Organics (Method 8270C)									*ug/L*
Bis(2-ethylhexyl)phthalate	10	ug/L	ND	ND	ND	ND	Not Tested	Not Tested	10 / 20
Di-n-butyl Phthalate	5	ug/L	ND	ND	ND	ND	Not Tested	Not Tested	30 / 60
Naphthalene	2	ug/L	ND	ND	ND	ND	Not Tested	Not Tested	10 / 20
Phenol	5	ug/L	ND	ND	ND	ND	Not Tested	Not Tested	10 / 20

NOTE Compounds included in this table are those listed in SectNOTE Compounds included in this table are those listed in Section D 3 and detected as part of the analytical methods conducted per Section F 1 of Industrial Wastewater Discharge Agreement.

All analyses performed by Environmental Testing & Consulting, IAll analyses performed by Environmental Testing & Consulting Inc Memphis TN

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** = Recovery well RW-08 was not in operation at the time of sar** = Recovery well RW-08 was not in operation at the time of sample collection

^ = Recovery well RW-03 was not in operation at the time of sar^ = Recovery well RW-03 was not in operation at the time of sample collection.

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J = estimated value - presence of the compound was confirmed U = estimated value - presence of the compound was confirmed but less than the reported DL

J* = estimated value quality control recoveries outside acceptanJ* = estimated value, quality control recoveries outside acceptance ranges

ND = not detected

B = analyte detected in associated method and/or equipment blank

mg/L = milligrams per liter

ug/L = micrograms per liter

DL = detection limit

GPM = gallons per minute

GPD = gallons per day

61 2 = bold number indicates that value exceeds Discharge Max Levels

A=Effluent meter zeroed out 03-Nov-99

Data provide by Jacobs Engineering

TABLE 2-8
Census Block Data from 1990
Rev 0 Memphis Depot Dunn Field RI

Block Group	Persons	Male	Female
471570065 00:1	1,173	540	633
471570069 00:3	1,246	571	675
471570069.00 2	1,087	504	583
471570078 10.3	2,017	877	1,140
471570078.10 4	642	288	354
471570069 00 1	1,637	753	884
471570078 10:1	13	6	7
471570078.10 2	909	418	491
471570081 20:3	634	305	329
471570081.10.2	788	370	418
471570078 20·3	1,687	758	929
471570081 10:1	771	364	407
471570081 20 4	882	444	438
471570081 20.5	416	212	204
471570081.10 3	707	320	387
471570081 10:4	611	293	318
471570081.10:5	636	292	344
471570078.20 7	811	370	441
471570078.20:2	1,850	836	1,014
471570078.20·1	1,750	713	1,037
471570081 10·6	996	420	576
471570081 20:6	775	330	445
471570078 20·8	1,599	693	906
Totals	**23,637**	**10,677**	**12,960**

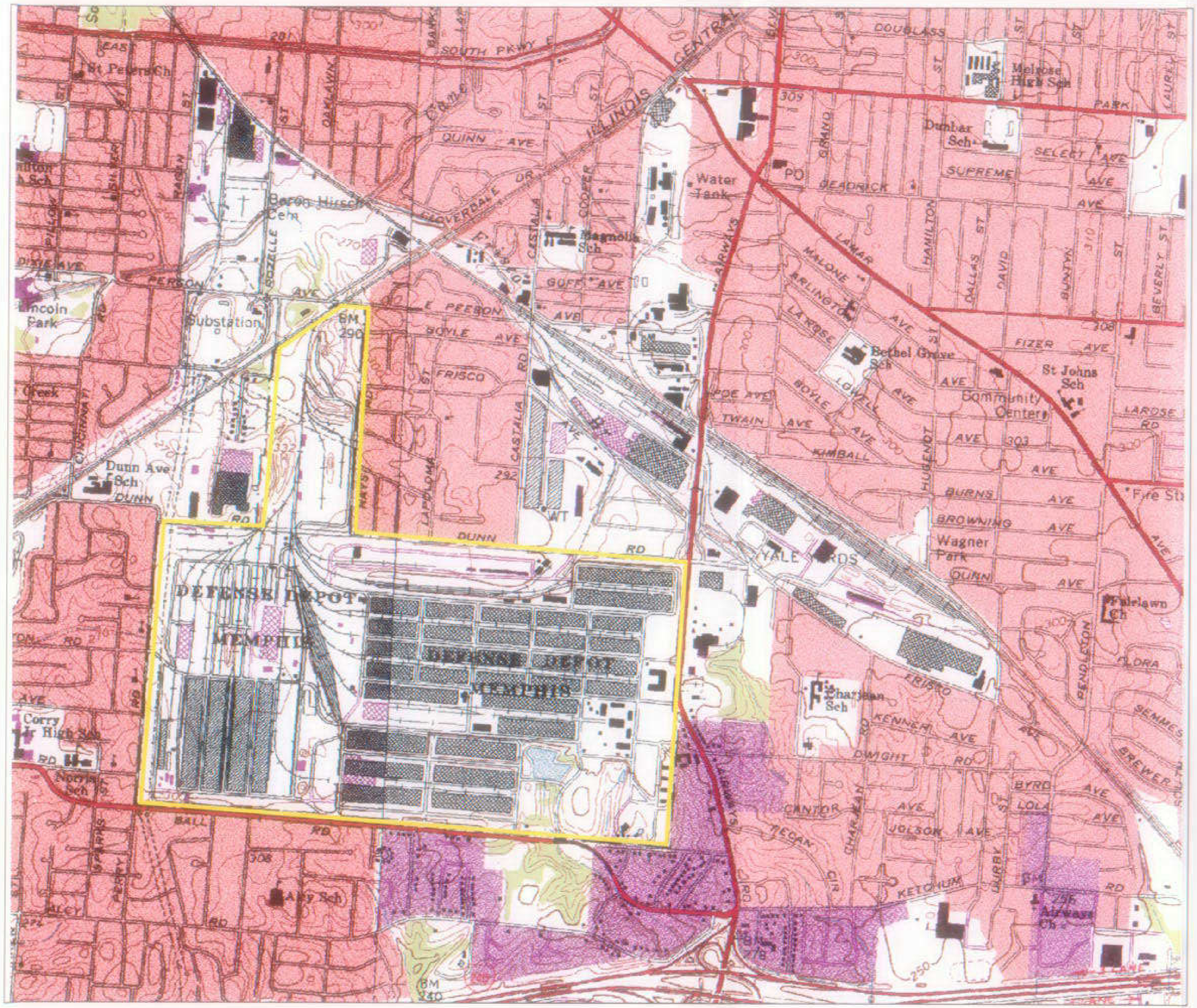
Source Wessex Data, 1997

TABLE 2-9
1990 Census Data for Memphis Depot and Area Surrounding
Rev 0 Memphis Depot Dunn Field RI

	1980 Census	1988 Estimate	1993 Projection
1990 Census Data for Memphis			
Total Population	646,356	652,875	659,441
Total Households	230,474	244,545	253,588
Average Household Size	2 8	2 6	2 6
1990 Census Data for Zip Code 38114			
Total Population	47,781	47,109	46,587
Total Households	15,502	16,315	16,562
Average Household Size	3.1	2 9	2 8
1990 Census Data for Zip Code 38106[a]			
Total Population	46,686	43,956	43,108
Total Households	14,588	14,214	14,312
Average Household Size	3 2	3 1	3 0

[a] Dunn Field is surrounded by zip codes 38114 and 38106.

Figures



N

LEGEND

Site Boundary

0 500 1000 Feet
SCALE IS APPROXIMATE

FIGURE 2-1
SURFACE TOPOGRAPHY OF
DUNN FIELD AND
SURROUNDING AREA
Rev.0 MEMPHIS DEPOT DUNN FIELD RI

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ATL \\Boomer\projects\Memphis\aprs\dunnfld_landuse_101901.apr

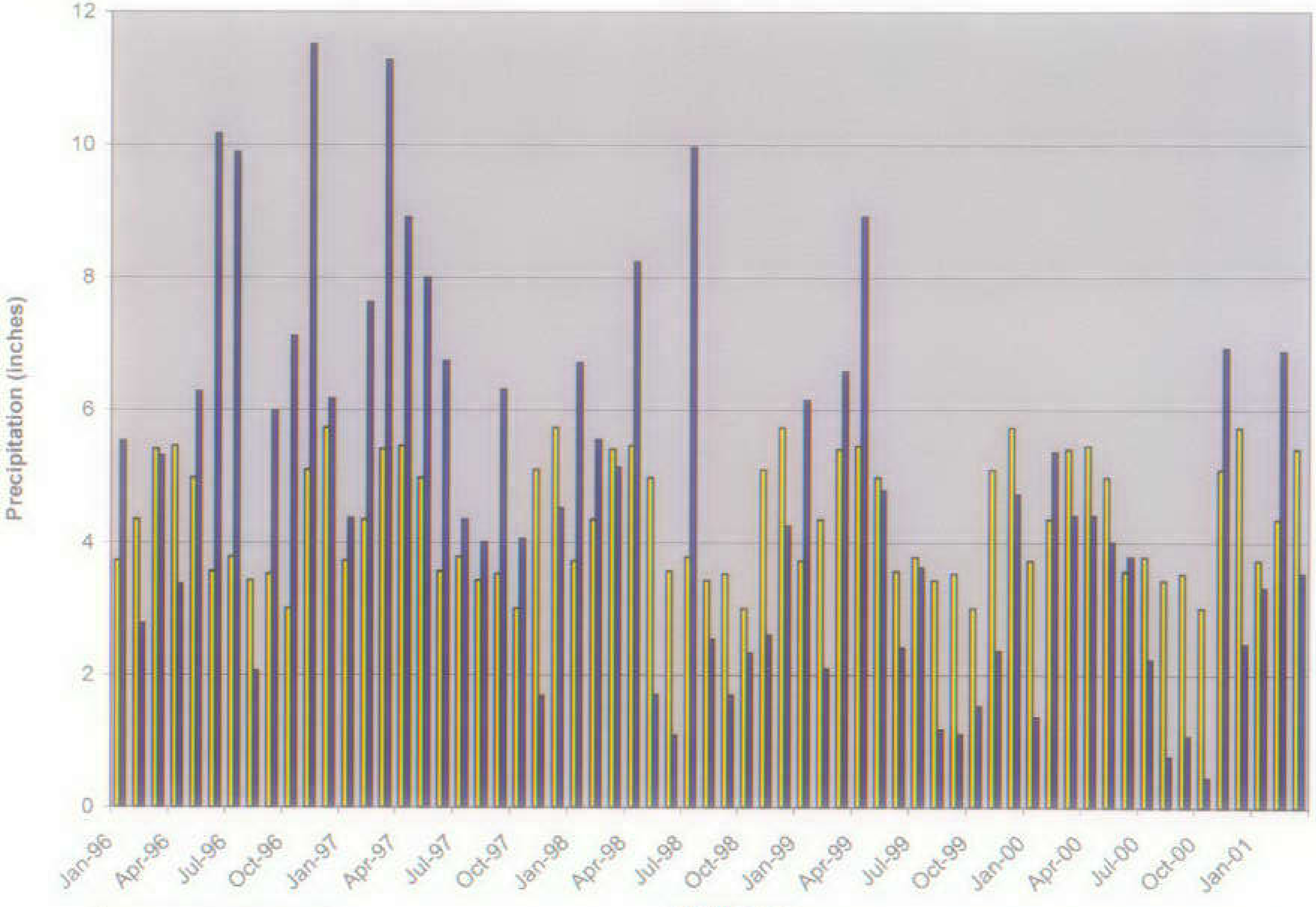
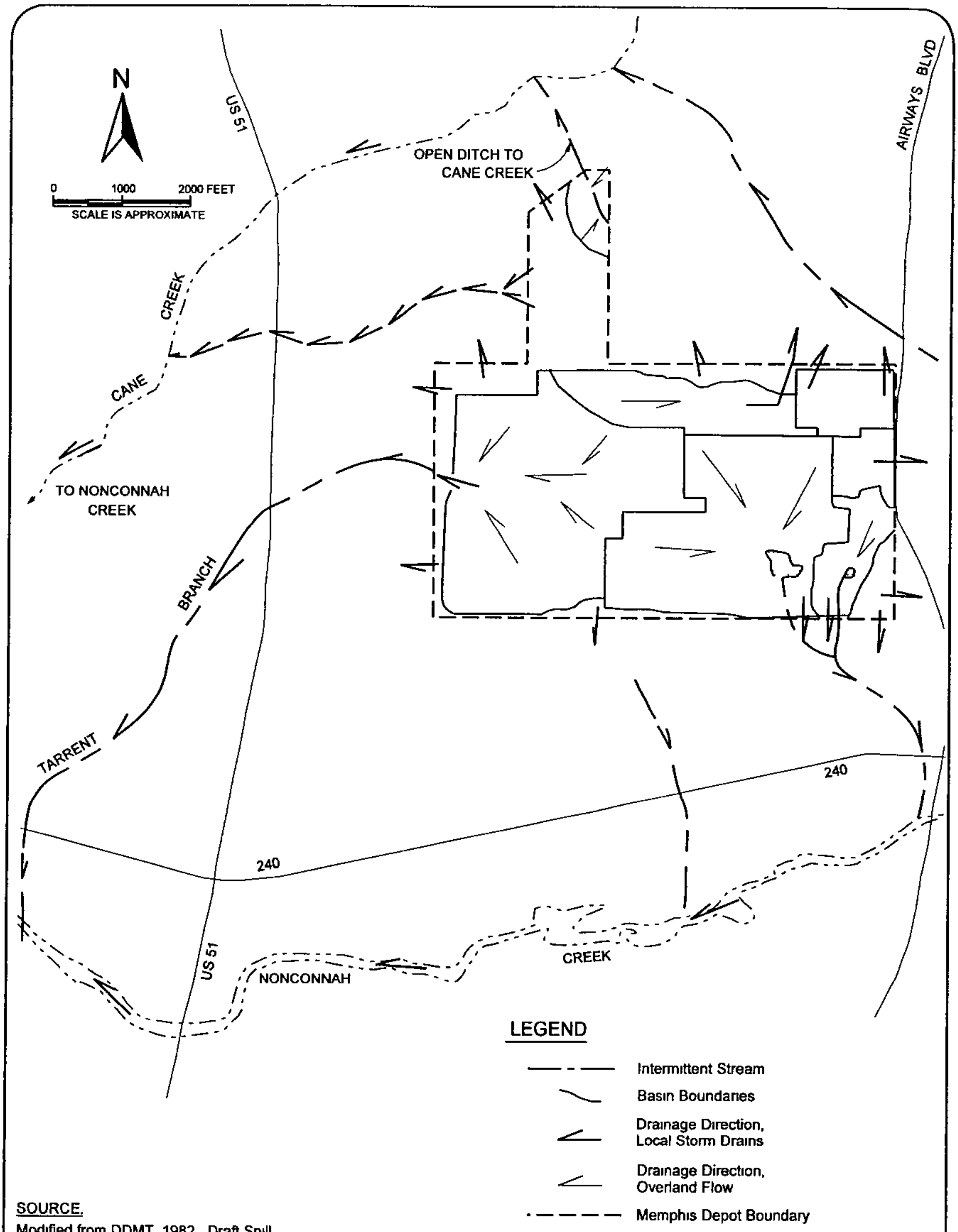


FIGURE 2-2
LONG-TERM AVERAGE AND ACTUAL PRECIPITATION DATA
MEMPHIS, TENNESSEE
REV. 1 MEMPHIS DEPOT DUNN FIELD RI



SOURCE.
Modified from DDMT, 1982 Draft Spill Prevention, Control and Countermeasures Plan Modified from Harland, Bartholomew & Associates, Inc , 1988 NPDES Storm Drainage Sampling Map, Drawing Number 45-90

FIGURE 2-3A
SURFACE DRAINAGE AT
MEMPHIS DEPOT AND SURROUNDING AREA
REV 1 MEMPHIS DEPOT DUNN FIELD RI

Source RI Report, 1990

CAD1\PROJECTS\148071 DDMT\DUNNFIELD RI 2001\8071DFRI01-2-3.dgn

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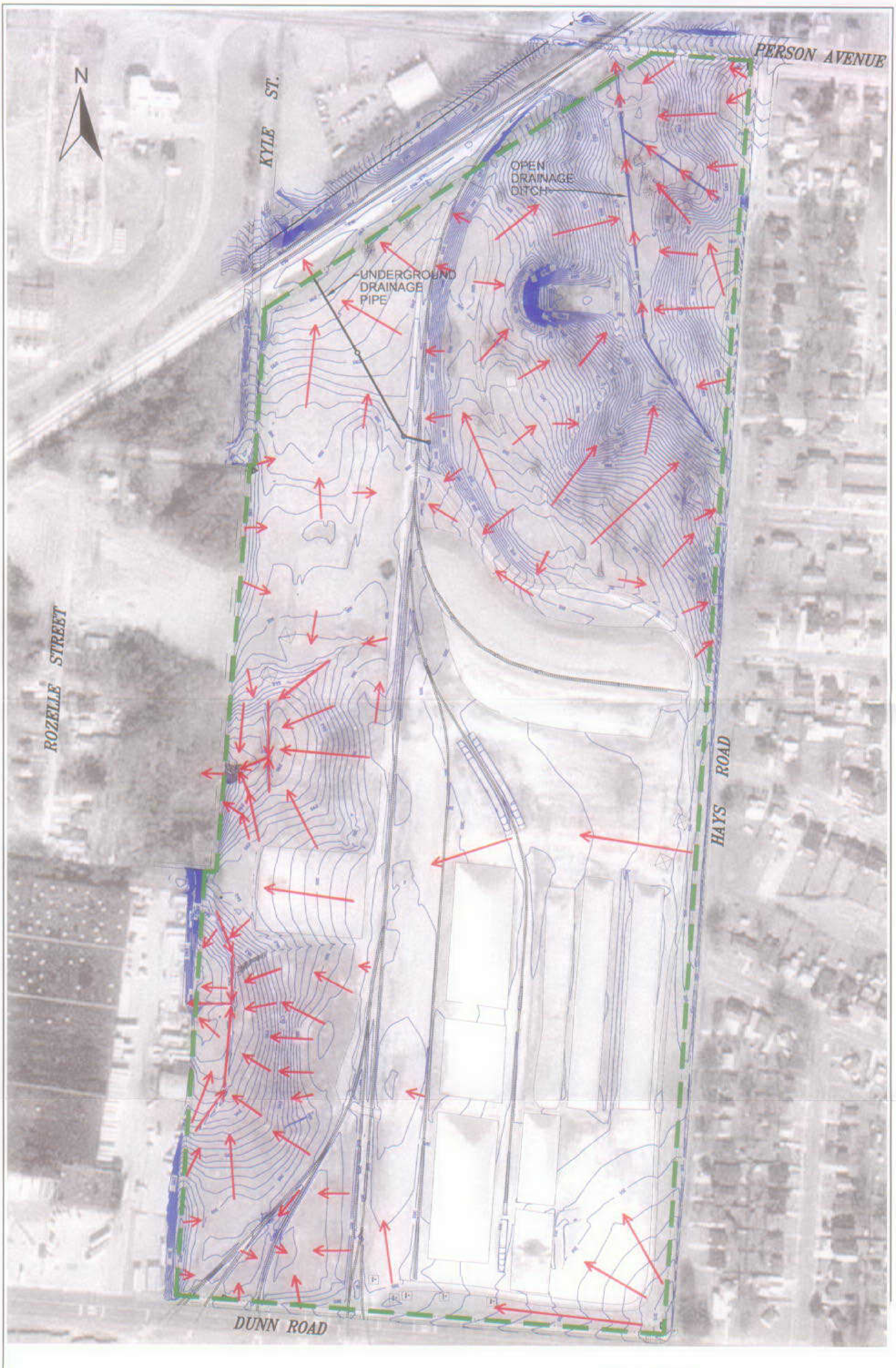

FIGURE 2-3B
SURFACE DRAINAGE WITHIN DUNN FIELD
REV. 1 MEMPHIS DEPOT DUNN FIELD RI

ATL/CAD1/PROJECTS/148071 DDMT/Figure2-3B

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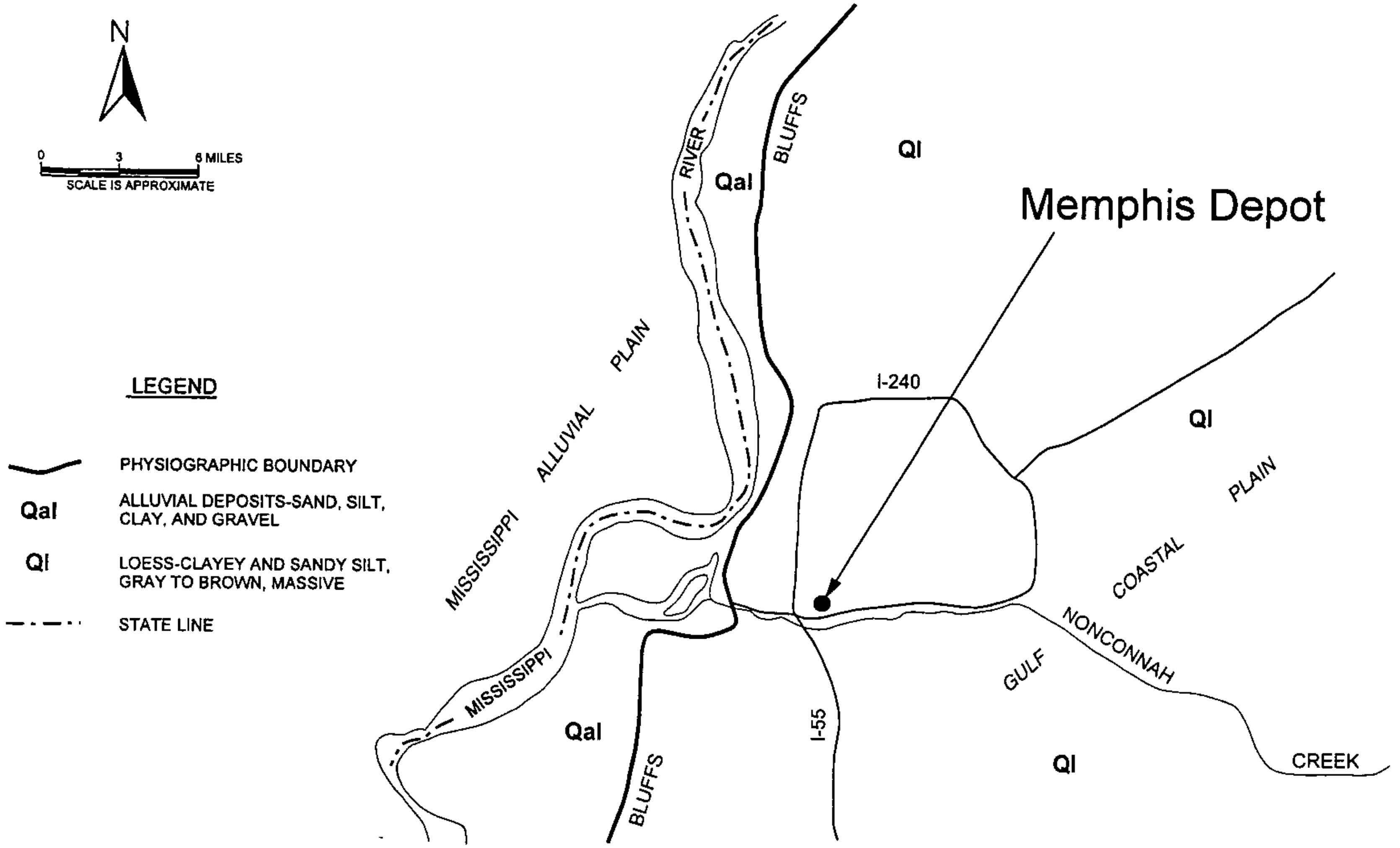
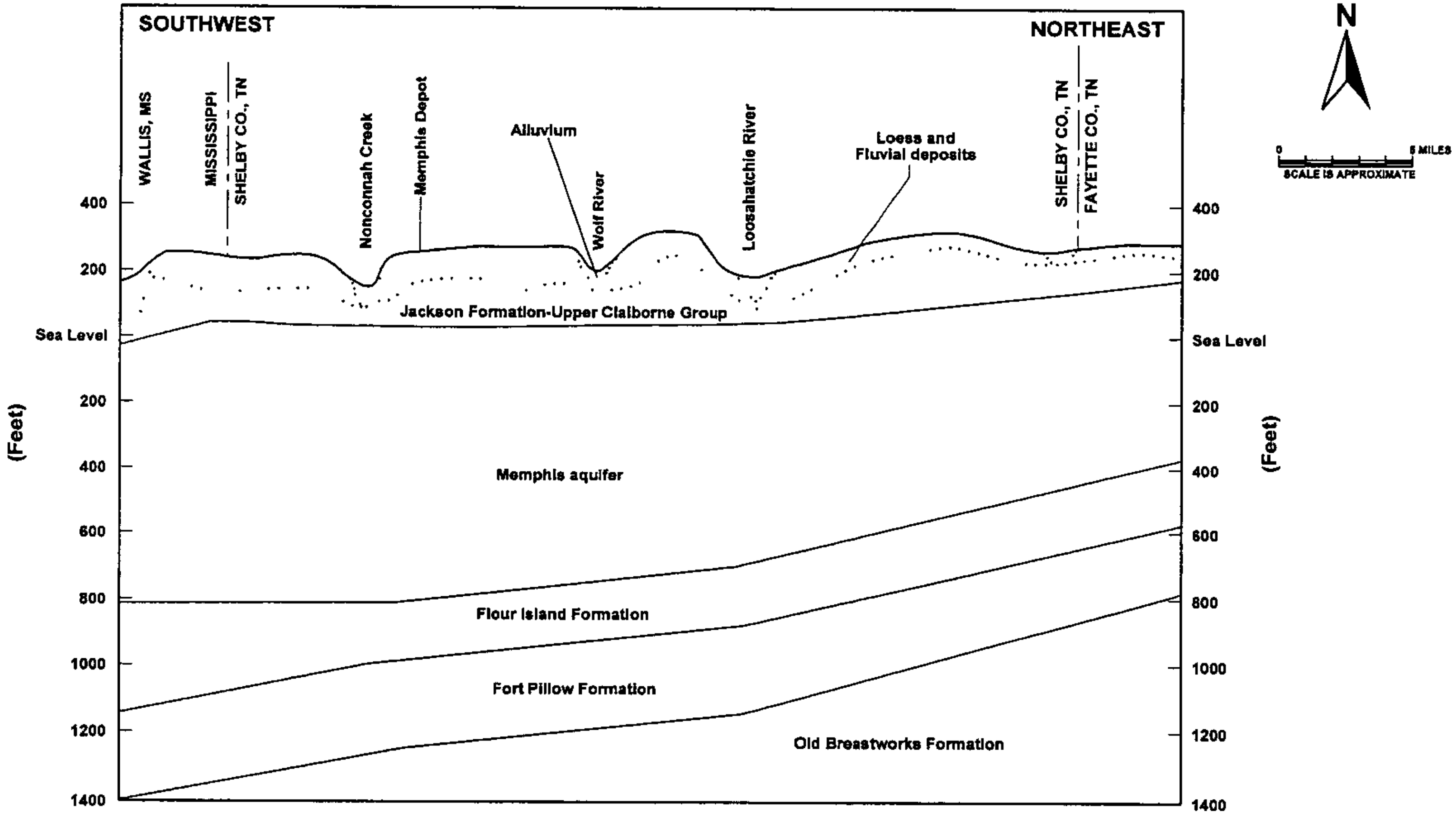


Source. Engineering-Science, 1993

Rev. 1

FIGURE 2-4
SURFACE GEOLOGY AND PHYSIOGRAPHIC MAP OF THE MEMPHIS AREA
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



Source: Parks, 1990

FIGURE 2-5
GENERAL GEOLOGICAL CROSS SECTION
OF THE MEMPHIS AREA
MEMPHIS DEPOT DUNN FIELD RI

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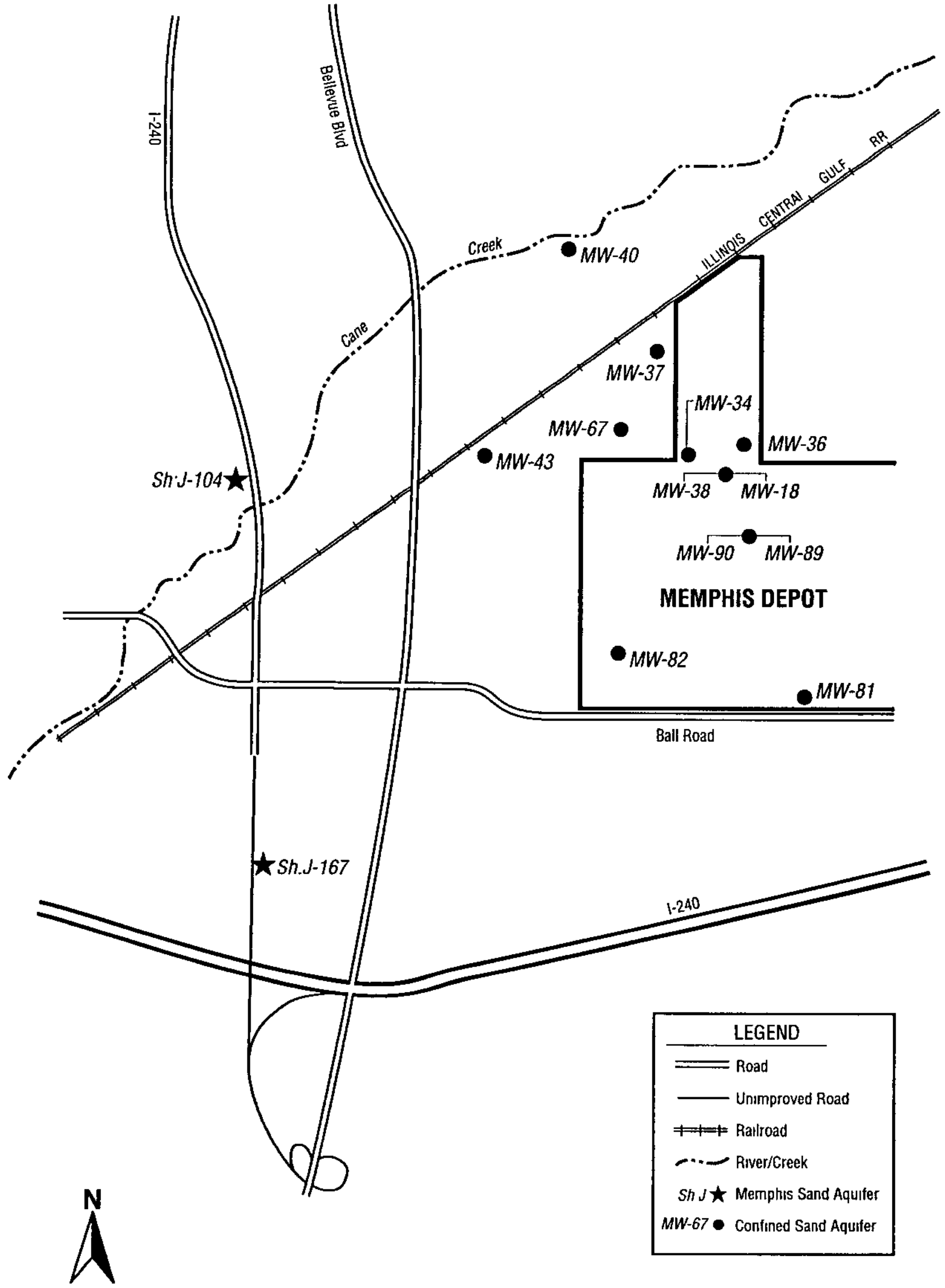

FIGURE 2-6
INTERMEDIATE AND MEMPHIS AQUIFER WELL LOCATIONS
REV 1 MEMPHIS DEPOT DUNN FIELD RI

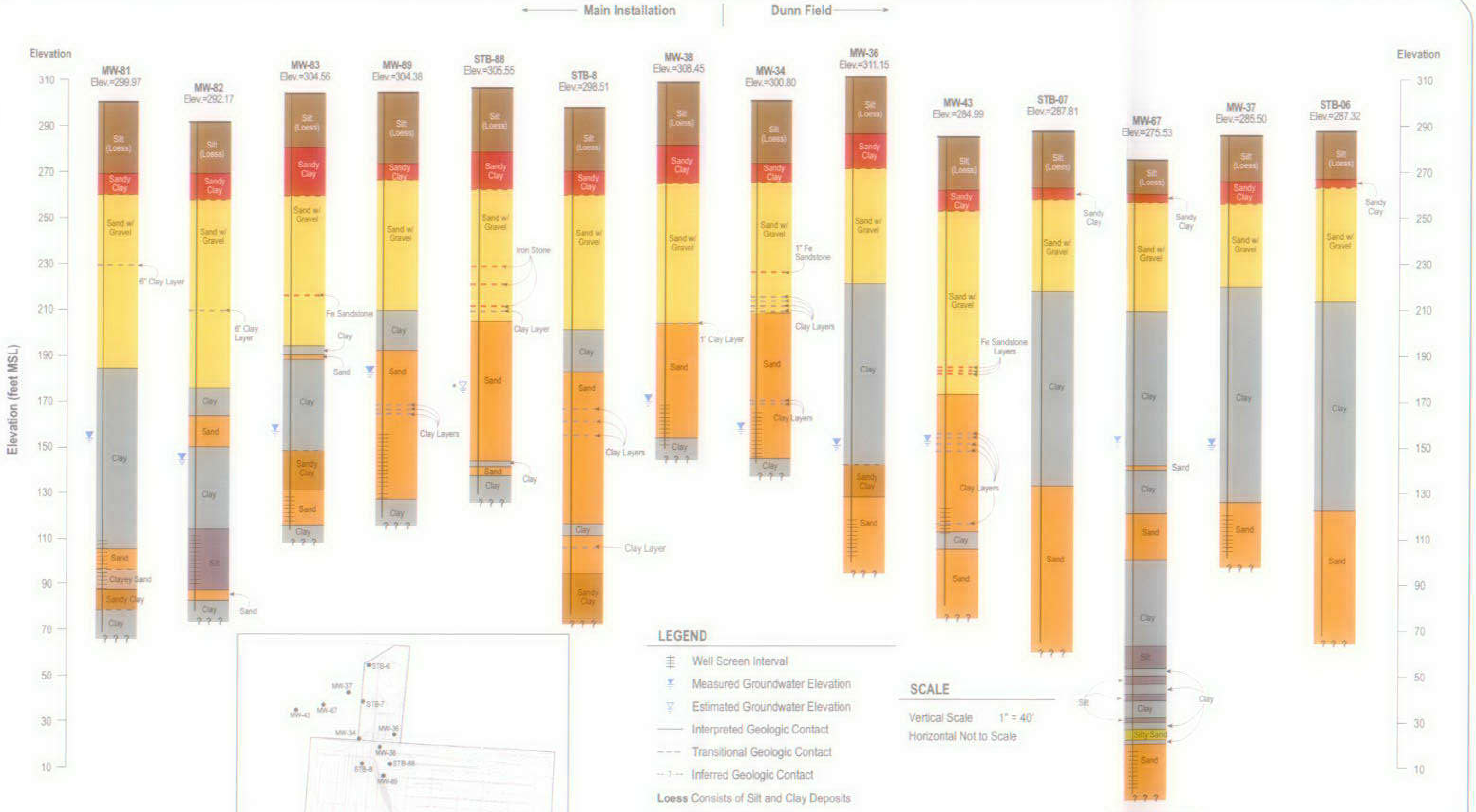

FIGURE 2-7
Reference for the Lithology of the Deepest Wells/Soil Borings on the Memphis Depot
Memphis Depot Dunn Field RI Report

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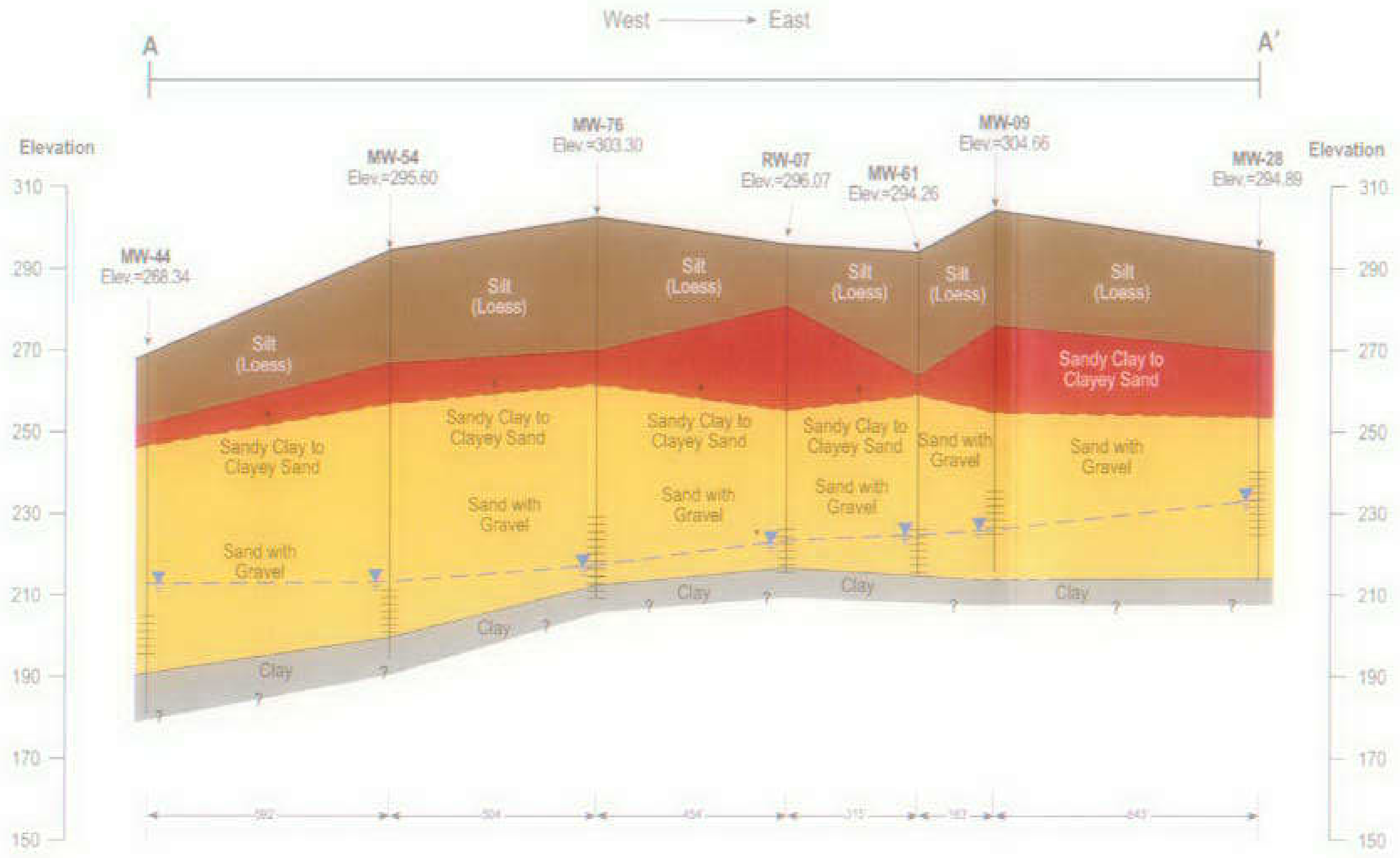

SCALE

Vertical Scale 1" = 40'
Horizontal Scale 1" = 400'

LEGEND

- ‡ Well Screen Interval
- ▼ Measured Groundwater Elevation
- —— Interpreted Geologic Contact
- – – – Transitional Geologic Contact
- – ? – Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event, except where noted.

* RW-07 was not operating on 01/10/2001.

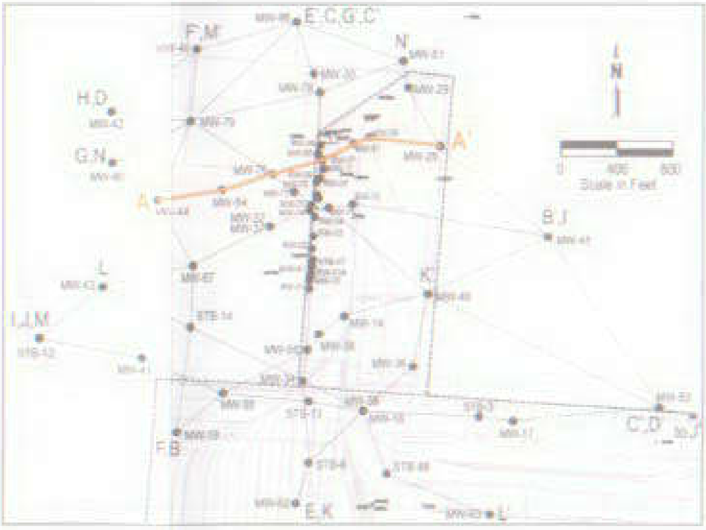

FIGURE 2-8a
Lithologic Cross-Section A - A'
Memphis Depot Dunn Field RI Report

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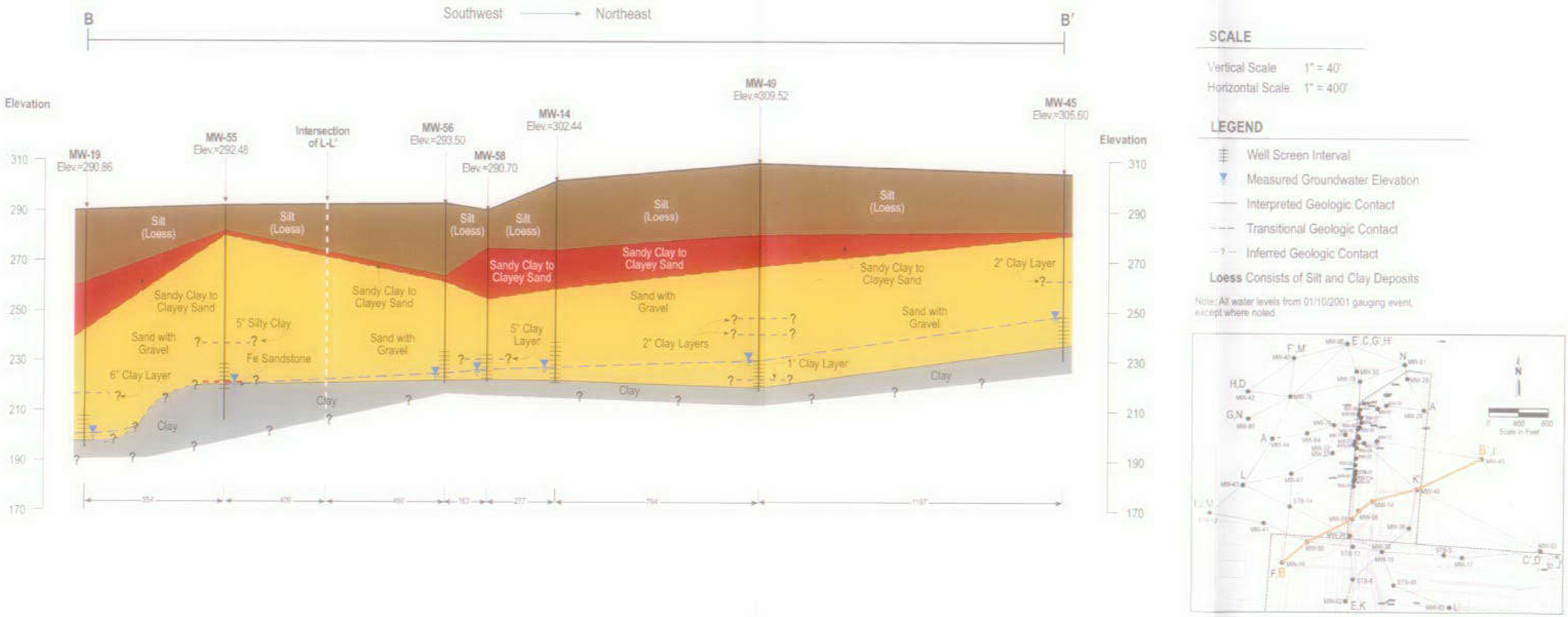

SCALE

Vertical Scale 1" = 40'
Horizontal Scale 1" = 400'

LEGEND

- ‡ Well Screen Interval
- ▼ Measured Groundwater Elevation
- —— Interpreted Geologic Contact
- - - - Transitional Geologic Contact
- -?- Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event, except where noted.

FIGURE 2-8b
Lithologic Cross-Section B - B'
Memphis Depot Dunn Field RI Report

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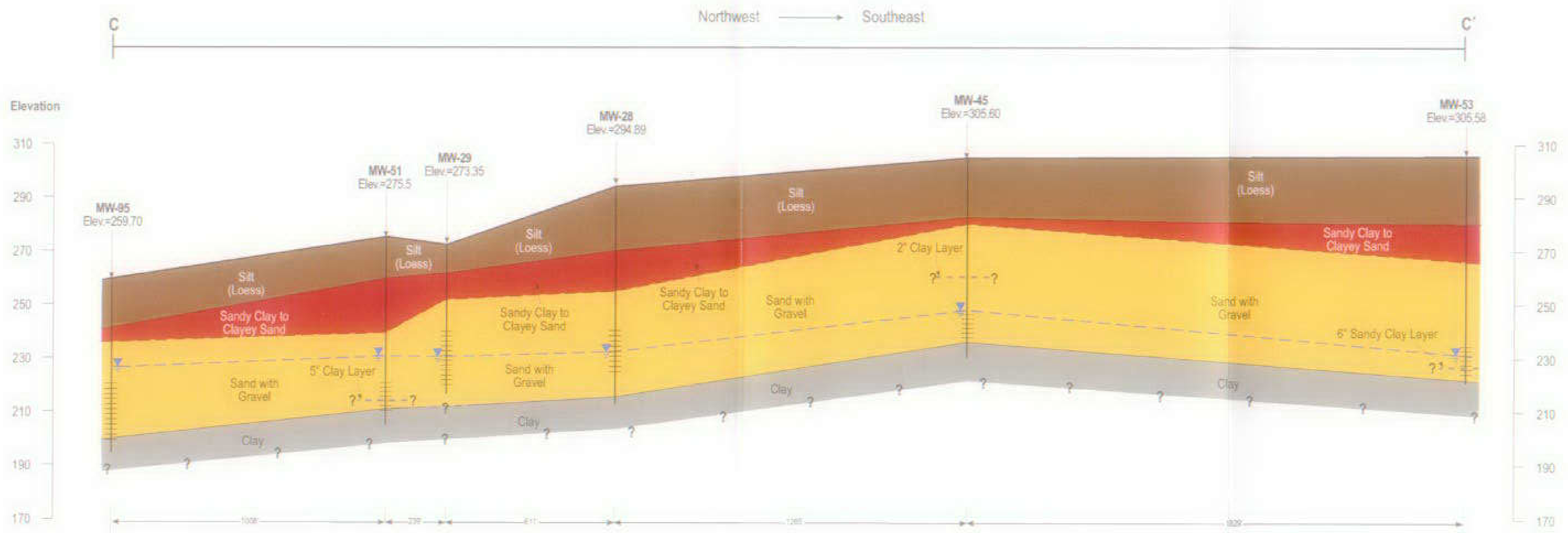

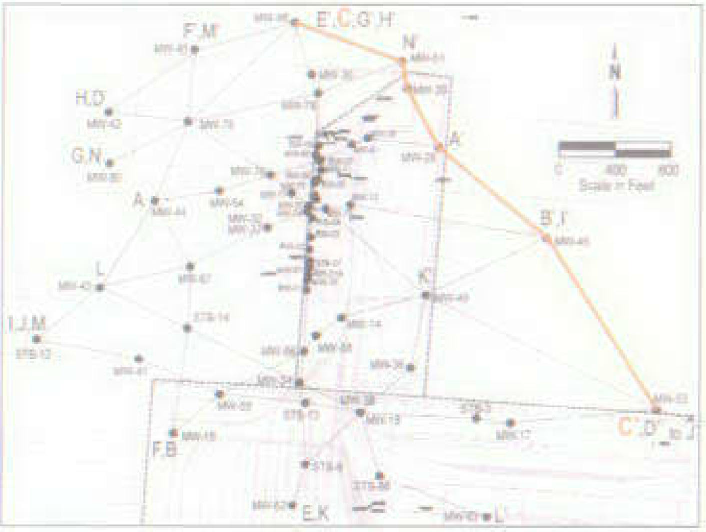

LEGEND

- ‡ Well Screen Interval
- ▼ Measured Groundwater Elevation
- — Interpreted Geologic Contact
- - - Transitional Geologic Contact
- - ? - Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event, except where noted.

SCALE

Vertical Scale 1" = 40'

Horizontal Scale 1" = 400'

FIGURE 2-8c
Lithologic Cross-Section C - C'
Memphis Depot Dunn Field RI Report

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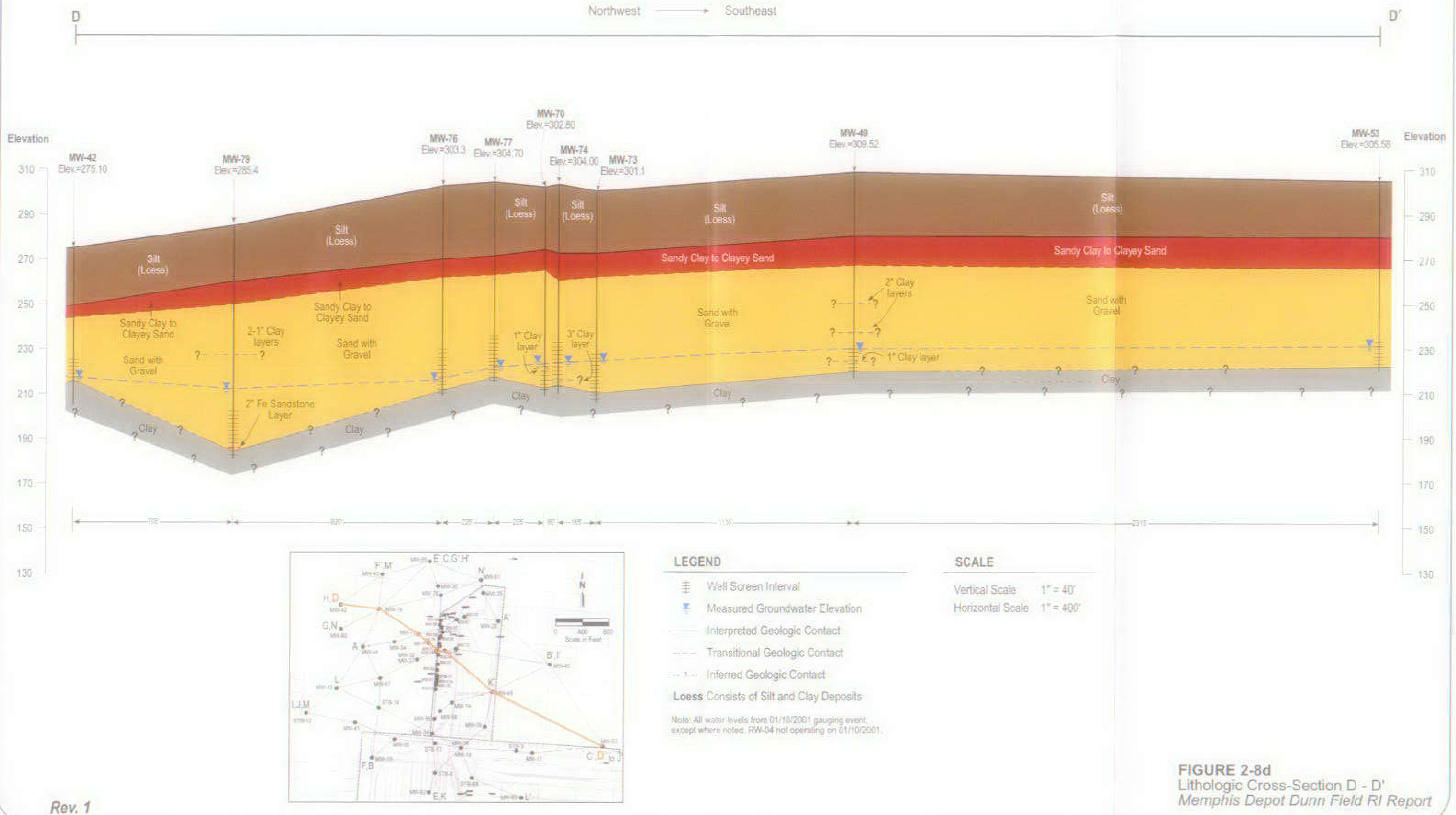

LEGEND

- ⋕ Well Screen Interval
- ▼ Measured Groundwater Elevation
- —— Interpreted Geologic Contact
- – – – Transitional Geologic Contact
- – ? – Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event, except where noted. RW-04 not operating on 01/10/2001.

SCALE

Vertical Scale	1" = 40'
Horizontal Scale	1" = 400'

FIGURE 2-8d
Lithologic Cross-Section D - D'
Memphis Depot Dunn Field RI Report

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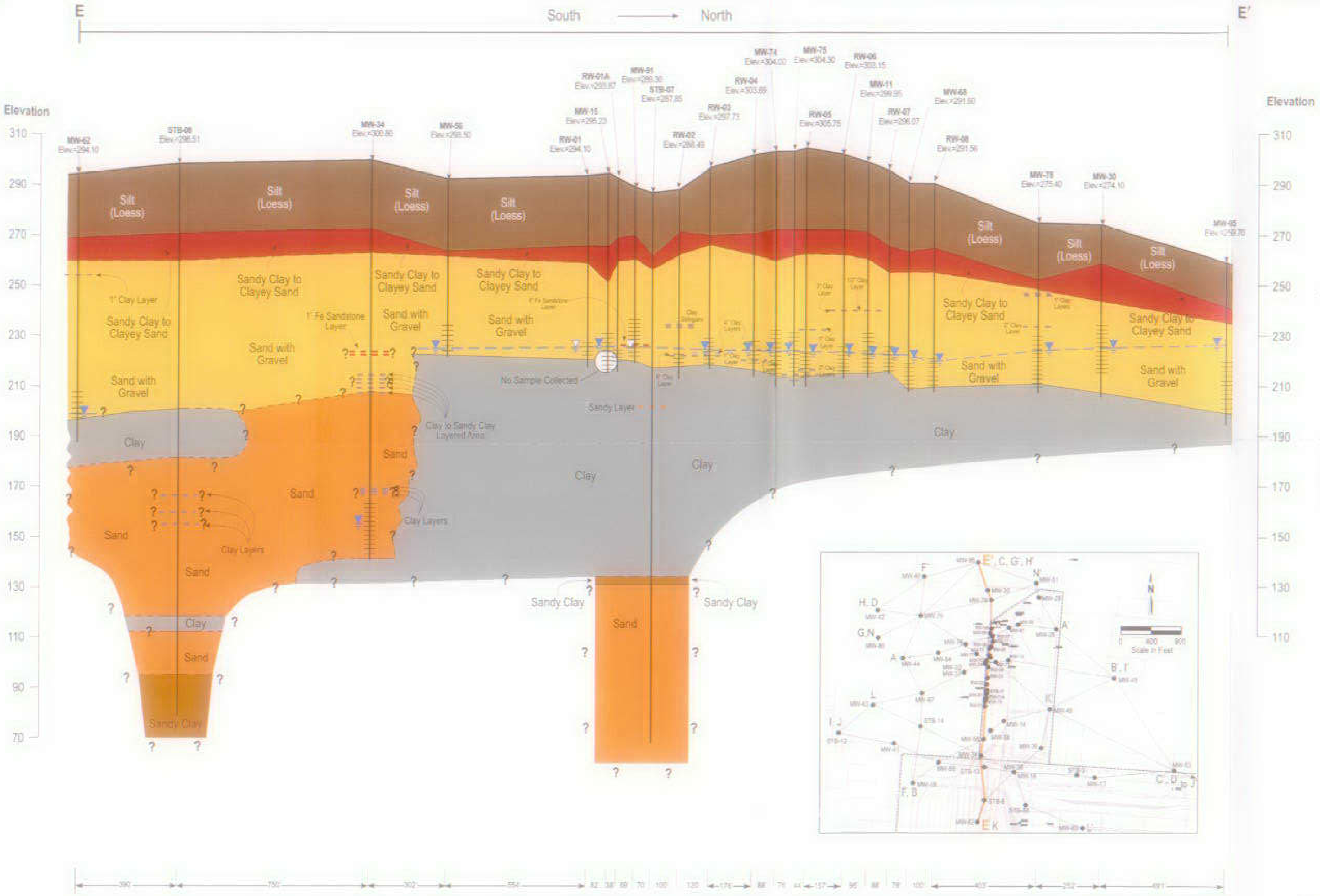

SCALE

Vertical Scale 1" = 40'
Horizontal Scale 1" = 400'

LEGEND

- Well Screen Interval
- Measured Groundwater Elevation
- Interpreted Geologic Contact
- Transitional Geologic Contact
- Inferred Geologic Contact
- **Loess** Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event, except where noted.
RW-08 was in operation and RW-01, RW-1A, RW-1B, RW-02, and RW-07 were not operating on 01/10/2001

FIGURE 2-8e
Lithologic Cross-Section E - E'
Memphis Depot Dunn Field RI Report

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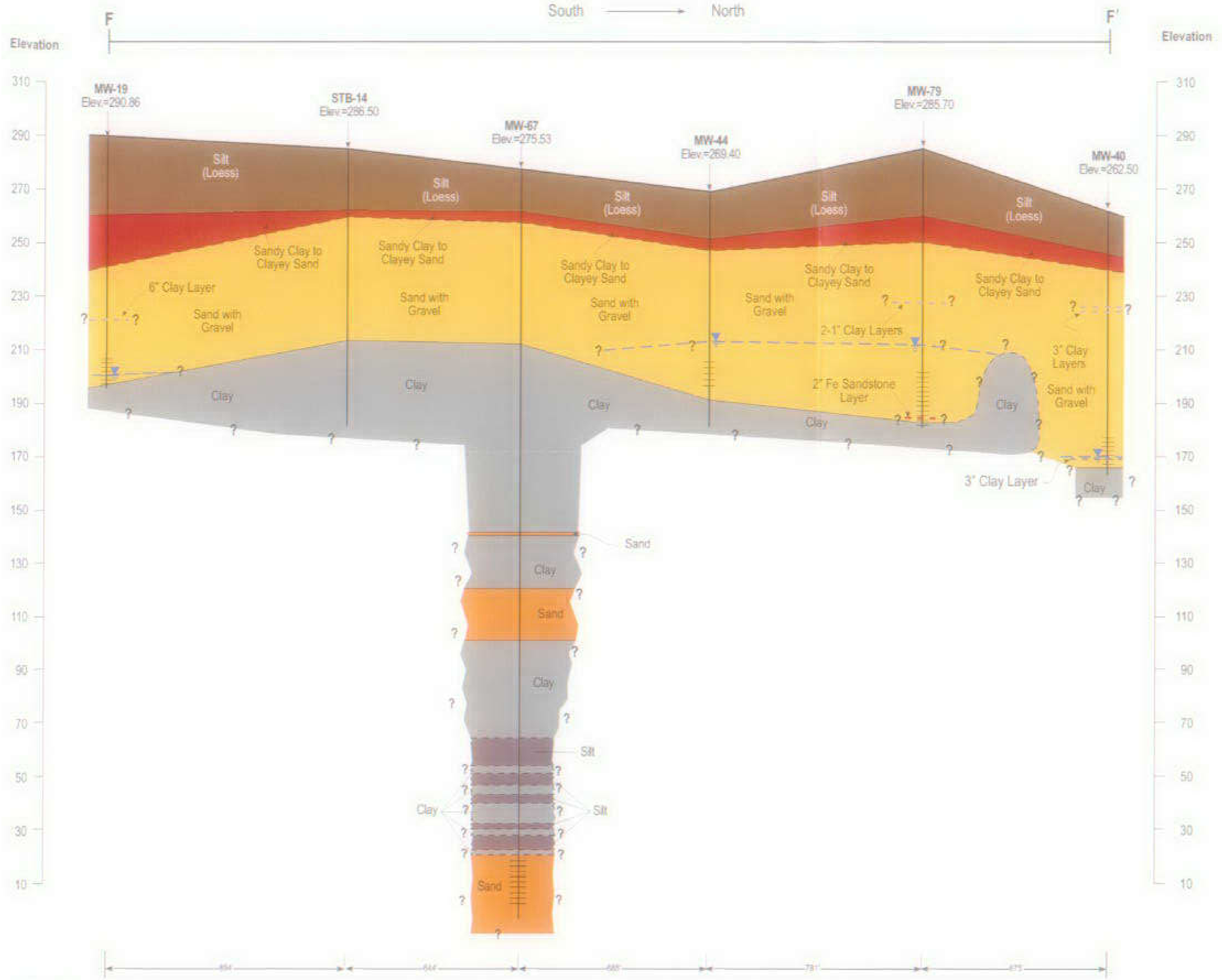

SCALE

Vertical Scale 1" = 40'
Horizontal Scale 1" = 400'

LEGEND

- ‡ Well Screen Interval
- ▼ Measured Groundwater Elevation
- —— Interpreted Geologic Contact
- - - - Transitional Geologic Contact
- - ? - Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event except where noted

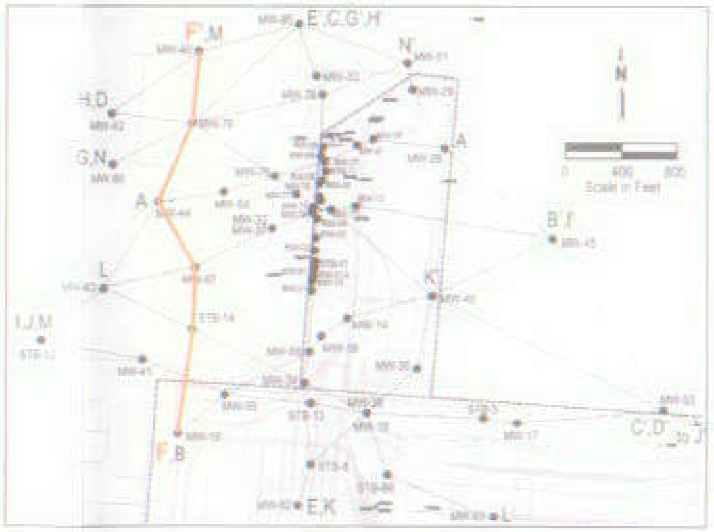

FIGURE 2-8f
Lithologic Cross-Section F - F'
Memphis Depot Dunn Field RI Report

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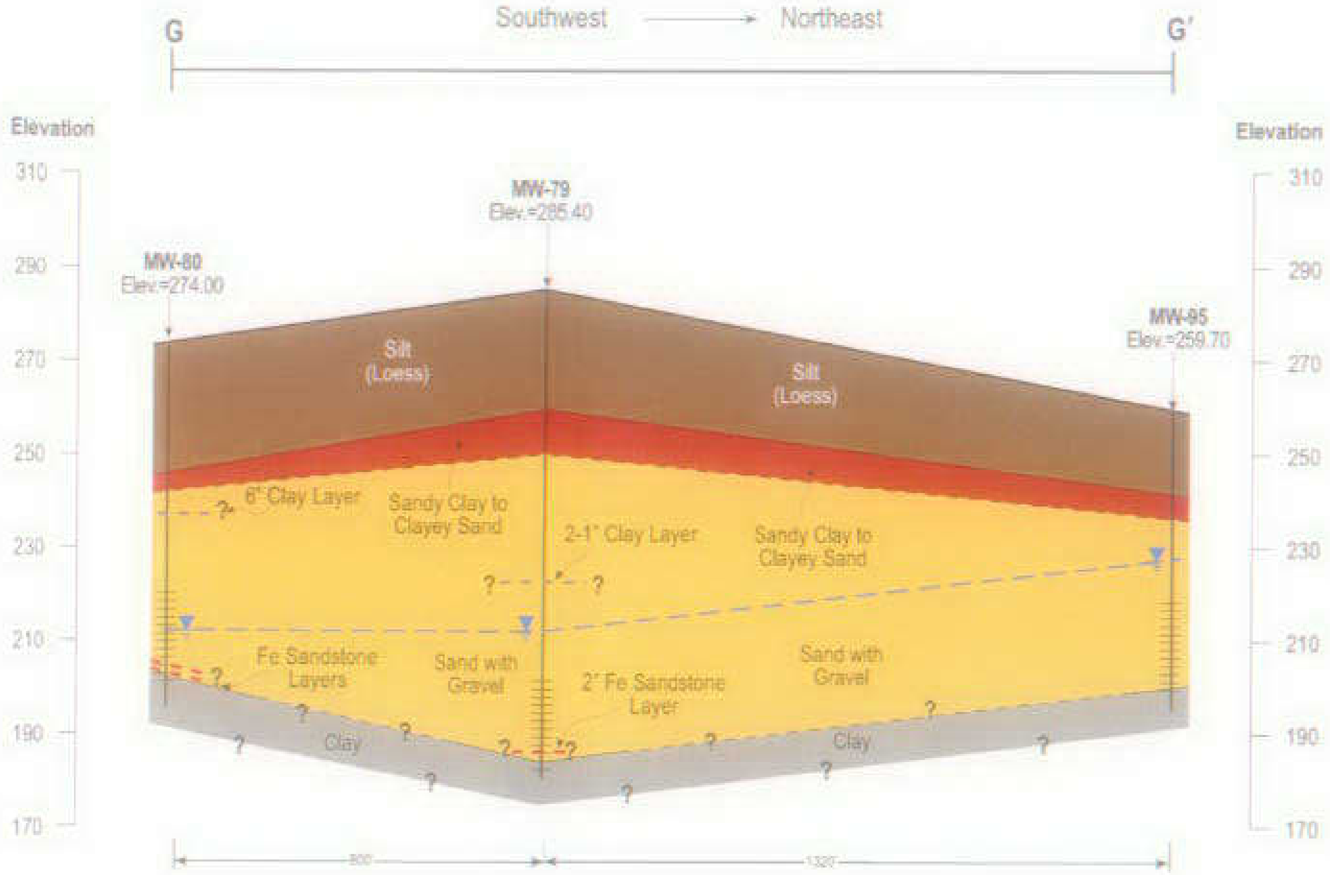
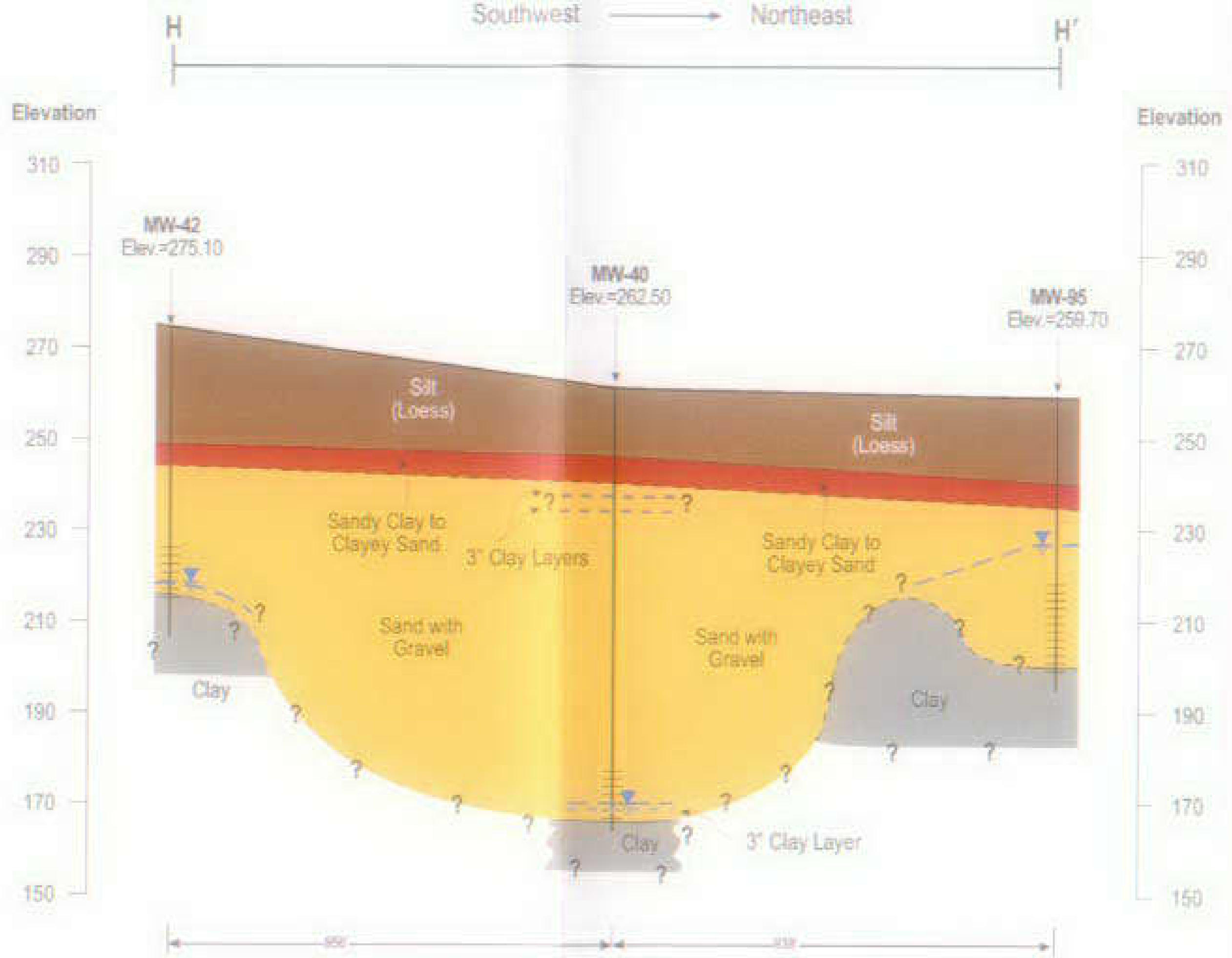
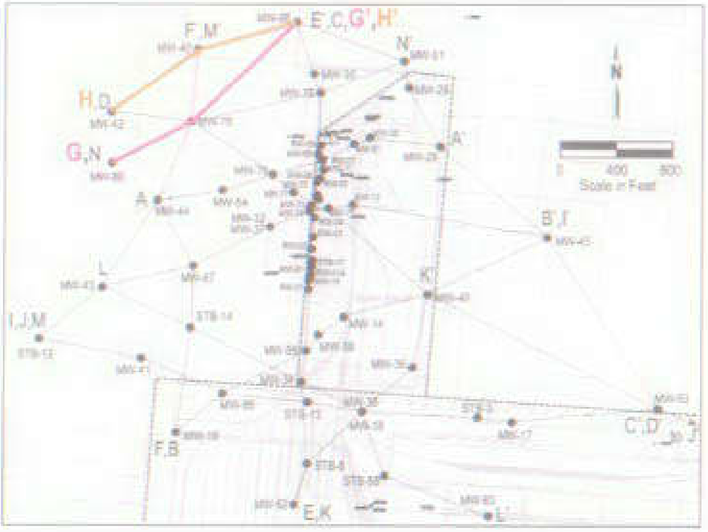
E032002012ATL\memphis depot 105.fh8







LEGEND

- ǂ Well Screen Interval
- ▼ Measured Groundwater Elevation
- —— Interpreted Geologic Contact
- - - - Transitional Geologic Contact
- -- ? -- Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 01/10/2001 gauging event, except where noted.

SCALE

Vertical Scale	1" = 40'
Horizontal Scale	1" = 400'

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FIGURE 2-8g
Lithologic Cross-Section G - G' and H - H'
Memphis Depot Dunn Field RI Report

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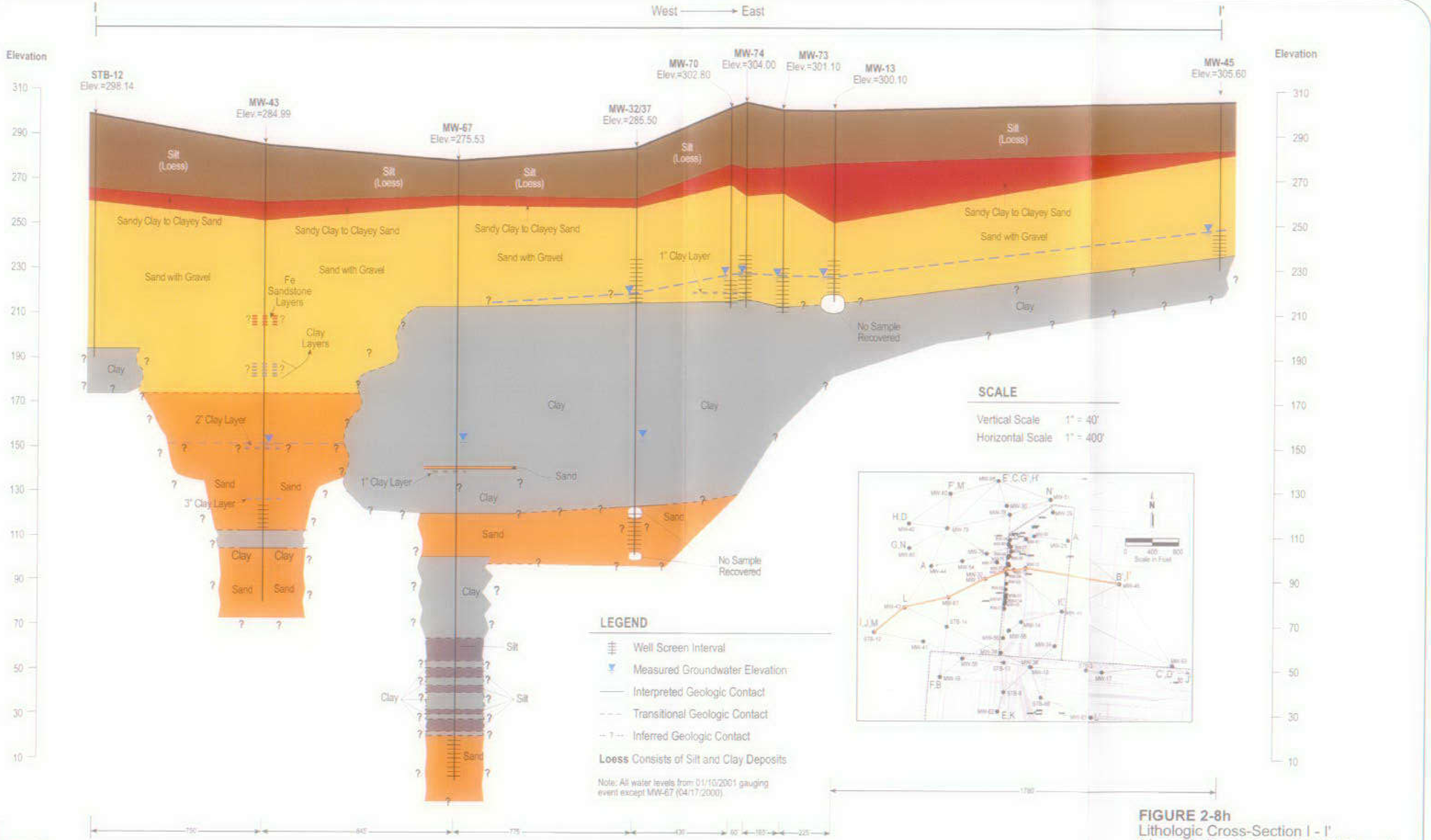

FIGURE 2-8h
Lithologic Cross-Section I - I'
Memphis Depot Dunn Field RI Report

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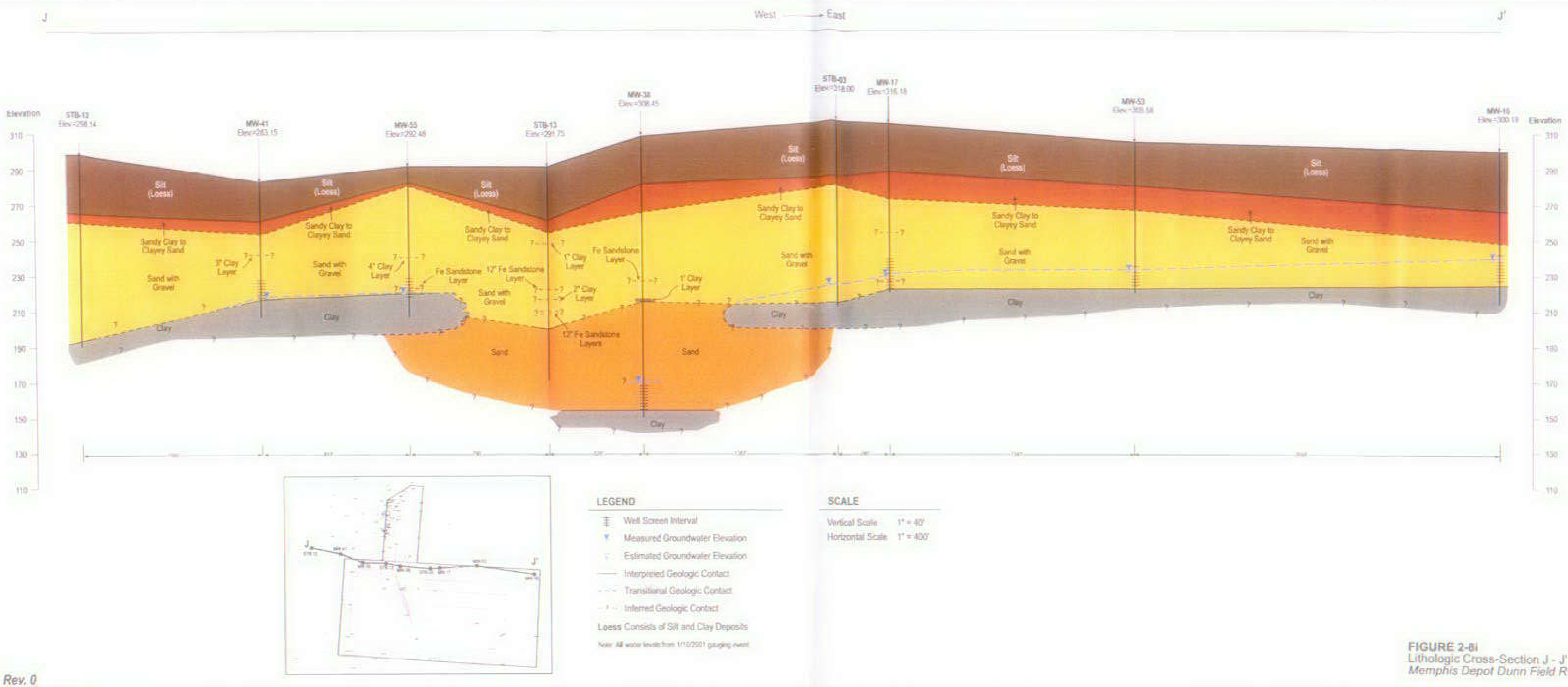
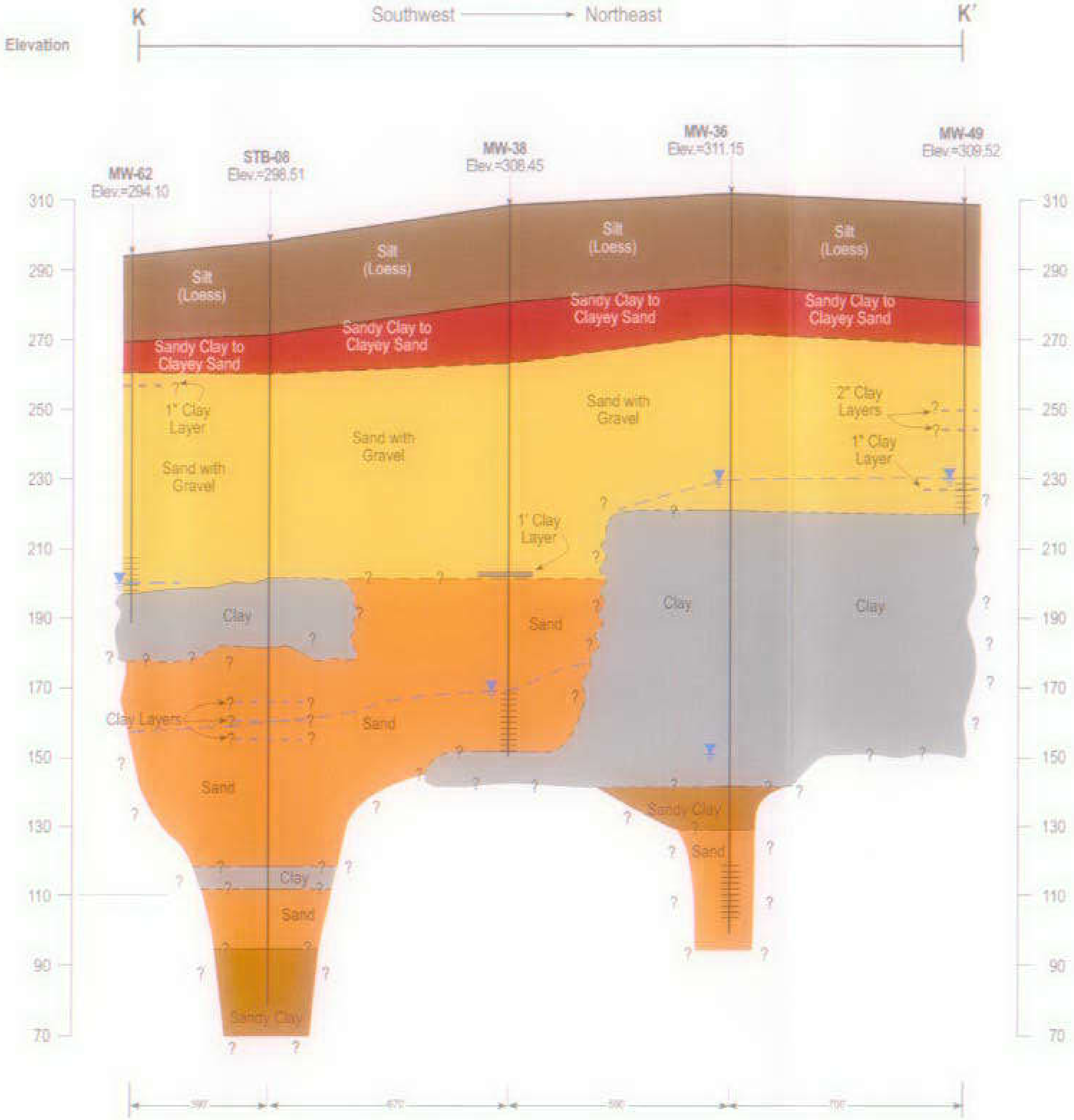


FIGURE 2-8i
Lithologic Cross-Section J - J'
Memphis Depot Dunn Field RI Report



SCALE

Vertical Scale	1" = 40'
Horizontal Scale	1" = 400'

LEGEND

‡	Well Screen Interval
▼	Measured Groundwater Elevation
▽	Estimated Groundwater Elevation
——	Interpreted Geologic Contact
- - -	Transitional Geologic Contact
--?--	Inferred Geologic Contact

Loess Consists of Silt and Clay Deposits

Note: All water levels from 1/10/2001 sampling event

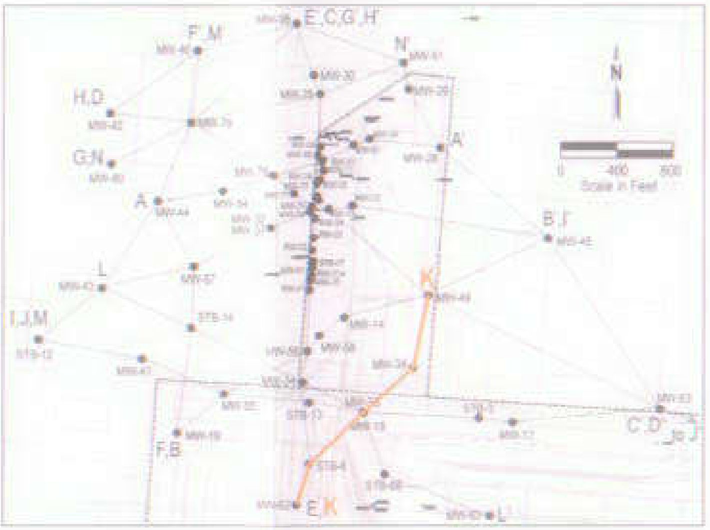


FIGURE 2-8j
Lithologic Cross-Section K - K'
Memphis Depot Dunn Field RI Report

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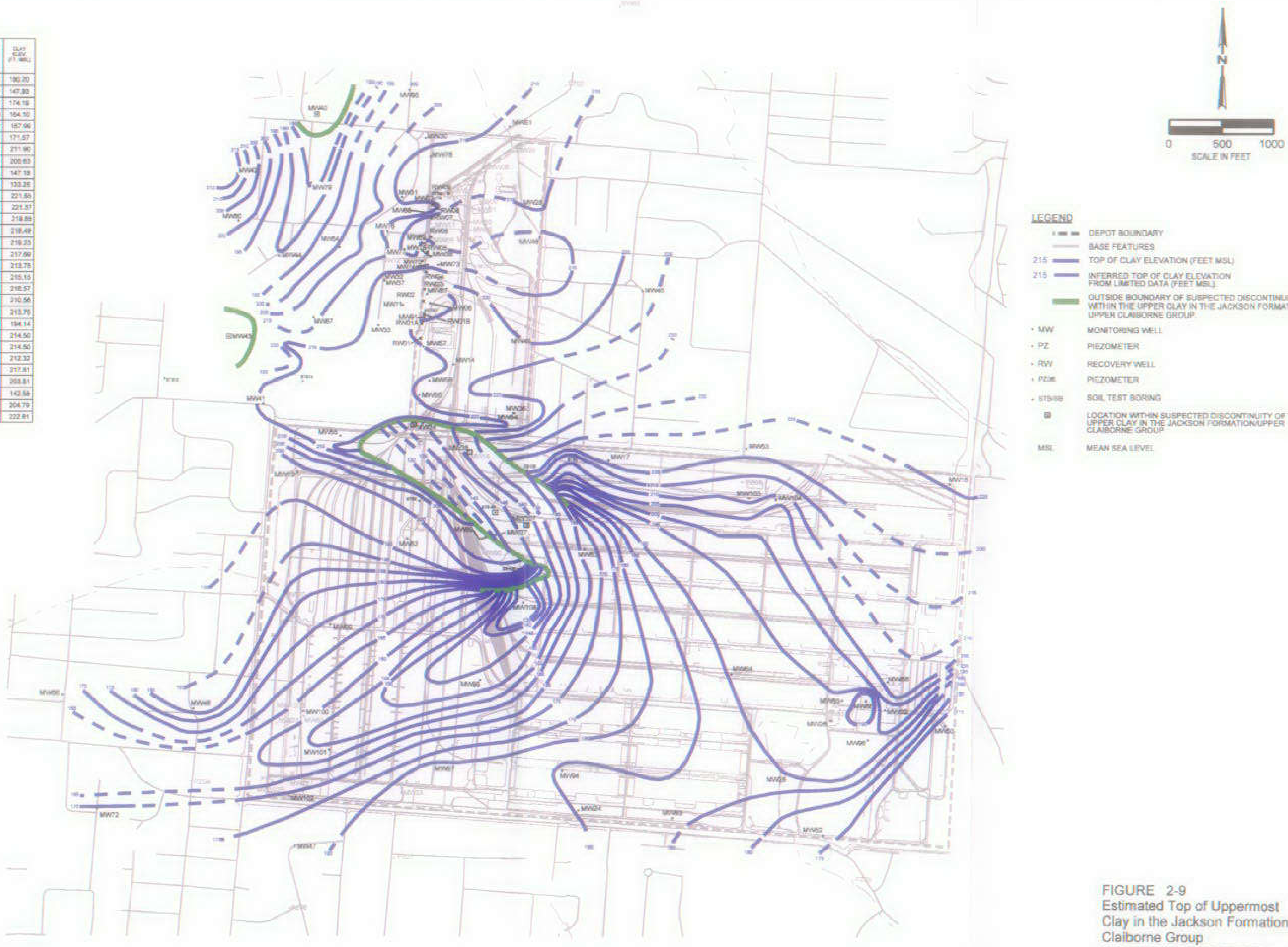
ID	GRND ELEV (FT. MSL)	DEPTH TO CLAY (FEET)	CLAY ELEV (FT. MSL)
MW-14	302.44	79.50	222.94
MW-16	300.19	75.00	225.19
MW-17	316.15	94.00	222.15
MW-19	290.86	93.50	197.36
MW-24	298.81	114.70	184.11
MW-25	270.32	80.70	189.62
MW-26	303.89	110.00	193.89
MW-27	304.28	96.00	208.28
MW-28	294.89	80.00	214.89
MW-30	274.10	66.00	208.10
MW-31	287.50	76.30	211.20
MW-32	285.60	66.50	219.10
MW-33	277.70	60.00	217.70
MW-34	300.90	158.30	142.60
MW-35	301.70	90.50	211.20
MW-36	311.15	90.00	221.15
MW-37	285.50	69.50	216.00
MW-38	308.45	155.00	153.45
MW-40	282.50	96.00	186.50
MW-41	283.15	67.00	216.15
MW-42	275.10	59.00	216.10
MW-43	284.99	173.00	111.99
MW-44	269.40	78.00	191.40
MW-45	293.30	69.50	223.80
MW-46	286.83	73.00	213.83
MW-47	292.15	115.00	177.15
MW-48	283.58	84.50	199.08
MW-49	309.52	89.50	220.02
MW-50	299.32	126.00	173.32
MW-51	275.50	64.50	211.00
MW-52	279.71	104.00	175.71
MW-53	305.58	83.00	222.58
MW-54	296.60	96.00	200.60
MW-55	292.48	74.00	218.48
MW-56	293.50	70.50	223.00
MW-57	291.10	71.00	220.10
MW-58	290.70	67.50	223.20
MW-62	294.10	97.00	197.10
MW-63	305.13	137.00	168.13
MW-64	304.46	113.00	191.46
MW-65	294.00	82.00	212.00
MW-66	289.00	121.00	168.00
MW-67	275.53	66.00	209.53
MW-68	291.60	82.50	209.10
MW-69	304.90	92.00	212.90
MW-70	302.80	90.00	212.80
MW-71	291.90	75.50	216.40
MW-72	296.41	126.00	170.41
MW-74	304.00	89.50	214.50
MW-75	304.30	90.40	213.90
MW-76	303.30	90.80	212.50
MW-77	304.70	87.00	217.70
MW-78	275.40	63.50	211.90
MW-79	285.40	101.00	184.40
MW-80	274.00	72.00	202.00
MW-81	299.97	114.00	185.97
MW-82	292.17	117.00	175.17
MW-83	304.56	110.00	194.56
MW-84	311.27	89.00	222.27
MW-85	304.50	111.50	193.00
MW-86	304.89	117.00	187.89
MW-87	292.80	77.50	215.30
MW-88	305.47	97.00	208.47
MW-89	304.38	94.50	209.88
MW-91	288.30	69.50	218.80
MW-92	304.78	107.89	196.89
MW-93	294.31	107.00	187.31
MW-94	296.95	110.70	186.25
MW-95	289.70	89.00	200.70
MW-96	289.67	95.50	194.17

ID	GRND ELEV (FT. MSL)	DEPTH TO CLAY (FEET)	CLAY ELEV (FT. MSL)
MW-97	297.70	117.50	180.20
MW-98	294.93	147.00	147.93
MW-99	285.69	111.50	174.19
MW-100S	291.60	127.50	164.10
MW-101	291.96	134.00	157.96
MW-102S	312.07	140.50	171.57
MW-103	301.90	90.00	211.90
MW-104	296.13	90.50	205.63
MW-107	305.18	158.00	147.18
MW-108	303.26	170.00	133.26
RW-01	294.10	72.25	221.85
RW-01A	293.87	72.50	221.37
RW-01B	287.88	68.00	219.88
RW-02	288.49	70.00	218.49
RW-03	297.73	78.50	219.23
RW-04	303.69	86.00	217.69
RW-05	305.75	92.00	213.75
RW-06	303.15	88.00	215.15
RW-07	298.07	79.50	218.57
RW-08	291.56	81.00	210.56
RW-09	289.26	75.50	213.76
STB-12	298.14	104.00	194.14
STB-14	286.50	72.00	214.50
STB-3	18.00	103.80	214.50
STB-6	287.32	75.00	212.32
STB-7	287.81	70.00	217.81
STB-8	298.51	95.00	203.51
STB-88	305.58	163.00	142.58
SB-105	304.29	99.50	204.79
SB-108	311.81	89.00	222.81



LEGEND

- DEPOT BOUNDARY
- BASE FEATURES
- 215 TOP OF CLAY ELEVATION (FEET MSL)
- 215 INFERRED TOP OF CLAY ELEVATION FROM LIMITED DATA (FEET MSL)
- OUTSIDE BOUNDARY OF SUSPECTED DISCONTINUITY WITHIN THE UPPER CLAY IN THE JACKSON FORMATION/ UPPER CLAIBORNE GROUP
- MW MONITORING WELL
- PZ PIEZOMETER
- RW RECOVERY WELL
- PZ06 PIEZOMETER
- STB/SB SOIL TEST BORING
- ⊠ LOCATION WITHIN SUSPECTED DISCONTINUITY OF THE UPPER CLAY IN THE JACKSON FORMATION/UPPER CLAIBORNE GROUP
- MSL MEAN SEA LEVEL

FIGURE 2-9
Estimated Top of Uppermost Clay in the Jackson Formation/Upper Claiborne Group
REV. 1 MEMPHIS DEPOT, DUNN FIELD RI

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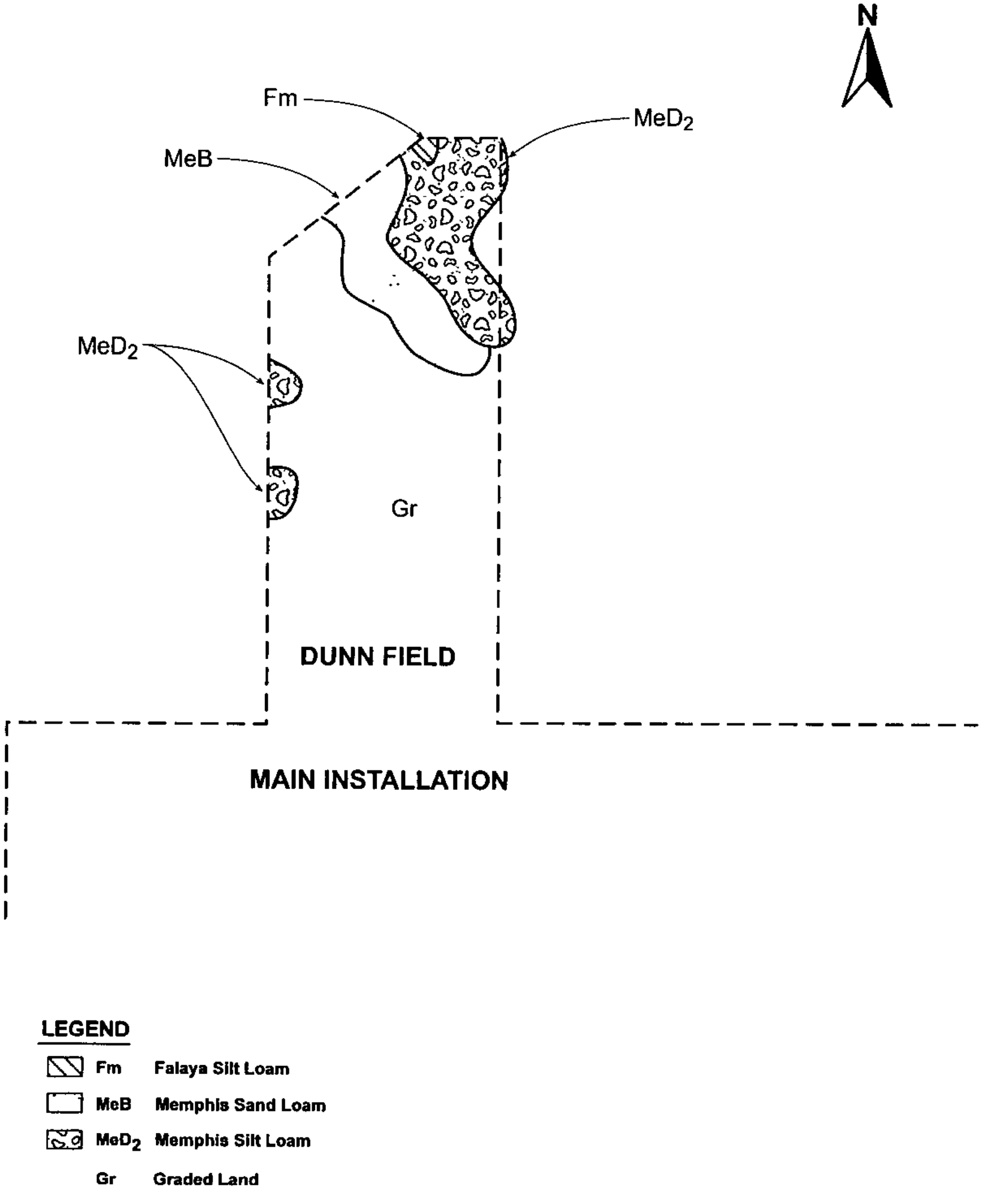

Source: Modified from USDA, Soil
Conservation Service, 1970

FIGURE 2-10
STUDY AREA SURFACE SOIL MAP
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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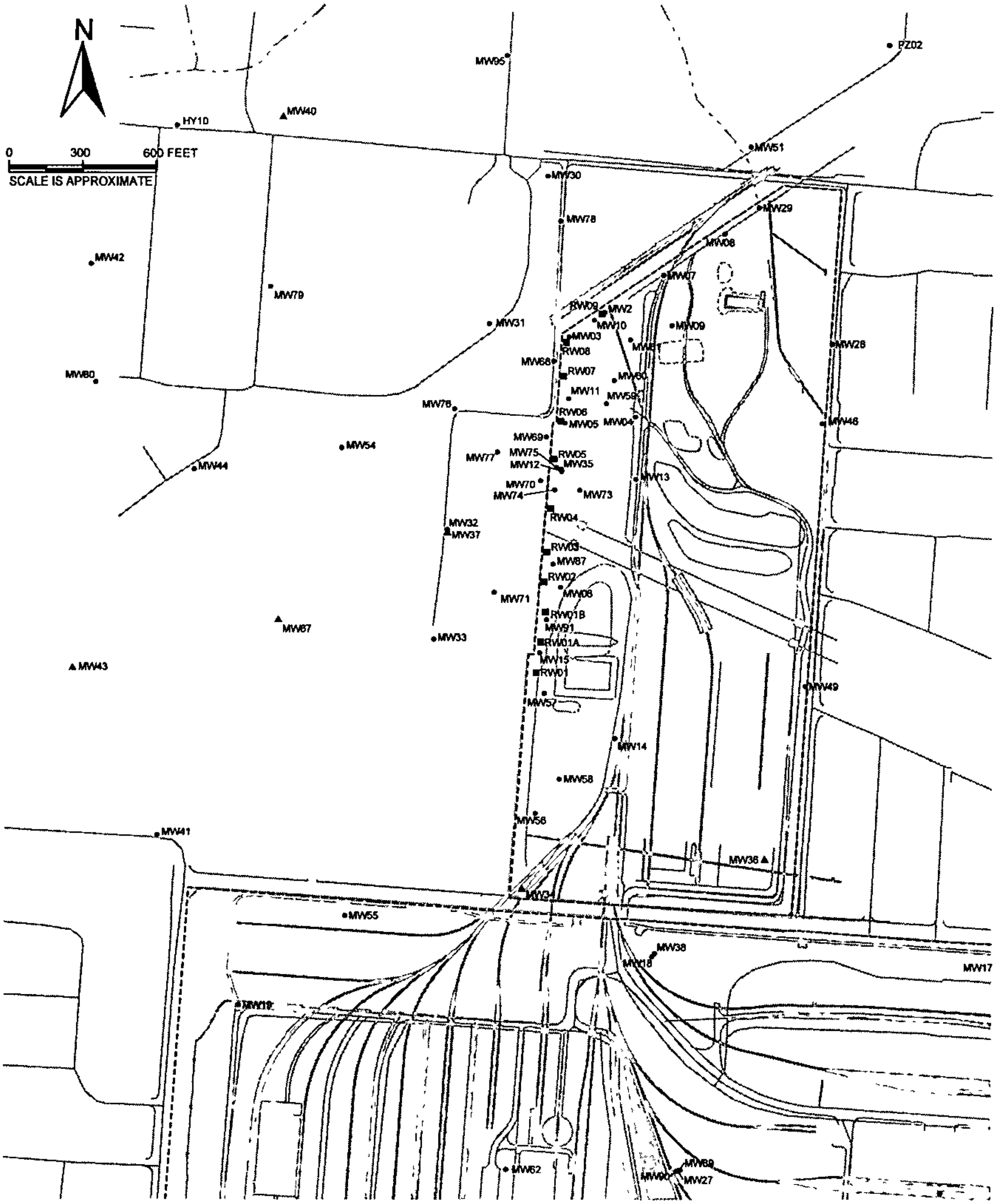

LEGEND

----	DEPOT BOUNDARY
——	BASE FEATURES
• MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
• PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER

FIGURE 2-11
GROUNDWATER MONITORING
WELL LOCATIONS
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

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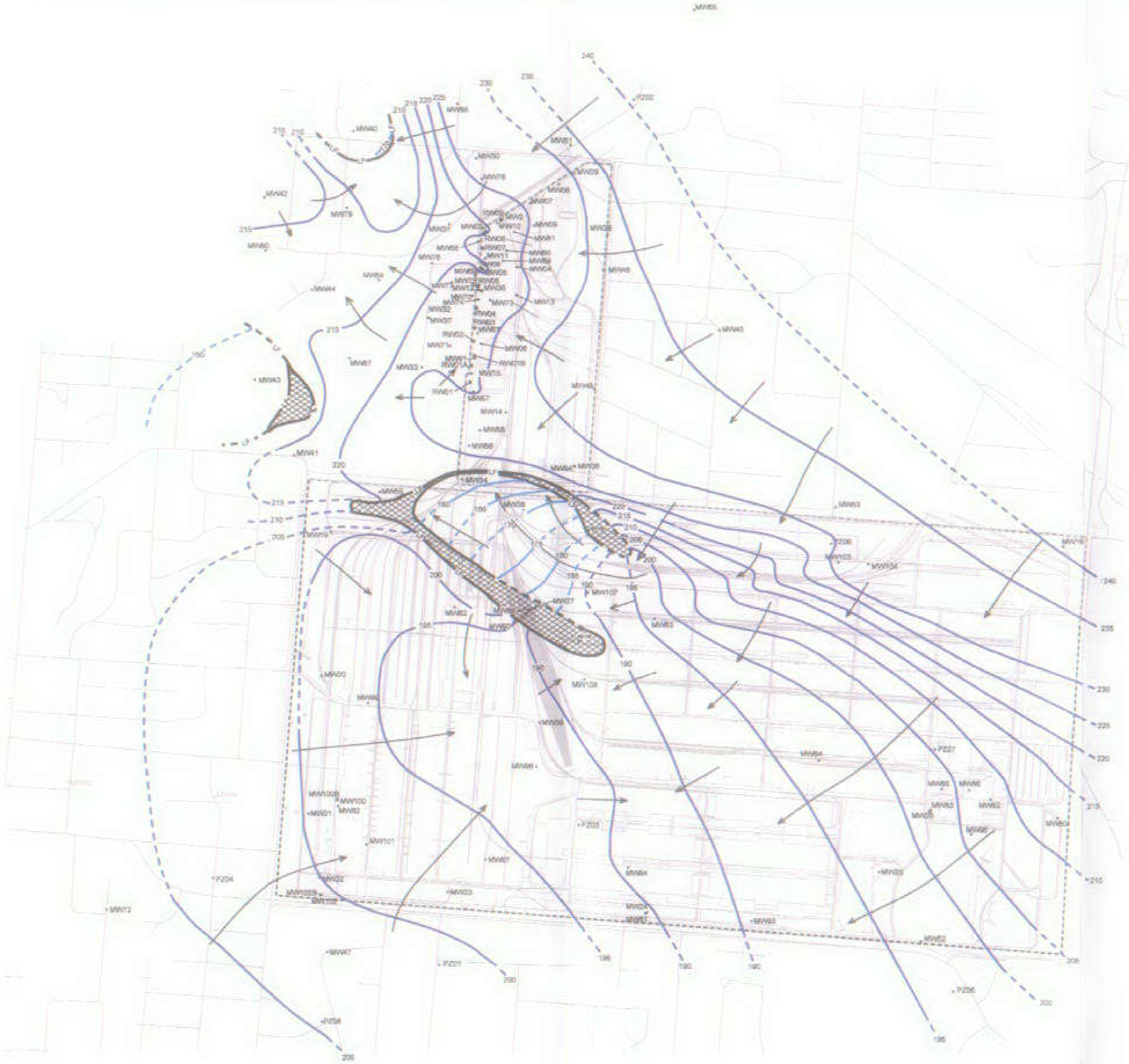
ATL/CAD1/Proj/148071 DDMT/80471DFRI01-2-11

Well ID	Water Level Elevation (feet MSL)	Well ID	Water Level Elevation (feet MSL)
MW03	221.66	MW64	196.83
MW04	224.84	MW65	252.65
MW06	224.00	MW67	151.59
MW07	226.71	MW68	221.79
MW08	228.86	MW69	222.44
MW09	226.43	MW70	223.06
MW10	223.18	MW71	222.43
MW11	222.66	MW72	206.91
MW12	224.11	MW73	223.67
MW13	224.61	MW74	223.36
MW14	227.22	MW75	222.99
MW15	224.49	MW76	217.04
MW16	241.44	MW77	221.42
MW18	175.20	MW78	226.11
MW19	200.92	MW79	212.63
MW20	199.30	MW80	212.64
MW21	199.96	MW81	154.67
MW22	200.03	MW82	151.50
MW23	198.57	MW83	157.48
MW24	190.62	MW84	228.46
MW26	203.03	MW85	204.16
MW27	DRY	MW86	206.08
MW28	233.86	MW87	223.70
MW29	233.52	MW88	224.17
MW30	226.59	MW89	183.57
MW31	218.34	MW90	183.94
MW32	221.41	MW91	223.76
MW33	224.18	MW92	207.66
MW34	156.66	MW93	191.63
MW35	222.34	MW94	189.87
MW36	151.53	MW95	228.82
MW37	151.12	MW96	206.00
MW38	169.97	MW97	196.19
MW39	191.89	MW98	192.43
MW40	171.05	MW99	195.73
MW41	217.86	MW100	198.21
MW42	217.70	MW101	198.38
MW43	152.75	MW102	200.68
MW44	212.97	MW103	231.92
MW45	236.88	MW104	232.75
MW46	232.06	MW107	190.49
MW47	203.89	MW108	189.86
MW49	230.56	PZ01	202.74
MW50	212.21	PZ02	241.91
MW51	234.82	PZ03	191.47
MW52	197.25	PZ04	200.96
MW53	232.67	PZ05	196.54
MW54	213.60	PZ06	229.22
MW55	221.06	PZ07	206.74
MW56	225.61	PZ08	204.86
MW57	224.97	RW04	223.38
MW58	226.29	RW06	220.82
MW59	223.92	RW08	219.24
MW60	224.15	RW09	221.89
MW61	224.73	SB105	DRY
MW62	199.71	SB106	DRY
MW63	197.46		



LEGEND

- - - - -	DEPOT BOUNDARY
——	BASE FEATURES
215 ——	WATER TABLE ELEVATION IN THE FLUVIAL AQUIFER (FEET MSL)
215 — —	INFERRED WATER TABLE ELEVATION IN THE FLUVIAL AQUIFER FROM LIMITED DATA (FEET MSL)
185 ——	WATER TABLE ELEVATION IN THE INTERMEDIATE AQUIFER (FEET MSL)
185 — —	INFERRED WATER TABLE ELEVATION IN THE INTERMEDIATE AQUIFER FROM LIMITED DATA (FEET MSL)
—LF—	LIMITED TO NO FLOW BOUNDARY (SEE NOTE)
- -LF- -	INFERRED LIMITED TO NO FLOW BOUNDARY (SEE NOTE)
• MW63	MONITORING WELL
• PZ06	PIEZOMETER
•	SOIL BORING
⟶	GROUNDWATER FLOW DIRECTION
▨	CLAY ELEVATION EXCEEDS GROUNDWATER ELEVATION

NOTES

- THE "LIMITED TO NO FLOW BOUNDARY" BOUNDS AN AREA WHERE THE WATER LEVEL IN THE FLUVIAL AQUIFER INTERSECTS THE CLAY DIRECTLY UNDERLYING THE FLUVIAL DEPOSITS, LEAVING FLUVIAL DEPOSITS UNSATURATED.
- MW18, 34, 36, 37, 38, 40, 43, 81, 82, 83, 89, AND 90 ARE WELLS SCREENED WITHIN THE INTERMEDIATE AQUIFER.
- MW107 AND 108 ARE LOCATED IN A TRANSITION ZONE BETWEEN THE FLUVIAL AQUIFER AND THE INTERMEDIATE AQUIFER.
- MW18, 36, 37, 81, 82, 83, 89 AND 90 ARE NOT INCLUDED IN THIS POTENTIOMETRIC SURFACE MAP
- MW67 IS SCREENED IN THE MEMPHIS AQUIFER AND THEREFORE NOT INCLUDED IN THIS POTENTIOMETRIC SURFACE MAP
- NO MEASUREABLE WATER LEVELS WERE RECORDED IN MW2, 5, 17, AND 27.
- DEPTH TO WATER MEASUREMENTS WERE NOT COLLECTED IN MW05, 48 AND 66.
- SB-105 AND 106 WERE MEASURED ON OCTOBER 16, 2001 AND OCTOBER 17, 2001, RESPECTIVELY
- EXCLUDES MW-88 GROUNDWATER ELEVATION DATA.

FIGURE 2-12A
Potentiometric Surface
Map of the Fluvial Aquifer,
Including Intermediate Aquifer
November 01, 2001

REV. 2 MEMPHIS DEPOT, DUNN FIELD RI

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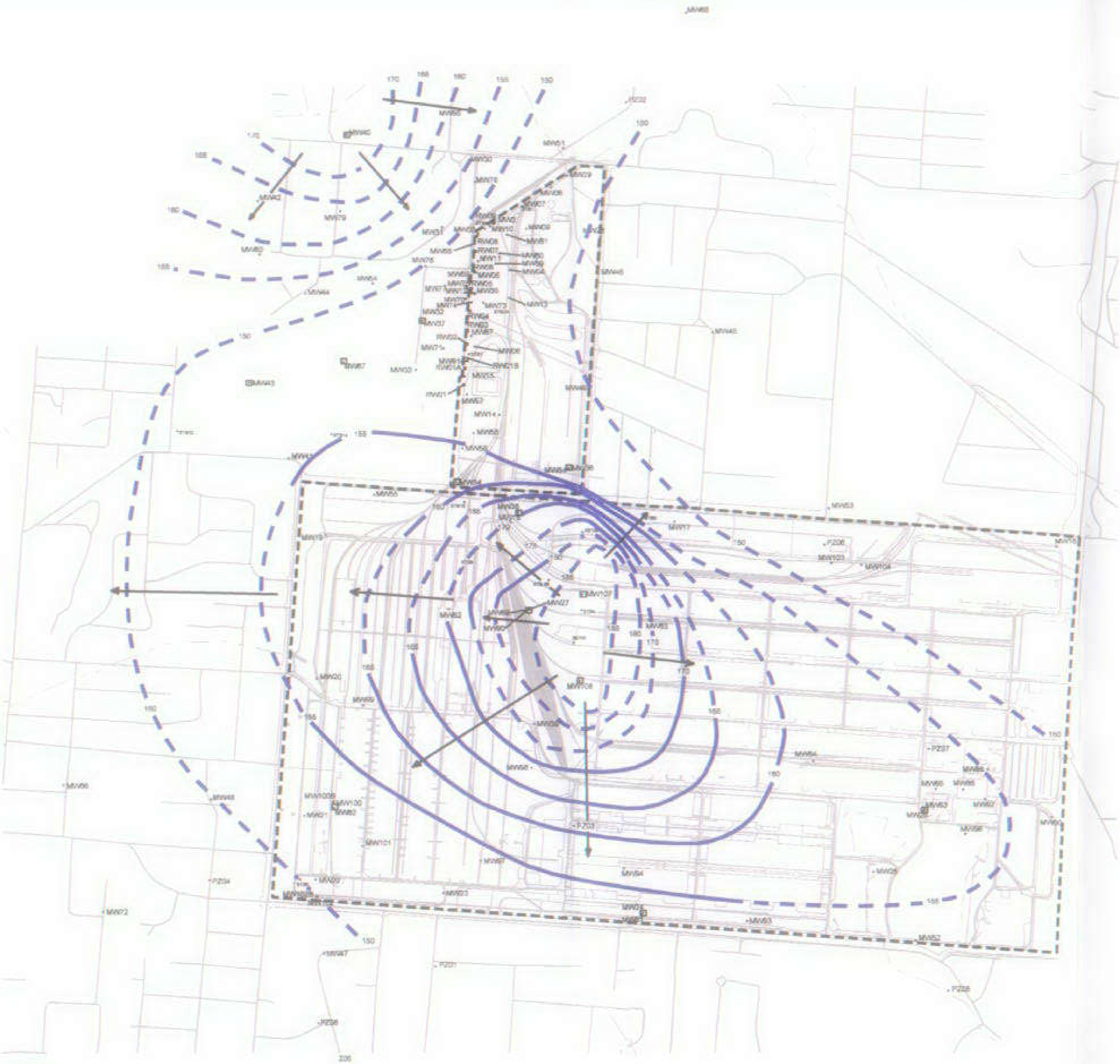
ATLANTA/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 03-JUL-2002 8071dfri01-2-12A.dgn

Well ID	Water Level Elevation (feet MSL)	Well ID	Water Level Elevation (feet MSL)
MW03	221.66	MW64	196.83
MW04	224.84	MW65	252.65
MW06	224.00	MW67	151.59
MW07	226.71	MW68	221.79
MW08	228.86	MW69	222.44
MW09	226.43	MW70	223.06
MW10	223.18	MW71	222.43
MW11	222.66	MW72	205.91
MW12	224.11	MW73	223.87
MW13	224.81	MW74	223.36
MW14	227.22	MW75	222.99
MW15	224.49	MW76	217.04
MW16	241.44	MW77	221.42
MW18	175.20	MW78	225.11
MW19	200.92	MW79	212.63
MW20	199.30	MW80	212.64
MW21	199.95	MW81	154.67
MW22	200.03	MW82	151.50
MW23	198.57	MW83	157.48
MW24	190.62	MW84	228.46
MW26	203.03	MW85	204.16
MW27	DRY	MW86	206.06
MW28	233.86	MW87	223.70
MW29	233.52	MW88	224.17
MW30	226.59	MW89	183.57
MW31	218.34	MW90	183.94
MW32	221.41	MW91	223.78
MW33	224.18	MW92	207.66
MW34	156.66	MW93	191.63
MW35	222.34	MW94	189.57
MW36	151.53	MW95	228.82
MW37	151.12	MW96	206.00
MW38	169.97	MW97	196.19
MW39	191.89	MW98	192.43
MW40	171.05	MW99	195.73
MW41	217.86	MW100	198.21
MW42	217.70	MW101	198.38
MW43	152.75	MW102	200.68
MW44	212.97	MW103	231.92
MW45	236.86	MW104	232.75
MW46	232.05	MW107	190.49
MW47	203.89	MW108	189.86
MW49	230.56	PZ01	202.74
MW50	212.21	PZ02	241.91
MW51	234.62	PZ03	191.47
MW52	197.25	PZ04	203.96
MW53	232.67	PZ05	196.54
MW54	213.60	PZ06	229.22
MW55	221.06	PZ07	205.74
MW56	225.61	PZ08	204.86
MW57	224.97	RW04	223.38
MW58	226.29	RW06	220.82
MW59	223.92	RW08	219.24
MW60	224.15	RW09	221.69
MW61	224.73	SB105	DRY
MW62	199.71	SB106	DRY
MW63	197.46		



LEGEND

- — —	DEPOT BOUNDARY
——	BASE FEATURES
215 ——	WATER TABLE ELEVATION IN THE INTERMEDIATE AQUIFER (FEET MSL)
215 — —	INFERRED WATER TABLE ELEVATION IN THE INTERMEDIATE AQUIFER FROM LIMITED DATA (FEET MSL)
• MW53	MONITORING WELL
• PZ08	PIEZOMETER
• SB10	SOIL BORING
→	GROUNDWATER FLOW DIRECTION
⊟	MONITORING WELLS SCREENED IN THE INTERMEDIATE AND MEMPHIS AQUIFERS

NOTES

— MW18, 34, 36, 37, 38, 40, 43, 81, 82, 83, 89, 90, 107 AND 108 ARE WELLS SCREENED WITHIN THE INTERMEDIATE AQUIFER.

— MW67 IS SCREENED IN THE MEMPHIS AQUIFER.

FIGURE 2-12B
Potentiometric Surface
Map of the Intermediate Aquifer
November 01, 2001
REV. 1 MEMPHIS DEPOT, DUNN FIELD RI

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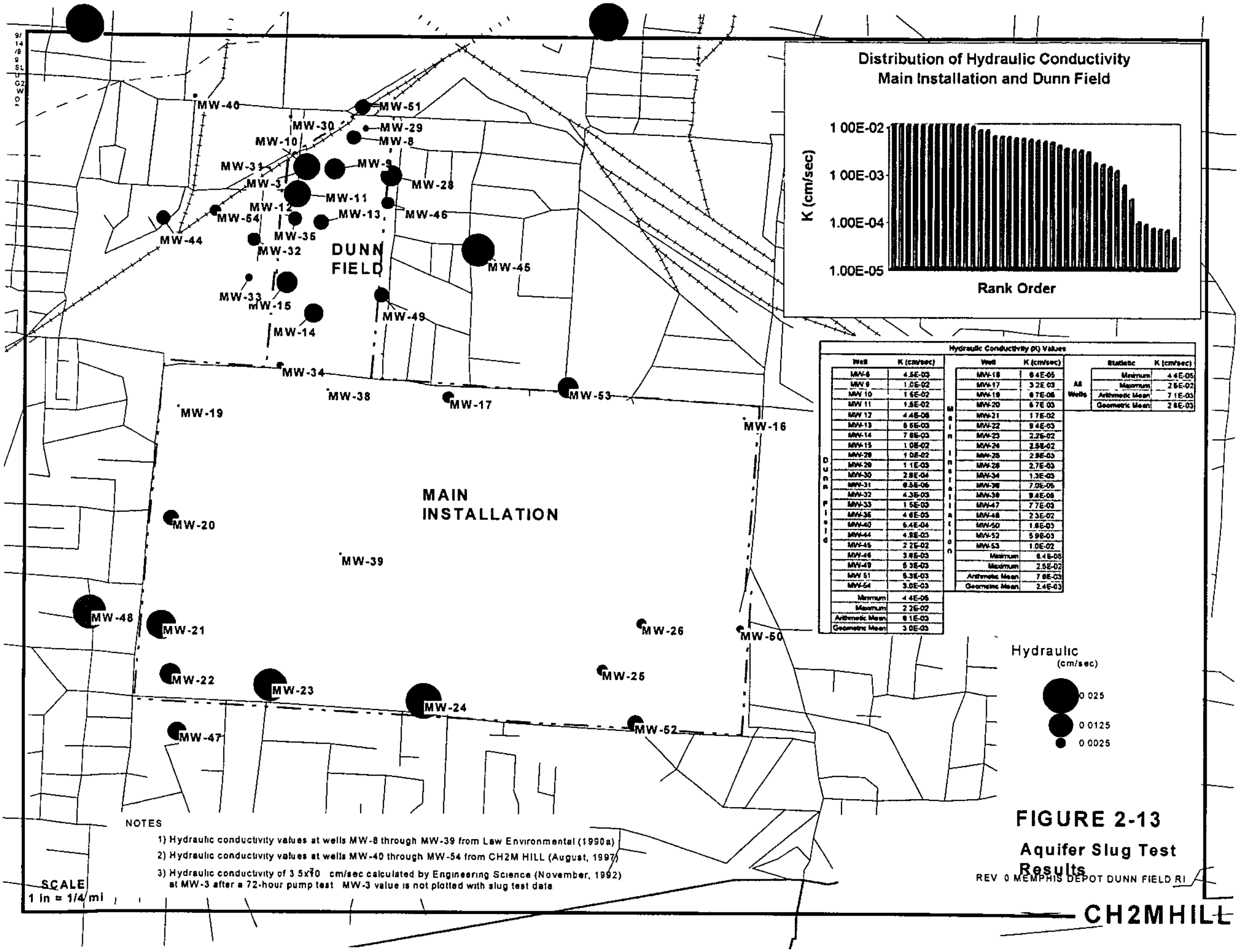

Hydraulic Conductivity (K) Values

	Well	K (cm/sec)
Dunn Field	MW-8	4.5E-03
	MW 9	1.0E-02
	MW 10	1 6E-02
	MW 11	1.5E-02
	MW 12	4 4E-06
	MW-13	6 6E-03
	MW-14	7 8E-03
	MW-15	1 0E-02
	MW-28	1 0E-02
	MW-29	1 1E-03
	MW-30	2 8E-04
	MW-31	8.5E-06
	MW-32	4.3E-03
	MW-33	1 5E-03
	MW-35	4 6E-03
	MW-40	5.4E-04
	MW-44	4.9E-03
	MW-45	2 2E-02
	MW-46	3.8E-03
	MW-49	5 3E-03
	MW 51	5.3E-03
	MW-54	3.0E-03
	Minimum	4 4E-06
	Maximum	2 2E-02
	Arithmetic Mean	8 1E-03
	Geometric Mean	3 0E-03

	Well	K (cm/sec)
Main Installation	MW-16	6 4E-05
	MW-17	3 2E 03
	MW-19	6 7E-06
	MW-20	6 7E 03
	MW-21	1 7E-02
	MW-22	9 4E-03
	MW-23	2.2E-02
	MW-24	2.5E-02
	MW-25	2.9E-03
	MW-26	2.7E-03
	MW-34	1.3E-03
	MW-38	7.0E-06
	MW-39	9.4E-06
	MW-47	7 7E-03
	MW-48	2 3E-02
	MW-50	1.6E-03
	MW-52	5 9E-03
	MW-53	1.0E-02
	Minimum	6.4E-05
	Maximum	2.5E-02
	Arithmetic Mean	7 6E-03
	Geometric Mean	2.4E-03

	Statistic	K (cm/sec)
All Wells	Minimum	4 4E-05
	Maximum	2 6E-02
	Arithmetic Mean	7 1E-03
	Geometric Mean	2 8E-03

NOTES

1) Hydraulic conductivity values at wells MW-8 through MW-39 from Law Environmental (1990a)
2) Hydraulic conductivity values at wells MW-40 through MW-54 from CH2M HILL (August, 1997)
3) Hydraulic conductivity of 3 5x10 cm/sec calculated by Engineering Science (November, 1992) at MW-3 after a 72-hour pump test MW-3 value is not plotted with slug test data

FIGURE 2-13

Aquifer Slug Test Results

REV 0 MEMPHIS DEPOT DUNN FIELD RI

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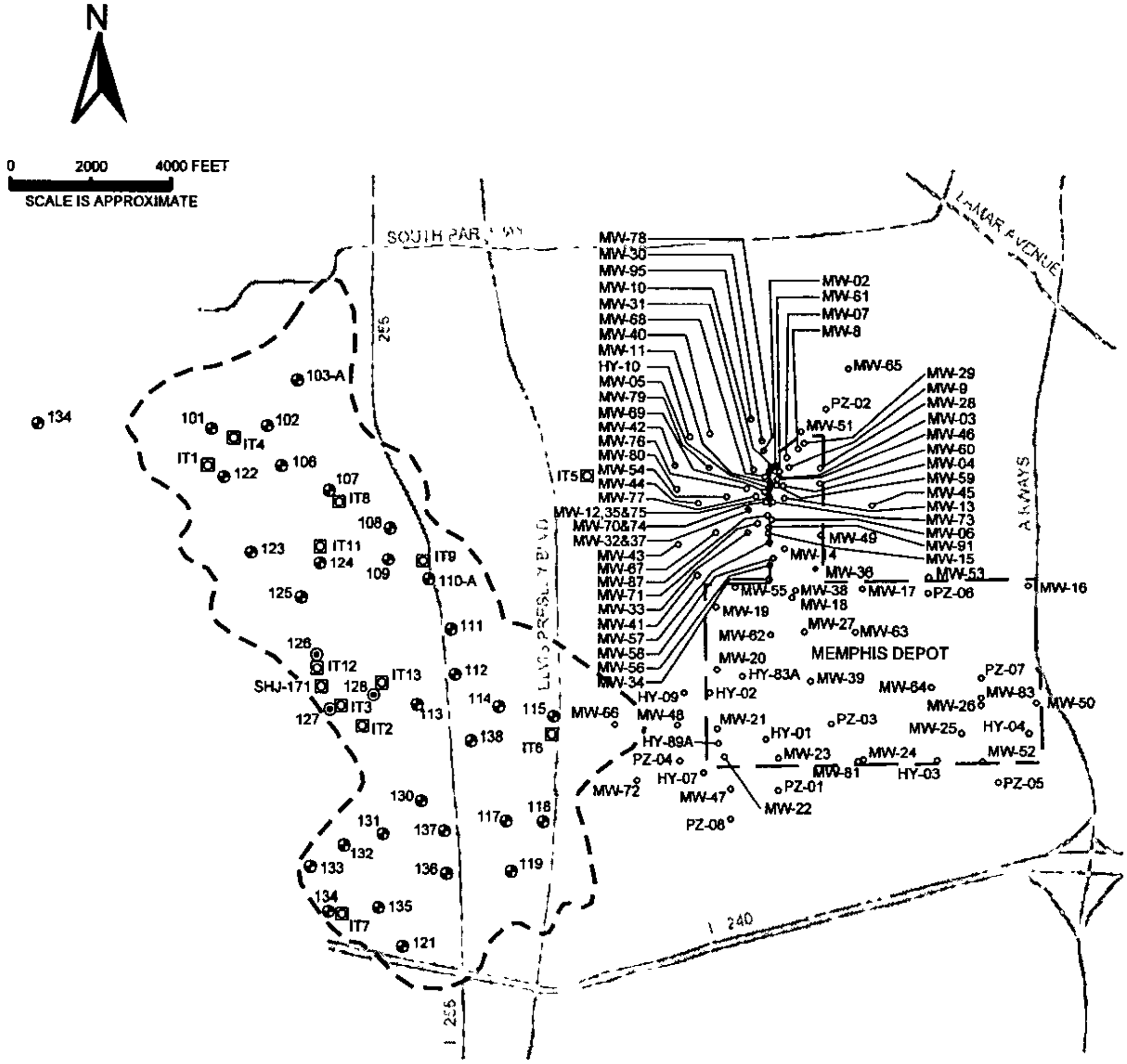

LEGEND

- ⊕ MEMPHIS LIGHT, GAS AND WATER (MLGW) PRODUCTION WELL, ALL WELLS ARE LOCATED IN THE ALLEN WELL FIELD
- ⊡ MLGW MONITORING WELL
- ◎ MLGW WELL CLOSED DUE TO CONTAMINATION
- ○ MONITORING WELL IN THE FLUVIAL DEPOSITS (RI/FS)
- • MONITORING WELL IN THE DEEPER AQUIFER (RI/FS) (POSSIBLY THE MEMPHIS SAND)
- ⌜⌟ APPROXIMATE EXTENT OF ALLEN WELL FIELD CAPTURE ZONE WITHIN THE MEMPHIS SAND (FROM UNIVERSITY OF MEMPHIS GROUND WATER INSTITUTE TECHNICAL BRIEF #6; NOV , 1994)

FIGURE 2-14
ALLEN WELL FIELD LOCATION
RELATIVE TO THE MEMPHIS DEPOT
REV 2 MEMPHIS DEPOT DUNN FIELD RI

Source RI Report, 1990

CAD1\PROJECTS\4071 DDMT\DUNNFIELD RI 2001\

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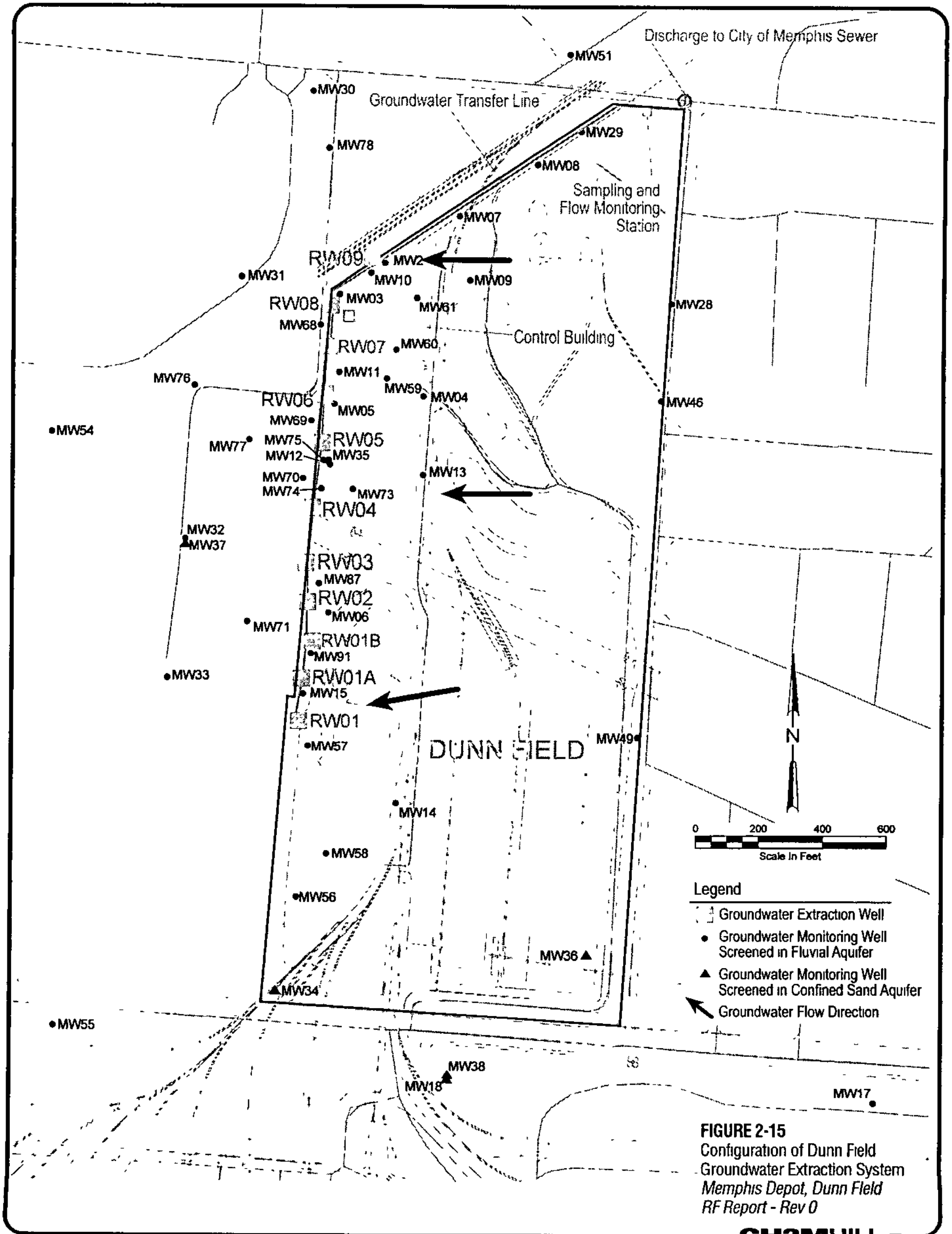
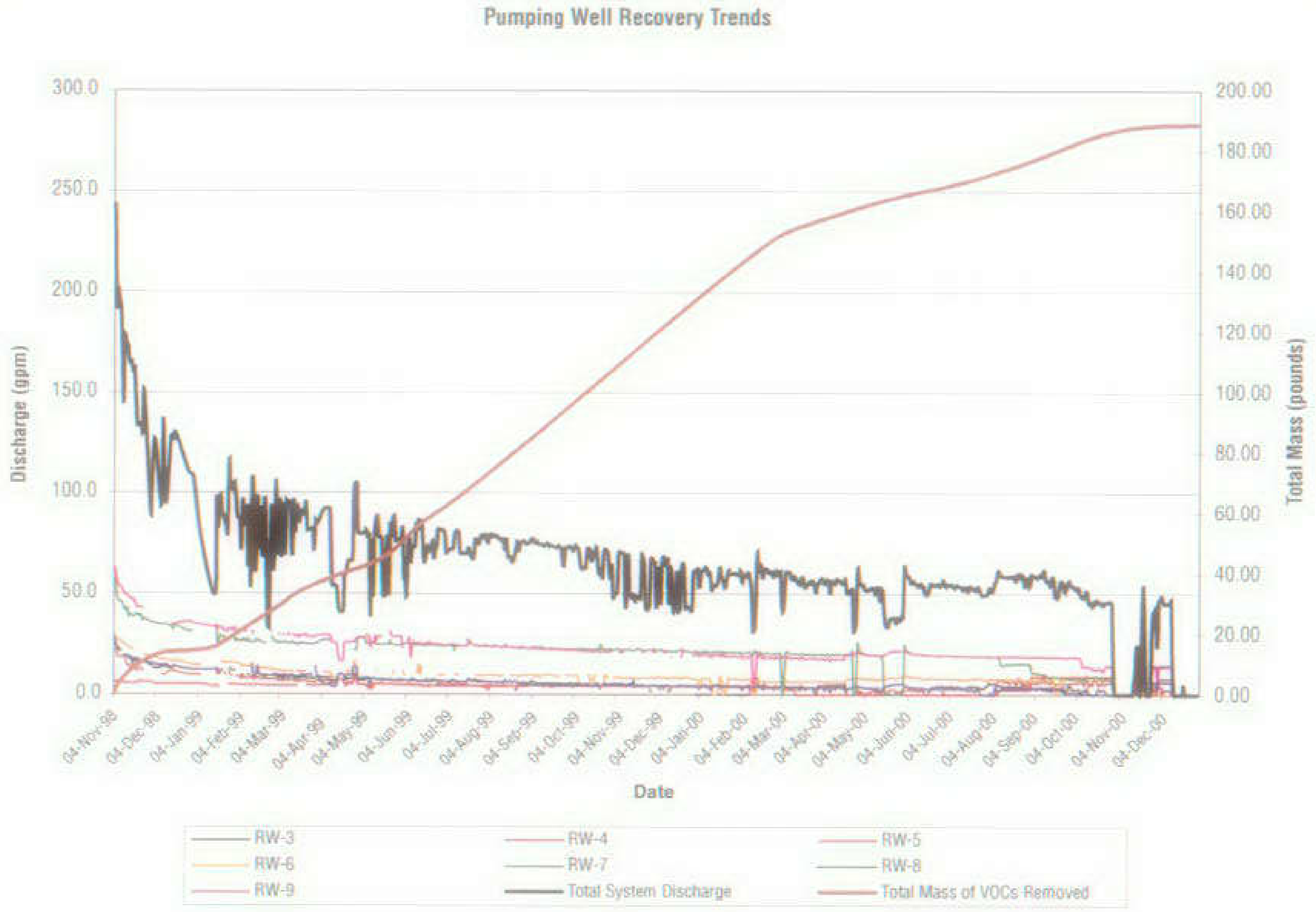


FIGURE 2-15
Configuration of Dunn Field Groundwater Extraction System
Memphis Depot, Dunn Field
RF Report - Rev 0

CH2MHILL



Note: Gaps in trends indicate removal of varying data that result from pump operations rather than sustained groundwater yields.

FIGURE 2-16
GROUNDWATER EXTRACTION SYSTEM PERFORMANCE
MEMPHIS DEPOT DUNN FIELD RI

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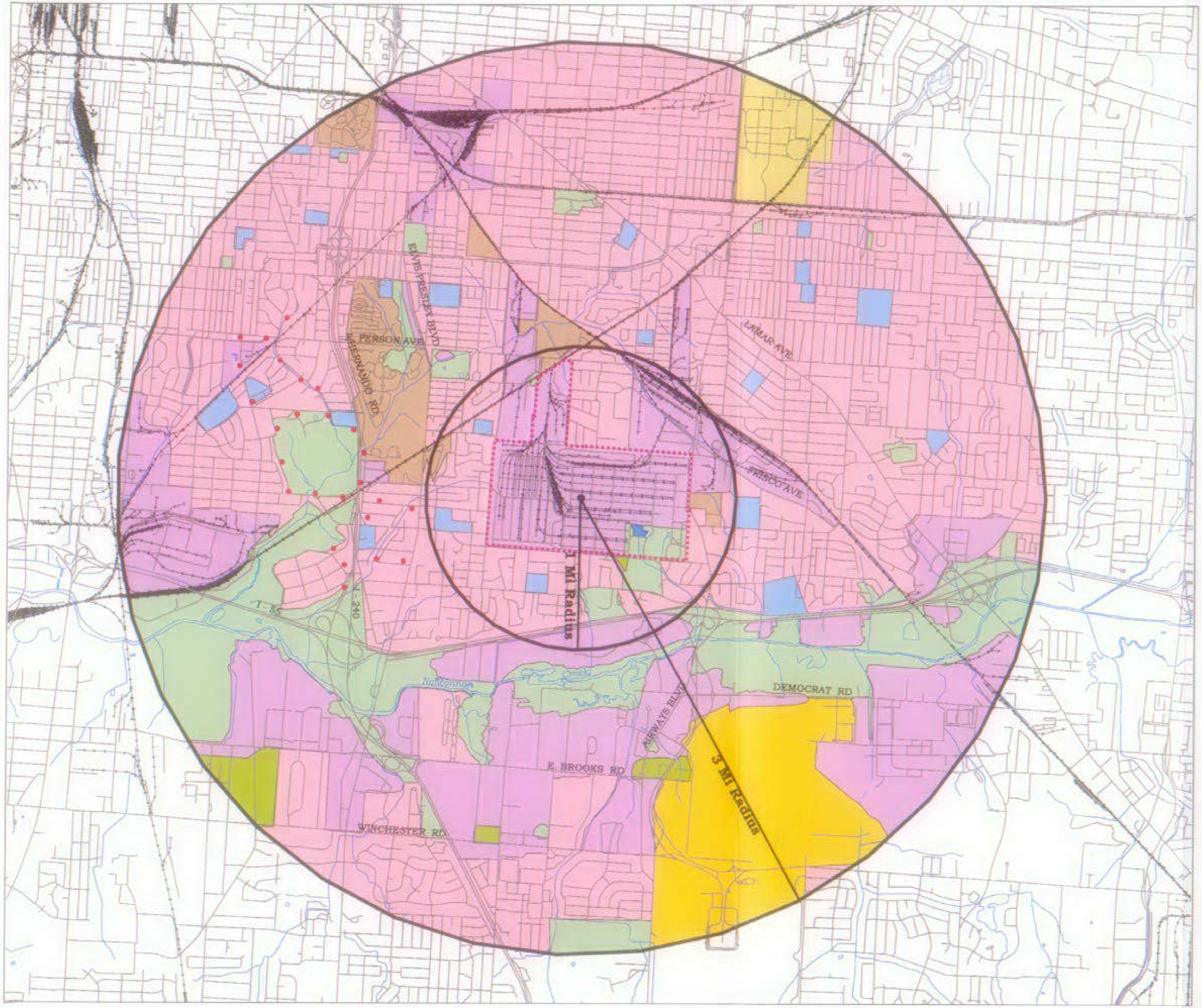

FIGURE 2-17
LAND USE WITHIN 3-MILE RADIUS OF MEMPHIS DEPOT
Rev.0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

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TAB

Section 3

3.0 Background Sampling Summary

3.1 Introduction

The purpose of the background sampling program at the Depot (both Dunn Field and MI) is to provide sufficient environmental data of known and acceptable quality to establish statistically representative background concentrations for chemicals present in surface soil, subsurface soil, surface water, groundwater, and sediment. Background sampling was done in areas surrounding the Depot that were not affected by Depot operations. Chemical concentrations detected in various media as part of ongoing remedial activities at the Depot were compared with background data to evaluate whether the concentrations of these chemicals are attributable to Depot operations, are naturally occurring, or are caused by ambient effects from the urban environment surrounding the Depot.

The background data were used to support several aspects of the environmental program at the Depot, including the following:

- Developing action levels to be used in CERCLA decision-making;
- Delineating the nature and extent of contamination during RI efforts;
- Evaluating the potential for offsite migration of site-related chemicals;
- Assessing potential and future risk, and
- Developing cleanup criteria and Preliminary Remediation Goals (PRGs).

This section presents a summary of the Depot background sampling program methods and results, which are presented in more detail in the *Final Background Sampling Program Report* (CH2M HILL, 1998c). Field methods and the data quality evaluation of the background data are presented in that report

3.2 Background Media Sampled

As specified in the *Final Generic Remedial Investigation/Feasibility Study Work Plan* (CH2M HILL, 1995c), environmental samples were taken from areas believed to be unaffected by past or present Depot industrial activities. The soils, sediment, and surface water field sampling effort began on October 9, 1995 and concluded on October 12, 1995. Groundwater sampling was conducted between February 6 and 27, 1996.

A total of 101 environmental samples were taken during this field investigation, excluding quality assurance/quality control (QA/QC) samples. The distribution of the samples by medium is described in Table 3-1.

Surface and subsurface soil sampling locations are shown in Figure 3-1 and are described in Tables 3-2 and 3-3, respectively. Surface and subsurface samples were taken from the same locations. Although locations of Samples BS02, BS14, BS15, and BS16 shown on Figure 3-1 appear to be near railroad tracks due to the condensed scale, all four locations are in fact at least 50 meters from the nearest tracks

Surface water and sediment sampling locations are shown in Figure 3-2 and are described in Tables 3-4 and 3-5, respectively. A surface water and sediment sample was taken at each location. Figure 3-3 shows the location of background monitoring wells. Samples were taken according to the procedures developed in the *Final Generic Remedial Investigation/Feasibility Study Work Plan* (CH2M HILL, August 1995). Samples from all media were analyzed by the laboratory according to the EPA Contract Laboratory Program (CLP) Statement of Work (SOW) except for herbicides, which were analyzed using EPA SW846, Method 8151. Specific methods are summarized in Table 3-6.

The overall sampling rationale is presented in Section 3.3 The rationale for selecting the number, sampling depth interval, and location of samples as well as the location-specific methods, procedures, and other sampling information (e.g., sample depth, equipment, and decontamination procedures) are presented in the *Final Background Sampling Program Report* (CH2M HILL, May 1998).

3.3 Overall Sampling Rationale

Background sampling locations were selected within areas believed to be unaffected by past or present Depot waste management activities. One important aspect of the sampling effort was to consider the potential effects of urban pollutants from the area surrounding the site and of historical uses of the general area (e.g., pesticides from farming operations).

A statistical approach was used to select the number of soil, sediment, groundwater, and surface water samples required to provide an appropriate level of confidence for each medium (CH2M HILL, August 1995). Sample sizes appropriate to estimate nonparametric tolerance intervals (Conover, 1980) were used to estimate the number of samples required for each medium. Nonparametric tolerance intervals make no assumptions about the underlying distribution of the chemical or compound. However, independent samples are assumed to be randomly drawn from an infinite population. Coverage is the percent or quartile of the population distribution to be bounded by the largest concentration in the sample. An upper tolerance bound is designed to contain 100 percent of the sampled population from a sample of size *n* with (1-a) percent confidence. The level of confidence reflects the probability that the maximum concentration detected from a collection of samples will bound the prespecified quartile of the population distribution.

The equation used to generate the minimum sample size is as follows:

$$N = \ln(a)/\ln(p)$$

where

a = significance level ($0 < a < 1$)

p = percentile of the population to be contained by the upper bound ($0 < p < 1$)

n = minimum number of samples required

Levels of confidence for each medium (sediment, surface water, surface soil, and subsurface soil) were calculated according to the project objectives and are provided in the *Final Generic Remedial Investigation/Feasibility Study Work Plan* (CH2M HILL, August 1995). The confidence intervals were selected based on the need to obtain a relatively representative data set and on the cost of obtaining such data. It was determined that for soil, sediment, and surface water, the 90th percentile of the population would be determined with 90 percent confidence requiring 22 samples, as follows·

$$n = \ln(1-0.9)/\ln(0.9) = 21.8 = 22$$

3.3.1 Surface and Subsurface Soil Sampling Rationale

Most of the land surface at the Depot is classified as graded land (meaning that cut-and-fill or other surface disturbances have occurred). During grading and land development, the surface soil was mixed and reworked. Native surface soil is apparent in the stream and swale channels Therefore, for purposes of this background sampling program, no distinctions were made between different surface soil mineralogies (as defined in Section 5.3.2.1 of the *Generic Remedial Investigation/Feasibility Study Work Plan* [CH2M HILL, August 1995]), although the soil type was classified in the field for identification purposes. Subsurface soil samples were taken from the same location as the surface soil samples at a depth interval representative of the native soil

Surface and subsurface soil sampling locations are shown on Figure 3-1. Station descriptions and sample information are provided in Tables 3-2 and 3-3, respectively.

To obtain a set of background soil data representative of the diversity (nonhomogeneity that results from regrading) of soil conditions anticipated at the Depot, samples were obtained from locations both on and off Depot property. Onsite locations were included to represent ambient conditions expected at the Depot resulting from normal operation of the facility, excluding waste management and waste disposal activities. Onsite soil sampling locations were selected by first delineating areas throughout the installation that were not appropriate for background sampling, including areas of known or suspected contamination and areas covered by buildings or roads. A total of 11 onsite sampling locations were selected (BS01 through BS08 and BS14 through BS16), as shown on Figure 3-1. These locations are generally along the perimeter of the Depot and thus represent the most reasonable geographical distribution over the site, considering site limitations. Samples collected on Depot property are herein referred to as "perimeter samples."

Soil sampling locations beyond Depot property were primarily at schools (SB10, SB11, SB17, SB18, and SB19), golf courses (SB13 and SB21), and cemeteries (SB20). Additional sampling locations included residential neighborhoods surrounding the Depot (BS09, BS12, and BS22) These locations were selected to represent ambient environmental conditions in the urban environment surrounding the Depot. They also are subject to similar grounds maintenance activities, such as the possible application of herbicides, pesticides, fertilizers, and lawn seed, as well as mowing and aeration. A total of 11 offsite locations were sampled during the background program.

At each sampling location, soil samples were collected from the ground surface (0 to 1 foot bgs) and at a depth sufficient to be representative of native (undisturbed) soil (4 to 6 feet bgs). The depth of the native soil was determined in the field on the basis of visual soil classifications. All samples were scanned in the field with a photoionization detector (PID) to eliminate sampling locations that might contain PID-detectable VOCs. No VOCs were detected in the field.

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3.3.2 Surface Water and Sediment Sampling Rationale

To obtain a minimum 90 percent confidence and 90 percent coverage of the sample population's maximum value, 22 surface water and 22 sediment samples were required. All surface water and sediment samples were collected from offsite locations (refer to Figure 3-2 and Tables 3-4 and 3-5). Sampling locations were selected upgradient of any outfalls from the Depot to ensure a representative background sample. Two types of surface water and sediment features were evaluated as part of the background program: 1) perennial streams and 2) ponds similar in size and surrounding land use to the Depot's Golf Course Pond and Lake Danielson.

Four ponds were sampled for surface water and sediment during the background sampling field effort. The ponds were located in Medal of Honor Park, Audubon Park, Memphis Lake in Chickasaw Gardens, and the Botanical Gardens in Audubon Park.

Surface water and sediment samples were taken from two perennial creeks near the Depot: Nonconnah Creek, located south of the Depot, and Cane Creek, located northwest of the Depot.

3.3.3 Groundwater Sampling Rationale

The approach to selecting wells for use in the background sampling program was to use the presence of VOCs, semivolatile organic compounds (SVOCs), or pesticides/polychlorinated biphenyls (PCBs) as an indicator to eliminate wells that are potentially affected by Depot operations (CH2M HILL, August 1995). Areas that are outside of known contamination and that are primarily upgradient of the site were considered as potential sampling locations.

On the basis of the criteria noted above, the following groundwater monitoring wells were selected for use as background wells: MW-16, MS-19, MW-24, MW-28, MW-30, MW-45, MW-46, MW-48, MW-49, MW-50, MW-52, and MW-53 (see Figure 3-3)

Data from these 12 wells provide an 85 percent confidence level that the population's 85th percent quartile has been identified. The derivation of the confidence level for groundwater is found in Section 2.2.3 of the *Final Background Sampling Program Report* (CH2M HILL, May 1998), on page 2-13.

3.4 Background Values by Medium

Soil, sediment, surface water, and groundwater were sampled in locations unaffected by the Depot waste management operations and analyzed for a wide range of organic and inorganic chemical constituents. A background statistical database has been developed to identify background concentrations of contaminants at the Depot that will be used to determine whether site-specific waste management operations or releases of hazardous materials at the Depot have contributed contaminants exceeding background levels.

Metals, SVOCs, pesticides, and dioxin/furan compounds were detected at concentrations exceeding risk-based preliminary remedial action (RA) criteria, as summarized in Table 3-7.

Background values for all detected constituents are presented in Table 3-8. Complete statistical tables were developed for all media and are presented in Appendix F of the background report (CH2M HILL, May 1998)

Surface and subsurface background soil samples were taken from locations along the Depot perimeter and beyond the Depot property to evaluate the potential impact of normal operation of the Depot, excluding waste management operations, on background soil concentrations. The Depot perimeter sampling locations represent an industrial environment, whereas offsite background locations are associated with residential or recreational environments.

Perimeter surface soil concentrations were higher for metals, VOCs, SVOCs, pesticides, and PCBs, but the difference between perimeter and offsite concentrations was less than 100 percent relative percent difference (RPD). Elevated xylene and phthalate concentrations at the Depot perimeter are likely a result of increased vehicular traffic around the facility. This difference in concentration is expected when comparing industrial land use with residential and recreational land uses and does not suggest impact from waste management and disposal operations.

Dioxins and furans were detected in most perimeter and offsite soils and at generally higher concentrations at the surface than at depth. Dioxins were also detected in sediment and surface water samples; the highest detected concentrations exceeded EPA Region III risk-based concentrations (RBCs) at the Botanical Gardens and Audubon Park. Most background detections were octa- and hepta-isomers, indicating that the detections likely resulted from atmospheric deposition rather than isolated surface sources.

3.5 Background Values Modified by BCT

During the BCT meetings of August 2, 1997 and August 4 through August 6, 1997, BRAC data from the first phase of RI field investigations were evaluated relative to applicable criteria and background concentrations Chemicals were identified for which concentrations exceeded the applicable criteria but the background concentration also exceeded the criteria. For these "sensitive" chemicals, background is also an important evaluation criterion. To provide a conservative evaluation, the background concentrations of these chemicals were modified by removing outliers. In all instances, removal of outliers resulted in a lower, more restrictive background value. The results of the BCT evaluation are summarized in Table 3-9 and are used in evaluating the Dunn Field RI data.

Tables

TABLE 3-1
Distribution of Samples by Medium
Rev. 0 Memphis Depot Dunn Field RI

Sample Medium	Number of Environmental Samples
Surface soil	22
Subsurface soil	22
Surface water	22
Sediment	22
Groundwater	12

TABLE 3-2
Background Surface Soil Sample and Location Information for Background Sampling Program
Rev 0 Memphis Depot Dunn Field RI

Sample No.	Location	Group	Date	Time	General Sample Location	QA/QC Sample
SS51	BS01	Perimeter	10/9/95	1447	Northeast corner of Dunn Field near intersection of Person and Hays Street	NA
SS51A	BS01	Perimeter	10/9/95	1447	Northeast corner of Dunn Field near intersection of Person and Hays Street	Duplicate
SS52	BS02	Perimeter	10/9/95	1542	Dunn Field near intersection of Carver and Hays Street	Split
SS53	BS03	Perimeter	10/9/95	1618	Dunn Field near intersection of Carver and Hays Street	NA
SS54	BS04	Perimeter	10/10/95	857	Northeast corner of Depot at intersection of Airways Boulevard and Dunn Avenue	NA
SS55	BS05	Perimeter	10/10/95	1010	East of southeast corner of Administration Building	NA
SS56	BS06	Perimeter	10/10/95	1055	East of northeast corner of Administration Building	NA
SS57	BS07	Perimeter	10/10/95	1334	South side of Depot, south of Building 490	NA
SS58	BS08	Perimeter	10/10/95	1409	Southwest corner of Depot, south of Buildings 970 and 875	NA
SS59	BS09	Off-site	10/10/95	1516	East of Depot near intersection of Jolson and Barrymore Street	NA
SS60	BS10	Off-site	10/11/95	916	Dunn Avenue Elementary School, east of school building	NA
SS61	BS11	Off-site	10/11/95	1003	Dunn Avenue Elementary School, north of school playground	NA
SS62	BS12	Off-site	10/11/95	1102	West of Depot at intersection of Sparks Street and Sparks Cove	NA
SS63	BS13	Off-site	10/11/95	1321	Pine Hills Golf Course near Alice Avenue and Benton Street	NA
SS64	BS14	Perimeter	10/11/95	1445	West edge of Depot at Dunn Avenue and Perry Street (below power lines)	NA
SS65	BS15	Perimeter	10/11/95	1525	West edge of Depot at Perry Street and Elliston Street (below power lines)	NA
SS66	BS16	Perimeter	10/11/95	1604	West edge of Depot at Perry Street and Norris Street (below power lines)	NA
SS67	BS17	Off-site	10/12/95	835	Charjean School near intersection of Dwight Road and Imogene Street	MS/MSD
SS68	BS18	Off-site	10/12/95	925	Airways Junior High School, south of southwest corner of school building	NA
SS69	BS19	Off-site	10/12/95	1022	Alcy Elementary School, east of southeast corner of school building	NA

TABLE 3-2
Background Surface Soil Sample and Location Information for Background Sampling Program
Rev 0 Memphis Depot Dunn Field RI

Sample No.	Location	Group	Date	Time	General Sample Location	QA/QC Sample
SS70	BS20	Off-site	10/12/95	1247	Forest Hill Cemetery, near Cane Creek east of Garden of Hope	NA
SS71	BS21	Off-site	10/12/95	1345	Pine Hills Golf Course off Mallory Avenue near pump house	NA
SS72	BS22	Off-site	10/12/95	1424	Alcy Park West (southwest of Depot) south of Alcy Street	NA

Notes All samples were collected from 0- to 1-foot bgs

All samples were analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals, and dioxin/furans

bgs	below ground surface
MS/MSD	matrix spike/matrix spike duplicate
NA	Not applicable
PCBs	polychlorinated biphenyls
QA/QC	quality assurance/quality control
TAL	Target Analyte List
VOCs	volatile organic compounds
SVOCs	semivolatile organic compounds

TABLE 3-3

Background Subsurface Soil Sample and Location Information for Background Sampling Program

Rev 1 Memphis Depot Dunn Field RI

Sample No.	Location	Group	Date	Time	Sample Location Description	QA/QC Sample
SB095	BS01	Perimeter	10/9/95	1451	Northeast corner of Dunn Field at intersection of Person and Hays Street	MS/MSD
SB105	BS02	Perimeter	10/9/95	1555	Dunn Field near intersection of Carver and Hays Street	NA
SB115	BS03	Perimeter	10/9/95	1627	Dunn Field near intersection of Carver and Hays Street	NA
SB125	BS04	Perimeter	10/10/95	904	Northeast corner of Depot at intersection of Airways Boulevard and Dunn Avenue	NA
SB135	BS05	Perimeter	10/10/95	1025	East of southeast corner of Administration Building	NA
SB145	BS06	Perimeter	10/10/95	1101	East of northeast corner of Administration Building	NA
SB155	BS07	Perimeter	10/10/95	1340	South side of Depot, south of Building 490	NA
SB155A	BS07	Perimeter	10/10/95	1340	South side of Depot, south of Building 490	Duplicate
SB165	BS08	Perimeter	10/10/95	1415	Southwest corner of Depot, south of Buildings 970 and 875	NA
SB175	BS09	Off-site	10/10/95	1522	East of Depot, near intersection of Jolson and Barrymore Street	NA
SB184	BS10	Off-site	10/11/95	930	Dunn Elementary School, east of school building	MS/MSD
SB195	BS11	Off-site	10/11/95	1007	Dunn Elementary School, north of school playground	NA
SB205	BS12	Off-site	10/11/95	1108	West of Depot at intersection of Sparks Street and Sparks Cove	NA
SB215	BS13	Off-site	10/11/95	1329	Pine Hills Golf Course near Alice Avenue and Benton Street	NA
SB225	BS14	Perimeter	10/11/95	1458	West edge of Depot at Dunn Avenue and Perry Street (below power lines)	Split
SB235	BS15	Perimeter	10/11/95	1540	West edge of Depot at Perry and Elliston Street (below power lines)	NA
SB245	BS16	Perimeter	10/11/95	1625	West edge of Depot at Perry and Norris Street (below power lines)	NA
SB255	BS17	Off-site	10/12/95	851	Charjean School near intersection of Dwight Road and Imogene Street	NA
SB265	BS18	Off-site	10/12/95	936	Airways Junior High School south of southwest corner of school building	NA

TABLE 3-3

Background Subsurface Soil Sample and Location Information for Background Sampling Program

Rev 1 Memphis Depot Dunn Field RI

Sample No.	Location	Group	Date	Time	Sample Location Description	QA/QC Sample
SB265A	BS18	Off-site	10/12/95	936	Airways Junior High School south of southwest corner of school building	Duplicate
SB275	BS19	Off-site	10/12/95	1027	Alcy Elementary School, east of southeast corner of school building	NA
SB275A	BS19	Off-site	10/12/95	1027	Alcy Elementary School, east of southeast corner of school building	Duplicate
SB285	BS20	Off-site	10/12/95	1255	Forest Hill Cemetery near Cane Creek east of Garden of Hope	NA
SB295	BS21	Off-site	10/12/95	1350	Pine Hills Golf Course off of Mallory Avenue near pump house	NA
SB305	BS22	Off-site	10/12/95	1428	Alcy Park West (southwest of Depot) south of Alcy Street	NA

Notes All samples were collected from 5- to 6-feet bgs

All samples were analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals, and dioxin/furans

bgs	below ground surface
MS/MSD	matrix spike/matrix spike duplicate
NA	Not applicable
PCBs	polychlorinated biphenyls
QA/QC	quality assurance/quality control
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
VOCs	volatile organic compounds

TABLE 3-4
Background Surface Water Sample and Location Information for Background Sampling Program
Rev 0 Memphis Depot Dunn Field RI

Sample No.	Location	Group	Date	Time	General Sample Location	QA/QC Sample
SW17	BW01	Nonconnah	10/10/95	930	Nonconnah Creek downstream of Tenmile Creek	NA
SW17A	BW01	Nonconnah	10/10/95	930	Nonconnah Creek downstream of Tenmile Creek	Duplicate
SW18	BW02	Nonconnah	10/10/95	1030	Nonconnah Creek near the mouth of Tenmile Creek	Split Sample
SW19	BW03	Nonconnah	10/10/95	1120	Nonconnah Creek upstream of Tenmile Creek	NA
SW20	BW04	Nonconnah	10/10/95	1340	Nonconnah Creek upstream (east) of Lamar Avenue Bridge	MS/MSD
SW21	BW05	Nonconnah	10/10/95	1345	Nonconnah Creek upstream (east) of Lamar Avenue Bridge	NA
SW22	BW06	Nonconnah	10/10/95	1400	Nonconnah Creek upstream (east) of Lamar Avenue Bridge	NA
SW23	BW07	Cane	10/10/95	1600	Cane Creek upstream (east) of Ragan Street Bridge	NA
SW24	BW08	Cane	10/10/95	1605	Cane Creek upstream (east) of Ragan Street Bridge	NA
SW25	BW09	Cane	10/10/95	1615	Cane Creek upstream (east) of Ragan Street Bridge	NA
SW26	BW10	MOH	10/11/95	925	Medal of Honor Park, western section of lake	NA
SW27	BW11	MOH	10/11/95	935	Medal of Honor Park, northwestern section of lake	NA
SW28	BW12	MOH	10/11/95	950	Medal of Honor Park, northern section of lake	NA
SW29	BW13	MOH	10/11/95	1015	Medal of Honor Park, southwestern section of lake	NA
SW30	BW14	MOH	10/11/95	1020	Medal of Honor Park, southern section of lake	NA
SW31	BW15	Botanical	10/11/95	1140	Botanical Gardens Lake (western section)	NA
SW32	BW16	Botanical	10/11/95	1145	Botanical Gardens Lake (eastern section)	NA
SW33	BW17	Audubon	10/11/95	1230	Audubon Park Lake (northern section of lake)	NA
SW33A	BW17	Audubon	10/11/95	1230	Audubon Park Lake (northern section of lake)	Duplicate
SW34	BW18	Audubon	10/11/95	1245	Audubon Park Lake (northwestern section of lake)	NA
SW35	BW19	Audubon	10/11/95	1315	Audubon Park Lake (northeastern section of lake)	Split + MS/MSD

TABLE 3-4
Background Surface Water Sample and Location Information for Background Sampling Program
Rev 0 Memphis Depot Dunn Field RI

Sample No.	Location	Group	Date	Time	General Sample Location	QA/QC Sample
SW35A	BW19	Audubon	10/11/95	1315	Audubon Park Lake (northeastern section of lake)	Duplicate
SW36	BW20	Chickasaw	10/12/95	900	Chickasaw Gardens Lake (northwestern section of lake)	NA
SW37	BW21	Chickasaw	10/12/95	855	Chickasaw Gardens Lake (north edge of lake, next to outfall)	NA
SW38	BW22	Chickasaw	10/12/95	840	Chickasaw Gardens Lake (northeastern section of lake)	NA

Notes: All samples were analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals, and dioxin/furans.

MS/MSD	matrix spike/matrix spike duplicate
NA	Not applicable
PCBs	polychlorinated biphenyls
QA/QC	quality assurance/quality control
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
VOCs	volatile organic compounds

TABLE 3-5
Background Sediment Sample and Location Information for Background Sampling Program
Rev 1 Memphis Depot Dunn Field RI

Sample No.	Station	Group	Date	Time	Sample Location Description	QA/QC Sample
SD060	BW01	Nonconnah	10/10/95	930	Nonconnah Creek downstream of Tenmile Creek	NA
SD06A0	BW01	Nonconnah	10/10/95	930	Nonconnah Creek downstream of Tenmile Creek	Duplicate
SD070	BW02	Nonconnah	10/10/95	1030	Nonconnah Creek near the mouth of Tenmile Creek	Split Sample
SD080	BW03	Nonconnah	10/10/95	1120	Nonconnah Creek upstream of Tenmile Creek	NA
SD090	BW04	Nonconnah	10/10/95	1340	Nonconnah Creek upstream (east) of Lamar Avenue Bridge	MS/MSD
SD100	BW05	Nonconnah	10/10/95	1345	Nonconnah Creek upstream (east) of Lamar Avenue Bridge	NA
SD110	BW06	Nonconnah	10/10/95	1400	Nonconnah Creek upstream (east) of Lamar Avenue Bridge	NA
SD120	BW07	Cane	10/10/95	1600	Cane Creek upstream (east) of Ragan Street Bridge	NA
SD130	BW08	Cane	10/10/95	1605	Cane Creek upstream (east) of Ragan Street Bridge	NA
SD140	BW09	Cane	10/10/95	1615	Cane Creek upstream (east) of Ragan Street Bridge	NA
SD150	BW10	MOH	10/11/95	925	Medal of Honor Park western section of lake	NA
SD160	BW11	MOH	10/11/95	935	Medal of Honor Park northwestern section of lake	NA
SD170	BW12	MOH	10/11/95	950	Medal of Honor Park northern section of lake	NA
SD180	BW13	MOH	10/11/95	1015	Medal of Honor Park southwestern section of lake	NA
SD190	BW14	MOH	10/11/95	1020	Medal of Honor Park southern section of lake	NA
SD200	BW15	Botanical	10/11/95	1140	Botanical Gardens Lake (western section)	NA
SD210	BW16	Botanical	10/11/95	1145	Botanical Gardens Lake (eastern section)	NA
SD220	BW17	Audubon	10/11/95	1230	Audubon Park Lake (northern section of lake)	NA
SD220A	BW17	Audubon	10/11/95	1230	Audubon Park Lake (northern section of lake)	Duplicate
SD230	BW18	Audubon	10/11/95	1245	Audubon Park Lake (northwestern section of lake)	NA

TABLE 3-5

Background Sediment Sample and Location Information for Background Sampling Program

Rev 1 Memphis Depot Dunn Field RI

Sample No.	Station	Group	Date	Time	Sample Location Description	QA/QC Sample
SD240	BW19	Audubon	10/11/95	1315	Audubon Park Lake (northeastern section of lake)	Split + MS/MSD
SD240A	BW19	Audubon	10/11/95	1315	Audubon Park Lake (northeastern section of lake)	Duplicate
SD250	BW20	Chickasaw	10/12/95	900	Chickasaw Gardens Lake (northwestern section of lake)	NA
SD260	BW21	Chickasaw	10/12/95	855	Chickasaw Gardens Lake (north edge of lake, next to outfall)	NA
SD270	BW22	Chickasaw	10/12/95	840	Chickasaw Gardens Lake (northeastern section of lake)	NA

Notes All samples were collected from zero to 6 inches bgs.

All samples were analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals, and dioxin/furans

bgs	below ground surface
MS/MSD	matrix spike/matrix spike duplicate
NA	Not applicable
PCBs	polychlorinated biphenyls
QA/QC	quality assurance/quality control
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
VOCs	volatile organic compounds

TABLE 3-6
Sampling Methods Used in Background Sampling Program
Rev 0 Memphis Depot Dunn Field RI

Analytes	VOCs	SVOCs	Pesticides/ PCBs	Herbicides	TAL Metals (Unfiltered)	TAL Metals (Filtered)	Dioxin/ Furans
Method	**CLP Organic Laboratory Method 1.9**			**SW 846**	**CLP Inorganic Laboratory Method 3.1**		**CLP Dioxin/ Furan Laboratory Method 1.1**
Soil	✓	✓	✓	✓	✓		✓
Surface Water	✓	✓	✓	✓	✓	✓	✓
Sediment	✓	✓	✓	✓	✓		✓
Groundwater	✓	✓	✓	✓	✓		

CLP	Contract Laboratory Program
PCB	polychlorinated biphenyl
SVOC	semivolatile organic compound
TAL	target analyte list
VOC	volatile organic compound

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TABLE 3-7

Summary of Background Constituents Exceeding Risk-Based Preliminary Remedial Action Criteria

Rev 1 Memphis Depot Dunn Field RI

Matrix	Background Constituents Exceeding Screening Criteria
Soil	Arsenic, barium, beryllium, manganese, and selenium[a], benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenol, and dioxin/furan TEF
Sediment	Antimony[a], arsenic, cadmium, total chromium, copper, mercury, lead, silver[a], zinc, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, naphthalene, phenanthrene, and pyrene
Surface water	Aluminum, arsenic, total chromium, copper, iron, nickel[a], lead, silver[a], zinc, and dioxin/furan TEF
Groundwater	Antimony[a], arsenic[a], barium, beryllium, copper, lead, vanadium, 1,1,1-trichloroethane; 1,1-dichloroethane; and trichloroethylene

[a] All concentrations are estimated

TEF toxicity equivalent factor

TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program
Rev. 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
Metals									
Surface Water									
	Aluminium, Total	µg/L	22	18	266	16900	2538	5077	VALUE DETECTED TWICE MEAN
	Aluminum, Dissolved	µg/L	22	2	191.0	280.0	235.5	471.0	
	Antimony, Dissolved	µg/L	22	1	16.4	16.4	16.4	32.8[a]	
	Arsenic, Total	µg/L	22	11	6.6	13.6	9.0	18.0	
	Arsenic, Dissolved	µg/L	22	6	5.1	7.4	6.2	12.4[a]	
	Barium, Total	µg/L	22	22	26.2	185.0	62.6	125.3	
	Barium, Dissolved	µg/L	22	19	23.0	99.4	43.8	87.6	
	Calcium, Total	µg/L	22	22	4410	34800	15900	31800	
	Calcium, Dissolved	µg/L	22	22	3710	34200	15100	30200	
	Chromium, Dissolved	µg/L	22	1	16.7	16.7	16.7	33.4[a]	
	Chromium, Total	µg/L	22	2	18.0	18.1	18.1	36.1[a]	
	Manganese, Dissolved	µg/L	22	21	32	713	176	352	
	Nickel, Total	µg/L	22	5	6.9	19.9	11.4	22.8[a]	
	Nickel, Dissolved	µg/L	22	1	118	118	118	236[a]	
	Potassium, Total	µg/L	22	19	733	6730	3640	7280	
	Potassium, Dissolved	µg/L	22	17	1050	6450	3360	6720	
	Selenium, Dissolved	µg/L	22	2	1.4	1.6	1.5	3.0[a]	
	Silver, Total	µg/L	22	2	1.8	1.8	1.8	3.6[a]	
	Sodium, Total	µg/L	22	18	2890	17900	10700	21400	
	Sodium, Dissolved	µg/L	22	17	6720	17500	10800	21600	
	Vanadium, Total	µg/L	22	5	13.2	39.4	19.5	39.0	
	Zinc, Total	µg/L	22	3	64.0	221.0	143.7	287.3	
	Zinc, Dissolved	µg/L	22	1	205.0	205.0	205.0	410.0[a]	
Surface Soil									
	Aluminum	mg/kg	22	22	8160	18500	11905	23810	
	Antimony	mg/kg	22	1	3.5	3.5	3.5	7.0[a]	
	Arsenic	mg/kg	22	22	4.2	27.7	10.9	21.8	

TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program

Rev 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
	Barium	mg/kg	22	22	77	160	126	253	VALUE DETECTED TWICE MEAN
	Beryllium	mg/kg	22	15	0.5	0.6	0.5	1.1[a]	
	Cadmium	mg/kg	22	4	0.6	0.8	0.7	1.4[a]	
	Calcium	mg/kg	22	22	424	30600	2920	5840	
	Chromium, Total	mg/kg	22	22	8.4	17.7	13.7	27.4	
	Cobalt	mg/kg	22	22	5.7	12.3	9.1	18.3	
	Copper	mg/kg	22	22	7.3	23.3	16.7	33.5	
	Iron	mg/kg	22	22	10800	26100	18520	37040	
	Lead	mg/kg	22	22	11.7	73.3	21.3	42.6	
	Magnesium	mg/kg	22	22	1110	3200	2308	4616	
	Manganese	mg/kg	22	22	330	1080	652	1304	
	Mercury	mg/kg	22	4	0.1	0.4	0.2	0.4	
	Nickel	mg/kg	22	22	10.4	21.4	16.5	33	
	Potassium	mg/kg	22	22	641	1460	1013	2025	
	Selenium	mg/kg	22	3	0.3	0.5	0.4	0.8[a]	
	Silver	mg/kg	22	1	1.0	1.0	1.0	2.0[a]	
	Vanadium	mg/kg	22	22	17.7	35.2	26.1	52	
	Zinc	mg/kg	22	22	35.6	89.5	62.8	126	
Subsurface Soil									
	Aluminum	mg/kg	22	22	6820	14900	10915	21829	
	Arsenic	mg/kg	22	22	3.1	14.1	8.5	17.0	
	Barium	mg/kg	22	22	90	243	150	300	
	Beryllium	mg/kg	22	14	0.5	0.7	0.6	1.2[a]	
	Cadmium	mg/kg	22	3	0.7	0.7	0.7	1.4[a]	
	Calcium	mg/kg	22	22	511	2630	1216	2432	
	Chromium, Total	mg/kg	22	22	8.7	18.0	13.2	26.4	
	Cobalt	mg/kg	22	22	5.0	20.4	10.2	20.4	
	Copper	mg/kg	22	22	7.4	23.1	16.3	32.7	
	Iron	mg/kg	22	22	8340	24900	19240	38480	

TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program
Rev 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
	Lead	mg/kg	22	22	6 9	22 7	12 0	23 9	V
	Magnesium	mg/kg	22	22	1200	3370	2450	4900	A
	Manganese	mg/kg	22	22	231	1580	770	1540	L
	Mercury	mg/kg	22	1	0 1	0 1	0 1	0 2[a]	U
	Nickel	mg/kg	22	22	9 0	22 4	18 3	36 6	E
	Potassium	mg/kg	22	22	483	1480	900	1800	
	Selenium	mg/kg	22	1	0 3	0 3	0 3	0 6[a]	D
	Silver	mg/kg	22	2	0 4	0 6	0 5	1 0[a]	E
	Vanadium	mg/kg	22	22	15 0	31 7	25 6	51 3	T
	Zinc	mg/kg	22	22	30 9	79 5	57 0	114	E
Sediment									C
	Aluminum	mg/kg	22	22	490	14200	5042	10085	T
	Antimony	mg/kg	22	2	3 7	3 9	3 8	7 6[a]	E
	Arsenic	mg/kg	22	17	1 5	11 1	6 0	12 0	D
	Barium	mg/kg	22	22	3 7	137 0	59 0	118	
	Beryllium	mg/kg	22	5	0 5	0 8	0 6	1 3	T
	Cadmium	mg/kg	22	3	1 3	38 2	14 5	28 9	W
	Calcium	mg/kg	22	20	134	56800	7430	14860	I
	Chromium, Total	mg/kg	22	22	4 1	174	19	38	C
	Cobalt	mg/kg	22	14	1 2	10 8	6 8	13 6	E
	Copper	mg/kg	22	16	1 7	1250	135	271	
	Iron	mg/kg	22	22	3330	30700	11540	23080	M
	Lead	mg/kg	22	21	1 7	291	36 0	72 0	E
	Magnesium	mg/kg	22	22	51 2	2950	1220	2440	A
	Manganese	mg/kg	22	22	59 3	2610	436	871	N
	Mercury	mg/kg	22	1	2 0	2 0	2 0	4 0[a]	

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TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program

Rev. 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
	Nickel	mg/kg	22	13	5 3	37 4	15 2	30 5	V
	Potassium	mg/kg	22	9	269	1080	780	1560[a]	A
	Selenium	mg/kg	22	4	0 4	1.5	0 8	1.7	L
	Silver	mg/kg	22	1	0 9	0 9	0 9	1.8	U
	Sodium	mg/kg	22	1	120	120	120	240	E
	Thallium	mg/kg	22	2	0 5	0 6	0.5	1 1[a]	
	Vanadium	mg/kg	22	22	4 4	31 5	15 0	30 0	D
	Zinc	mg/kg	22	22	8 4	7630	399	797	E
Groundwater									T
	Aluminum	µg/L	12	5	235	2670	899 2	1798	E
	Antimony	µg/L	12	1	17 2	17 2	17 2	34 4[a]	C
	Barium	µg/L	12	12	42 9	307 0	111 9	223 8	T
	Beryllium	µg/L	12	2	0 2	0 4	0 3	0 6	E
	Calcium	µg/L	12	12	9950 0	49200.0	26437 5	52875 0	D
	Chromium, Total	µg/L	12	2	20 3	34 0	27 2	54 4	
	Cobalt	µg/L	12	5	2 2	19.6	12 4	24 8	T
	Copper	µg/L	12	4	2 0	315 0	81 3	162.6	W
	Iron	µg/L	12	9	598 0	7960 0	3364 0	6728.0	I
	Lead	µg/L	12	3	2.6	7 6	4 7	9 4[a]	C
	Magnesium	µg/L	12	12	5250 0	24000 0	13022 5	26045 0	E
	Manganese	µg/L	12	11	17 2	917 0	280 0	560 0	
	Nickel	µg/L	12	3	9 4	25 6	15 7	31 4	M
	Potassium	µg/L	12	9	849 0	4040.0	1747 7	3495 4	E
	Selenium	µg/L	12	1	2 9	2 9	2 9	5 8[a]	A
	Sodium	µg/L	12	4	32300.0	74600 0	53325 0	106650[a]	N
	Vanadium	µg/L	12	4	14 8	7 3	3.0	6 0	

TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program
Rev. 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
Volatile Organics									
Surface Soil									
	Carbon Disulfide	µg/kg	22	2	2	2	2	2	NP
	Methyl ethyl Ketone (2-Butanone)	µg/kg	22	1	2	2	2	2	NP
	Toluene	µg/kg	22	1	2	2	2	2	NP
	Total Xylenes	µg/kg	22	10	1	9	2 8	9	NP
Subsurface Soil									
	Carbon Disulfide	µg/kg	22	2	1	2	1 5	2	NP
	Total Xylenes	µg/kg	22	4	1	2	1 5	2	NP
Surface Water									
	Methyl ethyl Ketone (2-Butanone)	µg/L	22	5	1	2	1 6	2	NP
	Total Xylenes	µg/L	22	2	1	1	1	1	NP
Sediment									
	Chloromethane	µg/kg	22	1	3	3	3	3	NP
	Methyl ethyl Ketone (2-Butanone)	µg/kg	22	10	1	10	4 8	10	NP
	Toluene	µg/kg	22	3	2	14	8 7	14	NP
Groundwater									
	1,1,1-Trichloroethane	µg/L	12	1	1	1	1	1	NP
	1,1,-Dichloroethene	µg/L	12	1	2	2	2	2	NP
	Tetrachloroethene	µg/L	12	1	1	1	1	1	NP
	Trichloroethylene	µg/L	12	1	1	1	1	1	NP
Semi-volatile Organics									
Surface Soil									
	Acenaphythylene	µg/kg	22	1	190	190	190	190	NP
	Anthracene	µg/kg	22	1	96	96	96	96	NP
	Benzo(a)anthracene	µg/kg	22	9	43	710	151	710	NP
	Benzo(a)pyrene	µg/kg	22	9	44	960	186	960	NP
	Benzo(b)fluoranthene	µg/kg	22	9	51	900	208	900	NP
	Benzo(g,h,i)perylene	µg/kg	22	9	37	820	169	820	NP

TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program
Rev 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
	Benzo(k)fluoranthene	µg/kg	22	9	45	780	192	780	NP
	Carbazole	µg/kg	22	1	67	67	67	67	NP
	Chrysene	µg/kg	22	10	40	940	190	940	NP
	Dibenz(a,h)anthracene	µg/kg	22	3	36	260	117	260	NP
	Fluoranthene	µg/kg	22	11	49	1600	310	1600	NP
	Ideno(1,2,3-c,d)pyrene	µg/kg	22	7	63	700	179	700	NP
	Phenathrene	µg/kg	22	9	37	610	159	610	NP
	Phenol	µg/kg	22	5	52	14000	5238	14000	NP
	Pyrene	µg/kg	22	11	50	1500	272	1500	NP
Subsurface Soil									
	Fluoranthene	µg/kg	22	2	44	45	45	45	NP
	Phenol	µg/kg	22	6	580	19000	4295	19000	NP
	Pyrene	µg/kg	22	2	39	42	41	42	NP
Sediment									
	Acenaphthene	µg/kg	22	2	59	770	415	770	NP
	Anthracene	µg/kg	22	2	310	1600	955	1600	NP
	Benzo(a)anthracene	µg/kg	22	6	64	2900	820	2900	NP
	Benzo(a)pyrene	µg/kg	22	7	64	2500	632	2500	NP
	Benzo(b)fluoranthene	µg/kg	22	7	59	2600	669	2216.05	LN
	Benzo(g,h,i)perylene	µg/kg	22	7	48	1800	452	1800	NP
	Benzo(k)fluoranthene	µg/kg	22	7	75	2300	624	2300	NP
	bis(2-ethylexyl)phthalate	µg/kg	22	1	480	480	480	480	NP
	Carbazole	µg/kg	22	2	83	1100	592	1100	NP
	Chrysene	µg/kg	22	8	88	3200	735	3200	NP
	Dibenzo(a,h)anthracene	µg/kg	22	2	130	700	415	700	NP
	Dibenzofuran	µg/kg	22	2	42	380	211	380	NP
	Di-n-Octylphthalate	µg/kg	22	1	47	47	47	47	NP
	Fluoranthene	µg/kg	22	10	60	7100	1294	7100	NP
	Fluorene	µg/kg	22	2	130	870	500	870	NP

TABLE 3-8
Statistics for Detected Background Constituents in Background Sampling Program
Rev 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
	Ideno(1,2,3-c,d)Pyrene	µg/kg	22	7	42	1700	428	1700	NP
	Naphthalene	µg/kg	22	1	130	130	130	130	NP
	Phenanthrene	µg/kg	22	6	68	6900	1651	6900	NP
	Phenol	µg/kg	22	5	51	200	86	200	NP
	Pyrene	µg/kg	22	10	43	6800	1360	2882	LN
Groundwater									
	Benzyl Butyl Phthalate	µg/L	12	1	2	2	2	4.	NP
Pesticides/PCBs									
Surface Soil									
	Alpha-Chlordane	µg/kg	22	5	3 5	29 0	9 4	29 0	NP
	Dieldrin	µg/kg	22	14	3 3	530	114	530	NP
	Gamma-Chlordane	µg/kg	22	5	2 3	26 0	11 0	26 0	NP
	Heptachlor Epoxide	µg/kg	22	1	7 7	7 7	7 7	7 7	NP
	p,p'-dichlorodiphenyldichoroethane	µg/kg	22	1	6 7	6 7	6 7	6 7	NP
	p,p'-dichlorodiphenyldichloroethene	µg/kg	21	1	160	160	160	160	NP
	p,p'-dichlorodiphenyltrichloroethene	µg/kg	22	3	9 4	74 0	43 5	74.0	NP
	PCB-1260 (Arochlor 1260)	µg/kg	22	2	100	110	105	110	NP
Subsurface Soil									
	Alpha-Chlordane	µg/kg	22	1	2 6	2 6	2 6	2 6	NP
	Dieldrin	µg/kg	22	3	3 5	370 0	127 0	370 0	NP
	Gamma-Chlordane	µg/kg	22	1	2 2	2 2	2 2	2 2	NP
	p,p'- dichlorodiphenyldichloroethene	µg/kg	22	1	1 5	1 5	1 5	1 5	NP
	p,p'- dichlorodiphenyltrichloroethene	µg/kg	22	1	7 2	7 2	7 2	7 2	NP
Sediment									
	Alpha-chlordane	µg/kg	21	4	3 6	5 2	4 5	5 2	NP
	Dieldrin	µg/kg	22	1	11 0	11 0	11 0	11 0	NP
	Gamma-Chlordane	µg/kg	22	5	6 1	2000 0	417 0	2000 0	NP
	Heptachlor Epoxide	µg/kg	22	1	230	230	230	230	NP
	p,p'- dichlorodiphenyldichoroethane	µg/kg	22	3	2 8	6 1	5 0	6 1	NP

TABLE 3-8

Statistics for Detected Background Constituents in Background Sampling Program

Rev. 1 Memphis Depot Dunn Field RI

Parameter Group and Matrix	Constituent	Units	No. Analyses	No. Detects	Minimum Detected	Maximum Detected	Mean Detected	Background Value	Background Basis
	p,p'- dichlorodiphenyldichloroethene	µg/kg	22	2	5.8	7.2	6.5	7.2	NP
Dioxin/Furans									
Surface Soil									
	Octachlorodibenzofuran	µg/kg	22	3	0.045	0.39	0.16	0.393	NP
	Octachlorodibenzo-p-Dioxin	µg/kg	22	22	0.747	23.33	5.52	9.72	LN
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	µg/kg	22	6	0.071	0.39	0.14	0.390	NP
	Total Equivalency Factor	µg/kg	22	22	0.001	0.02	0.01	0.010	LN
Subsurface Soil									
	Octachlorodibenzo-p-Dioxin	µg/kg	22	17	0.209	9.44	2.99	9.44	NP
	Total Equivalency Factor	µg/kg	22	17	0.000	0.01	0.00	0.006	LN
Surface Water									
	2,3,7,8-Tetrachlorodibenzofuran	ng/L	22	6	0.007	0.03	0.02	0.031	NP
	2,3,4,7,8-Pentachlorodibenzofuran	ng/L	22	2	0.024	0.05	0.04	0.050	NP
	1,2,3,7,8-Pentachlordibenzofuran	ng/L	22	3	0.027	0.06	0.04	0.057	NP
	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	ng/L	22	1	0.046	0.05	0.05	0.046	NP
	Octachlorodibenzo-p-Dioxin	ng/L	22	15	0.206	1.23	0.58	1.225	NP
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dixoin	ng/L	22	4	0.043	0.18	0.10	0.184	NP
	Total Equivalency Factor	ng/L	22	15	0.000	0.03	0.00	0.018	LN
Sediment									
	2,3,4,7,8-Pentachlorodibenzofuran	µg/kg	22	1	0.002	0.002	0.002	0.002	NP
	Octachlorodibenzo-p-Dixoin	µg/kg	22	11	0.431	8.56	2.62	8.56	NP
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	µg/kg	22	3	0.064	0.58	0.24	0.583	NP
	Total Equivalency Factor	µg/kg	22	11	0.000	0.009	0.003	0.009	NP

Notes

[a]Because of the low number of detections, the background value, based on twice mean detected value, exceeds the maximum detected value.

LN	background is the UCL95 value based on a lognormal distribution
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
ng/L	nanograms per liter
NO	background is the UCL95 value based on a normal distribution
NP	background is the maximum value based on nonparametric distribution
PCB	polychlorinated biphenyl
SVOC	semivolatile organic compound
UCL95	95th percentile upper confidence level on mean concentration
VOC	volatile organic compound

TABLE 3-9
Background Data Modified by BCT
Rev 0 Memphis Depot Dunn Field RI

Chemical	Matrix	Units	Initial Background	Modified Background	Comments
Arsenic	SB	mg/kg	**17**		
Arsenic	SD	mg/kg	**12**		17 detections No outliers
Arsenic	SS	mg/kg	21 8	**16.5**	Off-site locations only. Dropped outlier of 27 7
Arsenic	SW	mg/L	**18**		No outliers
Arsenic, Dissolved	SW	mg/L	**12.4**		No outliers
Barium	SB	mg/kg	**300**		No outliers
Barium	SS	mg/kg	253	**234**	Off-site locations only
Beryllium	SS	mg/kg	**1.1**		No outliers. Perimeter and off-site values nearly identical
Cadmium	SD	mg/kg	**28.9**		Only 3 detections.
Chromium	SB	mg/kg	**26.4**		No outliers
Chromium	SD	mg/kg	38	**20**	Dropped 2 outliers (174 and 40).
Chromium	SS	mg/kg	27.4	**24.8**	Based on off-site mean of 12.4.
Copper	SD	mg/kg	271	**58**	Dropped 2 outliers (512 and 1250 – both are J qualified)
Dieldrin	SS	mg/kg	530	**86**	Nonparametric distribution – Maximum value proposed Alternate value is maximum of three off-site dieldrin detections.
p,p'-DDD	SD	mg/kg	**6.1**		
p,p'-DDD	SS	mg/kg	**6.7**		
p,p'-DDE	SD	mg/kg	**7.2**		
p,p'-DDE	SS	mg/kg	**160**		
p,p'-DDT	SS	mg/kg	**74**		
Lead	SD	Mg/kg	69	**35.2**	Removed 2 outliers.
Lead	SS	mg/kg	42.6	**30**	Off-site values only with 73 3 mg/kg outlier removed
Lead	SW	mg/L	**18 6**		Twice mean detected No outliers
Lead, Dissolved	SW	mg/L	**11.3**		Maximum detected. Only one detected
Mercury	SD	mg/kg	**4**		Only one detection
Nickel	SS	mg/kg	33	**30**	No outliers. Off-site values only
Nickel	SB	mg/kg	**37**		No positive outliers
Vanadium	SS	mg/kg	52	**48.4**	No outliers Off-site values only.

Notes
Values in bold-face were used in evaluation of Depot data
SS = Surface Soil, SB = Subsurface Soil, SW = Surface Soil, SD = Sediment
mg/kg = milligrams per kilogram
mg/l = milligrams per liter

Figures

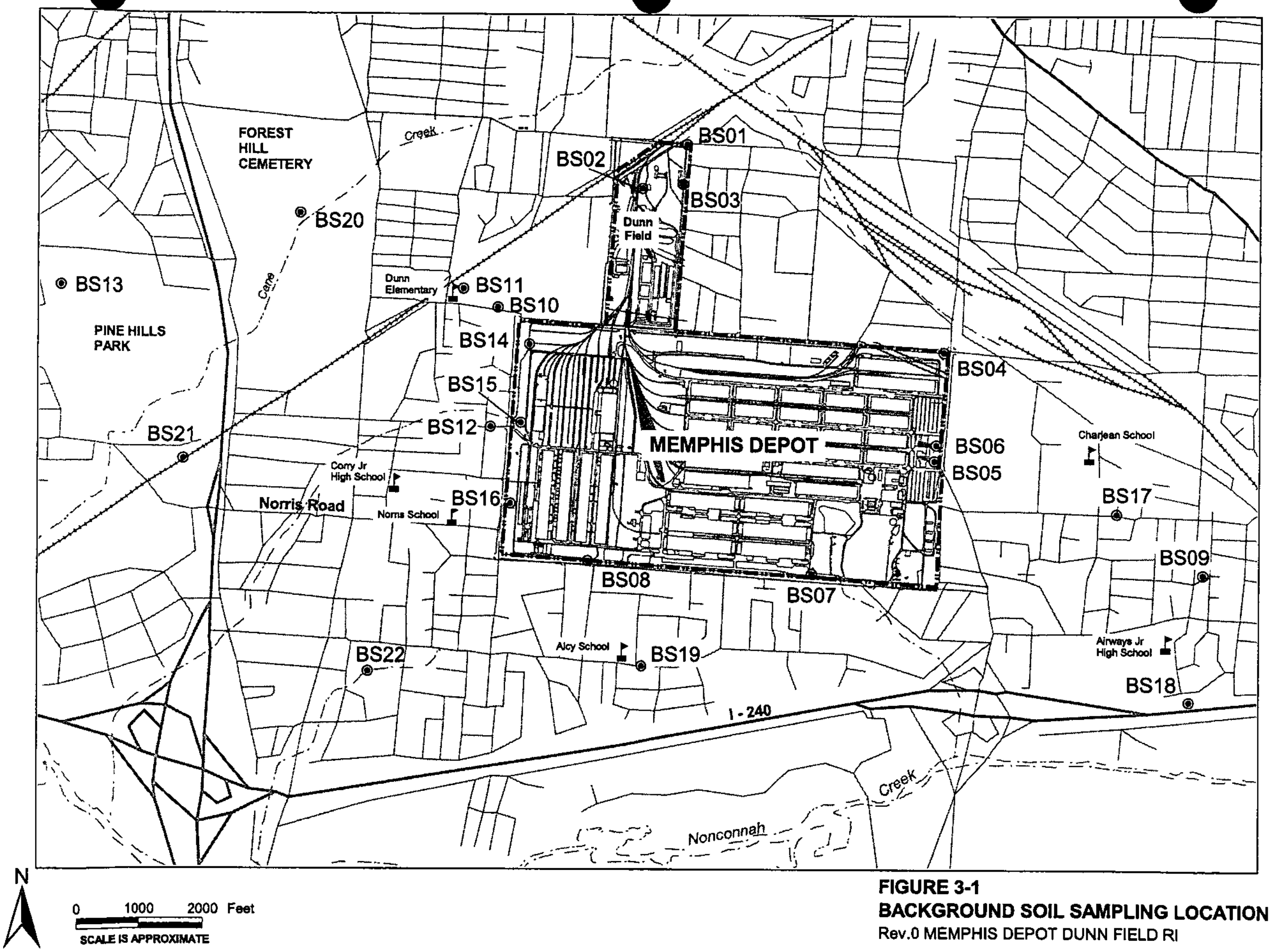

FIGURE 3-1
BACKGROUND SOIL SAMPLING LOCATIONS
Rev.0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

ATL \\Boomer\projects3\Memphis\aprs\atldunnfld8-01-01.apr

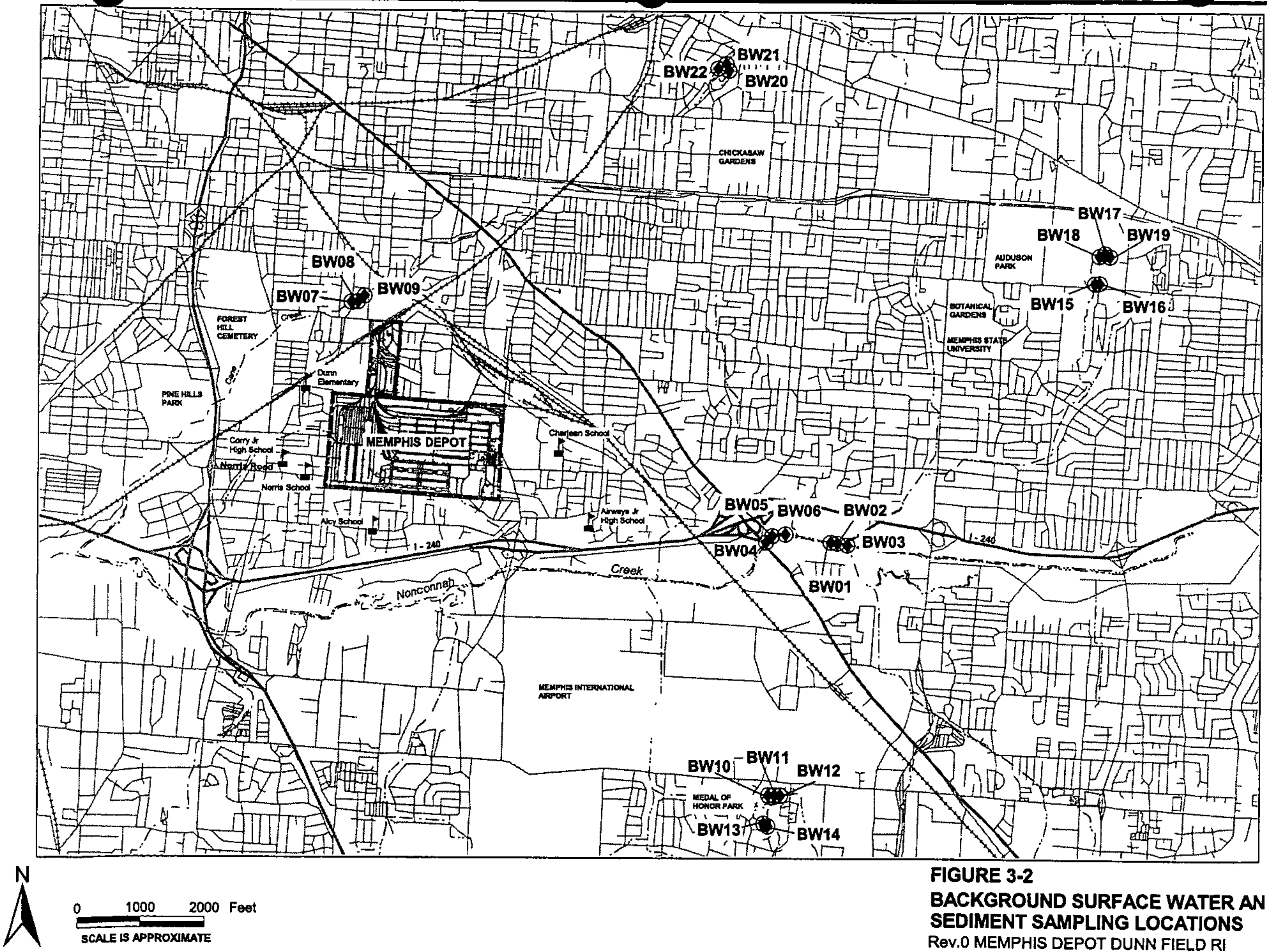

FIGURE 3-2
BACKGROUND SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS
Rev.0 MEMPHIS DEPOT DUNN FIELD RI
CH2MHILL

ATL \\Boomer\projects3\Memphis\aprs\atldunnfld8-01-01.apr

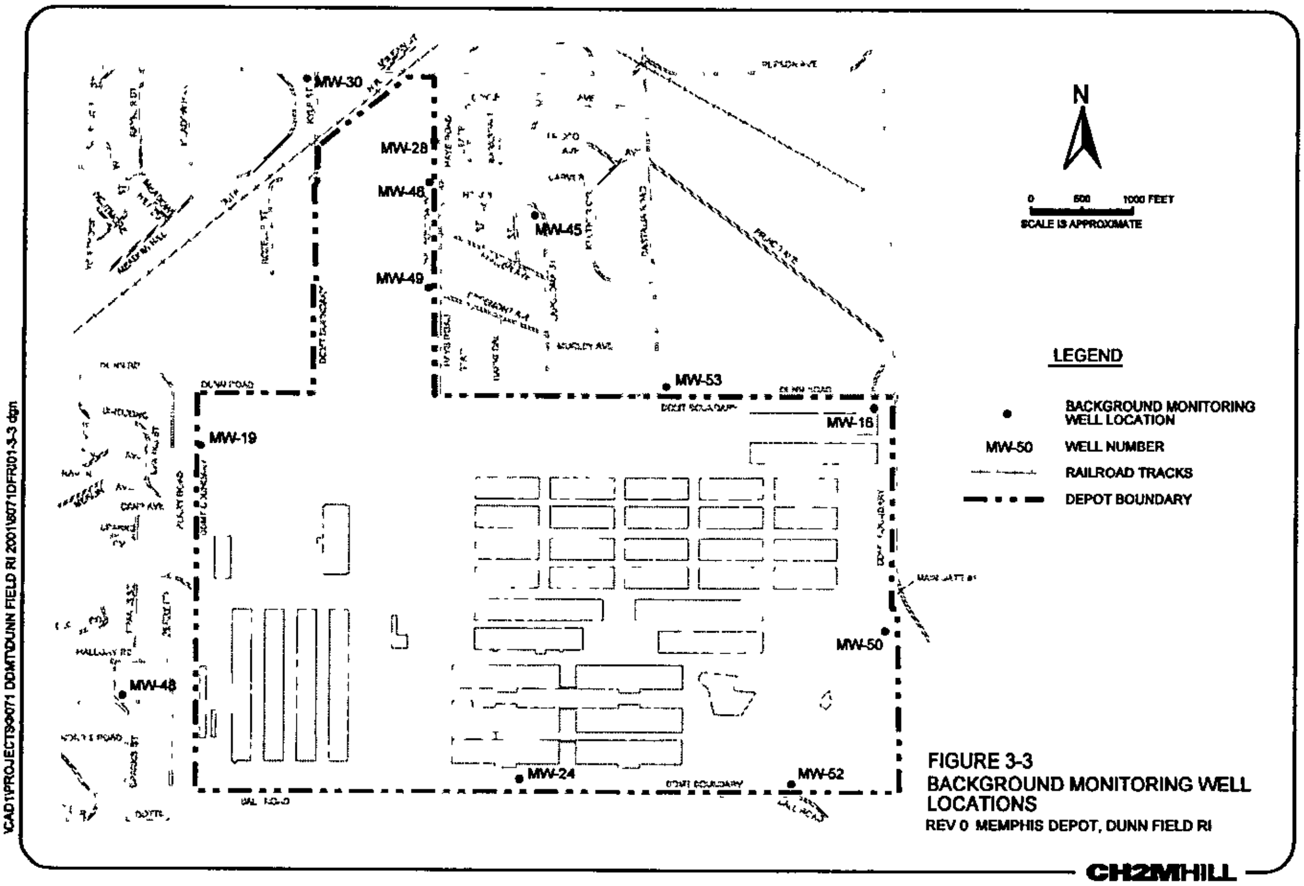

FIGURE 3-3
BACKGROUND MONITORING WELL LOCATIONS
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

TAB

Section 4

4.0 CH2M HILL Sampling Program at Dunn Field

The sampling program described in this section includes the 1998 passive soil gas survey and the 1999 and 2000/2001 RI field investigations, all of which were conducted by CH2M HILL. Previous investigation results pertinent to Dunn Field are discussed in the appropriate nature and extent sections of this report.

Three activities at Dunn Field necessitated changing some of the sampling proposed in the OU 1 FSP (CH2M HILL, 1995). First, in February 1998 Parsons Engineering Science (Parsons ES) conducted a geophysical survey at Dunn Field as part of EE/CA for CWM Sites 1 and 24-A/24-B. Geophysical anomalies were noted outside of the disposal areas identified, mapped and reported in the OU 1 FSP indicating that potential burial operations occurred outside of previously suspected areas. Second, in early 1998 OHM/IT Corp., performed waste characterization activities of excavated soil resulting from the installation of the below-grade conveyance system of the Dunn Field groundwater extraction system. VOC contamination was found along the western and northern perimeter of Dunn Field, outside of previously mapped disposal areas. This information required soil gas field screening to be conducted at Dunn Field to identify areas of contamination not previously identified.

The Dunn Field RI fieldwork conducted in 1999 was directed by implementation of the FSP Addendum [I] for OU-1 (CH2M HILL, March 1999). That document modified the sampling strategies presented in the OU 1 FSP dated September 1995 (CH2M HILL, September 1995), by incorporating the results of the geophysical survey and soil gas monitoring. Field sampling occurred as proposed in the 1995 FSP except where modified by the addendum. The addendum was implemented in conjunction with the OU 1 FSP (CH2M HILL, September 1995), the Generic RI/FS Work Plan (CH2M HILL, August 1995), the Hazardous and Toxic Waste Health and Safety Plan (HASP) (CH2M HILL, August 1995), the Generic Quality Assurance Project Plan (QAPP) (CH2M HILL, August 1995), and the Approach to Risk Assessment Memorandum (CH2M HILL, August 1999).

The most significant change to the 1995 FSP as presented in the 1999 Addendum [I] involved consolidating individual disposal areas or areas of concern into eight larger sampling areas, Locations A through H (see Figure 4-1). These sampling areas are delineated based on the soil gas survey (discussed below) and anomalies detected through the Parsons ES 1998 geophysical investigation. In effect, these sampling areas were evaluated as a consolidation of individual sites into a suspected common contaminant plume as defined by the soil gas results.

Expanded RI fieldwork was conducted on- and offsite of Dunn Field in 2000 and 2001. This expanded investigation involved implementation of the RI FSP Addendum II for Dunn Field (OU 1) (CH2M HILL, 2000). This FSP Addendum II called for a more focused investigation to assess the presence or absence of a dense non-aqueous phase liquids (DNAPL) in soil or groundwater on the central and west portion of the Disposal Area, and the area offsite to the west. Groundwater samples were collected by Jacobs from wells in

February 2000 during the quarterly groundwater monitoring program conducted as part of the second year of the operations and maintenance of the groundwater extraction system on Dunn Field. Groundwater analytical results from MW70 indicated the presence of trichloroethene (TCE) and 1,1,2,2-tetrachloroethane (1,1,2,2-PCA) at concentrations of 11,700 micrograms per liter (µg/L) and 4,830 µg/L, respectively.

A summary of the field investigations that comprise the data collection efforts for this RI report are included in Table 4-1A.

4.1 1998 Soil Gas Survey

A passive soil gas survey was conducted at Dunn Field in August (Phase 1) and October (Phase 2) of 1998. Phase 1 focused on the Disposal Area and Phase 2 expanded the soil gas sampling grid to the east and north to further delineate soil gas identified in Phase 1. The goal of this survey was to provide screening information on the potential sources of VOC contamination of groundwater at Dunn Field. A total of 538 Gore-Sorber modules were installed: 302 in Phase 1 and 236 in Phase 2. W. L Gore and Associates, Inc., provided the modules and performed the module analysis.

4.1.1 Procedures and Analyses

The passive soil gas method used in this investigation is based on hydrophobic modules that contain an absorbent material at the bottom of the sock. The passive soil gas modules were placed to a depth of 3 feet over a grid based on 50-foot centers in the Disposal Area (avoiding the CWM Site disposal areas); 50- to 75-foot centers in the Northeast Open Area; and every 100 feet along the eastern and southern fence lines of the Stockpile Area. The modules in the Disposal Area were analyzed for chlorinated VOCs and CWM breakdown products. The Northeast Open Area and Stockpile Area modules were analyzed for chlorinated VOCs only. One out of every 10 modules was run as a field blank and one duplicate for every 50 modules was analyzed. No analytes were detected in the field blanks and the duplicates corresponded closely with the module.

4.1.2 Results

The VOC analytical results of the passive soil gas survey are presented on Figures 4-2 through 4-6. Analysis of the modules did not indicate the presence of CWM breakdown products outside the suspected CWM and mustard disposal areas. The VOC analytical data were contoured and color-coded into three categories as described below:

- "Low" represents VOC detections up to one order of magnitude above the method detection limit (MDL);
- "Medium" represents detections between one and two orders of magnitude above the MDL; and
- "High" represents detections two orders of magnitude above the MDL.

The VOC results were used to develop the sampling plan for the eight Locations (A-H).

4.2 Characterization of Potential Onsite Sources

The primary objective of the 1999 RI effort was to provide data to characterize the nature and extent of contamination in surface and subsurface soils, groundwater, surface water, and sediments resulting from past waste handling and disposal operations. Data were collected to meet the following data quality objectives:

- Evaluate the presence of VOCs in surface soil and define horizontal and vertical extent;
- Characterize the nature of the materials contained in the Disposal Area;
- Support human health and ecological risk assessment of exposure to surface soil during intrusive activities; and
- Provide data for feasibility studies.

The objectives of the 2000/2001 expanded remedial investigation at Dunn Field were to assess (1) the presence or absence of a DNAPL in the groundwater in the west-central portion of the Disposal Area; and (2) the source and areal extent of the subsurface DNAPL, if confirmed to be present.

As described in Section 1, Dunn Field was divided into three areas: Northeast Open Area, Disposal Area, and Stockpile Area. All sampling points within Locations A through H in the Northeast Open Area and the Disposal Area are shown on Figure 4-7; the entire 1999 RI sampling program is summarized in Table 4-1B. Table 4-2 presents a summary of the sampling program for the 2000/2001 DNAPL investigation.

Data management and QA/QC activities were conducted in accordance with the procedures outlined in the generic QAPP (CH2M HILL, 1995f), and onsite health and safety procedures described in the *Final Generic HASP* (CH2M HILL, 1995g) were followed.

A discussion of the field investigation by Area can be found in Section 8 (Northeast Open Area), Section 10 (Disposal Area), and Section 12 (Stockpile Area).

4.2.1 Methodology

4.2.1.1 Surface Soil Sampling Procedure

Samples were collected in 1999 using decontaminated stainless-steel hand augers or scoops to retrieve soil from ground surface to 12 inches bgs. VOC samples were placed in appropriate jars immediately upon collection. The remaining samples were thoroughly mixed in a stainless-steel mixing bowl or aluminum pan before being transferred to the appropriate sample containers. Surface cover (grass and weeds) and debris (such as broken glass and rocks) were removed from the sample before it was placed in a sample container. Often a pick or shovel were used to loosen the soil or remove the gravel in an area where a sample was to be collected. In these cases, care was taken not to allow the sample to include any soil that had come in contact with the pick or shovel.

During CH2M HILL sampling efforts, 50 surface soil samples were collected to better define the nature and extent of site-specific contamination. The locations of surface soil samples are provided in each Area-specific nature and extent section.

4.2.1.2 EnCore Sampling Procedure

VOC soil sampling conducted for this RI effort incorporated the EnCore sampling methodology for VOC analysis of soils. Samples collected as part of the 1995 FSPs were analyzed by traditional "purge-and-trap" procedures outlined in Update II to SW-846 (Method 5030A, Revision 1, 1992). However, on June 13, 1997, Method 5030B and Method 5035 were promulgated in SW-846 Update III. This update removed the option of analyzing soils and sediments by Method 5030 and replaced it with Method 5035, *Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Water Samples.*

The EnCore sampler option of Method 5035 was used to analyze VOC samples. At each VOC sampling location, three samples were collected for VOC laboratory analysis. The EnCore device sealed the soil in small (25-gram) inert composite polymer tubes. Three EnCore samplers were required for each VOC sample collected. The EnCore samplers were submitted to the laboratory for preservation within the specified 48 hours.

4.2.1.3 Subsurface Soil Sampling Procedures

During CH2M HILL's 1999 sampling efforts, subsurface soil samples were collected from 51 borings. Subsurface soil samples were collected from vertical soil borings that were installed by hollow-stem auger. The specific number of samples for chemical analysis and collection depths are discussed in each Area-specific nature and extent section.

Soil samples were collected based upon specific intervals identified for sampling and also on visual or organic vapor analyzer/photoionization detector (OVA/PID) field screening. Soil samples were stored in air-tight containers and shipped as necessary to the laboratory in accordance with holding times for analyses.

During the 2000 supplemental RI investigation, additional subsurface soil samples were collected. The reasons for the sample collection and sampling procedures are presented within Section 4.2.3.

4.2.1.4 Surface Water and Sediment Sampling Procedures

Surface water at Dunn Field flows overland via swales, ditches, concrete-lined channels, and storm drainage systems to nearby streams. The drainage channels at Dunn Field convey only seasonal (wet weather) flow and are frequently dry. During CH2M HILL's 1999 sampling effort, 4 sediment and 4 surface water samples were collected. These samples were collected at the onsite origin or terminus of drainageways to characterize stormwater runoff and evaluate the quality of stormwater runoff leaving Dunn Field. Specific locations and analyses are identified in each Area-specific nature and extent section. Sediment samples were collected from the same location as surface water samples to the extent possible.

4.2.1.5 Surface Water

Samples were collected from the surface directly into the container where the column of water was less than one foot deep and from below the surface where the water depth was greater than one foot. Samples requiring preservatives were collected in a chemically clean, nonpreserved bottle and then transferred to the appropriate container. Sediment samples were collected at the same locations as surface water samples unless the water sample was obtained from a concrete-lined drainage ditch with no accumulated sediment. Care was taken to ensure that sediments were not disturbed prior to surface water sample collection.

4.2.1.6 Sediment

Sediment samples from site drainage ditches were collected using a decontaminated stainless-steel scoop. The samples were collected while there was no flow in the ditch or when flow allowed wading to the sample location. If surface water was greater than 12 inches deep, stainless-steel hand augers were used to collect sediment samples. The depth of sampling was limited to no more than 12 inches for surface sediments. Smaller intervals were used when necessary to limit sampling to sediments rather than native soil, as assessed by visual observation of particle density and color. If there was flow in the stream, the sampling locations were approached from downstream. All nonpurgeable organic samples were thoroughly mixed in a stainless-steel mixing bowl or aluminum pie plate before being transferred to the appropriate sample container. Sediment samples that were to be analyzed for VOCs were immediately placed in the appropriate sample container and filled completely.

4.2.1.7 4.2.1.4 Aquifer Characterization Procedures

Groundwater samples were collected for the 1999 RI for chemical analysis from both previously existing and newly constructed monitoring wells at Dunn Field. Groundwater samples were analyzed to accomplish the following:

- Characterize the sites and evaluate the nature of releases from disposal sites at Dunn Field;
- Evaluate the vertical and horizontal extent of a potential contaminant plume in the fluvial aquifer;
- Evaluate the extent to which contaminants in the fluvial aquifer pose a threat to the Memphis aquifer; and
- Obtain background water quality data (offsite and upgradient wells) for comparative study.

Additional samples analyzed included equipment blanks and field duplicates, as prescribed in the Generic QAPP (CH2M HILL, 1995f).

Groundwater samples were collected prior to RI activities in February 1996, June 1997, September 1997, March 1998, and October 1998. Reports were generated for each sampling event. The October 1998 sampling event was the most inclusive groundwater sampling event for the Dunn Field RI. This event included the most wells of any sampling event up to that date. Section 14.0 summarizes the findings of groundwater sampling events.

4.2.1.8 Monitoring Well Installation

To characterize the extent of both the groundwater contamination beneath Dunn Field and the extent of the plume offsite, 15 additional groundwater monitoring wells were installed since completion of the Law RI in 1990 and before the end of the 1999 RI effort. In addition, one groundwater quality sample was obtained with push methods (HY-10), and one piezometer was installed to monitor water levels, though a VOC sample was also obtained at this location (PZ-02). Groundwater wells and piezometers were installed and push samples were obtained using primarily rotasonic drilling methods (CH2M HILL, 1997). Exceptions were MW-56 through MW-59, which were installed by Parsons Environmental using hollow-stem augers. As discussed in Section 14 0, samples were collected and analyzed both from new and from previously existing wells to further characterize the nature and extent of the COPCs in groundwater. (Monitoring well locations are shown on Figure 2-11.)

Monitoring wells were constructed using 2-inch inside diameter (ID) Schedule 40 PVC casings and 0.010-inch well screens according to the following procedure:

1. Once the borehole was completed to the top of the confining unit clay, the inner core barrel was removed, leaving the outer drill pipe to hold open the borehole;
2. Any penetration into the confining unit clay was filled with chipped bentonite vibrated in place with the core barrel;
3. A small amount of sand (usually 1 foot) was poured down the borehole to provide a firm base for installing the monitoring well;
4. The well casing and screen were then installed through the outer drill pipe;
5. A sand pack (20/40 silica sand) was then poured around the well screen to 2 ft above the top of the well screen;
6. The inner core barrel was vibrated during sand pack installation to avoid bridging of sand grains;
7. The borehole was then grouted using a high-solids bentonite clay to within 2 ft of the ground surface using side discharge tremie pipe; and
8. The outer drill pipe was removed.

The grout in the borehole was allowed to cure for a minimum of 24 hours before the concrete surface pad was installed. The well pad used for all wells was 3 ft by 3 ft by 6 inches deep. The finished pad was sloped so that drainage flows away from the protective casing. A steel tamper- and traffic-resistant, flush-mount protective vault was installed over the well casing. A standard expandable lockable well cap was installed on all wells.

Monitoring wells with sufficient saturated thickness were developed using a decontaminated Grundfos Rediflo® submersible pump. Wells were developed by overpumping with submersible pumps until the water was clear and water quality parameters stabilized in accordance with the QAPP. Monitoring well construction details, where available, for all wells on the MI and Dunn Field are summarized in Table 4-3.

4.2.1.9 Water Level Measurements

Before the groundwater samples were collected, static water levels in monitoring wells were measured to calculate groundwater purge volumes. Groundwater levels used to construct a groundwater potentiometric surface map were collected within a 24-hour time frame. All water levels were measured using a decontaminated, electronic water-level indicator with an accuracy of plus or minus 0.1 foot 1999 RI Groundwater Sampling Procedures.

To prevent contamination of sampling equipment by surface soils when the wells were being purged or sampled, a plastic ground cloth was placed beneath all sampling equipment. Purging was accomplished with a decontaminated stainless-steel submersible pump or Teflon® bailer. The discharged water was monitored for pH, temperature, and specific conductivity. Purging continued until three to five well volumes had been removed, and the pH, temperature, and conductivity were stable (three successive measurements are within 5 percent of one another). Field instruments used by CH2M HILL to measure temperature, pH, and conductivity were direct reading, thus making field calculations and subsequent data reduction unnecessary. All field data were recorded in the site logbooks. Water quality parameters were monitored continuously with an inline probe.

The amount of purged fluid was measured by filling graduated buckets or by using a stopwatch and noting the flow rate of the pump versus elapsed time. All water purged from the wells ultimately was discharged under permit to the city sewer system. Wells were sampled immediately after purging, if possible, but no later than 6 hours after purging. Wells that recharged slowly were purged dry and allowed to recharge to at least 80 percent of initial well volume before sampling.

Clean disposable vinyl gloves were used to handle all samples and equipment used for purging and collecting samples. Wells were sampled with a Teflon® bailer, which had been decontaminated according to the procedures described previously. Pre-cleaned bailers were wrapped in aluminum foil for transportation to the Main Installation and new braided nylon cord was used to lower bailers into the wells.

Samples were collected in accordance with the guidelines in the *Practical Guide for Ground Water Sampling* (EPA, 1985), the *EPA Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (ECBSOPQAM)* (EPA, February 1991e), and U.S. Environmental Protection Agency Science and Ecosystem Services Division, Environmental Investigation Standard Operating Procedure (EISOPQAM), May 1996 (revised in 1997) (EISOPQAM. In accordance with the EISOPQAM, care was taken to avoid aerating the sample. The sample was poured in a slow, steady stream from the bailer to the prepared sample containers. The process was repeated as necessary to fill each container to the required volume. Field measurements of pH, specific conductance, and temperature were recorded using instruments that had been calibrated daily and decontaminated before each use. Temperature was measured immediately upon pouring the sample from the bailer into a glass beaker.

Samples to be analyzed for VOCs were collected first to minimize the effects of volatilization caused by disturbing the water surface in the well. VOC sample containers were filled completely, leaving no air space above the liquid. Before being transported to the laboratory for analysis, samples were preserved in accordance with the guidelines specified in the QAPP. Trip blanks were included with each container holding samples to be analyzed for VOCs. EPA and state regulators also collected split groundwater samples on a regular basis throughout the project.

4.2.1.10 Slug Tests

Slug tests (using a pneumatic method) were performed during the 1999 RI on 22 installed monitoring wells at Dunn Field. A pneumatic slug testing method was chosen because of expected high values of hydraulic conductivity to be encountered within the fluvial aquifer (10^{2} to 10^{-3} centimeters per second [cm/sec]). With manual slug insertion methods, high values of hydraulic conductivity result in rapid recovery of water levels that can lead to significant "noise" in the early time data and erroneous interpretation of the well recovery curve. The *Final Groundwater Characterization Data Report* (CH2M HILL, 1997) contains further discussion regarding this method and its application at the Depot.

4.2.1.11 Field Investigation QA/QC

During the 1999 RI field investigation and 2000/2001 DNAPL investigation efforts, CH2M HILL sample collection personnel adhered to stringent QA/QC criteria. The frequency of QA/QC samples is summarized below:

- **Trip blanks** accompanied every shipment of samples to be analyzed for VOCs. One trip blank also accompanied split VOC samples;
- **Equipment blanks** were collected once each day for the equipment used during sampling procedures;
- **Field blanks** were collected once each week from each water source;
- **Field duplicate samples** were collected to measure the precision of the sampling process from at least 10 percent of the total number of sample locations previously known to contain contamination;
- **Split samples** were collected from 5 percent of the samples collected at Dunn Field for the purpose of a QC check by the USACE Missouri River Division (MRD) laboratory in Omaha, Nebraska; and
- **Matrix spike/matrix spike duplicate (MS/MSD) samples** were collected and shipped to the laboratory for spike analyses. Five percent of the samples collected were accompanied by spike samples.

The list of analytical methods that were used for offsite analysis is presented in Section 4.0 of the *Final Generic* QAPP (CH2M HILL, 1995f). Container type, container quantities, preservatives, holding times, SW-846 Methods, and extraction and preparation methods for each parameter are also listed in the QAPP. The QAPP identifies the general requirements and purposes for collecting surface samples, including the field QA/QC methods.

4.2.2 2000/2001 Supplemental RI Investigation

A supplemental RI investigation was conducted on the west-central portion of Dunn Field in October of 2000 and completed in February 2001. This additional investigation assessed the presence or absence of a DNAPL in groundwater underlying the Disposal Area of Dunn Field. The goal of this survey was to delineate the potential source and areal extent of the DNAPL, if confirmed to be present.

This investigation was the result of analysis of groundwater samples that were collected by Jacobs Engineering, Inc. (Jacobs) from monitoring wells MW69, 70, and 71 in February 2000 during quarterly groundwater monitoring as part of the second year of the operations and maintenance of the groundwater extraction system on Dunn Field. Groundwater analytical results from MW70 indicated the presence of TCE and 1,1,2,2-PCA at concentrations of 11,700 µg/L and 4,830 µg/L, respectively. Monitoring wells MW68, 69, 70, and 71 were installed west of Dunn Field in November 1999 (MW69, 70 and71) and February 2000 (MW68) to determine water levels in the fluvial aquifer and to evaluate the capture zone of the Dunn Field groundwater extraction system.

According to EPA (1996), when concentrations of DNAPL chemicals (e.g., TCE) in groundwater are greater than 1% of the aqueous solubility limit, then the presence of DNAPL is inferred. The detected concentration of TCE in MW70 was 1.06% of the aqueous solubility, which suggested the presence of DNAPL.

4.2.2.1 Procedures and Analyses

Preliminary Screening and Exploratory Borings

The area upgradient, downgradient, and near MW70 was investigated by installing 16 soil borings advanced to the top of the clay confining unit located approximately 80 to 95-feet below ground surface (bgs) (see Figure 4-8). Boring installation techniques included using either a hollow stem drilling technique with a 5-ft continuous core sampler advanced along with the augers (as described in Section 12.3.2 of the EISOPQAM) or a rotasonic drilling technique with a continuous inner-casing sampling core.

The ground surface elevation at each potential location was pre-surveyed, so the elevation of the underlying clay layers encountered could be determined in the field. The elevations of clay layers dictated the location and quantity of subsequent borings.

Soil screening and sampling procedures for soil borings were separated into different categories of importance based on the location of the investigation. The categories are described below:

<u>Category 1: Onsite Soil Borings within the Suspected Source Area</u>

- The interval from the ground surface to the bottom of the loess (approximately 30 ft bgs) was field screened at least once every 5 feet using an Organic Vapor Analyzer (OVA) - Flame Ionization Detector (FID), only. Soil samples that exhibited elevated headspace OVA-FID readings were subjected to a shake test using a hydrophobic dye (Sudan IV dye). Sudan IV turns bright red in the presence of DNAPL. No laboratory soil samples were collected. Areas associated with changes in soil lithologies (high permeability to a lower permeability unit) within each 5 foot interval were targeted.

- The bottom of the loess to the water table was field screened at least once every 5 feet using an OVA-FID in all borings except for two (SB-6 and SB-7). Due to a change in drilling method (Rotasonic versus hollow-stem), samples for FID readings could not be collected. Soil samples that exhibited elevated OVA-FID headspace readings were subjected to a shake test using a hydrophobic dye (Sudan IV dye). Areas associated with changes in soil lithologies within each 5 foot interval were targeted. Soil corresponding to OVA-FID concentrations greater than or equal to 20 parts per million (ppm) were subject to soil collection using EnCore® Samplers and sent to a laboratory for analysis; only one soil sample for laboratory analysis was collected from every 20 foot interval. If no OVA-FID concentrations within the 20 foot interval were greater than or equal to 20 ppm, one soil sample was still collected and sent to a laboratory for chemical analysis.

Category 2: Onsite Soil Borings Downgradient of Suspected Source Area and Between RW-4 and RW-5

- The interval from ground surface to the water table was field screened at least once every 5 feet using an OVA-FID. Soil samples that exhibited elevated headspace readings were subjected to a shake test using a hydrophobic dye (Sudan IV dye). Areas associated with changes in soil lithologies (high permeability to a lower permeability unit) within each 5 foot interval were targeted. Soil corresponding to FID concentrations greater than or equal to 20 ppm was subject to soil collection using EnCore® Samplers and sent to a laboratory for analysis; only one soil sample for laboratory analysis was collected from every 20 foot interval. If no OVA-FID concentrations between the ground surface and the water table were greater than or equal to 20 ppm, only one soil sample was collected just above the water table and sent to a laboratory for chemical analysis.

Category 3: Offsite Soil Borings

- The same screening and sampling approach as Category 2 was implemented for these soil borings, beginning at the highest depth where a concentration of 20 ppm or greater was detected within the Category 2 soil borings. If all soil headspace concentrations within the Category 2 soil borings were less than 20 ppm, then the screening and sampling began at 50 feet BGS.

Environmental Testing & Consulting, Inc. in Memphis, Tennessee was contracted for soil sample analysis of VOCs according to EPA SW-846 Method 8260B and prepared using EPA Method 5035. Analytical results, which were obtained in 12 to 24 hours, were used to define placement of additional borings and monitoring wells. Thirty-seven soil samples were collected for laboratory VOC analysis. Twenty percent of the samples collected were split with Columbia Analytical Services in Redding, California, for confirmation analysis using EPA Contract Laboratory Program (CLP) analytical methods. FID readings are presented in Table 4-4. The depth for each sample collected and the associated analytical laboratory distribution is presented in Table 4-5.

Monitoring Well Installation

Five of the soil borings were converted to monitoring wells MW-73 through MW-77, based on the results of the lithological logging, clay orientation, known groundwater gradient, field screening of soil samples, and laboratory analyses of the confirmation soil samples. The monitoring wells were installed using 2-inch-diameter polyvinyl chloride (PVC) screen and riser, with 0.01-inch continuously slotted screen (QAPP, Section 5.4). The bottom of the screened interval for each well was placed at the top of the confining clay unit based on the information gathered during preliminary screening of the soil borings. The complete saturated thickness interval was screened. A sample of aquifer materials was obtained from the center of the saturated thickness for TOC analysis and grain size distribution. Once the screen was installed, a filter pack and bentonite seal were placed around and above the screen, as appropriate. The remainder of the outer annulus was filled with a bentonite-grout mixture using tremie pipe extending from the top of the bentonite seal to land surface. All soil borings not completed as monitoring wells were plugged and abandoned with grout tremied from the bottom up to land surface according to methods described in the EISOPQAM, Section 6.9.

The grout in the borehole was allowed to cure for a minimum of 24 hours before the concrete surface pad was installed. The well pad used for all wells was 3 ft by 3 ft by 6 inches deep. The finished pad was sloped so that drainage flows away from the protective casing. A steel tamper- and traffic-resistant, flush-mount protective vault was installed over the well casing. A standard expandable lockable well cap was installed on all wells.

Following installation, all wells were developed in accordance with the approved procedures previously established for Dunn Field (QAPP, Section 5.4.2.7). Wells were developed by overpumping with submersible pumps until the water was clear and water quality parameters stabilized in accordance with the QAPP. Monitoring well construction details, where available, for all wells on the MI and Dunn Field are summarized in Table 4-3.

A discussion of the analytical results of this supplemental RI field investigation effort can be found in Sections 10 (Disposal Area) and 14 (Groundwater).

Groundwater Sampling

During the DNAPL investigation, twelve existing and newly installed wells (MW-13, 42, 69, 70, 73, 74, 75, 76, 77, 79, 80, and 87) were sampled using polyethylene-based passive diffusion bag samplers. The bag samplers were utilized according to Vroblesky, D.A. and Campbell, T.A., 2000. Draft *Guidance Document for the Use of Polyethylene-Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells.* The monitoring wells that were sampled during this effort, besides MW-70, were selected based on proximity to MW-70, current extent of VOC contamination, and proximity to the western perimeter of Dunn Field. Sample bags were placed at five foot intervals along the screen length of each well to obtain vertical contaminant data in the fluvial aquifer.

A discussion of the analytical results of this sampling effort are presented in Section 14 (Groundwater).

Clay Confining Unit Soil Borings

Five additional soil borings (MW-34A, MW-34B, MW-40A, SB-43A, and STB-88) were drilled during the DNAPL investigation to provide additional information on the orientation and location of the upper clay confining unit of the Jackson Formation/Upper Claiborne Group as well as to prove or disprove the existence of the fluvial aquifer at the locations selected. The information gained from the installation of the soil borings would also aid the development of potentiometric maps for the site. Figure 4-9 presents the location of these borings.

The soil borings were installed using hollow-stem auger drilling techniques and a 5-ft core sampling device. The cores were returned to the surface and reviewed for lithologic and hydrogeologic characteristics. Borings were drilled until either the clay confining unit was encountered or the depth of the boring was believed to beyond the point where the fluvial aquifer was anticipated to be found. After the borings were completed, all drill rig equipment was removed and the borings were grouted to surface.

Water Level Measurements

On January 10, 2001, depth to water level measurements were collected from all Depot wells that could be accessed. Measurements were taken in order to develop a site-wide potentiometric surface map. The measurements were collected within a 24 hour period. All water levels were measured using a decontaminated, electronic water-level indicator with an accuracy of plus or minus 0.1 foot. Monitored Natural Attenuation Study

As part of the FS for the MI, groundwater samples were collected from both Dunn Field and MI monitoring wells as part of Monitored Natural Attenuation study in March 2000. The study focused on geochemical and biological parameters within aquifers underlying Dunn Field and the MI that may indicate the potential for natural attenuation in aquifers underlying both sites. Eight wells were sampled on Dunn Field, including MW-15, 31, 35, 40, 46, 54, 70, and 71 in accordance with the Sampling and Analysis Plan for Evaluation of Biodegradation of VOCs in Groundwater at the Memphis Depot (CH2M HILL, March 2000). Results of this study are presented in Appendix A-1.

4.2.3 Soil Sampling from CWM Excavations

Soil samples were collected from the CWM excavations at Sites 1, 24-A and 24-B to determine the presence of hazardous and toxic waste (HTW), including dense non-aqueous phase liquids (DNAPL) and dissolved/sorbed phase chlorinated volatile organic compounds (CVOCs) in accordance with the Amended Sampling and Analysis Plan [III]: Soil Sampling from CWM Excavations 24-A, 24-B, and 1 for HTW (CH2M HILL, March 2000). Because of the potential for CWM, these disposal areas were not investigated during the previous Dunn Field RI field efforts. A total of 8 soil samples were collected from the excavations between June 2000 and March 2001 as follows:

- 2 floor samples were collected from Site 1 in June 2000;
- 1 floor sample and 2 sidewall samples were collected from Site 24-A in October/November 2000; and
- 2 floor samples and 1 sidewall sample were collected from Site 24-B in March 2001.

The samples were analyzed according to USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Each sample was analyzed for TCL volatile organics by SW-846 Method 8260B, TCL semi-volatile organic compounds by SW-846 Method 8270C, organochlorine pesticides by SW-846 Method 8081A, PCBs by SW-846 Method 8082, and TAL Metals (by various SW-846 Methods). The analytical results of these samples are summarized in Appendix K.

Tables

TABLE 4-1A
Summary of the Field Investigations for the Dunn Field RI
Rev 1 Memphis Depot Dunn Field RI

Field Investigation	Event	Date	Comments
Passive Soil Gas Survey (CH2M HILL)	Phase I	Aug-1998	Disposal Area only
	Phase II	Oct-1998	Expanded to Northeast Open Area & Stockpile Area
EE/CA Investigation of the CWM Sites (Parsons ES)	Geophysical Investigation	Feb through Jul-1998	Investigating the CWM sites (1, 24-A & 24-B) in the Disposal Area & Stockpile Area. 6 soil borings & 6 monitoring wells installed & sampled
	Soil Borings & Sampling	Aug-1998	
	Monitoring Well Installation & Sampling	Aug-1998	
RI Sampling (CH2M HILL)	Initial Soil, Sediment and Surface Water Sampling	Mar & Apr-1999	Northeast Open Area & Disposal Area
	Supplemental Soil Sampling	Oct-1999	Stockpile Area
Expanded RI Sampling (CH2M HILL)	Soil Borings & Sampling	Oct & Nov-2000	Disposal Area & off-site to the West of Dunn Field
	Monitoring Well Installation	Oct, Nov & Dec-2000	Installed 5 well on-site in the Disposal Area & 6 well off-site to the west & northwest of Dunn Field.
Dunn Field Groundwater Sampling (CH2M HILL)	1st Quarter	Jan & Feb-1996	33 Dunn Field wells sampled
	2nd Quarter	Jun-1997	33 Dunn Field wells sampled
	3rd Quarter	Sep-1997	33 Dunn Field wells sampled
	4th Quarter	Mar-1998	39 Dunn Field wells sampled
	5th Quarter	Oct & Nov-1998	34 Dunn Field wells sampled
	MNA Study	Mar-2000	8 Dunn Field wells sampled
	Expanded RI	Jan & Feb-2001	9 wells initially sampled in Jan-2001 & additional 3 wells were sampled in Feb-2001 with diffusion bag samplers
Groundwater Extraction System Performance Monitoring (OHM/IT Corp [Year 1] & Jacobs Engineering [Year 2])	Year 1 of Operation – Quarters 1, 2, 3 & 4	Feb, May, Aug & Nov-1999	Quarterly sampled 10 monitoring wells & 7 recovery wells
	Year 2 of Operation – Quarters 1, 2, 3 & 4	Feb, May, Aug & Nov-2000	Quarterly sampled 20 monitoring wells & 11 recovery wells

TABLE 4-1A

Summary of the Field Investigations for the Dunn Field RI

Rev. 1 Memphis Depot Dunn Field RI

Field Investigation	Event	Date	Comments
CWM Site Excavation Sampling (UXB & CH2M HILL)	Site 1	Jun-2000	2 excavation floor samples were collected for TAL/TCL analyses (Disposal Area)
	Site 24-A	Oct & Nov-2000	1 excavation floor & 2 sidewall samples were collected for TAL/TCL analyses (Disposal Area)
	Site 24-B	Mar-2001	2 excavation floor & 1 sidewall samples were collected for TAL/TCL analyses (Stockpile Area)

CWM = chemical warfare materiel
EE/CA = Engineering Evaluation/Cost Analysis
TAL/TCL = target analyte list/target compound list

Table 4-18
Sampling and Analysis Summary for 1999 Dunn Field R
Rev 1 Memphis Depot Dunn Field RI Report

Site Consolidation Identification	Sites Consolidated	Sampling Objective	Number of Borings	Surface soil (0-2ft)	Sub-surface soil (>2-30 ft)	Sample Interval (ft)	Analyses VOC	PPM Metals	TAL Metals	Herbicides	Pest/ PCB	SVOC	Aluminum	Thiodigycol	Dioxin	Zinc	MS/MSD	Field Duplicates	Comments
A Asphalt Pad	23 24-A 63 64	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities	4	4	8 (4 held)	0 0-1 0 waste 14-16 28-30	12 (4 held)	4	1	1	5	6	2				1	2	
B Debris Site	22, 23 63 64	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities	5	5	15	0 0-1 0 waste 14-16 28-30	15 (5 held)	5	4	1	5	5					1	2	
C-South Burial Site	12, 12 1, 14	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities	6	6	18	0 0-1 0 waste 14-16 28-30	24	6	2	2	6	7					1	3	
D North Burial Site	13 15 15 1, 15 2 16 16 1 17	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities	8	8	24	0 0-1 0 waste 14-16 28-30	32	8	4	4	8	10					3	2	
E Site 10 Area	7 8 10	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities	8	8	24	0 0-1 0 waste 14-16 28-30	32	8	4	4	9	9					4	1	
F-POL Waste Sites	1 2 3 4 41 5 6 9 11 18 66 1 CWM	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities.	7	7	21	0 0-1 0 waste 14-16 28-30	28	7	6	8	11	14		1			2	3	
G-Asphalt Burial Site and Tear Gas Canister Burn Area	Incinerator Site 19 20 62 TEC	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Data will support human health and ecological risk assessment of exposure to surface/subsurface soil during construction activities.	6	5	6(6held)	0 0-1 0 3 0-5 0 8 0-10	17	5			4						1	1	
H Drainage Culvert Discharge Area	50	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	3	3	3	0 0-1 0 waste 8 0-10	9	3			3	3						2	
Surface Water		Evaluate presence of volatile organic semivolatile organic, metals, and pesticides in surface water Data will support human health and ecological risk assessment of exposure					1	4			4	4		1	1				
Sediment		Evaluate presence of volatile organic semivolatile organic, metals and pesticides in sediments Data will support human health and ecological risk assessment of exposure					1	4			4	4		1	1				
Pesticide Survey Areas	21 60 85	Evaluate pesticide and metals contamination in surface soil – confirm horizontal and vertical extent. Data will support human health and ecological risk assessement of exposure to surface soil during construction activities.	4	4	4						6(SS)	8				8			
Site 61 Buried Drain Pipe	61	Evaluate pesticide and metals contamination in surface soil – confirm horizontal and vertical extent Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	1	1	2	0 0-1 0 3 0-5 0, 8 0-10	3	3			3	3		3	3				
Stockpile Area	Site 61 (Bauxite Storage) Site 62 (Fluorspar Storage) and Site 63 (Bauxite Storage)	Evaluate presence of volatile organic semivolatile organic metals pesticides/PCBs and herbicide contamination in surface soil and subsurface soil. Data will support human health and ecological risk assessment of exposure	6	26	14	0 0-1 0 1 0-2 0 3 0-5 0 8 0-10, 14-15 28-30	40		36	23	26	23					2	3	10 surface soil locations were sampled at 0-1 and 1-2' bls for a total of 20 samples at 10 locations.

ft = feet VOC = volatile organic compounds PP = Priority Pollutant TAL = Target Analyte List; Pest = organochlorine pesticides, PCB = polychlorinated biphenyls SVOC = semi-volatile organic compounds MS/MSD = matrix spike/matrix spike duplicate

TABLE 4-2

Sampling and Analysis Summary for 2000/2001 Expanded Remedial Investigation

Rev 0 Memphis Depot Dunn Field RI Report

Site Consolidation Identification	Sites Consolidated	Sampling Objective	Number of Borings	Surface soil (0-1ft)	Sub-surface soil (>1-85 ft)	Sample Interval (ft)	Analyses												Comments
							VOC	TOC	TAL	Herbicides	Pest/ PCB	SVOC	Aluminum	Thiodigycol	Dioxin	Zinc	MS/MSD	Field Duplicates	
C-South Burial Site	12, 12 1 14	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area Data will support human health and ecological risk assessment of exposure to surface soil during construction activities	16	0	67	various	46	21									1	13	8 split samples
Groundwater		Evaluate presence of volatile organic, semivolatile organic metals, and pesticides in surface water Data will support human health and ecological risk assessment of exposure					32										6	4	

ft = feet VOC = volatile organic compounds PPM = Priority Pollutant Metals, TAL = Target Analyte List, PCB = polychlorinated biphenyls SVOC = semi-volatile organic compounds, MS/MSD = matrix spike/matrix spike duplicate

TABLE 4-3

Summary of Well Construction Details for Memphis Depot

Rev 0 Memphis Depot Dunn Field RI

Well ID	Type	Location	Onsite or Offsite	Date Installed	Northing	Easting	Ground Elevation (feet MSL)	TOC Elevation (feet MSL)	Diameter of Casing (inches)	Length of Casing (feet BGS)	Length of Screen (feet)	Length of Sump (feet)	Total Well Depth (feet BGS)	Depth of Soil Boring (feet BGS)	Depth to Water 01/10/01 (feet BTOC)	Water Level Elev (feet MSL)
MW-02	MW	DF	On	May-82	281693 78	802244 75	289 70	292 04	2	18 0	10	0	35 0	30 0	DRY	--
MW-03	MW	DF	On	May-82	281596 25	802100 69	290 40	292 35	2	63 5	10	0	77 0	75 0	69 49	222 86
MW 04	MW	DF	On	May-82	281278 87	802369 19	300 00	301 61	2	58 5	20	0	81 8	80 0	75 84	225 77
MW-05	MW	DF	On	May-82	281254 49	802084 68	301 30	304 64	2	57 0	20	0	79 3	80 0	DRY	--
MW 06	MW	DF	On	May-82	280604 17	802069 13	288 10	289 11	2	50 0	20	0	70 2	70 0	63 23	225 88
MW-07	MW	DF	On	May-82	281839 88	802481 70	293 10	295 10	2	64 0	10	0	77 2	75 0	68 29	226 81
MW-08	MW	DF	On	Feb-89	282001 04	802727 91	292 74	292 59	2	56 5	10	2 4	68 9	75 0	64 18	228 41
MW-09	MW	DF	On	Feb-89	281641 18	802516 42	304 66	304 32	2	70 1	10	2 4	82 5	88 0	77 47	226 85
MW-10	MW	DF	On	Mar-89	281662 55	802201 26	289 20	288 79	2	58 6	10	2 4	71 0	75 0	64 79	224 00
MW-11	MW	DF	On	Mar-89	281353 10	802099 00	299 59	299 47	2	67 9	15	2 4	85 3	85 0	75 33	224 14
MW 12	MW	DF	On	Mar-89	281067 19	802071 22	301 70	301 30	2	69 4	15	2 4	86 8	90 0	76 69	224 61
MW-13	MW	DF	On	Mar-89	281033 56	802369 21	300 10	300 01	2	66 0	15	2 4	83 4	85 0	74 04	225 97
MW-14	MW	DF	On	Mar-89	280003 37	802288 95	302 44	302 22	2	65 0	15	0	80 0	80 0	75 10	227 12
MW-15	MW	DF	On	Mar-89	280348 88	801985 38	295 23	295 12	2	63 4	15	2 4	80 8	80 0	68 82	226 30
MW 16	MW	MI	On	Mar-89	278837 83	807099 66	300 19	299 86	2	57 6	15	2 4	75 0	85 0	59 04	240 82
MW 17	MW	MI	On	Mar-89	279061 13	803801 63	318 18	315 85	2	77 6	15	2 4	95 0	95 0	NM	--
MW 18	MW	MI	On	Apr-89	279136 41	802448 08	308 34	308 04	2	122 8	15	2 4	140 0	140 0	136 02	172 02
MW 19	MW	MI	On	Mar-89	278945 87	800782 26	290 86	290 57	2	83 1	10	2 4	95 5	95 0	89 26	201 31
MW-20	MW	MI	On	Mar-89	277677 06	800705 19	285 71	285 21	2	83 1	15	2 4	100 5	100 0	85,75	199 46
MW-21	MW	MI	On	Mar-89	276473 39	800602 39	295 21	295 00	2	92 1	15	2 4	109 5	109 5	94 63	200 37
MW-22	MW	MI	On	Mar-89	275912 38	800702 16	298 49	298 04	2	95 4	10	2 4	107 8	115 0	97 60	200 44
MW-23	MW	MI	On	Mar-89	275791 02	801817 13	299 24	298 99	2	101 2	10	2 4	113 6	115 0	100 17	198 82
MW-24	MW	MI	On	Mar-89	275816 05	803538 81	299 81	299 51	2	97 3	15	2 4	114 7	115 0	108 48	191 03
MW-25	MW	MI	On	Mar-89	275976 09	805529 10	270 32	270 17	2	69 0	10	2 4	81 4	81 5	73 39	196 78
MW-26	MW	MI	On	Apr-89	276508 16	805962 09	303 89	303 69	2	97 6	10	2 4	110 0	115 0	100 56	203 13
MW-27	MW	MI	On	Apr-89	278285 47	802547 09	304 28	303 98	2	76 2	15	2 4	93 6	100 0	DRY	--
MW-28	MW	DF	On	Nov-89	281568 58	803154 48	294 89	294 79	2	54 3	15	0 1	69 4	81 5	61 45	233 34
MW-29	MW	DF	On	Nov-89	282104 92	802863 96	273 35	273 22	2	34 2	20	0 1	54 3	56 5	41 42	231 80
MW-30	MW	DF	Off (N)	Nov-89	282229 19	802013 96	274 10	275 14	2	39 0	20	0 1	57 5	66 5	49 06	226 08
MW-31	MW	DF	Off (NW)	Dec-89	281651 53	801783 90	287 50	290 37	2	64 1	15	0 1	76 0	76 5	71 27	219 10
MW-32	MW	DF	Off (W)	Nov-89	280834 37	801615 51	285 60	285 38	2	52 7	15	0 1	67 8	71 5	63 33	222 05
MW-33	MW	DF	Off (W)	Dec-89	280398 10	801561 30	277 70	280 71	2	44 6	15	0 1	59 7	61 5	55 67	225 04
MW-34	MW	DF	On	Nov-89	279411 21	801917 96	300 80	299 97	2	136 6	20	0 1	156 7	158 5	143 47	156 50
MW-35	MW	DF	On	Nov-89	281072 31	802070 44	301 70	300 46	2	69 6	20	0 1	89 7	92 0	75 81	224 65
MW 36	MW	DF	On	Dec-89	279531 02	802687 01	311 15	310 24	2	192 3	15	2 1	209 4	212 0	158 67	151 57
MW-37	MW	DF	Off (W)	Dec-89	280831 22	801616 58	285 50	284 91	2	165 7	15	2 1	182 8	183 0	134 20	150 71
MW-38	MW	MI	On	Nov-89	279141 38	802450 43	308 45	307 45	2	139 9	15	0 1	155 0	158 5	137 92	169 53
MW-39	MW	MI	On	Nov-89	277280 67	802598 11	296 58	296 28	2	95 5	20	0 1	115 6	116 0	103 87	192 41
MW-40	MW	DF	Off (NW)	Jan-96	282460 42	800948 23	262 50	262 23	2	85 0	10	0	95 0	98 5	91 91	170 32
MW-41	MW	DF/MI	Off (W)	Jan-96	279621 65	800457 21	283 15	283 81	2	57 0	10	0	67 0	75 0	66 27	217 54
MW-42	MW	DF	Off (W)	Jan-96	281883 92	800182 40	275 10	274 83	2	49 0	10	0	59 0	67 5	57 62	217 21
MW-43	MW	DF	Off (W)	Oct-98	280284 33	800111 73	284 99	284 99	2	161 5	10	0 5	172 0	204 3	132 88	152 11
MW 44	MW	DF	Off (W)	Jan-96	281073 71	800601 09	269 40	269 07	2	64 0	10	0	74 0	87 5	56 07	213 00
MW-45	MW	DF	Off (E)	Jan-96	280728 08	804125 99	293 30	293 22	2	58 0	10	0	68 0	75 0	56 97	236 25
MW-46	MW	DF	On	Jan-96	281256 81	803115 96	286 83	287 58	2	62 0	10	0	72 0	77 5	55 74	231 82
MW-47	MW	MI	Off (S)	Jan-96	275261 64	800780 89	NA	306 39	2	110 0	10	0	120 0	125 0	103 08	203 31
MW-48	MW	MI	Off (W)	Jan-96	276616 18	799793 92	283 55	284 49	2	84 0	10	0	94 0	105 0	NM	--
MW-49	MW	DF	On	Jan-96	280211 84	803051 31	309 52	310 49	2	80 0	10	0	90 0	92 5	80 01	230 48
MW-50	MW	MI	On	Jan-96	276455 81	807065 28	299 32	298 82	2	114 0	10	0	124 0	136 0	86 42	212 40
MW-51	MW	DF	Off (N)	Jan-96	282345 86	802828 62	275 50	275 23	2	55 0	10	0	65 0	70 0	43 63	231 60
MW-52	MW	MI	On	Feb-96	275371 97	805897 36	279 71	279 26	2	94 0	10	0	104 0	105 0	81 94	197 32
MW-53	MW	MI	Off (N)	Feb-96	279176 66	805136 05	305 58	306 38	2	72 5	10	0	82 5	85 0	74 32	232 06
MW-54	MW	DF	Off (W)	Feb-96	281160 10	801183 32	295 60	295 35	2	84 5	10	0	94 5	101 0	81 63	213 72
MW-55	MW	MI	On	Feb-96	279301 05	801204 62	292 48	292 08	2	64 0	10	0	74 0	85 5	71 48	220 60
MW-56	MW	DF	On	Aug-98	279708 26	801971 55	293 50	293 60	2	59 0	10	0 5	69 5	71 5	67 98	225 62
MW-57	MW	DF	On	Aug-98	280184 05	802006 19	291 10	290 77	2	60 0	10	0 5	70 5	72 5	64 24	226 53
MW-58	MW	DF	On	Aug-97	279845 07	802066 44	290 70	290 51	2	57 0	10	0 5	67 5	68 5	64 14	226 37
MW 59	MW	DF	On	Aug-98	281333 67	802252 00	300 40	300 13	2	72 5	10	0 5	83 0	85 5	75 06	225 07
MW-60	MW	DF	On	Aug-98	281424 39	802282 05	297 20	296 86	2	72 5	10	0 5	83 0	84 0	71 70	225 16
MW 61	MW	DF	On	Aug-98	281585 68	802347 35	294 20	294 04	2	68 5	10	0 5	79 0	79 0	68 57	225 47
MW 62	MW	MI	On	Oct-98	278289 89	801858 16	294 10	293 65	2	86 0	10	0	96 0	107 0	94 22	199 43
MW-63	MW	MI	On	Oct-98	278192 29	803585 83	305 13	304 63	2	124 5	10	0	134 5	140 0	107 13	197 50

TABLE 4 3

Summary of Well Construction Details for Memphis Depot

Rev 0 Memphis Depot Dunn Field RI

Well ID	Type	Location	Onsite or Offsite	Date Installed	Northing	Easting	Ground Elevation (feet MSL)	TOC Elevation (feet MSL)	Diameter of Casing (inches)	Length of Casing (feet BGS)	Length of Screen (feet)	Length of Sump (feet)	Total Well Depth (feet BGS)	Depth of Soil Boring (feet BGS)	Depth to Water 01/10/01 (feet BTOC)	Water Level Elev. (feet MSL)
MW-64	MW	MI	On	Oct-98	278951 52	805005 97	304 46	304 21	2	102 0	10	0	112 0	115 0	107 53	196 68
MW-65	MW	DF	Off (N)	Nov-98	283529 72	803687 68	264 00	263 22	2	40 8	10	0	50 8	55 0	14 47	248 75
MW-66	MW	MI	Off (W)	Nov-98	276742 50	798517 42	289 00	288 7	2	102 5	10	0	112 5	125 0	NM	--
MW-67	MW	DF	Off (W)	Jul-99	280474 00	800630 36	275 53	278 21	2	260 0	15	0	275 0	275 0	NM	--
MW-68	MW	DF	Off (W)	Feb-00	281500 76	802040 04	291 60	291 69	2	72 5	10	0 5	83 0	83 0	68 56	223 13
MW-69	MW	DF	Off (W)	Nov-99	281202 55	802011 49	304 90	307 02	2	84 2	10	0 5	94 7	92 2	83 02	224 00
MW-70	MW	DF	Off (W)	Nov-99	281029 60	801988 49	302 60	304 99	2	83 0	10	0 5	93 5	93 0	80 64	224 35
MW-71	MW	DF	Off (W)	Nov-99	280584 68	801804 71	291 90	294 40	2	66 0	10	0 5	78 5	77 7	69 37	225 03
MW-72	MW	MI	Off (SW)	Sep-99	275626 27	798864 75	295 41	295 11	2	110 7	10	0 5	121 2	128 0	88 58	206 53
MW-73	MW	DF	On	Nov-00	280989 42	802144 95	301 10	300 65	2	72 0	20	0 5	92 5	93 0	75 32	225 33
MW-74	MW	DF	On	Nov-00	280991 20	802044 29	304 00	303 68	2	70 0	20	0 5	90 5	92 0	78 96	224 72
MW-75	MW	DF	On	Nov-00	281080 10	802051 10	304 30	303 61	2	71 0	20	0 5	91 5	94 5	79 15	224 46
MW-76	MW	DF	Off (W)	Nov-00	281311 98	801642 76	303 30	302 71	2	73 0	20	1 0	94 0	94 0	65 13	217 58
MW-77	MW	DF	Off (W)	Nov-00	281142 96	801815 29	304 70	304 42	2	68 0	20	1 0	89 0	90 0	81 94	222 48
MW-78	MW	DF	Off (N)	Dec-00	282051 71	802065 28	275 40	275 00	2	44 5	20	1 0	65 5	68 0	50 02	224 98
MW-79	MW	DF	Off (W)	Dec-00	281794 22	800899 03	285 40	285 03	2	82 5	20	0 5	103 0	104 0	72 38	212 65
MW-80	MW	DF	Off (W)	Dec-00	281417 56	800199 07	274 00	273 81	2	53 0	20	1 0	74 0	78 0	61 28	212 53
MW-81	MW	MI	On	Dec-00	275608 42	803527 67	299 97	299 62	2	190 0	20	0 0	210 0	230 0	144 30	155 32
MW 82	MW	MI	On	Dec-00	276539 89	800862 13	292 17	291 77	2	179 0	20	0 0	199 0	210 0	146 27	145 50
MW-83	MW	MI	On	Dec-00	276521 38	805969 16	304 56	304 21	2	176 0	10	0 0	186 0	190 0	146 90	157 31
MW-87	MW	DF	On	Oct-00	280696 36	802038 55	292 80	294 93	2	63 0	30	0 5	78 5	81 0	69 46	225 47
MW-89	MW	MI	On	Oct-00	278286 97	802555 25	304 38	303 98	2	147 0	30	0 5	177 5	185 0	120 43	183 55
MW 90	MW	MI	On	Oct-00	278283 60	802539 51	304 64	304 19	2	115 0	30	0 5	145 5	150 0	120 29	183 90
MW-91	MW	DF	On	Oct-00	280474 97	802014 43	289 30	291 99	2	55 0	15	0	70 0	70 0	66 00	225 99
MW-95	MW	DF	Off (N)	Dec-00	282707 50	801650 21	259 70	259 43	2	40 0	20	1 0	61 0	62 0	32 03	227 40
PZ-01	PZ	MI	Off (S)	Oct-98	275150 00	801750 00	308 00	307 76	0 75	103 7	10	0	113 7	115 0	104 73	203 03
PZ-02	PZ	DF	Off (N)	Oct-98	282746 00	803373 00	285 00	284 39	0 75	44 0	10	0	54 0	54 5	45 17	239 22
PZ-03	PZ	MI	On	Oct-98	276379 33	802941 05	298 98	298 51	0 75	108 9	10	0	118 9	120 0	106 83	191 68
PZ-04	PZ	MI	Off (SW)	Nov-98	275905 40	799780 49	303 00	302 30	0 75	98 3	10	0	108 3	109 0	97 77	204 53
PZ-05	PZ	MI	Off (S)	Nov-98	274934 56	806177 53	257 00	256 04	0 75	68 1	10	0	78 1	79 0	59 37	196 67
PZ-06	PZ	MI	On	Nov-98	278855 86	805100 13	303 00	302 74	0 75	89 4	10	0	99 4	101 6	NM	--
PZ-07	PZ	MI	On	Nov-98	277053 25	806006 75	305 22	304 72	0 75	101 3	10	0	111 3	112 0	99 13	205 59
PZ-08	PZ	MI	Off (S)	Nov-98	274652 33	800732 76	290 00	289 35	0 75	98 2	10	0	108 2	111 2	84 10	205 25
RW-01	RW	DF	On	Oct-99	280267 14	801973 88	294 10	296 57	4	67 0	5	4	76 0	77 0	NM	--
RW-01A	RW	DF	On	Oct-99	280386 26	801990 08	293 87	296 83	4	68 4	5	4	77 4	77 0	NM	--
RW-01B	RW	DF	On	Oct-99	280504 87	802009 37	287 85	290 48	4	63 0	5	4	72 0	72 0	NM	--
RW-02	RW	DF	On	Oct-99	280624 56	802003 32	288 49	290 93	4	65 0	5	4	74 0	75 0	NM	--
RW-03	RW	DF	On	Feb-98	280743 76	802012 69	297 73	299 40	6	68 0	10	0	78 0	80 0	NM	--
RW-04	RW	DF	On	Feb-98	280918 07	802027 11	303 69	305 48	6	75 0	10	0	85 0	90 0	80 60	224 88
RW-05	RW	DF	On	Mar-98	281113 38	802041 97	305 75	308 09	6	82 0	10	0	92 0	95 0	DRY	--
RW-06	RW	DF	On	Jan-98	281264 22	802067 17	303 15	304 94	6	77 0	10	0	87 0	90 0	80 82	224 12
RW-07	RW	DF	On	Jan-98	281442 21	802079 19	296 07	297 63	6	69 5	10	0	79 5	80 0	74 15	223 68
RW-08	RW	DF	On	Jan-98	281574 72	802088 53	291 56	293 34	6	70 5	10	0	80 5	83 0	72 70	220 64
RW-09	RW	DF	On	Jan-98	281688 06	802232 41	289 26	290 98	8	65 0	10	0	75 0	76 0	68 50	222 48

MW = Monitoring Well
RW = Recovery Well
PZ = Piezometer
MSL = Mean Sea Level
BGS = Below Ground Surface
BTOC = Below Top of Casing
NM = not measured

Table 4-3
Summary of Soil Boring Details for Memphis Depot
Rev 0 Memphis Depot Dunn Field RI

Boring ID	Type	Location	Onsite or Offsite	Northing	Easting	Ground Elevation (feet MSL)	Depth of Soil Boring (feet BGS)	Bottom of Soil Boring (feet MSL)
STB-1	SB	DF	On	281833 25	802470 04	290 00	80 0	210 00
STB-12	SB	DF/MI	Off (W)	279860 60	799487 60	298 14	108 0	190 14
STB-13	SB	MI	On	279233 10	801985 60	291 75	120 0	171 75
STB-14	SB	DF	Off (W)	–	–	–	105	–
STB-2	SB	DF	On	280908 32	802356 96	300 00	80 0	220 00
STB-3	SB	MI	On	279088 25	803524 80	318 00	105	213 00
STB-34A	SB	DF	On	279415 57	801927 38	301 00	80	221 00
STB-34B	SB	DF	On	279424 68	801919 89	300 78	160	140 78
STB-40A	SB	DF	Off (NW)	282466 33	800950 85	262 30	68	194 30
STB-43A	SB	DF	Off (W)	280285 33	800114 73	284 99	120	164 99
STB-4	SB	MI	On	278281.26	803001 06	304 00	103 5	200 50
STB-5	SB	MI	On	275910 95	800571 43	296 00	83 5	212 50
STB-6	SB	DF	On	281640 19	802157 22	287 32	220 0	67 32
STB-7	SB	DF	On	280538 47	802024 04	287 81	222 0	65 81
STB-8	SB	MI	On	278659 93	801977 56	298 51	220 0	78 51
STB-88	SB	MI	On	278547 39	802715 44	305 55	177 0	128 55
SBLFA	SB	DF	On	280928 32	802320 97	299 60	30 0	269 60
SBLCE	SB	DF	On	280904 20	802239 38	299 70	30 0	269 70
SBLCD	SB	DF	On	280919 47	802162 92	300 30	30 0	270 30
SBLCB	SB	DF	On	280954 30	802184 10	300 00	30 0	270 00
SBLCC	SB	DF	On	280987 35	802220 83	300 60	30 0	270 60
SBLCA	SB	DF	On	280988 67	802149 99	301 20	30 0	271 20
SBLEE	SB	DF	On	281644 99	802169 36	289 40	30 0	259 40
SBLEE SB1	SB	DF	On	281647 26	802172 12	289 40	81 0	208 40
SBLCA SB1 (MP-1)	SB/MP	DF	On	280925 92	802202 04	299 80	90 0	209 80
SBLAC SB2 (VW-1)	SB/VW	DF	On	280996 43	802153 34	301 20	93 0	208 20
SBLCA SB3 (MP-2)	SB/MP	DF	On	281010 26	802098 19	301 00	88 0	213 00
SBLCA SB4	SB	DF	On	281050 80	802116 37	301 00	92 5	208 50
SBLCA SB5 (MP-3)	SB/MP	DF	On	281029 52	802175 45	301.20	90 0	211 20
SBLCA SB6	SB	DF	On	280957 39	802177 66	300 60	90 0	210 60
SBLCA SB7	SB	DF	On	280987 99	802202 43	300 80	90 0	210 80
SBLCA SB8 (MP-4)	SB/MP	DF	On	280957 77	802115 90	300 80	87 0	213 80
SBLCA SB9 (MW-74)	SB/MW	DF	On	280991 20	802044 29	304 00	93 5	210 50
SBLCA SB10	SB	DF	On	281038 56	802046 86	304 10	93 5	210 60
SBLCA SB11 (MW-75)	SB/MW	DF	On	281080 10	802051 10	304 30	93 5	210 80
SBLCA SB12	SB	DF	Off (W)	281025 66	801994 91	302 90	89 0	213 90
SBLCA SB13	SB	DF	Off (W)	281051 34	801940 20	306 00	91 0	215 00
SBLCA SB14 (MW-76)	SB/MW	DF	Off (W)	281311 98	801642 76	303 30	93 5	209 80
SBLCA SB15 (MW-77)	SB/MW	DF	Off (W)	281142 96	801815 29	304 70	88 5	216 20
HY01	HP	MI	On	276191 00	801593 00	–	115 0	–
HY02	HP	MI	On	277230 00	800520 00	–	96 0	–
HY03	HP	MI	On	275470 00	805000 00	–	–	–
HY04	HP	MI	On	275860 00	806870 00	–	105 0	–
HY07	HP	MI	Off (SW)	275630 00	800250 00	–	55 0	–
HY09	HP	MI	Off (W)	277270 00	799980 00	–	–	–
HY10	HP	DF	Off (NW)	282430 00	800530 00	–	–	–
HY83A	HP	MI	On	277492 81	801211 73	–	82.0	–
HY89A	HP	MI	On	276191 10	800603 10	–	93 0	–

SB = Soil Boring
MP = Monitoring Point
VW = Venting Well
HP = Hydropunch
MI = Main Installation
DF = Dunn Field

Table 4-4
FID Readings for 2000/2001 Soil Borings
Rev 0 Memphis Depot Dunn Field RI

SBLCA-SB-1 (MP-1)

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace Readings FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-5	41	2.5	0	0	0
5-10	48	7.5	0	0	0
10-11.5	■	■	■	■	■
11.5-15	24	12.5	7.7	0	7.7
15-20	60	17.5	0	0	0
20-21.5	■	■	■	■	■
21.5-25	60	22.5	0	0	0
25-30	60	25.5	10.1	0	10.1
30-31.5	■	■	■	■	■
31.5-35	15	32.5	46.5	0	46.5
35-40	25	38.5	7.3	1	6.3
40-41.5	■	■	■	■	■
41.5-45	4	41	25.2	0	25.2
45-50	13	46	7.2	0	7.2
50 51.5	■	■	■	■	■
51.5 55	24	53	1.2	0	1.2
55-60	10	54	38.2	0	38.2
60-61.5	■	■	■	■	■
61.5-65	14	6	39.7	0	39.7
65-70	30	67	22.8	0	22.8
70 71.5	■	■	■	■	■
71.5-75	26	73	7.9	0	7.9
75 80	18	77	0.6	0	0.6
80-85	NR	NR	NR	NR	NR
85 90	NR	NR	NR	NR	NR

SBLCA-SB-2 (VW-1)

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace Readings FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	36	3	2.5	0	2.5
4-9	49.5	6.5	2	0	2
9-10.5	■	■	■	■	■
10.5-14	53	12.5	13.2	0	13.2
14-19	60	17	23.7	0	23.7
19-20.5	■	■	■	■	■
20.5-24	54	22.5	29	0	29
24-29	60	27	94	0.2	93.8
29-30.5	■	■	■	■	■
30.5-34	53	32	159.7	1.3	158.4
34-39	48	37	331.1	38	293.1
39-40.5	■	■	■	■	■
40.5-44	27	42.5	376.7	0	376.7
44-49	30	47	246.3	7.8	238.5
49-50.5	■	■	■	■	■
50.5-54	31	52	70.5	2.8	67.7
54-59	33	57	148.1	3.4	144.7
59-60.5	■	■	■	■	■
60.5-64	27	62	194.3	0	194.3
64-69	35	67	226.1	0	226.1
69-70.5	■	■	■	■	■
70.5-74	36	72	271.3	0	271.3
74-79	32	77	153.9	0	153.9
79-84	NR	NR	NR	NR	NR
84-89	NS	NS	NS	NS	NS
89 94	NS	NS	NS	NS	NS

SBLCA-SB-3 (MP-2)

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace Readings FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	41	2.5	1.6	0	1.6
4-9	52	7.5	0.8	0	0.8
9-10.5	■	■	■	■	■
10.5-14	60	12	0	0	0
14-19	60	17.5	0	0	0
19-20.5	■	■	■	■	■
20.5-24	54	22	4.5	1	3.5
24-29	60	27	0	0	0
29-30.5	■	■	■	■	■
30.5-34	47	32	0	0	0
34-39	52	36.5	0.7	0	0.7
39-40.5	■	■	■	■	■
40.5-44	28	43	15.8	0.5	15.3
44-49	39	47	9	0	9
49-50.5	■	■	■	■	■
50.5-54	60	52.5	37.9	0.7	37.2
54-59	30	57	2.8	0	2.8
59-60.5	■	■	■	■	■
60.5-64	32	62	12.7	0	12.7
64-69	43	67	32.8	0	32.8
69-70.5	■	■	■	■	■
70.5-74	31	72	1.6	0	1.6
74-79	47	77	1.7	0	1.7
79-84	10	82	0.8	0	0.8
84-89	NS	NS	NS	NS	NS

SBLCA-SB-4

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace Readings FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	39	2.5	0	0	0
4-9	40	7.5	0	0	0
9 10.5	■	■	■	■	■
10.5-14	52	12	0	0	0
14-19	60	17.5	0	0	0
19-20.5	■	■	■	■	■
20.5-24	60	22	0	0	0
24 29	60	27	0	0	0
29 30.5	■	■	■	■	■
30.5-34	60	32	0	0	0
34 39	52	36.5	0	0	0
39-40.5	■	■	■	■	■
40.5-44	31	43	12.1	0	12.1
44-49	36	47	9.5	0	9.5
49-50.5	■	■	■	■	■
50.5 54	34	52.5	51.6	0	51.6
54 59	48	57	17.9	0	17.9
59-60.5	■	■	■	■	■
60.5-64	33	62	26.5	0	26.5
64-69	50	67	21.2	0	21.2
69-70.5	■	■	■	■	■
70.5-74	35	72	9.4	0	9.4
74-76.5	35	75	70.2	0.8	69.4

SBLCA-SB-5 (MP-3)

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace Readings FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	36	2	2	0	2
4-9	48	7	12.3	0	12.3
9-10.5	■	■	■	■	■
10.5-14	52	12	6.2	0	6.2
14-19	60	17	36.6	1.1	35.5
19-20.5	■	■	■	■	■
20.5-24	57	22	22.8	0.9	21.9
24-29	55	27	95.1	2.2	92.9
29-30.5	■	■	■	■	■
30.5-34	51	32	37	0.9	36.1
34-39	52	36	28.8	2.5	26.3
39-40.5	■	■	■	■	■
40.5-44	33	43	100.6	2.4	98.2
44-49	46	47	46.6	0	46.6
49-50.5	■	■	■	■	■
50.5-54	40	52	141.4	0.2	141.2
54-59	53	57	63.8	0	63.8
59-60.5	■	■	■	■	■
60.5-64	32	62	50.8	0.5	50.3
64-69	52	67	36.8	4.1	32.7
69-70.5	■	■	■	■	■
70.5-74	48	72	22.2	4.5	17.7
74-76.5	18	75	81.9	1.1	80.8
76.5-79	Water	77	106.1	8.6	97.5

SBLCA-SB-6 (MP-4)

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace Readings FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	14	2	0	0	0
4-9	52	7	2.6	0	2.6
9-10.5	■	■	■	■	■
10.5-14	53	12	4	0	4
14-19	60	17	6.2	0	6.2
19-20.5	■	■	■	■	■
20.5-24	52	22	12.1	0	12.1
24-29	56	27	1.7	0	1.7
29-30.5	■	■	■	■	■
30.5-34	43	32	0	0	0
34-39	35	36	6.2	0	6.2
39-40.5	■	■	■	■	■
40.5-44	48	43	20.5	0	20.5
44-49	37	47	52.1	0	52.1
49-50.5	■	■	■	■	■
50.5-54	34	52	75.3	0	75.3
54-59	44	57	31.6	0	31.6
59-60.5	■	■	■	■	■
60.5-64	45	62	32.2	0	32.2
64-69	41	67	26.4	0	26.4
69-70.5	■	■	■	■	■
70.5-74	38	72	78.4	0	78.4
74-76.5	21	75	39.1	0	39.1

SBLCA = Soil boring location Consolidated Area C Sampling location A
ft BGS = feet below ground surface
ppm = parts per million
FID = Flame Ionization Detector
■
Double Lined SimulProbe Sampling Location No FID reading collected
NR = Not recovered
NS = Not sampled

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Table 4-4
FID Readings for 2000/2001 Soil Borings
Rev 0 Memphis Depot Dunn Field RI

SBLCA-SB-9 (MW-74)

			Headspace		
Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	35	NS	NS	NS	NS
4-9	50	7	0	0	0
9-14	55	12	2400	330	2070
14-19	56	17	2204	42.5	2161.5
19-24	60	22	2934	478.9	2455.1
24-29	60	27	2949	1295	1654
29-34	60	32	121.5	72.5	49
34-39	60	37	54.1	23.5	30.6
39-44	40	42	41.9	10.3	31.6
44-49	55	47	30.8	4.3	26.5
49-54	54	52	10.9	0	10.9
54-59	53	57	56.5	0	56.5
59-64	48	62	25.2	0	25.2
64-69	49	67	23.1	0	23.1
69-74	32	72	10.3	0	10.3
74-79	50	77	20.4	0	20.4

SBLCA-SB-10

			Headspace		
Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-5	48	2.5	0	0	0
5-10	48	7.5	79.7	0	79.7
10-15	17	12.5	2384	602.9	1781.1
15-20	60	17.5	2414	1314	1100
20-25	60	22.5	2412	1582	830
25-30	60	27.5	2442	2329	113
30-35	52	32.5	484.6	484.6	0
35-40	60	37.5	177.3	38.5	138.8
40-45	38	42.5	6.1	6.1	0
45-50	38	47.5	37	2.9	34.1
50-55	44	52.5	20.8	3	17.8
55-60	50	57.5	46.3	2.1	44.2
60-65	40	62.5	20.7	2.4	18.3
65-70	41	67.5	38.3	0	38.3
70-75	26	72.5	31.8	0	31.8
75-80	38	77.5	15.5	0	15.5

SBLCA-SB-11 (MW-75)

			Headspace		
Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-5	23	2.5	0	0	0
5-10	60	7.5	0.2	0	0.2
10-15	53	12.5	162.2	146.5	15.7
15-20	60	17.5	547.2	547.2	0
20-25	55	22.5	965.3	965.3	0
25-30	60	27.5	1776	1396	380
30-35	60	32.5	2272	2272	0
35-40	46	37.5	210.4	83.7	126.7
40-45	43	42.5	49.9	49.9	0
45-50	32	47.5	10.2	0	10.2
50-55	39	52.5	4.1	0	4.1
55-60	28	57.5	5.1	0	5.1
60-65	30	62.5	7.4	0	7.4
65-70	34	67.5	8	0	8
70-75	50	72.5	6.6	0	6.6
75-80	52	77.5	19.1	0	19.1
80-82.5	26	81	32.3	0	32.3

SBLCA-SB-12

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	30	2	0	0	0
4-9	26	6.5	0.4	0	0.4
9-14	50	11.5	1.8	0	1.8
14-19	60	16.5	1.3	0	1.3
19-24	60	21.5	2.6	0	2.6
24-29	60	26.5	7.2	0	7.2
29-34	60	31.5	13.2	0	13.2
34-39	56	36.5	11.3	0	11.3
39-44	26	41.5	8	0	8
44-49	24	46.5	25.4	0	25.4
49-54	46	51.5	22.5	0	22.5
54-59	54	56.5	15.3	0	15.3
59-64	22	61.5	0	0	0
64-69	29	66.5	6.6	0	6.6
69-74	44	69.5	9	0	9
69-74	SAA	71.5	11.6	0	11.6
69-74	SAA	74	15.4	0	15.4

SBLCA = Soil boring location Consolidated Area C, Sampling location A
ft BGS = feet below ground surface
ppm = parts per million
FID = Flame Ionization Detector
■ SimulProbe Sampling Location No FID reading collected
Double lined boxes indicate sampled interval for 8260B
NR = Not recovered
NS = Not sampled

SBLCA-SB-13

			Headspace		
Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
0-4	30	2	0	0	0
4-9	NR	6.5	NR	NR	NR
9-14	55	11.5	2.7	0	2.7
14-19	42	16.5	5.7	0	5.7
19-24	54	21.5	7.2	0	7.2
24-29	53	26.5	13.4	0	13.4
29-34	53	31.5	15.3	0	15.3
34-39	50	36.5	19.1	0	19.1
39-44	42	41.5	2.8	0	2.8
44-49	24	46.5	4.9	0	4.9
49-54	46	51.5	9.8	0	9.8
54-59	12	56.5	0.4	0	0.4
59-64	15	61.5	1.2	0	1.2
64-69	33	66.5	10.8	0	10.8
69-74	54	71.5	17	0	17
74-79	44	76.5	33.8	0	33.8

SBLCA-SB-14 (MW-76)

			Headspace		
Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	FID (ppm)	With Filter (ppm)	Total Hydrocarbons (ppm)
3-8	60	5.5	0	0	0
8-13	60	10.5	0	0	0
13-18	47	15.5	0	0	0
18-23	33	20.5	0	0	0
23-28	32	25.5	0	0	0
28-33	60	30.5	0	0	0
33-38	50	35.5	0	0	0
38-43	36	40.5	0	0	0
43-48	30	45.5	0	0	0
48-53	45	50.5	0	0	0
53-58	17	55.5	0	0	0
58-63	40	60.5	0	0	0
63-68	44	65.5	0	0	0
68-73	42	70.5	0	0	0
73-78	42	75.5	0	0	0
78-83	46	83	0	0	0

Table 4-4
FID Readings for 2000/2001 Soil Borings
Rev 0 Memphis Depot Dunn Field RI

SBLCA-SB-15 (MW-77)

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace FID (ppm)	Headspace With Filter (ppm)	Headspace Total Hydrocarbons (ppm)
3-8	60	5 5	0	0	0
8 13	60	10 5	0	0	0
13-18	60	15 5	0	0	0
18-23	46	20 5	0	0	0
23-28	47	25 5	3 1	0	3 1
28-33	48	30 5	10	0	10
33-38	45	35 5	0	0	0
38-43	28	40 5	0	0	0
43-48	12	45 5	0	0	0
48 53	24	50 5	0	0	0
53-58	48	55 5	0	0	0
58-63	36	60 5	0	0	0
63-68	46	65 5	4 7	0	4 7
68 73	44	70 5	2 4	0	2 4
73-78	43	75 5	13.2	0	13 2
78-80 5	24	80	NS	NS	NS

SBLCA = Soil boring location Consolidated Area C Sampling location A
ft BGS = feet below ground surface
ppm = parts per million
FID = Flame Ionization Detector
■ Simu Probe Sampling Location No FID reading collected
Double lined boxes indicate sampled interval for 8260B
NR = Not recovered
NS = Not sampled

SBLEE-SB-1

Sample Interval (ft BGS)	Inches Recovered	Sample Depth (ft BGS)	Headspace FID (ppm)	Headspace With Filter (ppm)	Headspace Total Hydrocarbons (ppm)
0-4	4	2	NR	NR	NR
4-9	36	7	986 5	27 9	958 6
9-10 5	■	■	■	■	■
10 5-14	52	12	1351	245	1106
14-19	55	17	2625	2130	495
19-20 5	■	■	■	■	■
20 5-24	60	22	2023	1270	753
24-29	60	27	1652	1248	404
29-30 5	■	■	■	■	■
30 5-34	48	32	811 6	598 8	212 8
34-39	38	38	222 9	193 8	29 1
39-40 5	■	■	■	■	■
40 5-44	38	43	21 4	21 4	0
44-49	60	47	151 8	21 7	130 1
49-50 5	■	■	■	■	■
50 5-54	30	52	55	6.2	48 8
54-59	56	57	6 5	5	1 5
59-60 5	■	■	■	■	■
60 5-64	35	62	4	2 8	1 2
64-66 5	20	67	27 6	5 3	22 3

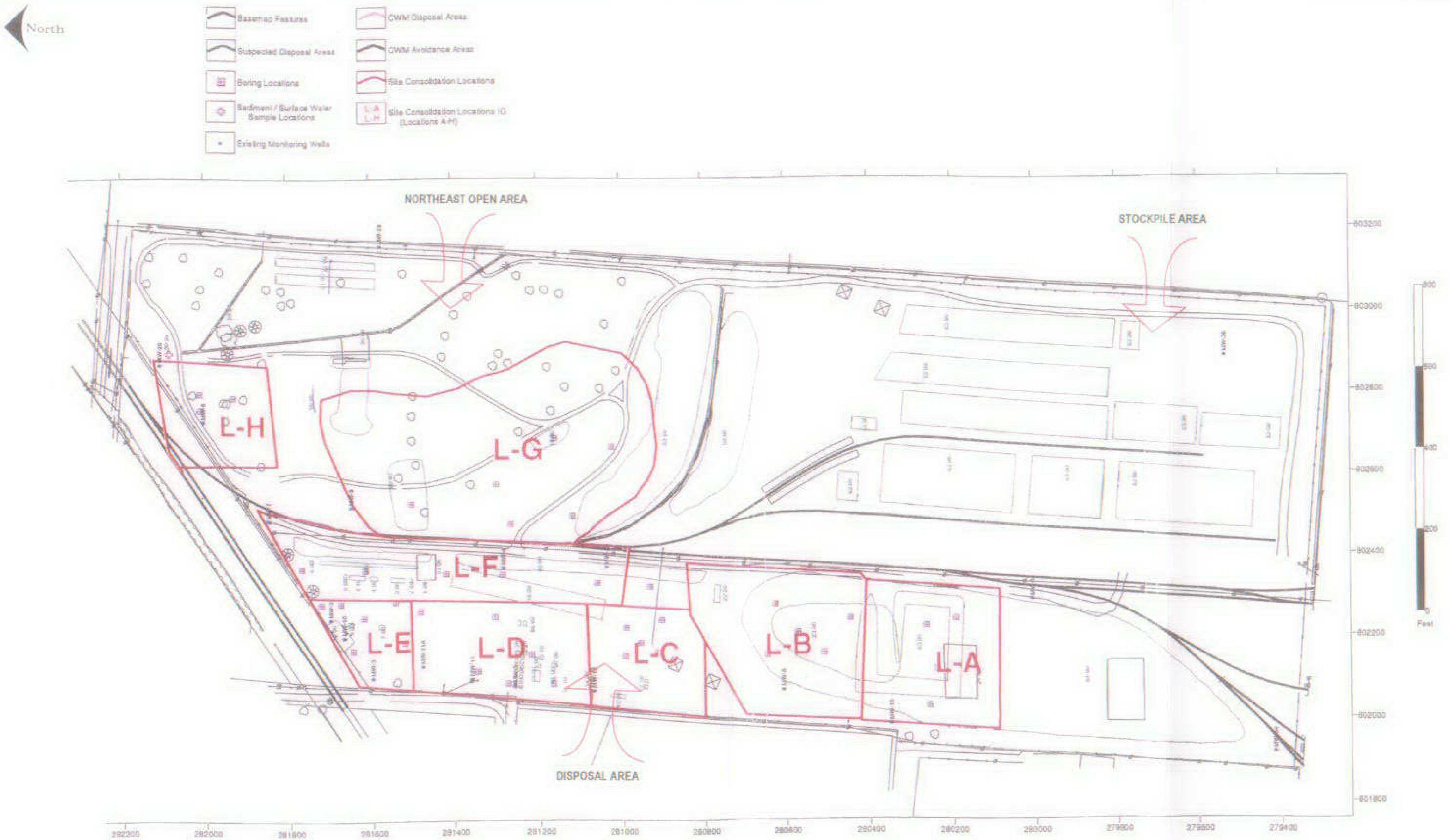
Table 4-5
2000/2001 Soil Sample Analytical Distribution
Rev 0 Memphis Depot Dunn Field RI

Boring ID Sample Collection Date	Soil Sample Analytical Distribution					
	Volatile Organics				Total Organic Carbon*	Equipment Rinse Blanks*
	Columbia Labs	Duplicate	ETC Labs	Duplicate		
Split percentage	20	10	[illegible]	10		
SBLCA-SB-1 10/12/2000			33 feet 64 feet 74 feet			X
SBLCA-SB-2 10/16/2000	44S feet		44 feet 68 feet 73 feet	444 feet	12 feet 47 feet 73 feet 90 feet	
SBLCA-SB-3 10/17/2000 10/18/2000			44 feet 53 feet 67 feet		12 5 feet 38 feet 87 feet	
SBLCA-SB-4 10/18/2000 10/19/2000	75S feet	755S feet	42 feet 52 feet 75 feet		18.5 feet	X
SBLCA-SB-5 10/24/2000			44 feet 54 feet 77 feet		17 5 feet 42.5 feet 61 feet 88 feet	
SBLCA-SB-8 10/25/2000	47S feet		47 feet 52 feet 72 feet	522 feet	31 5 feet	
SBLCA-SB-9 10/30/2000 10/31/2000	56S feet		22 feet 42 feet 56 feet 77 feet		42 5 feet 67 feet	X
SBLCA-SB-10 11/01/2000			12.5 feet 37 5 feet 57 5 feet 72 5 feet	12 55 feet		
SBLCA-SB-11 11/07/2000	27 5S feet		27 5 feet 37.5 feet 81 feet	811 feet		
SBLCA-SB 12 11/13/2000	74S feet		46 5 feet 74 feet		80.5 feet	
SBLCA-SB-13 11/14/2000			77 feet			X
SBLCA-SB-14 11/21/2000			83 feet			
SBLCA-SB-15 11/28/2000	80S feet		80 feet			X
SBLEE-SB-1 10/26/2000 10/27/2000	34S feet		5 feet[1] 34 feet 67 feet		18 5 feet 41 5 feet 54 5 feet 64 5 feet 74 feet	
Total	8	1	37	4	21	5

Sample identifications were developed by adding the collection depth to the boring ID For example SBLCA-SB-1-33 is the sample collected at 33 feet below ground surface at the SBLCA-SB-1 boring location.

[1] 4 oz jar of asphalt medium

Figures



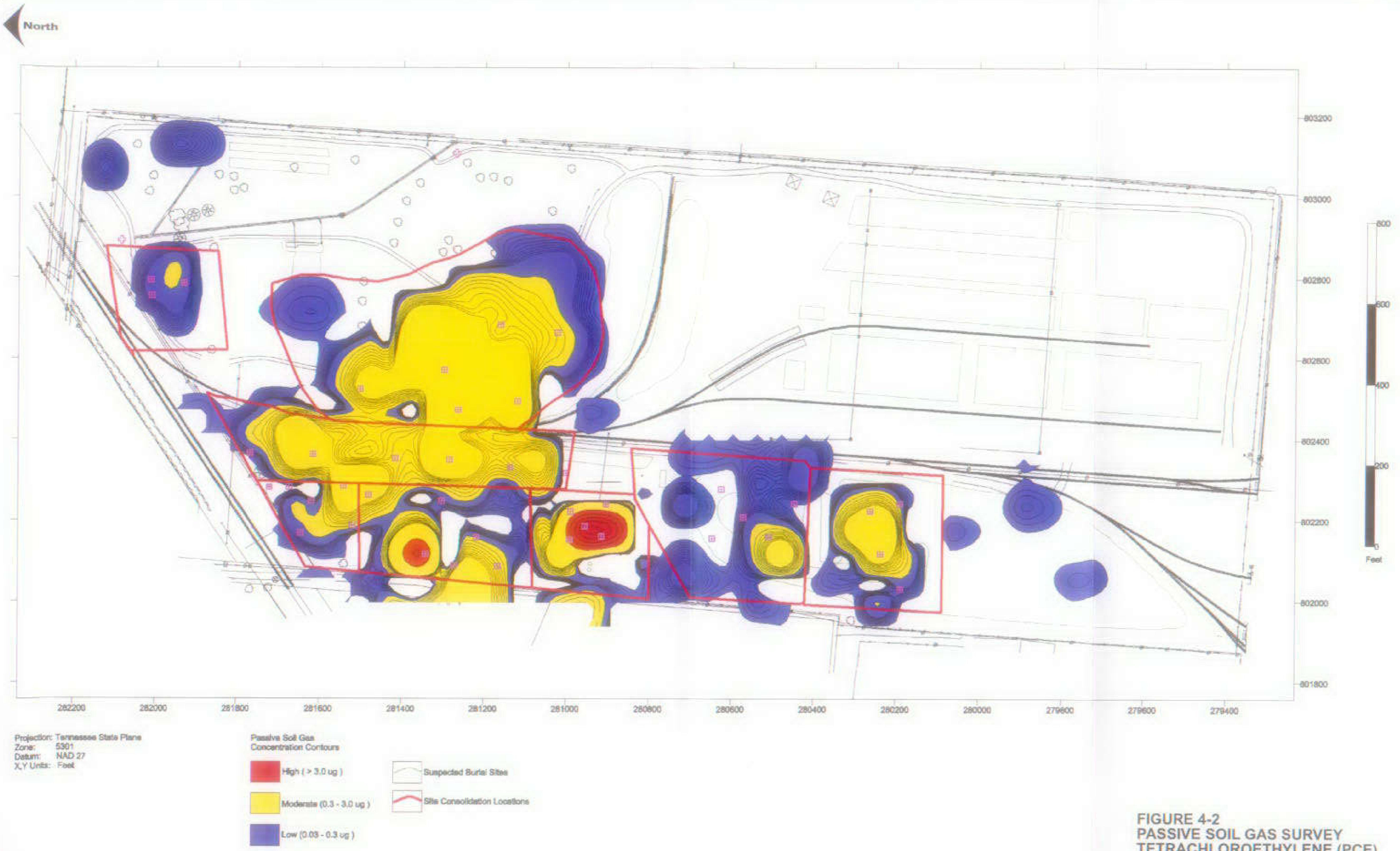
Projection: Tennessee State Plane
Zone: 5301
Datum: NAD 27
X,Y Units: Feet

E072001017ATL\Dunn143.FH8

FIGURE 4-1
CONSOLIDATION LOCATIONS MAP FOR DUNN FIELD

REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



E032002012ATL/Memphis Depot 118.FH8

FIGURE 4-2
PASSIVE SOIL GAS SURVEY
TETRACHLOROETHYLENE (PCE)
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

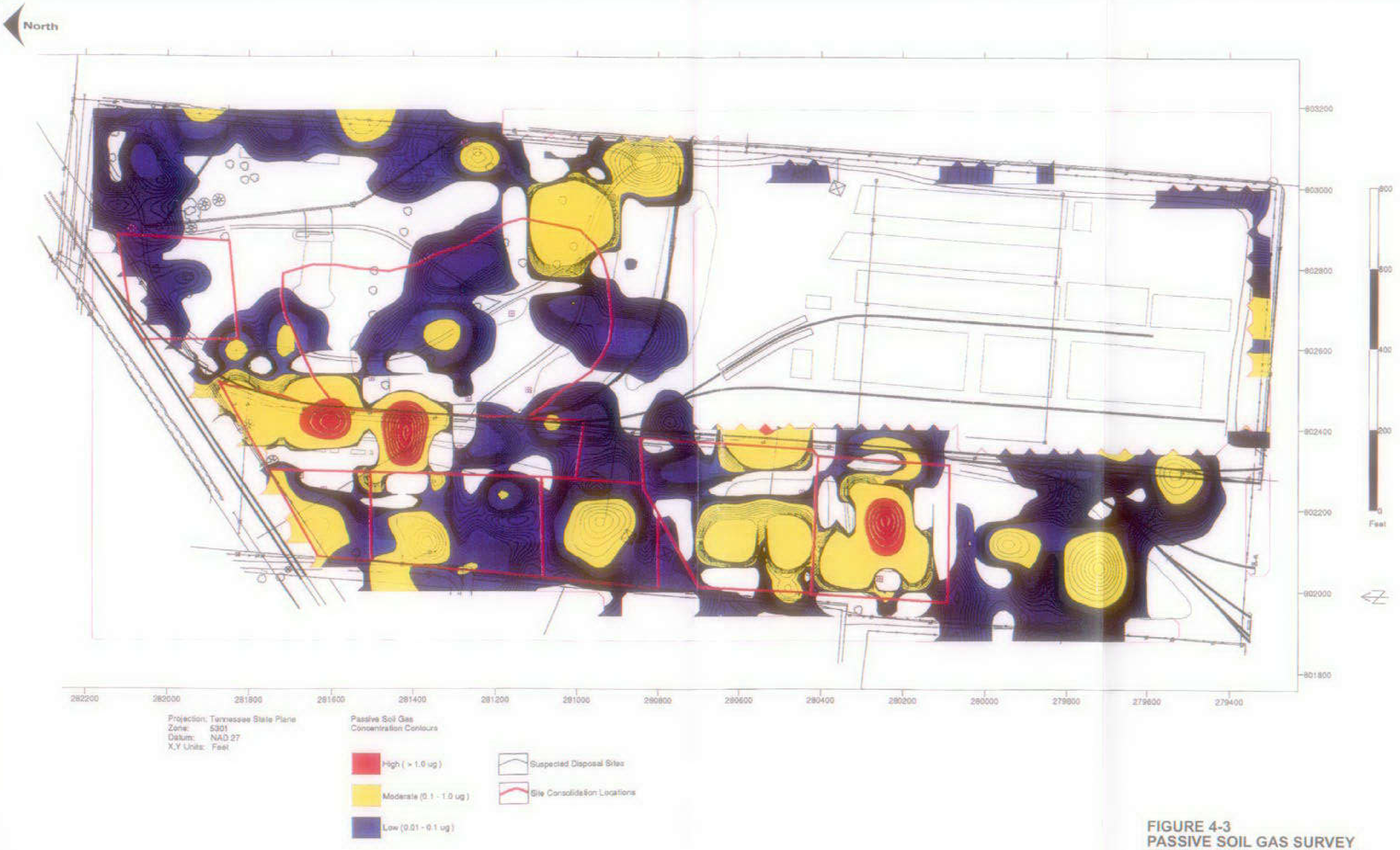


FIGURE 4-3
PASSIVE SOIL GAS SURVEY
TRICHLOROETHYLENE (TCE)
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

E032002012ATL/Memphis Depot 116.FH8

FIGURE 4-4
PASSIVE SOIL GAS SURVEY
TOTAL 1,2-DICHLOROETHENE (1,2-DCE)
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

FIGURE 4-5
PASSIVE SOIL GAS SURVEY
CARBON TETRACHLORIDE
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

E072001017ATL \ Dunn137.FH8

Projection: Tennessee State Plane
Zone: 5301
Datum: NAD 27
X,Y Units: Feet

FIGURE 4-6
PASSIVE SOIL GAS SURVEY
CHLOROFORM

REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

E032002012ATL/Memphis Depot 117.FH8

E072001017ATL | Dunn100.FH8

FIGURE 4-7
SAMPLE LOCATIONS FOR 1999 RI FIELD EFFORT
NORTHEAST OPEN AND DISPOSAL AREAS
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

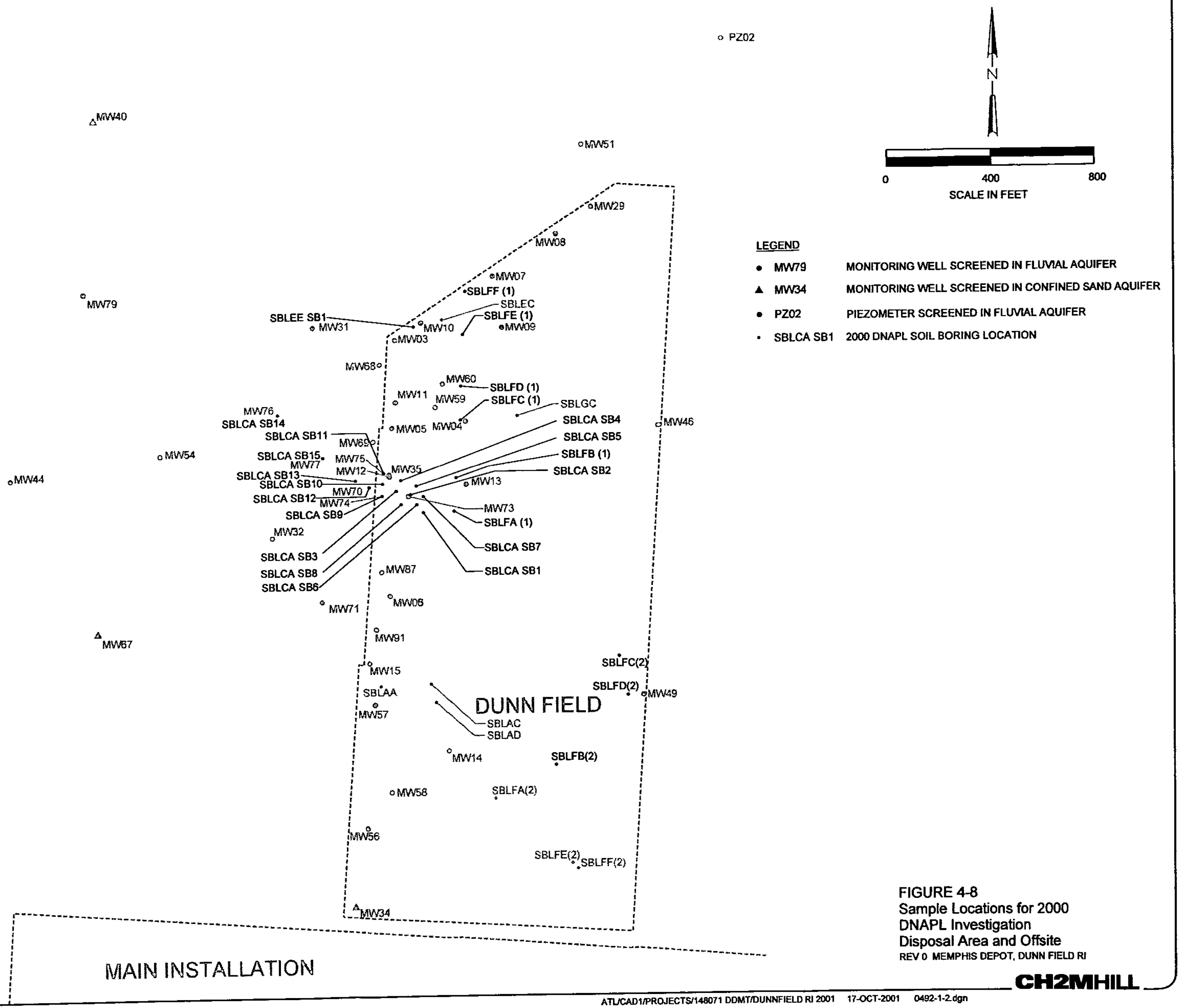
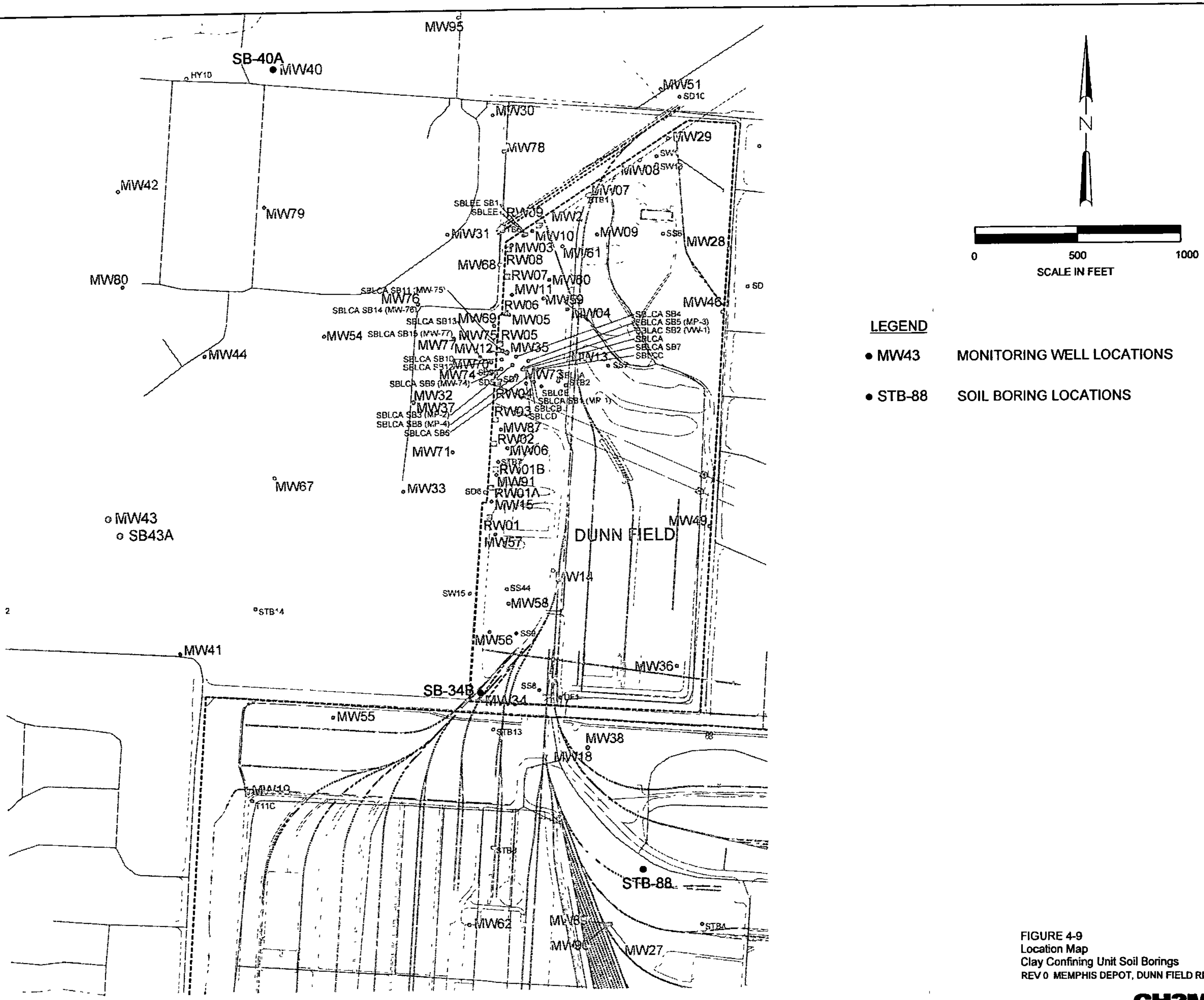


FIGURE 4-8
Sample Locations for 2000
DNAPL Investigation
Disposal Area and Offsite
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 0492-1-2.dgn



LEGEND

- ● MW43 MONITORING WELL LOCATIONS
- ● STB-88 SOIL BORING LOCATIONS

FIGURE 4-9
Location Map
Clay Confining Unit Soil Borings
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfr01-4-8.dgn

TAB

Section 5

5.0 Data Quality Evaluation

The purpose of the data quality evaluation (DQE) process is to assess the effect of the overall analytical process on the usability of the data. The two major categories of data evaluation are laboratory performance and matrix interference. Evaluation of laboratory performance is a check for compliance with the method requirements; either the laboratory did, or did not, analyze the samples within the limits of the analytical method. Evaluation of matrix interference is more subtle and involves the analysis of several areas of results including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results.

5.1 Introduction

Soil samples included in this DQE were collected during initial RI investigation activities in March and April 1999, during a supplemental sampling effort in October 1999, and from October 12 through November 28, 2000 during the DNAPL investigation. Groundwater samples included in this DQE were collected from January 8 through March 9, 2001 during groundwater sampling with diffusion bag samplers. Other groundwater samples were collected during five quarterly groundwater sampling events from 1996 through 1998 and the sample data are included in this RI report but were evaluated in separate documents entitled Quarterly Groundwater Sampling reports.

Field QC samples included duplicates, field blanks, trip blanks (analyzed for VOCs only), equipment rinsate blanks, and matrix spikes. The number of each type of sample is listed by analytical method in Tables 5-1 through 5-3. The samples were analyzed for the following analytical fractions:

- Volatile organic compounds (VOCs) by SW-846 Method 8260B;
- Semivolatile organic compounds (SVOCs) by SW-846 Method 8270;
- Organochlorine Pesticides and PCBs by SW-846 Method 8081 and 8082;
- Herbicides by SW-846 Method 8151;
- Explosives by SW-846 Method 8330;
- Dioxins by SW-846 Method 8280;
- Metals by EPA Methods 200.7, 204.2, 206.2, 213.2, 239.2, 245.1, 245.5, 270.2, 279.2;
- Metals by SW-846 Methods 6010, 7060, 7421, 7471, 7740, and 7841 (October 1999 only);
- Thiodiglycol by Method UL09/L; and
- Total organic carbon (TOC) by SW-846 Method 9060

The hardcopy data packages for this DQE were reviewed by project chemists using the process outlined in the EPA guidance document *USEPA CLP National Functional Guidelines for Inorganic (Organic) Data Review* (1994a, revised October 1999). A summary of all raw analytical data for all samples included in this RI can be found as Appendix B-1 - Summary of Raw Analytical Data. Areas of review included (when applicable to the method) holding time compliance, calibration verification, blank results, matrix spike precision and accuracy, method accuracy as demonstrated by laboratory control samples (LCSs), field duplicate results, surrogate recoveries, and internal standard performance. A data review worksheet was completed for each of these data packages and any non-conformance documented. The data review and validation process is independent of the laboratory's checks and focuses on the usability of the data to support the project data interpretation and decision-making processes.

Thirty-seven (37) soil samples (including 4 duplicates) were collected for 24-hour turnaround time during the expanded RI field investigation in late 2000. These samples were analyzed by Environmental Testing & Consulting in Memphis, TN, using QC Level 2 procedures based on the 'quick' turnaround; therefore, only surrogate recovery QC data was reported. This VOC data was used in the field to determine placement of additional boring/wells and for the assessment of potential DNAPL in the subsurface. The Precision, Accuracy, Representativeness, Completeness, and Comparability section of the 2000 DQE states that 100% of the data were valid based upon the information provided; that is, no data were rejected. Surrogate recoveries were provided and presented and provided as an attachment. The majority of the surrogate recoveries were well within control limits indicating no matrix effects, which would bias the data. Those that were out were slightly high. None of the data was rejected for surrogates. In addition, there were no other QC data in the deliverable in order to perform a complete Functional Guidelines validation.

Twenty (20) percent of these VOC samples (8 samples plus 1 duplicate) were split and sent to a second laboratory, Columbia Analytical Services in Redding CA, for 14-day analysis as a quality control check on the level 2 data (see Table 4-5). The analysis of these samples were conducted using QC Level 3 (CLP equivalent) procedures. The results of these split samples were complete enough to be reviewed and validated using the process outlined in USEPA, 1999, using CLP-type QC summary forms. Analytical results of the split samples from 2000 soil sampling event for VOCs are shown on Figure 10-11B and a comparison is included in Appendix B-4h. The results of the data validation for the 2000 soil samples are presented in Appendix B-4.

Also for the 2000 data, TOC data were contained within complete DQO Level III data packages and were validated.

Data that were not within the acceptance limits were appended with a qualifying flag, which consists of a single- or double-letter abbreviation that reflects an uncertainty or problem with the data. Although the qualifying flags originate during the database query process, they are included in the final data summary table deliverables so that the data will be used only for the intended purpose and with the qualifiers known. For the validated 2000 and 2001 data, the qualifiers also include secondary, or two-digit sub-qualifier flags which are entered into the Comments field of the database. The secondary qualifiers provide the reasoning behind the assignment of a qualifier to the data. The sub-qualifiers are presented and defined in Table 5-4. The following flags were used in this text:

- = D Detected. Analyte was analyzed for and detected at the reported concentration;
- U - Undetected. Analyte was analyzed for but not detected above the method detection limit (MDL);
- UJ - Detection limit estimated. Analyte was analyzed for and qualified as not detected. The result is estimated;

- **J** - Estimated. The analyte was present, but the reported value may not be accurate or precise; and
- **R** - Rejected. The data are unusable. (NOTE: Analyte/compound may or may not be present.).

Inorganic and organic numerical sample results that are greater than the MDL but less than the laboratory reporting limit (RL) are qualified with a "J" for estimated as required by the *EPA Functional Guidelines for Evaluating Data Quality*.

Once the data review and validation process was completed, the entire data set was reviewed for chemical compound frequencies of detection, dilution factors that might affect data usability, and patterns of target compound distribution. The data set was also evaluated to identify potential data limitations, uncertainties, or both in the analytical results. Appendix B-2a, B-3a, and B-4a lists the changes in data qualifiers due to the validation process for the March and April 1999 data, the October 1999 data, and the 2000 and 2001 data, respectively. A list of all rejected results is provided in Appendix B-2b through B-4b.

The 2000 VOC data contained many dilutions due to the linear range of the calibration curve being exceeded. As a result, there were two valid values in the database for several VOC samples As presented in Appendix B-4a, project chemists compared the dilution with the original results and selected the proper record from the two results available. The other value was rejected, as there can be only a single valid record per compound, per sample.

Where data were qualified as estimated, a "J" flag was applied to positive hits and a "UJ" flag was applied to not detected results. The entire sample database was also queried for frequency of detection in blanks and samples, detailed listing of blank detects, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicate precision, surrogate recoveries, preparation, and analysis dates pertaining to holding times. The queries were then manipulated to calculate necessary statistics for evaluation of data. Appendix B-4a lists the changes in data qualifiers due to the validation process. A list of all rejected results is provided in Appendix B-4b.

5.2 Holding Times and Calibration

5.2.1 Holding Times

According to SW-846 requirements, all holding times were met for all sampling events.

5.2.2 Calibration

The 2000 VOC QC Level 2 data from Environmental Testing & Consulting did not include calibration data in the VOC hard copy or electronic data deliverable and, therefore, could not be evaluated as to the impact that calibration and tuning results may have had on these data. There were no other QC data other than surrogate recoveries in the deliverable in order to perform a complete Functional Guidelines validation. The data were used based on the surrogate recoveries and the fact the lab followed the approved SW846 methodology procedure as stated. Split samples from 20% of the QC Level 2 VOC samples were analyzed by Columbia Analytical Services using QC Level 3 data package deliverables, which included calibration data. No records were qualified from calibration criteria.

For the 2001 data, six records were quantified as non-detects were qualified as estimated (UJ) due to continuing calibration deficiencies. These records consisted of a single bromoform, two chloroethane, and three bromomethane results.

No other records were qualified from calibration criteria.

5.3 Potential Field Sampling and Laboratory Contamination

Four types of blank samples were used to monitor potential contamination introduced during field sampling, sample handling, and shipping activities, as well as sample preparation and analysis.

- **Trip Blank (TB)**: A sample of ASTM Type II water that is prepared in the laboratory prior to the sampling event. The water is stored in VOC sample containers, which are not opened in the field, and travels back to the laboratory with the other samples for VOC analysis. This blank is used to monitor the potential for sample contamination during the sample container trip. One trip blank should be included in each sample cooler that contained samples for VOC analysis. A total of 12 trip blanks were submitted to the laboratory with the samples in this DQE report;
- **Equipment Rinsate Blank (EB)**: A sample of the analyte-free water used for the final rinse during the equipment decontamination process. This blank sample is collected by rinsing the sampling equipment after decontamination and is analyzed for the same analytical parameters as the corresponding samples. This blank is used to monitor potential contamination caused by incomplete equipment decontamination. One equipment rinsate blank should be collected per day of sampling, per type of sampling equipment. Depending on the analysis, up to five equipment rinsate blanks were submitted to the laboratory for analysis;
- **Field Blank or Ambient Blank (FB or AB)**: The field blank is an aliquot of the source water used for equipment decontamination. This blank monitors contamination that may be introduced from the water used for decontamination. One field blank was collected from each source of decontamination water and analyzed for the same parameters as the associated samples. Depending on the analysis, up to five ambient blanks were collected during the 1999 and 2001 sampling events; and
- **Laboratory Method Blank or Method Blank (MB)**: A laboratory method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process. One method blank was prepared and analyzed for every 20 samples or per analytical batch, whichever was more frequent.

According to the EPA Functional Guidelines, concentrations of common organic contaminants detected in samples at less than 10 times the concentration of the associated blanks can be attributed to field sampling and laboratory contamination rather than environmental contamination from site activities. Common organic contaminants include acetone, methylene chloride, 2-butanone, and the phthalates. For other inorganic and organic contaminants, 5 times the concentration detected in the associated blanks rather than 10 is used to qualify results as potential field and/or laboratory contamination rather than environmental contamination. A detailed list of contaminants found in the field and laboratory blanks for all data is provided in Appendix B-2c through B-4c. The frequency and range of analytes detected in all samples is provided in Appendix B-2d through B-4d.

Common organic contaminants were found in various blanks for the 1999 data, including:

- Acetone (extraction solvent and common lab contaminant) was detected in all 7 equipment rinsate blanks, 2 field blanks, 4 trip blanks, and all 4 ambient blanks, as well as 19 laboratory method blanks. Twelve field samples had acetone present greater than 10 times the highest associated blank levels;
- Methylene chloride (extraction solvent and common lab contaminant) was detected in 1 equipment rinsate blank, 2 ambient blanks, 5 trip blanks, and 14 laboratory method blanks. Thirty-one field samples had methylene chloride detected above 10 times the level of the associated blanks;
- 2-Butanone (common lab contaminant) was found in two laboratory method blanks. For the October 1999 data, 2-Butanone was found in one of the field blanks. Sixty field samples had 2-butanone present where either the associated blanks were free of 2-butanone or the concentrations were greater than 10 times the highest associated blank levels; and
- Phthalates are common lab contaminants and were detected in a number of blanks. Benzyl butyl phthalate was found in two laboratory blanks. One equipment blank contained di-n-octyl phthalate. Di-n-butylphthalate was detected in two equipment blanks and one laboratory blank. Three laboratory method blanks had bis-2-(ethylhexyl)phthalate (BEHP) present. Additionally, diethylphthalate was found in one laboratory method blank.

For the October 1999 data, toluene was present in two trip blanks. Six field samples were qualified as non-detect due to blank contamination of toluene. A number of metals were detected in various blanks and are summarized in Appendix B-3d. These include aluminum, calcium, chromium, copper, iron, magnesium, manganese, lead, potassium, sodium, and zinc. Many of these metals are ubiquitous at low levels. Zinc is used in galvanizing steel and as a catalyst in many chemical and/or manufacturing processes. Aluminum, chromium, copper and iron are used in constructing sinks, faucets, laboratory ventilation hoods, and other tools or equipment used on a day-to-day basis. Lead is associated with many alloys or solder combinations. Calcium, magnesium, potassium and sodium are the cations associated with common salts. Additionally, many of these elements can be found as trace level contaminants in acids utilized for digestion in the laboratory. Three potassium and nine sodium results were qualified as non-detect due to blank contamination.

For the 2000 data, TOC was reported at two times the MDL or less in two laboratory blanks. As Appendix B-4a indicates, this resulted in four samples being qualified as non-detects due to TOC blank contamination. Two VOCs were reported in a single equipment rinsate blank

(1 of 5 equipment rinsate blanks). These included 1,1,2,2-tetrachloroethane (at 3.7 µg/L) and TCE (at 6.4 µg/L). Appendix B-4d contrasts these data with field sample results.

For the 2001 data, seven VOCs were reported in laboratory method or field blanks. These included 1,1,2,2-tetrachloroethane, methylene chloride, chloromethane, bromomethane, toluene, TCE, and acetone. Twenty-one results were qualified as non-detect for methlyene chloride, 37 samples were qualified as non-detect for acetone, 10 samples were qualified as non-detects due to blank contamination for chloromethane, and 2 samples were qualified as non-detect for 1,1,2,2-PCA. Other concentrations reported as detections are attributable to blank contamination rather than site-related environmental activities for acetone, bromomethane, chloromethane, and methylene chloride.

Within a significant amount of data such as this, common laboratory contaminants may sometimes be reported at low levels in samples, but are not detected in any associated blank samples. Therefore, they cannot be qualified as "U" (undetected) based upon blank evaluation. However, the reported levels of these compounds must be evaluated carefully to determine if they are actually indicative of environmental conditions, or low level contamination from the field or laboratory. Benzyl butyl phthalate, BEHP, di-n-butyl phthalate, and diethyl phthalate were found in 2, 13, 5, and 6 samples, respectively, but not in the associated blanks and were therefore not qualified as undetected. These are common laboratory contaminants and may be due to low level contamination, rather than environmental conditions.

A number of other organic compounds were detected in blanks for the 1999 sample results, including:

- VOCs: Carbon disulfide was found in one laboratory method blank. Chlorobenzene was detected in one ambient blank. Chloroform was present in two laboratory method blanks. Styrene was detected in 16 laboratory method blanks. Toluene was present in seven trip blanks, two ambient blanks, and four laboratory method blanks. Two laboratory method blanks contained 1,2-dichloroethene. Trichloroethene was found in four laboratory method blanks; and
- SVOCs: One equipment blank contained benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, and phenol below the reporting limit. Benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, fluoranthene, and pyrene were detected in one laboratory method blank.

A number of metals were detected in various blanks, as summarized in Table 5-5. In the cases of copper, lead, iron, and zinc, the maximum values can be attributed to field and/or laboratory contamination. Zinc is used in galvanizing steel and as a catalyst in many chemical and manufacturing processes. Copper and iron are used in manufacturing sinks, faucets, laboratory ventilation hoods, and other tools or equipment used on a day-to-day basis. Lead is associated with many alloys and solder combinations. For the remaining metals not listed above, concentrations detected can be attributed to instrument noise at or near the MDL. Associated field sample results less than 5 times the maximum concentration found in the laboratory method or field blanks were attributed to field sampling or laboratory contamination and are not considered to be indicative of environmental contamination. These results were qualified as not detected and indicated with a "U" qualifier.

5.4 Matrix Effects

5.4.1 Surrogate Spike Recovery

Surrogate spike compounds were added to every sample analyzed for the organic parameters, including field and laboratory blanks as well as field environmental samples. Surrogate spikes consist of organic compounds, which are similar to the method analytes in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.

Surrogate spike recoveries were used to monitor both laboratory performance and matrix interferences. Surrogate spike recoveries from field and laboratory blanks were used to evaluate laboratory performance because the blanks should represent an "ideal" sample matrix. Surrogate spike recoveries for field samples were used to evaluate the potential for matrix interference. According to *EPA (1999)*, data are not qualified with respect to surrogate recoveries unless two or more volatile surrogates are out of specifications.

Table 5-6 summarizes the March and April 1999 VOC, SVOC, herbicide, pesticide/PCB, dioxin, and explosive average surrogate recovery and the number of results flagged based on surrogate recovery exceptions. All reported surrogate spike recoveries for field and QC samples are presented in Appendix B-2e through B-4e.

For the March and April 1999 data, surrogates for all organic analytical fractions generally recovered well. Therefore, any adverse effect of the matrix on the results is demonstrated to be minimal. For the October 1999 data, no samples were flagged due to poor surrogate recoveries. These recoveries indicate that the specific sample matrix did not interfere with the analytical process. For the 2000 data, all reported surrogate recoveries were well within method acceptance ranges. Any surrogate value outside the laboratory established limits are found in Appendix B-2e through B-4e. Any that were outside the limits were found to be high. None of these data were rejected due to surrogate recovery failure and the data are usable in the decision-making process. For the 2001 data, surrogate recoveries were well within method acceptance ranges. Forty records from seven (7 out of 117) samples were qualified as estimated (J or UJ) due to surrogate recoveries outside control limits. No data were rejected.

5.4.2 Matrix Spike Recoveries

Matrix spikes are prepared in order to document the precision and bias of a method in a given sample matrix. For inorganic matrix spikes, three aliquots of a single sample were analyzed; one native sample, one native duplicate, and one sample spiked with analytes. Spike recovery is used to evaluate potential matrix interference as well as accuracy. Precision is evaluated by comparing the native sample and native duplicate results for each analyte. Three aliquots of a single sample are also analyzed for organic compounds, however, using one native and two spiked aliquots. Unlike the surrogate spike compounds, organic matrix spike compounds are found on the method TCL. The duplicate results, consisting of MS/MSD or native/duplicate), are compared to evaluate precision.

Organic concentrations are not qualified based on MS/MSD results alone. The results are evaluated in conjunction with surrogate and internal standard (if applicable) results. For the March and April 1999 data, the GC/MS volatile and semivolatile MS/MSD recovery and precision data all fell within method control limits. One set of the organochlorine pesticide spikes in this data set were diluted due to native concentrations of pesticides, so recovery could not be determined. "Native concentration" refers to the level of target in the sample. The target was high enough that it exceeded the calibration range and had to be diluted. The dilution "diluted out" the concentration of the spike added.

For the October 1999 data, the GC/MS volatile and semivolatile MS/MSD recovery and precision data all fell within method control limits. The GC pesticide, PCB, and herbicide MS/MSD data also were within criteria. For the 2000 data, all TOC MS accuracy and native duplicate precision results were well within established criteria, indicating that the specific sample matrix did not greatly influence the overall TOC analytical process or the final numerical result. For the 2001 data, all of the accuracy and precision results were well within established criteria, indicating that the specific sample matrix did not influence the overall analytical process or the final numerical result. No MS/MSD data were submitted for the 2000 VOC analysis.

Inorganic results in the March and April 1999 data were qualified based solely on the results of the MS/MSD precision and accuracy. Most of the unacceptable recoveries were greater than 60 percent and all spike recoveries were greater than 30 percent. No results were rejected based on MS performance. Inorganic results for this data set are summarized as follows:

- Antimony was flagged as estimated (J/UJ) in 88 samples based on MS recovery. All soil matrix spikes were below 75 percent recovery;
- Selenium was flagged as estimated (J/UJ) in 42 samples based on MS recovery. The recovery of selenium was below 75 percent in three of the soil matrix spikes;
- Arsenic and copper were flagged as estimated (J/UJ) in 16 samples based on MS recoveries; and
- Beryllium, cadmium, manganese, and mercury were each flagged as estimated (J/UJ) in three or less samples due to MS recoveries.

For the October 1999 data, no inorganic results were rejected based on matrix spike performance. The following table reflects the number of samples per element qualified based on MS/MSD results outside control limits. Additionally, several project specific MS/MSD sets were not provided to the project in hard copy or e-data formats because they were not requested on the COPC. The hard copy validation process revealed that these QC samples were performed and hard copy was provided for the data validation process.

Number of Samples per Element Flagged due to MS/MSD QC Results in the October 1999 Inorganic Data

Element	Number Samples Flagged	Flag Assigned
Antimony	16	"J" hits / "UJ" non-detects
Arsenic	21	"J" hits / "UJ" non-detects
Barium	7	"J" hits / "UJ" non-detects
Cadmium	6	"J" hits / "UJ" non-detects
Calcium	22	"J" hits / "UJ" non-detects
Chromium	15	"J" hits / "UJ" non-detects

Iron	6	"J" hits / "UJ" non-detects
Lead	6	"J" hits / "UJ" non-detects
Manganese	12	"J" hits / "UJ" non-detects
Selenium	13	"J" hits / "UJ" non-detects
Vanadium	15	"J" hits / "UJ" non-detects
Zinc	9	"J" hits / "UJ" non-detects

The precision and accuracy information obtained from the matrix spiking and native duplicate precision for both 1999 data sets indicate that the specific sample matrix did not influence the overall analytical process or the final numerical result. All MS/MSD precision and accuracy results are listed in Appendix B-2f through B-4f.

5.4.3 Field Duplicate Sample Results

Field duplicate analyses measure both field and laboratory precision and can also be affected by the homogeneity of the samples. Therefore, the results may have more variability than lab duplicates, which measure only lab performance. According to the EPA Functional Guidelines, there are no qualification criteria for field duplicate precision.

For soil samples collected in 1999 and 2000, a control limit of ± 35 percent for the RPD was used for original and duplicate sample values greater than or equal to five times the RL. For the 2001 data, an aqueous control limit of ±20 percent for the RPD was used for original and duplicate sample values greater than or equal to five times the RL. A control limit of ± two times the RL was used if either the sample or the duplicate value was less than five times the RL. In the case where only one result is above the five times the RL level and the other is below, the ± two times the RL criteria were applied. A summary of <u>all</u> field duplicate results (including precision) is provided in Appendix B-2g through B-4g.

There were several sets of field duplicates collected during the 1999 field effort and four for the 2000 and 2001 effort (see Tables 5-1 through 5-3). Both the native and duplicate samples were analyzed for the same parameters. Precision criteria for both the 1999 data sets were met for greater than 95 percent of all parameters, demonstrating minimal matrix heterogeneity. For the 2000 data, half of the measurable data for the precision statistic were outside the above-detailed criteria. Therefore, the precision data indicate that matrix heterogeneity could have influenced the final numerical result. For the 2001 data, the precision data indicate that matrix heterogeneity and sampling technique did not greatly influence the final numerical result.

5.4.4 Inductively Coupled Plasma (ICP) Serial Dilution

The serial dilution of samples quantitated by ICP determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high, the serial dilution analysis must agree within a 10 percent difference of the original determination after correction for dilution.

For the March and April 1999 data, vanadium and zinc did not meet serial dilution criteria during this sampling event. Vanadium and zinc results were qualified as estimated (J/UJ) in 2 and 18 samples, respectively. For the October 1999 data, six zinc results did not meet serial dilution criteria during this sampling event. These results were qualified as estimated (J/UJ).

5.4.5 Samples Requiring Dilution

During sample analysis, a dilution may be required for various reasons. Diluting a sample is usually performed to provide more accurate quantitation of the target compounds and to protect the analytical instrumentation. If the concentrations of the target compounds are above the calibration range of the instrument, the sample extract must be diluted in order to obtain an accurate quantitation. Laboratories typically dilute the sample extracts such that the responses of the target compounds are in the upper part of the calibration range. This is done in order to give a clear, strong signal from the detector while providing the lowest possible reporting limits.

Another reason for diluting samples is the presence of non-target compounds and chemical interferences, or matrix effects. Matrix effects can be produced from a variety of sources, including conductivity, pH, organic content, and biota (oils and lipids). Laboratories often perform a clean-up procedure on the sample extract prior to analysis. Standard clean-up procedures are designed to recover the analytes, while minimizing or removing interfering non-analytes; however, interferences can still persist, even after the clean-up procedures have been completed.

Of the samples collected in March and April 1999, some inorganic samples were diluted for selected parameters (calcium, barium, and iron) in order to prevent concentrations from exceeding the instrument linear ranges or when excessive interference was present. Many organochlorine pesticide and gas chromatography/mass spectroscopy (GC/MS) VOC samples had to be diluted due to levels of analytes present in the samples. Some of these were diluted to a level at which surrogate and spike recoveries could not be determined.

Several SVOC samples had to be diluted due to levels of analytes present in the samples. In these cases, the laboratory also produced data from less diluted analysis, thus providing better report limits for the other compounds.

For the samples collected in October 1999, Appendix B-3a presents several organochlorine pesticide samples, which required dilutions due to levels of certain targets present in the samples. Some of these were diluted to a level at which surrogate and spike recoveries could not be determined.

5.4.6 Samples Requiring Dilution

During the 2000 field sampling effort, eight samples were split and analyzed by the primary laboratory and a second, or QA, laboratory in order to compare results from a laboratory precision perspective. Appendix B-4h presents the comparison of the data from the two different laboratories. Data in this appendix indicates that the vast majority are not "comparable." That is, either both results are non-detected, rejected due to dilution or linear range issues, or a mixture of the two. Unusable (rejected) data and non-detects cannot provide statistically valid information from an analytical perspective. For data that can be compared in the same manner as the field duplicate data, a relative percent difference (RPD) is calculated. Compounds that do not pass the field duplicate evaluation criteria are highlighted. However, the data that can be evaluated reflect much the same trend as the field duplicate samples. These results indicate limited matrix heterogeneity.

5.5 Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC)

Precision--is defined as the agreement between duplicate results, and was estimated by comparing duplicate matrix spike recoveries, sample duplicates, as well as the field duplicate sample results. Other than the documented exceptions, the precision between native and field duplicate sample results for both 1999 data sets and the 2001 data sampling efforts were within acceptable criteria for 90 percent of the measurements, indicating that sample matrix did not significantly interfere with the overall analytical process. For the 2000 data, the precision between field duplicate sample results and the split samples for VOCs indicates that sample matrix heterogeneity could have influenced the overall analytical process and the final numerical result.

Accuracy--is a measure of the agreement between an experimental determination and the true value of the parameter being measured. For the organic analyses, each of the samples was spiked with a surrogate compound; for organic analyses, an MS, MSD, and laboratory control standard (LCS) were spiked with a known reference material before preparation; and for inorganic analyses an MS and LCS were spiked with target analytes before preparation. Each of these approaches provides a measure of the matrix effects on the analytical accuracy. The LCS results demonstrate the accuracy of the method and the laboratory's ability to meet the method criteria. MS and MSD results establish precision and accuracy of the matrix. Accuracy can be estimated from the analytical data and was not measured directly. For both 1999 data sets and the 2000 data, spike recoveries were within the method acceptance limits in greater than 92 percent of the measurements and surrogate recoveries were within acceptance limits in greater than 95 percent of the measurements; therefore, other than the documented exceptions, there was no evidence of significant matrix interference that would affect the usability of the data. For the 2001 data, spike recoveries were within the method acceptance limits for all of the measurements; therefore, there was no evidence of significant matrix interference that would affect the usability of the data.

Representativeness--a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition. Representativeness is a subjective parameter and is used to evaluate the efficacy of the sampling plan design. For all data, representativeness was demonstrated by providing full descriptions in the project scoping documents of the sampling techniques and the rationale used for selecting sampling locations.

Completeness--is defined as the percentage of measurements that are judged to be valid compared to the total number of measurements. Of a total of 19,183 validated results in the March and April 1999 data (individual compounds or elements), 2,133 (11.1 percent of total results) were rejected. Of the rejected data, 2,125 (99 percent of rejected results) were attributed to re-extracts, re-analysis, or secondary dilutions for the organic parameters (there can be only one valid result for a sample). Only 8 results (< 0.1 percent of total results) were completely rejected (where no valid result for parameter remains). Therefore, not considering the rejects based on multiple parameter results, more than 99 percent of the data were determined to be valid

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For the October 1999 data, out of a total of 7154 validated results (individual compounds or elements), 117 (1.6 percent of total results) were rejected. Of the rejected data, all 117 were attributed to re-extraction, re-analysis, secondary dilutions, or linear ranges exceeded for the organic parameters (there can only be one valid result for a sample). Over 98 percent of the data are complete.

For the 2000 and 2001 data, 100 percent of the data were determined to be valid.

Comparability--is another qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix type, and analytical method. Comparability is limited by the other PARCC parameters because data sets can be compared with confidence only when precision and accuracy are known. Data from these investigations are comparable with other data collected at the site because only EPA methods were used to analyze the sample and standard EPA Level III QC data are available to support the quality of the data.

5.6 Summary and Conclusions

March and April 1999 Data

- The laboratory analyzed the samples according to the EPA methods stated in the project plan as demonstrated by the deliverable summaries and analytical run sequences.
- Antimony recovery was low in all soil matrix spikes. All soil results were flagged as estimated (J/UJ), indicating that the matrix affected this analysis.
- Selenium matrix recovery was less than 75 percent in 3 of the 6 soil matrix spikes. Approximately half of the selenium results were qualified as estimated (J/UJ), indicating that the matrix may have affected the selenium results.
- Most concentrations of acetone and methylene chloride can be attributed to field sampling and/or laboratory contamination rather than environmental contamination. In four samples, acetone was detected significantly higher than any field or laboratory blank. Methylene chloride was detected in 21 samples, which could not be flagged as undetected due to blank contamination. Of these 21 samples, 17 were below the reporting limits. Since acetone and methylene chloride are common contaminants, these results should be used cautiously.
- Two phthalates, benzyl butyl phthalate and BEHP, were found in 2 and 13 soil samples, respectively, at concentrations below the sample reporting limits. These compounds were not detected in the associated blanks and were, therefore, not qualified as undetected. These are common laboratory contaminants and are probably due to low level lab contamination, rather than environmental conditions.
- Sample results for metals above the MDL but less than the reporting limits may be attributed to instrument noise rather than site-related activities and as such may be false positives. Typically, values at or near the MDL may well be Type I errors, those due to instrument noise and a lack of accuracy or precision at this level. This phenomena is seen in calibration blanks and is often enhanced by the real matrix

- After a global review of the overall dataset, spike recoveries and duplicate sample results indicate that the specific sample matrix did not interfere with the analytical process for target parameters (accept where noted above)

October 1999 Data

- The laboratory analyzed the samples according to the EPA methods stated in the project plan as demonstrated by the deliverable summaries and analytical run sequences.
- The organic compounds acetone, methylene chloride, 2-butanone, and BEHP which were found in samples should be considered as contaminants and not from environmental activities.
- Sample results for metals above the MDL but less than the RL could be attributed to instrument noise and/or low level contamination and not site-related activities and as such may be false positives
- Analytical accuracy and precision results indicate that the specific sample matrix did not have a significant influence on the final numerical result.

2000 Data

- The laboratory documented that the samples were analyzed according to the EPA approved SW846 methods.
- Two VOCs were reported in a single equipment rinsate blank (1 of 5 equipment rinsate blanks). These included 1,1,2,2-tetrachloroethane (at 3.7 µg/L) and TCE (at 6.4 µg/L).
- Sample results for organic compounds above the MDL but less than the RL should be considered as uncertain but indicative of the presence of that compound at an estimated concentration.
- Spike recoveries and surrogates indicate that the specific sample matrix did not significantly interfere with the analytical process or the final numerical result.
- Samples were not qualified due to the field duplicate precision statistic or the split sampling findings. However, available data indicate that sample heterogeneity may have influenced the final numerical results. Analytical results of the split samples from 2000 soil sampling event for VOCs are shown on Figure 10-11B and a comparison is included as Appendix B-4h. The split samples generally confined the level 2 VOC data. High concentrations of target analytes and sample heterogeneity (comparison of 2 discrete samples) appear to account for much of the difference in findings.

2001 Data

- The laboratory analyzed the samples according to the EPA methods stated in the work plan as demonstrated by the deliverable summaries and analytical run sequences.
- Samples with concentrations reported as detections should be considered attributable to blank contamination and not site related environmental activities for acetone, bromomethane, chloromethane, and methylene chloride.

- Sample results for organic compounds above the MDL but less than the RL should be considered as uncertain but indicative of the presence of that compound at an estimated concentration.
- Spike recoveries, surrogates, and duplicate sample results indicate that the specific sample matrix did not significantly interfere with the analytical process or the final numerical result.

The project objectives or PARCCs were met, and the data can be used in the project decision-making process as qualified by the DQE process.

Tables

TABLE 5-1
Analyses Totals by Method
Rev 0 Memphis Depot Dunn Field RI

Parameter	Analytical Method	N	FD	AB	EB	TB
Metals by ICP	C200 7	108	9	1	5	
Antimony	C204 2	4				
Arsenic, Lead, Selenium, and Thallium	C206 2, C239 2, C270 2, C279 2	90	9	1	5	
Cadmium	C213 2	4				
Mercury	C245 1	23	1		4	
Mercury	C245 5	76	8	1	1	
OC Pesticides	SW8081	85	5	1	5	
PCBs	SW8082	75	5	1	5	
Herbicides	SW8151	31	1	1	5	
Volatiles	SW8260	182	17	4	5	8
Semivolatiles	SW8270	89	6	1	5	
Dioxins	SW8280	5		1	1	
Explosives	SW8330	29				
Thiodiglycol	UL09/L	6		1	1	

Table 5-2
2000 Sample Data
Number of Samples Collected per Matrix, Method, and Type
Rev. 0 Memphis Depot Dunn Field RI

Matrix	Analytical Method	Preparation Method	N	FD	EB	TB
SO	SW8260	SW5030	1			
SO	SW8260	SW5035	36	4	5	2
SO	SW9060	NONE	21			

SO= Soil
N = Number of samples
FD = Field duplicate
AB = Ambient blank
EB = Equipment blank
TB = Trip blank

Table 5-3
Analyses Total by Method for January through March 2001
Rev 0 Memphis Depot Dunn Field RI

Matrix	Analytical Method	N	FD	AB	EB	TB
WG	SW8260	35	4			
WQ	SW8260	2		1	3	4

WG = Water, ground
WQ= Water, quality assurance
N = Number of samples
FD = Field duplicate
AB = Ambient blank
EB = Equipment blank
TB = Trip blank

Table 5-4
Sub-qualifier Data Flags Used for 2001 Data
Rev 0 Memphis Depot Dunn Field RI

Code	Definition
TN	Tune
BS	Blank Spike/LCS
IS	Internal Standard
MS	Matrix Spike and/or Matrix Spike Duplicate Recovery
MD	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source
SD	Serial Dilution
SS	Spiked Surrogate
LR	Analyte present above linear (or calibration) range
IC	Initial Calibration
CC	Continuing Calibration Verification
PD	Pesticide Degradation
LD	Lab Duplicate
2C	Second Column (Confirmation)
HT	Holding Time
PS	Post Spike
BL	Blank
RE	Re-extraction
DL	Dilution
IB	In Between
FD	Field Duplicate
OT	Other

TABLE 5-5
Frequency of Metal Detects in Blanks
Rev 0 Memphis Depot Dunn Field RI

Parameter	EB Detects	AB Detects	MB Detects	Number of Sample Detects After Validation
Aluminum	5	1	19	96
Antimony	---	---	1	24
Barium	---	1	13	36
Beryllium	---	---	1	73
Calcium	3	1	18	39
Cobalt	---	---	2	27
Copper	1	1	6	89
Iron	3	1	13	28
Lead	---	---	1	96
Magnesium	---	---	2	29
Manganese	2	---	---	29
Potassium	---	---	7	16
Silver	---	---	1	26
Sodium	2	---	12	28
Vanadium	---	---	1	25
Zinc	5	---	15	106
Mercury	---	---	2	20

TABLE 5-6
Surrogate Recovery Control Limits
Rev. 0 Memphis Depot Dunn Field RI

Surrogate Compound	Average Sample Recovery (%)	Number of Results Qualified due to Surrogate Recovery
4-Bromofluorobenzene (VOC – 8260)	100	0
Dibromofluoromethane (VOC – 8260)	102	
Toluene-d8 (VOC – 8260)	99	
Tetrachloro-m-xylene (Pesticides – 8081)	59	198 Pesticides 20 PCBs
Decachlorobiphenyl (Pesticides and PCBs – 8081 & 8082)	65	
2,4-Dichlorophenylacetic acid (Herbicides – 8151)	102	24
4-Chloro-2methylphenol (Explosives – 8330)	84	70
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin C13 (8290)	78	0
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin C13 (8290)	65	
2,3,7,8-Tetrachlorodibenzo-p-dioxin C13 (8290)	75	
2,3,7,8-Tetrachlorodibenzofuran C13 (8290)	65	
Octachlorodibenzo-p-dioxin C13 (8290)	109	
2-Fluorophenol (SVOC – 8270)	83	128
Phenol-d5 (SVOC – 8270)	75	
2,4,6-Tribromophenol (SVOC – 8270)	76	
2-Fluorobiphenyl (SVOC – 8270)	83	
Nitrobenzene-d5 (SVOC – 8270)	80	
Terphenyl-d14 (SVOC – 8270)	95	

TAB

Section 6

6.0 Overview of Fate and Transport by Chemical Group

The behavior of chemicals in the environment is controlled by both properties of individual chemicals and by environmental characteristics, including soil erosion, surface runoff, proximity to surface water bodies, groundwater depth, groundwater flow velocity, soil permeability, adsorption, temperature, and presence of conditions conducive to microbial populations. The fate and transport of an environmental constituent (in this case, a chemical contaminant) are influenced by the physical, chemical, and biological processes that affect the chemical's form and distribution in the environment. The following release and transport mechanisms are evaluated for COPCs at Dunn Field.

- Soil to groundwater pathway;
- Soil-to-air migration;
- Groundwater migration;
- Groundwater–to-air; and
- Surface runoff, sedimentation, and accumulation.

Each of these transport mechanisms was evaluated for the COPCs at each area. Monitoring data were used in place of quantitative modeling for the media at Dunn Field. For example, if a surface-soil-to-groundwater leaching potential is indicated by comparing soil concentrations to a default soil-to-groundwater leachability criterion, subsurface soil data and regional groundwater monitoring data are used to check for the presence of that particular constituent in the deeper soil and groundwater media. This approach accurately represents site-specific evidence of leaching.

This section summarizes the physical and chemical properties that affect the behavior of COPCs in soils, sediments, surface water, and groundwater at Dunn Field. Site-specific interpretation for individual Areas presented in Sections 8.0 through 13.0 will be based on general concepts presented in this section.

6.1 Physical Characteristics at Dunn Field that Affect Fate and Transport

Physical characteristics at Dunn Field that could influence contaminant transport pathways and fate are presented in this section. These characteristics include climate, topography, hydrogeology, and hydrology. Climatic factors that influence transport of chemicals include wind, precipitation, and temperature. Wind disperses chemical vapors and chemicals bound to particulates. Precipitation in the form of rain or snow may transport chemicals down through the soil column or produce runoff that contains soil particulate bound chemicals. Temperature influences volatilization and biodegradation rates. Of these three, precipitation is of primary concern at Dunn Field because of the potential for transport of chemicals to the groundwater aquifer(s) beneath the site. Precipitation may also limit the transport of dust-borne particulate emissions.

Local precipitation data indicate that the Memphis area had an annual precipitation rate of approximately 52 inches (approximately 6 inches was attributable to snow), based on data collected from 1961 to 1990 by the National Climatic Data Center. In addition, according to the 1983 annual rainfall and recharge rates report from the National Oceanic and Atmospheric Administration's (NOAA) West Tennessee Climatic Division of the United States, the net annual precipitation available for groundwater recharge is 9 inches after evapotranspiration effects. This may indicate that lower availability of precipitation for groundwater recharge, combined with the relatively low permeability of the soils, limits the vertical transport of chemicals from soil to groundwater. However, additional information on the loess deposits, where all of the contaminant source material would have been disposed of originally, indicates that permeability of loess may be reasonably high (Domenico and Schwartz, 1990). In addition, based upon a review of subsurface soil and groundwater contaminant data, infiltration of precipitation and leaching of contaminants from the subsurface soil have occurred. Site topography may also be a factor in the transport of contaminants either vertically or horizontally. At Dunn Field, the site is nearly level. Surface elevation ranges from approximately 316 feet National Geodetic Vertical Datum (NGVD) in the southeast quadrant to 276 feet in the low area of the northeastern boundary. The relatively flat terrain would allow precipitation to rest on the surface and infiltrate the soil prior to other effects such as runoff or evaporation. Throughout the period of use, the site has had little impervious ground cover, such as buildings or parking lots, that may hinder infiltration.

Hydrogeological features determine the likelihood that groundwater will transport chemicals to exposure points, such as extraction wells for drinking water or industrial use, or discharge points to surface water bodies. At Dunn Field, groundwater flows from the northeast to the west and northwest, where flow direction in the unconfined fluvial aquifer is controlled by the configuration of the Jackson Formation/Upper Claiborne group clay confining unit. There is no groundwater use within the site or in the immediate vicinity of the site (see Section 2.0). At the present time, based on the data generated for this RI and on information developed by others, there appears to be limited interconnection between the fluvial aquifer and intermediate aquifer. Specifically, the clay confining unit is absent in the area of MW-34, MW-40 and MW-43, permitting the connection or window between the two aquifers.

Local hydrogeological characteristics preclude groundwater discharge to surface water bodies. The general groundwater elevations fall well below local stream base elevations in the vicinity of the Depot; therefore, groundwater does not recharge the local streams.

There are no natural surface water bodies such as streams or creeks within Dunn Field. Cane Creek and Nonconnah Creek are about one mile northwest and south, respectively, from Dunn Field. There are no natural or industrial discharge streams with continuous flow from Dunn Field, although during rain events, intermittent discharge through the drainage ditches does occur. There are concrete-lined surface drainage ditches, as well as buried drain pipes, to gather storm water runoff from the confines of Dunn Field; these ditches converge at several locations along the Dunn Field boundary and discharge offsite. The discharge points are as follows: northeast fence line; northwest corner; and western fence line. Two surface drainage ditches are concrete-lined within the property boundary, thus limiting surface runoff, sedimentation, and percolation of runoff contaminants. Transport of COPCs offsite via surface water runoff and/or groundwater discharge is evaluated in the Area-specific sections (Sections 8.0 through 13.0) to identify potentially complete transport and exposure pathways. Surface water hydrology features indicate a low potential for offsite migration of chemicals in surface water.

6.2 Physical and Chemical Properties of COPCs

Table 6-1 indicates important chemical properties that are used to estimate fate and transport; values for these properties for COPCs are presented in Table 6-2. Many of these properties are correlated, and these relationships can be used to predict trends and patterns of behavior. In general, chemicals that are soluble, volatile, or leachable tend to be mobile. Mobile chemicals are likely to be released and transported from the source (e.g., chlorinated VOCs, or CVOCs) and are not persistent, whereas persistent chemicals tend to remain localized in the source area and are resistant to chemical and biological degradation reactions (e.g., dieldrin, dioxins, and PCBs). Chemicals that are observed to occur frequently in the environmental media at Dunn Field are addressed below by their chemical group (VOCs, metals, etc.). The following sections summarize general trends and patterns for groups of chemicals found at Dunn Field based on properties of chemicals that would be expected to behave similarly. These general concepts will be used to interpret site-specific fate and transport in the various environmental media.

6.2.1 Volatile Organic Compounds

VOCs are characterized by relatively high vapor pressures, Henry's Law constants, and generally high solubility in water. VOCs have a tendency to partition to the vapor phase (air) from either the sorbed (soil) or dissolved (aqueous) phases. These chemicals could be released through volatilization from either VOC-contaminated soil or surface water. The most consistently detected VOC group of chemicals at concentrations above comparison criteria in the site media are CVOCs, such as trichloroethylene (TCE), PCE, and 1,1,2,2-tetrachloroethane (1,1,2,2-TCA).

During landfilling activities at Dunn Field between the mid-1940s and the early 1970s, hazardous and solid wastes from the MI were handled and disposed of at Dunn Field. Chlorinated solvents were historically used for degreasing activities during vehicle maintenance. Disposal or accidental releases of CVOCs to the subsurface media may have occurred during historical waste management activities. Additionally, landfilling of wastes was reported in the Disposal Area, which was extensively investigated through screening and probing techniques; these activities provided the location of the landfill areas. Residual solvents are found in high concentrations in the subsurface soils starting at 8-ft depths. Over time VOCs, including chlorinated solvents, leached to deeper soils, ultimately reaching groundwater. The vertical depth profiling of the soil column indicated the presence of some of the CVOCs at high concentrations.

The correlation of CVOC occurrences between media at Dunn Field is presented in Table 6-3. No CVOCs were detected in sediment and surface water samples from the drainage ditches within Dunn Field. CVOCs have high vapor pressures and Henry's Law constants, indicating potential for volatilization, and are not expected to persist in surface soils. The rate of loss from volatilization depends on the compound, temperature, soil gas permeability, and chemical-specific vapor pressure. However, the subsurface soils in the Disposal Area are significantly contaminated and these compounds are detected in groundwater beneath Dunn Field. The CVOCs 1,1,2,2-TCA, PCE, TCE, and 1,2-dichloroethene (1,2-DCE) have been detected in environmental media (soils and groundwater) at Dunn Field.

Release and transport mechanisms include vertical migration through unsaturated soils toward the water table. The range of K_{oc}, high solubility, and low K_{ow} values indicates that the CVOCs are mobile through soils and tend not to partition significantly from water to soil. These solvents may move through groundwater as dense nonaqueous phase liquids (DNAPLs) because CVOCs are denser than water.

DNAPLs can represent a long-term source of contaminants to groundwater. Groundwater flowing through residually saturated soils dissolves the solvents and transports them downgradient. Assuming there is no biodegradation or volatilization of residual solvents below the water table, DNAPLs may remain a steady-state source until the residual solvent is gradually removed by dissolution. Soils that have been in contact with DNAPLs for a long period of time are likely to continue releasing contaminants slowly after the DNAPL in the larger pore spaces is removed. If such nonequilibrium release of contaminants is occurring, it can prolong remediation efforts.

The maximum detected soil concentrations were compared to the soil saturation limits to evaluate soil saturation concentration conditions at the site. Table 6-4 presents the results of this evaluation. The maximum detected concentrations of 1,1,2,2-tetrachloroethane and trichloroethene (TCE) were below these limits, indicating that these residual solvents will not continue to migrate downwards significantly due to excessive saturation concentrations. However, migration could occur via groundwater recharge due to precipitation.

As CVOCs migrate vertically through soil, some mass are retained in the pore spaces and some may spread across layers of lower permeability. Specific lateral migration may occur if a zone of very low permeability is reached, in which case the nonaqueous phase liquid (NAPL) migrates laterally, depending in part on the contours of the surface of the layer.

Subsurface soil CVOCs were present significantly above leachability-based comparison criteria (Soil Screening Levels [SSLs]), indicating that soils may be continuing potential sources of CVOCs in the groundwater (see Table 6-5). This was based on the following technical information. As a general rule, the potential presence of NAPL is indicated if concentrations in groundwater exceed 1 percent of the chemical's solubility limits. Based on the highest observed concentration of the detected solvents TCE and 1,1,2,2-PCA in groundwater, specifically TCE in MW-70 and 1,1,2,2-PCA in MW-73 (see Table 6-6), free-phase solvents may be present in Dunn Field groundwater.

Groundwater concentrations lower than these screening levels do not necessarily rule out the presence of NAPL, because (1) dilution occurs as the distance from the source increases and (2) the well screen interval might have missed the impacted groundwater interval. The latter was minimized during the Dunn Field groundwater investigation by placement screens near the base of the fluvial aquifer, where dissolved concentrations would likely be highest (resulting from DNAPLs that have sunk to the base of the fluvial aquifer). In addition, diffusion bags were used to collect samples across the well screens during the 2001

RI groundwater sampling event. Concentrations that exceed these screening levels are a general indicator that residual NAPL may be present.

Table 6-6 presents the most recent vertical profiling of the groundwater contaminant concentrations compared to solubility limit levels for four of the persistent VOCs. The high concentrations of 1,1,2,2-tetrachloroethane and trichloroethene (TCE) indicate the potential for the presence of these solvents as DNAPL in the groundwater under Dunn Field. For a more detailed discussion of the parameters indicative of DNAPL presence/absence, see Section 14.

Due to the presence of groundwater at elevations less than regional surface water bodies, the potential for groundwater contaminant discharge to nearby streams is low at Dunn Field. There are no natural surface water bodies within the downgradient areas of the groundwater flow from Dunn Field; therefore, there is no potential for such a discharge scenario. If surface water releases were to occur, the high vapor pressures of the CVOCs detected suggest that these compounds should rapidly volatilize from surface water. TCE volatilization from creeks and streams would result in a half-life of minutes to hours (Howard, 1990). Based on available low bioconcentration factors, CVOCs do not bioconcentrate significantly.

Aerobic and anaerobic biodegradation are important transformation processes for chlorinated aliphatic compounds in natural water systems and soil. Considerable research has been done on the degradation mechanisms and pathways for CVOCs (Wiedemeier et al., 1995). Although several degradation pathways could occur, the following patterns have been identified for degradation of these constituents under anaerobic conditions:

Anaerobic degradation pathway:

PCE---->TCE---->DCE---->vinyl chloride or chloroethane---->carbon dioxide (CO_2)

The anaerobic biodegradation of TCE, which initially forms cis-1,2-DCE, occurs under reducing conditions where sulfide/methane-producing conditions exist. Such conditions occur primarily in the presence of other natural or anthropogenic carbon sources. DCE is an indicator for this degradation pathway, because it is not used as a pure product but is found solely as a degradation product. 1,2-DCE may further degrade anaerobically to vinyl chloride, but the rate is slower and this compound may require stronger reducing conditions than are required for reduction of PCE or TCE. The anaerobic pathway may not be significant in groundwater but may be significant in the soil column. Groundwater samples collected to date do not indicate that reducing conditions are present; however, additional sampling is ongoing. Soil samples do indicate that degradation is occurring in the soil column. The 1,1,2,2-tetrachloroethane forms 1,2-dichloroethane and chloroethane, which degrade further into methane, carbon dioxide, chlorine, and water under anaerobic conditions. A more in-depth discussion of the degradation processes can be found in Section 16.

TCE would generally be expected to persist under aerobic or denitrifying conditions. Denitrifying conditions are indicated when nitrates are present in groundwater but no oxygen is detected. These conditions are evaluated in Section 16. Under ideal conditions, aerobic biodegradation of TCE may occur. Specialized microorganisms have been identified that aerobically degrade some of these solvents in the presence of ammonia, methane, or toluene. Smaller chlorinated compounds, such as DCE, are harder to degrade anaerobically

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but can be degraded more easily aerobically than the more highly chlorinated solvents such as TCE The rate depends only on temperature and the residence time in groundwater can be estimated: half-lives ranging from less than one year (25 degrees Celsius [°C]) to over 5 years at cooler temperatures (Wiedemeier et al., 1995).

6.2.2 Semivolatile Organic Compounds

PAHs are common components of fuel oils and tar mixtures. PAHs have been detected extensively at the railroad operations across the MI. Fuel use, vehicular and historical railroad traffic, asphalt roads, and pavement have contributed to non-point source releases of PAHs at the Depot. PAHs are relatively persistent and represent a broad class of compounds, ranging from low-molecular-weight components, such as naphthalene, to high-molecular-weight compounds such as dibenz(a,h)anthracene (see Table 6-7). Solubility, volatility, biodegradability, and toxicity vary widely across this class of compounds.

Volatility, as indicated by Henry's Law constants, decreases as the molecular weight of PAHs increases. Particulate emissions to ambient air can result from adsorption onto soot particles that can be carried on wind currents and then returned to the surface (dry deposition). High-molecular-weight PAHs are more likely to be transported via particulate emissions, while low-molecular-weight PAHs have a greater tendency to volatilize.

When PAHs are present in tar and oil waste mixtures, their behavior is determined to a large extent by the mobility and behavior of the waste itself. As tar waste weathers, volatilization, degradation, and leaching of the more mobile constituents occur. The overall loss rate decreases exponentially over time and the material left behind becomes richer in more viscous and persistent components. Therefore, low-molecular-weight PAHs can migrate from spills and continuous releases of tars and oils, but as weathering occurs, the rate of release decreases. Higher-molecular-weight PAHs would persist in the vicinity of the original release.

Low-molecular-weight PAHs have higher water solubilities and are more likely to be released into groundwater than higher-weight PAH compounds, which have relatively high K_{oc} values, indicating an increased tendency for adsorption to soil or other organic matter. A primary fate and transport mechanism is migration of adsorbed PAHs with mobile soil and sediment. Erosion of soil and movement of suspended sediments may result in migration of PAHs to surface water. However, the low solubility of adsorbed PAHs indicates that they would not partition significantly to water. Considering the historical operations at the Depot, any mobile constituents would have migrated to subsurface. Since subsurface soils are mostly free of organic contamination (including PAHs), more mobile PAHs may have attenuated over time due to retardation and/or degradation. Most PAHs in aquatic environments are associated with particulate materials. Only about 33 percent of the total PAHs are present in dissolved form.

Photolysis and biodegradation are two common attenuation mechanisms for PAH compounds. Although all PAHs transform in the presence of light via photolysis, their rates are highly variable. Photolysis may reduce concentrations of these chemicals in surface waters or surface soils, but is not relevant for subsurface soils. Biodegradation of PAHs in soils is also extremely variable across the chemical class. Generally, the di- and tricyclic PAHs biodegrade more readily than the higher-molecular-weight PAHs. Factors that affect the rate of biodegradation in soil include the types of microorganisms present, the availability of nutrients, the presence of oxygen, and the chemical concentration. The extent to which chemicals may biodegrade can also be affected by their presence in mixtures. Some PAHs are more degradable than others. If both stable and mobile PAHs are present in a mixture, the less readily degradable materials may be co-metabolized at rates similar to or higher than those of the more readily degradable compounds.

In surface water, PAHs can evaporate, disperse into the water column, become incorporated into bottom sediments, partition into aquatic biota, or undergo chemical oxidation and biodegradation. The most important processes for the degradation of PAHs in aquatic systems are photooxidation, chemical oxidation, and biological transformation by bacteria and animals. PAHs dissolved in the water column degrade rapidly via photooxidation. Generally, PAH degradation in aquatic environments occurs at a slower rate than in the atmosphere. PAHs degrade most rapidly at higher concentrations, at elevated temperatures, at elevated oxygen levels, and at higher levels of solar radiation.

Half-life estimates for PAHs in the literature vary widely because of the numerous variables involved. Conservative half-life estimates for naphthalene, anthracene, and benzo(a)pyrene, for example, show an increase in half-life associated with an increase in molecular weight (Table 6-7). Of these PAHs, the lower-molecular-weight PAHs, such as naphthalene, were not detected in site media, suggesting that the source material may have lost the lighter PAHs over time.

The ultimate fate of PAHs that accumulate in sediments is believed to be governed primarily by biotransformation and biodegradation by benthic organisms. PAHs in aquatic sediments degrade slowly in the absence of penetrating radiation and oxygen and may persist indefinitely in oxygen-poor basins or in anoxic sediments. The burial of contaminated sediments deep beneath deposits of organic matter can effectively remove these contaminants from interaction with surface water and biota.

Animals and microorganisms can metabolize PAHs to products that ultimately reach complete degradation. PAHs in soil may be assimilated by plants, degraded by soil microorganisms, or accumulated to relatively high levels in the soils. High PAH concentrations in soil can lead to increased populations of soil microorganisms that are capable of degrading the compounds. PAHs can be taken into the mammalian body by inhalation, skin contact, or ingestion (although they are poorly absorbed from the gastrointestinal tract). Specific enzymes present in mammals metabolize PAHs, thus making the PAHs water-soluble and available for excretion. Although metabolic pathways detoxify PAHs, some metabolic intermediates may be toxic, mutagenic, or carcinogenic to the host. Fish and most crustaceans possess the enzymes necessary for metabolic activation, but some mollusks and other invertebrates are unable to efficiently metabolize PAHs. The bioconcentration factor (BCF) for PAHs (used for development of Ambient Water Quality Criteria [AWQC]) is 30. Published values of BCFs in fish are shown in Table 6-2.

6.2.3 Pesticides and Dioxins

Dieldrin is the pesticide most present at Dunn Field, with relatively infrequent detection of DDT, DDE, and DDD in soil and sediment. These pesticides are no longer used at the facility.

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In general, these chlorinated pesticides have low Henry's Law constants and are not expected to volatilize significantly. All of the detected organo-chlorine pesticides have lower solubility and higher K_{oc} values, indicating that these pesticides are more likely to sorb to soil and are less mobile in aqueous phases. The most likely migration pathways for pesticides are transport in particulate emissions and transport of sorbed materials in surface runoff.

Dieldrin is extremely nonpolar and, therefore, has a strong affinity for organic matter, such as animal fat, and sorbs tightly to soil particulates. It has low mobility through the soil column and moves at extremely low rates even under saturated soil conditions (greater than 270 years to move through 3 meters, [ATSDR, 1992]). This is consistent with what was observed at the MI and Dunn Field, where most of the dieldrin in soil remains in the uppermost organic root zone comprising the top 2 inches of the soil column (see Appendix A, page A-33 of the Final Main Installation Remedial Investigation Report). Thus surface runoff and air-borne particulate emissions are the potential migration pathways for the chlorinated pesticides. Based on available BCFs, organo-chlorine compounds could bioconcentrate significantly.

6.2.4 Metals

Metals have been detected in all media at the Depot. Many of these metals are naturally occurring, and their reported presence may or may not indicate a contaminant release. Properties related to the fate and transport of selected metals were summarized in Table 6-2. In general, metals are persistent in the environment. Because metals are not volatile, any emissions to ambient air would be in the form of particulate emissions. The detected inorganic chemicals were compared against the default SSLs for the site.

Chemical distributions in both soil and water are more difficult to predict for metals than for organic compounds. A direct relationship between the measured total metal concentration in soil and the extractable aqueous concentration cannot be assumed. The metal may be fixed in the interior of the soil and unavailable for exchange or release to water, or exchangeable metal may be present at the surface of the particles.

Published K_d values generally represent the potential relationship between water and exchangeable metal at the surface of the soil (USEPA, 1996c), which is as follows:

$$C_{total} = C_{fixed} + C_{absorbed}$$

$$K_d = C_{absorbed}/C_{water}$$

where:

C_{total} = total concentration of metal (fixed plus absorbed)

C_{fixed} = fixed concentration of metal

$C_{absorbed}$ = absorbed concentration of metal

C_{water} = concentration of metal in water

This relationship is useful in determining retardation, or the tendency for the metal to sorb to the surface of the soil; however, this relationship does not relate the total metal concentration in the solid to a dissolved concentration.

The potential release and migration of metals in the subsurface environment is a complex process. The migration of metals depends on factors such as the overall groundwater composition, pH, presence of dissolved organic matter that may complex with the metals, the valence state of the metal, and the cation-ion exchange capacity. Metals may be removed from the water phase through mechanisms such as precipitation and irreversible sorption (USEPA, December 1979).

Metals detected well above background and frequently selected as COPCs in all site media at Dunn Field include aluminum, arsenic, cadmium, chromium, and lead (see Table 7-3). Metals that typically have very low solubilities or are highly absorbed in soils include lead and trivalent chromium. For example, lead has a tendency to form low-solubility compounds with the major anions of natural water. Hydroxide, carbonate, sulfide, and sulfate may act as solubility controls to precipitate lead from water. Another important factor is lead's strong tendency to sorb to soils. A significant fraction of lead is insoluble lead, which may be associated with colloidal particles.

Trivalent chromium is much less mobile than the hexavalent form. The oxidized hexavalent form would exist as a negatively charged chromate anion. Hexavalent chromium is reduced to the trivalent form in the presence of ferrous iron, particularly under slightly acidic conditions.

Arsenic is generally more mobile in groundwater than many other metals, but its behavior is complex. It can exist in multiple oxidation states that differ in solubility. The reduced form of arsenic (As^{+3}) is more mobile than the oxidized form (As^{+5}). The effect of solubility controls on arsenic concentrations cannot be evaluated with the information that currently exists (ATSDR, 1992). Adsorption of iron oxides or combination with sulfide may maintain low-level concentrations of arsenic. The adsorption of arsenic onto clays, iron oxides, and organic (humic) material is also an important transport pathway.

The total concentration of metal in soils is generally not a reliable guide to the extent of total metal uptake by plants. It is assumed that for a metal to be taken up by a plant or to exert an effect on plant growth, it must be present in solution. Therefore, factors that influence the speciation and solubility of heavy metals in soils also affect bioconcentration.

The relevance of these physico-chemical properties to each of the site surface media is described in the Area-specific discussions.

6.3 Migration Pathways

6.3.1 Soil-to-Groundwater Pathway

Chemicals detected in soils and sediments may migrate down through the soil column to the underlying shallow groundwater. Some of the factors that influence this process include mobility of the detected chemical, nature of the soils/sediments, rainfall and other climatological factors, and depth to groundwater. As noted above, the mobility of a chemical is dependent on its physico-chemical properties such as solubility, density, viscosity, and volatility.

The default Groundwater Protection (GWP)/SSLs are soil target concentrations that are adequately protective of regional groundwater against potential migration (assumes a dilution attenuation factor [DAF] of 20). These values were obtained from EPA (USEPA, 1996a) and were calculated using conservative assumptions about the nature of the soils, infiltration rate, chemical's physico-chemical properties, aquifer depths, and drinking water standards. No dilution or attenuation from the time of monitoring was assumed. These generic SSLs were used to evaluate potential migration of contaminants within the Depot soils (surface and subsurface) to the regional aquifer. Whenever an exceedance was indicated, two factors were evaluated: similar occurrence in the subsurface soils within the soil column, and the groundwater data from the nearest down-gradient wells. Chemicals exceeding SSLs were also selected as COPCs for direct exposure-based risk evaluations.

Site soils have total organic carbon (TOC) content ranging from 0.9 to 1.4 percent. The TOC content indicates the potential for soil to retain organic contaminants such as organochlorine pesticides.

The Area-specific comparisons of the data with the SSLs are presented in the respective sections. The data indicate the following patterns with regard to the soil-to-groundwater pathway:

- The organic chemicals detected within the site surface soils were present in the subsurface soils at the site;
- Some of the inorganic chemicals detected in surface and subsurface soil are naturally occurring in both soil and groundwater but were not detected continuously in the soil column, indicating that leaching to groundwater is not occurring; and
- The chlorinated solvents detected in the groundwater at Dunn Field and offsite were observed in the soils above, indicating that a continuing source may be present in subsurface soil. The subsurface soil CVOCs, primarily TCE and 1,1,2,2-PCA, are present at high concentrations that could continue to contribute to regional groundwater contamination.

6.3.2 Soil-to-Air Migration

The presence of relatively high CVOC concentrations in subsurface soil within the Disposal Area suggests the potential for migration of these constituents through the soil column. Subsurface CVOCs were observed almost exclusively in the Disposal Area soil. Therefore, the risk assessment section (Section 11) includes modeling of migration from subsurface to indoor air for this area.

6.3.3 Groundwater-to-Air Migration

Volatization of contaminants from groundwater particles in an aquifer to vapor in the overlying capillary zone and through the soil column may result in contaminants migrating from groundwater to air. VOCs are particularly capable of transforming from a particle in water to vapor allowing the contamination to eventually move into the surrounding air. Although there is a relatively long distance between the top of the water table and the ground surface (on average 73 feet) in the Dunn Field area, VOC laden vapors may rise to the surface and become airborne through diffusive processes. More specifically, these VOC vapors can adversely impact indoor air quality Therefore, the basis of the Dunn Field risk assessment (Section 7) considers this potential exposure by conducting modeling, the results of which are presented in each of the area risk assessments (Sections 9, 11, 13, and 15).

6.3.4 Groundwater Migration

A discussion of groundwater migration across Dunn Field is presented in Section 14.

6.3.5 Surface Runoff, Sedimentation, and Accumulation

Chemicals present in the surface media, soils in particular, will likely remain over time, particularly if they are bound to the soil particles through the organic carbon content of the soils. The COPCs detected in the surface soil could migrate via storm water runoff. There are no significant drainage features within Dunn Field. The northwestern section of Dunn Field includes two concrete-lined drainage ditches that convey overflow to the offsite storm water runoff ditches. These ditches are intermittent and are dry during most of the year. Thus, runoff potential is limited at the site. Offsite drainage pathways have been monitored for potential runoff from the site. Low levels of persistent pesticides were the only detected organic COPCs. The Area-specific sections (Sections 8 0 through 13.0) include the details of the fate and transport of the COPCs and potential runoff from the site.

Chemicals detected in surface soils include VOCs, SVOCs, pesticides, and metals. VOCs are the only chemicals of concern in groundwater at Dunn Field.

Tables

TABLE 6-1
Important Physical/Chemical and Environmental Fate Parameters
Rev 0 Memphis Depot Dunn Field RI

K_{oc} the soil organic carbon partition coefficient is a measure of the tendency for organic compounds to be adsorbed to the organic matter of soil and sediments. K_{oc} is expressed as the ratio of the amount of chemical adsorbed per unit weight of organic carbon to the chemical concentration in solution at equilibrium
K_{ow} the octanol-water partition coefficient is an indicator of hydrophobicity (the tendency of a chemical to avoid the aqueous phase) and is correlated with potential adsorption to soils It is also used to estimate the potential for bioconcentration of chemicals into tissues.
K_d the soil/water partition coefficient is a measure of the tendency of a chemical to adsorb to soil or sediment particles For organic compounds this coefficient is calculated as the product of the K_{oc} value and the fraction of organic carbon in the soils In general, chemicals with higher K_d values sorb more strongly to soil/sediment particles and are less mobile than those with lower K_d values
Solubility is an upper limit on a chemical's dissolved concentration in water at a specified temperature. Aqueous concentrations in excess of solubility may indicate sorption onto sediments, the presence of solubilizing chemicals such as solvents, or the presence of a non-aqueous phase liquid. Organic and inorganic chemicals with high solubilities are more mobile in water than those that sorb more strongly to soils.
Henry's Law Constants are a measure of the extent of chemical partitioning between the air and water phases at equilibrium. Because of the abundance of water in the environment, this property is best used to estimate the tendency to volatilize as the two are directly proportional Volatile compounds are defined as those with a Henry's Law constant of 1 x 10^{-5} atm-m3/mole or greater and with a molecular weight of less than 200 g/mole (EPA, 1991).
Vapor Pressure is the pressure exerted by a chemical vapor in equilibrium with its solid or liquid form at any given temperature It is used to calculate the rate of volatilization of a pure substance from a surface or in estimating a Henry's Law constant for chemicals with low water solubility. The higher the vapor pressure the more likely a chemical is to exist in a gaseous state.
Diffusivity describes the movement of a molecule in a liquid or gas medium as a result of differences in concentration. It is used to calculate the dispersive component of chemical transport. The higher the diffusivity, the more likely a chemical is to move in response to concentration gradients
Bioconcentration Factor (BCF) provides a measure of the extent of chemical partitioning at equilibrium between a biological medium such as fish tissue or plant tissue and an external medium such as water The higher the BCF, the greater the accumulation in living tissue is likely to be.
Media-specific Half-life provides a relative measure of the persistence of a chemical in a given medium although actual values can vary greatly depending onsite-specific conditions. The greater the half-life, the more persistent a chemical is likely to be.

EPA, 1991 Risk Assessment Guidance for Superfund Volume I – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals) Interim, December 1991.

TABLE 6-2
Physical and Chemical Properties of Selected COPCs
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Chemical Name	CAS Registry Number	Molecular Weight	Henry's Law Constant (dimensionless)		HENRY'S_LAW CONSTANT (atm*m³/mol)		Koc (cm³/gm)		Log Kow		Kd (L/kg) (pH = 7)		Water Solubility (mg\L)		Air Diffusivity (cm²/sec)		Water Diffusivity (cm²/sec)		BCF L/kg	BCF Species		Vapor Pressure mm Hg at 20C	
Metals																							
Aluminum	7429-90-5	27																					
Antimony	7440-36-0	122									4.50E+01	q		c	6.20E-01	jj			<1	bluegill, whole body	e	1.00E+00	o
Arsenic	7440-38-2	75									2.90E+01	q			6.50E-01	jj			4.00E+00	bluegill (wb)	e	1.00E+00	o
Barium	7440-39-3	137									4.20E+01	q			6.10E-01	jj						1.00E+01	o
Beryllium	7440-41-7	9									1.70E+03	q			1.14E+00	jj			1.90E+01	bluegill (wb)	e	1.00E+00	o
Cadmium	7440-43-9	112									1.10E+02	q			6.20E-01	jj			1.51E+02	brook trout (wb)	e		
Chromium (total)	16065-83-1	52									2.50E+06	q		d	6.90E-01	jj						1.00E+00	o
Chromium, hexavalent	18540-29-9	52									1.80E+01	q			6.90E-01	jj			2.80E+00	rainbow trout (wb)	e	1.00E+00	o
Cobalt	7440-48-4	59									4.46E+01	dd		v	6.80E-01	jj			40 - 1000	freshwater fish	c	3.00E+01	o
Copper	7440-50-8	64									1.40E+00	g		b	6.70E-01	jj			1.00E+00	bluegill (wb)	e	1.00E+00	o
Lead	7439-92-1	207									4.50E+00	g							4.50E+01	bluegill sunfish		1.00E+00	o
Manganese	7439-96-5	55									5.01E+01			c	6.90E-01	jj							
Mercury	7439-97-6	201	4.67E-01	q	1.10E-02	p					8.20E+01	q	5.60E-02	d	3.07E-02	q	6.30E-06	q	4.99E+03	fathead minnow	e	1.00E+02	o
Nickel	7440-02-0	59									8.20E+01	q			6.80E-01	jj			4.70E+01	fathead minnow (wb)	e	1.00E+00	o
Selenium	7782-49-2	79									4.30E+00	q			6.50E-01	jj			2.00E+01	bluegill (wb)	e		
Silver	7440-22-4	108									1.30E+01	q			6.20E-01	jj			3.08E+03	fish		1.00E+00	o
Thallium	7440-28-0	204									7.40E+01	q			5.90E-01	jj			3.40E+01	bluegill	c	1.00E+00	o
Vanadium	7440-62-2	51									1.00E+03	q											
Zinc	7440-66-6	65									7.50E+01	q			6.70E-01	jj			5.10E+01	Atlantic salmon (wb)	e	1.00E+00	o
Pesticides/PCBs																							
alpha-Chlordane	57-74-9	410	1.99E-03	jj	4.86E-05	f	1.20E+05	q	2.78E+00	o			5.60E-02	q	1.18E-02	q	4.37E-06	q	3.80E+04	fathead minnow	t	1.00E-05	o
Aroclor-1260	1335-36-3	328	4.45E-02	l	1.07E-03	l	3.09E+05	q	6.04E+00	l			7.00E-01	q	4.91E-02	y	5.60E-06	jj	1.00E+05		l	7.70E-05	l
beta-BHC	319-85-7	291	3.05E-05	q	7.43E-07	q	1.26E+03	q	3.81E+00	q			2.40E-01	q	1.42E-02	q	7.34E-06	q	1.80E+02	fathead minnow (Lindane)	y	2.80E-07	z
DDE	72-55-9	319	8.61E-04	q			4.47E+06	q	5.69E+00	n			1.20E-01	q	1.44E-02	q	5.87E-06	q	5.10E+04	SPHEM		6.50E-06	o
DDT	50-29-3	354	3.32E-04	q			2.63E+06	q	6.19E+00	n			2.50E-02	q	1.37E-02	q	4.95E-06	q	5.40E+04	SPHEM		1.50E-07	o
Dieldrin	60-57-1	381	6.19E-04	q	1.51E-05	q	2.14E+04	q	5.37E+00	q			1.95E-01	q	1.25E-02	q	4.74E-06	q	5.80E+03	kk	y	1.78E-07	z
gamma-Chlordane	58-69-9	291	1.99E-03	jj	4.86E-05	f	1.20E+05	q	2.78E+00	o			5.60E-02	q	1.18E-02	q	4.37E-06	q	1.82E+02	fathead minnow (wb)	gg	1.00E-05	o
Semi-volatile Organics																							
2,4-Dimethylphenol	105-67-9	122	8.20E-05	q	2.00E-06	q	2.09E+02	q	2.36E+00	q			7.87E+03	q	5.84E-02	q	8.69E-06	q	1.50E+02	bluegill	y	2.60E-02	z
4-Methylphenol (p-Cresol)	106-44-5	108	3.69E-07	jj	7.90E-07	q	9.25E+01	y	1.93E+00	bb			2.40E+04	hh	7.50E-02	y	5.00E-05	f	1.80E+01	kk	e	4.00E-02	hh
Acenaphthene	83-32-9	154	6.36E-03	q	1.84E-04	p	7.08E+03	q	3.92E+00	o			4.24E+00	q	4.21E-02	q	7.69E-06	q	3.87E+02	bluegill (wb)	e	1.00E+01	o
Benzo(a)anthracene	56-55-3	228	1.37E-04	q	3.61E-06	p	3.98E+05	q	5.61E+00	n			9.40E-03	q	5.10E-02	q	9.00E-06	q	3.00E+01	kk	e	5.00E-09	o
Benzo(a)pyrene	50-32-8	252	4.63E-05	q	8.36E-07	p	1.02E+06	q	5.98E+00	n			1.62E-03	q	4.30E-02	q	9.00E-06	q	1.20E+01	bluegill (wb)	i	5.00E-09	o
Benzo(b)fluoranthene	205-99-2	252	4.55E-03	q	6.17E-06	p	1.23E+06	q	6.57E+00	o			1.50E-03	q	2.26E-02	q	5.56E-06	q				5.00E-07	o
Benzo(k)fluoranthene	207-08-9	252	3.40E-05	q	3.87E-05	c	1.23E+06	q	6.84E+00	o			8.00E-04	q	2.26E-02	q	5.56E-06	q				9.59E-11	o
Carbazole	86-74-8	167	6.26E-07	q			3.39E+03	q	3.23E+00	kk			7.48E+00	q	3.90E-02	q	7.03E-06	q					
Chrysene	218-01-9	228	3.88E-03	q	1.21E-06	p	3.98E+05	q	5.61E+00	n			1.60E-03	p	2.48E-02	q	6.21E-06	q				6.30E-09	o
Dibenz(a,h)anthracene	53-70-3	278	6.03E-07	q	1.12E-08	p	3.80E+06	q	5.97E+00	n			2.49E-03	q	2.02E-02	q	5.18E-06	q	1.35E+03	fathead minnow (wb)	gg	1.00E-10	o
Fluoranthene	206-44-0	202	6.60E-04	q	9.33E-06	p	1.07E+05	q	5.33E+00	n			2.06E-01	q	3.02E-02	q	6.35E-06	q	2.90E+03	kk	e	5.00E-06	o
Fluorene	86-73-7	166	2.61E-03	q	7.29E-05	p	1.38E+04	q	4.18E+00	o			1.98E+00	q	3.63E-02	q	7.88E-06	q	1.80E+03	bluegill (wb)	i	1.00E+01	o
Indeno(1,2,3-cd)pyrene	193-39-5	276	6.56E-05	q	4.85E-09	p	3.47E+06	q	6.58E+00	n			2.20E-05	q	1.90E-02	q	5.66E-06	q	3.00E+01	kk	e	1.00E-10	o
Methylnaphthalene, 2-	91-57-6	142	2.08E-02	v	4.99E-04	v	2.46E+03	v	3.86E+00	o			2.60E+01	q	6.80E-02	jj	7.20E-06	jj	3.10E+02	bluegill (wb)	oo	1.00E+01	o
Naphthalene	91-20-3	128	1.98E-02	q	4.82E-04	p	2.00E+03	q	3.30E+00	n			3.10E+01	q	5.90E-02	q	7.50E-06	q	3.10E+02	bluegill (wb)	i	8.20E-02	o
Pentachlorophenol	87-86-5	266	1.00E-06	q	1.42E-05	p	5.92E+02	q	5.01E+00	n			1.95E+03	q	5.60E-02	q	6.10E-06	q	1.30E+01	sheephead minnow	mm	1.10E-04	o
Phenanthrene	85-01-8	178	9.41E-03	c	2.26E-04	c	1.40E+04	c	4.46E+00	n			8.16E-01	o	6.20E-02	jj	7.47E-06	jj	2.63E+03	fathead minnow (wb)	gg	1.00E+00	o
Pyrene	129-00-0	202	4.54E-04	q	8.27E-06	p	1.05E+05	q	5.18E+00	o			1.35E-01	q	2.72E-02	q	7.24E-06	q	6.90E+01	rainbow trout (liver)	i	2.50E+00	o
Volatile Organics																							
1,2-Dichloroethene (trans)	156-60-5	97	3.85E-01	q	9.38E-03	q	5.25E+01	q	2.07E+00	q			6.30E+03	q	7.07E-02	q	1.19E-05	q	2.20E+01	kk	t	3.24E+02	k
Benzene	71-43-2	78	2.28E-01	q	5.00E-03	p	5.89E+01	q	2.13E+00	n			1.75E+03	q	8.80E-02	q	9.80E-06	q	1.32E+01	kk	e	9.50E+01	o
Carbon Tetrachloride	56-23-5	154	1.25E+00	q	3.04E-02	q	1.74E+02	q	2.73E+00	q			7.93E+02	q	7.80E-02	q	8.80E-06	q	3.02E+01	bluegill	t	1.10E+02	r
Chlorobenzene	108-90-7	113	1.52E-01	q	3.70E-03	q	2.19E+02	q	2.86E+00	q			4.72E+02	q	7.30E-02	q	8.70E-06	q	4.47E+02	fathead minnow	s	1.17E+01	j
Chloroethane	75-00-3	65	3.60E-01	jj	8.80E-03	u	8.80E+01	u	1.43E+00	x			5.74E+03	hh	1.15E-01	y	1.19E-05	f				7.60E+02	h
Chloromethane	74-87-3	50	3.67E-01	o	8.82E-03	o	6.02E+00	q	9.10E-01	n			6.36E+03	o	1.26E-01	p	6.50E-06	mm				3.80E+03	o
Dibromochloromethane	124-48-1	208	3.21E-02	q	7.83E-04	q	6.31E+01	q	2.17E+00	q			2.60E+03	q	1.96E-02	q	1.05E-05	q	2.95E+01	jj	t	7.60E+01	ff
Methylene chloride	75-09-2	85	8.98E-02	q	2.00E-03	p	1.17E+01	q	1.25E+00	n			1.30E+04	q	1.01E-01	q	1.17E-05	q	5.00E+00	kk	t	4.29E+02	o
Tetrachloroethane, 1,1,2,2-	79-34-5	168	1.41E-02	q			9.33E+01	q	2.39E+00	n			2.97E+03	q	7.10E-02	q	7.90E-06	q	7.90E+00	bluegill	t	4.00E+00	o
Tetrachloroethene	127-18-4	166	7.54E-01	q	1.70E-02	p	1.55E+02	q	2.53E+00	n			2.00E+02	q	7.20E-02	q	8.20E-06	q	4.90E+01	bluegill	w	1.90E+01	o
Total petroleum hydrocarbons	C8 - C10 aromatics	1.20E+02	4.80E-01	f	1.20E-02	f	1.60E+03	f					6.50E+01	f	2.68E-04	f						6.30E-03	f
Trichloroethene	79-01-6	131	4.22E-01	q	1.10E-02	p	1.66E+02	q	2.53E+00	n			1.10E+03	q	7.90E-02	q	9.10E-06	q	1.70E+01	bluegill	w	7.70E+01	o
Xylene (total)	1330-20-7	106	3.01E-01	q	6.00E-03	aa	3.63E+02	q	3.16E+00	w			1.78E+02	q	8.70E-02	q	1.00E-05	q	7.00E+01	avg est	w	1.00E+01	o
Dioxins																							
2,3,7,8-TCDD	1746-01-6	322	3.24E-03	jj	7.90E-05	ee	4.57E+06	i	6.91E+00	m			7.90E-06	a	5.30E-02	y	6.82E-06	f	5.80E+03	fathead minnow	ii	1.10E-09	oo

TABLE 6-2
Physical and Chemical Properties of Selected COPCs
Rev 1 Memphis Depot Dunn Field RI

Chemical Name	CAS Registry Number	Molecular Weight	Henry's Law Constant (dimensionless)		HENRY'S_LAW CONSTANT (atm*m³/mol)		Koc (cm³/gm)		Log Kow		Kd (L/kg) (pH = 7)		Water Solubility (mg\L)		Air Diffusivity (cm²/sec)		Water Diffusivity (cm²/sec)		BCF L/kg	BCF Species		Vapor Pressure mm Hg at 20C	

Notes	
a	Adams, W J , Blaine, K M 1985 Geometric mean water solubility at 25oC from values reported in A Water Solubility of 2,3,7,8-TCDD Monsanto Company, St. Louis, Missouri, Dioxin 85 - 5th International Symposium on Chlorinated Dioxins and Related Compounds
b	ATSDR 1990 Toxicological profile for copper U S Dept. of Health & Human Services, Public Health Service, ATSDR, Atlanta, GA
c	ATSDR 1992 Toxicological profiles for benzo(g,h,i)perylene, benzo(k)fluoranthene, cyanide, manganese, phenanthrene U S Dept of Health & Human Services, Public Health Service ATSDR, Atlanta, GA
d	ATSDR 1993 Toxicological profiles for chromium, mercury U S Dept. of Health & Human Services, Public Health Service, ATSDR, Atlanta, GA
e	Ambient Water Quality Criteria Documents for [chemical specific], EPA (Note estimated steady-state BCFs from AWQC are based on 7 6 percent lipids)
f	Center for Human and Environmental Toxicology Technical Report Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F A C , April 1998
g	Dragun, J 1988 The Fate of Hazardous Materials in Soil HMC, May/June (observed ranges in agricultural soils/clays at pH 4 5 - 9 0)
h	Electronic Handbook of Risk Assessment Values database 1998 Although vapor pressure in a closed system may be greater than 760 mmHg, under environmental conditions, the vapor pressure will be the same as ambient barometric pressure
i	Eisler, R 1987 Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates A Synoptic Review
j	EPA 1984 Health Effects Assessment for Chlorobenzene Environmental Criteria and Assessment Office, Cincinnati, Ohio September 1984 EPA 540/1-86-040 PB86-134517
k	EPA 1984 Health Effects Assessment for cis-1,2-Dichloroethylene Environmental Criteria and Assessment Office, Cincinnati, Ohio September 1984 NTIS PB86-134269
l	EPA 1986 Superfund Public Health Evaluation Manual EPA 540 1-86 060 EPA, Washington, DC
m	EPA 1987 Geometric mean log Kow 4 values reported in Review and Development of Methodologies for Estimating Exposure to Dioxin Environmental Protection Agency The Exposure Assessment Group Office of Health and Environmental January, 1987
n	EPA 1992a Dermal Exposure Assessment: Principles and Applications, Interim Report. EPA/600/8-91/011B, January 1992, EPA, Washington, DC
o	EPA 1992b Handbook of RCRA Groundwater Monitoring Constituents Chemical and Physical Properties (40 CFR Part 264, Appendix IX) September 1992, EPA, Washington, DC
p	EPA 1994 Technical Background Document for Soil Screening Guidance Draft 1994 Office of Solid Waste and Emergency Response, EPA, Washington, DC
q	EPA 1996 Technical Background Document for Soil Screening Guidance EPA/540/R-95/128 May 1996 Office of Solid Waste and Emergency Response, EPA, Washington, DC
r	Hine, J , Mookerjee, P K 1975 The Intrinsic Hydrophilic Character of Organic Compounds Correlations in Terms of Structural Contributions J Org Chem 40 292-8
s	Howard, P H , ed 1989 Handbook of Environmental Fate and Exposure Data for Organic Chemicals Vol 1 Large Production and Priority Lewis Publishers, Inc , Chelsa, MI
t	Howard, P H , ed 1990 Handbook of Environmental Fate and Exposure Data for Organic Chemicals Vol 2 Solvents Lewis Publishers, Inc , Chelsa, MI
u	Hazardous Substance Data Bank cited in Center for Human and Environmental Toxicology Technical Report Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F A C , April 1998
v	HSDB 1994 *Hazardous Substance Data Bank* Online search for specified chemicals
w	The Installation Restoration Program (IRP) Toxicology Guide, Volume I, Dept of the Air Force, October, 1985, Arthur D Little, Inc Cambridge, MA
x	Jow, P and Hansch, C Pomona College Unpublished Results
y	Lyman, W J , Reehl, W F , and Rosenblatt, D H 1982 Chemical Property Estimation Methods McGraw-Hill, Inc , New York
z	Mabey, W R , Smith, J H , Podoll, R T , Johnson, H L, Mill, T , Chou, T W , Gates, J , Patridge, I W , Jaber, H , and Vandenberg, D 1982 Aquatic Fate Process Data for Organic Priority Pollutants Prepared by SRI International Prepared for Monitoring and Data Support Division, Office of Water Regulations and Standards Washington, D C EPA Nos 68-01-3867 and 68-03-2981
aa	Mackay, D and Shiu, W Y 1981 A Critical Review of Henry's Law Constants for Chemicals of Environmental Interest. J Phys Chem Ref Data 10 1175-1199
bb	Pomona College of Medicinal Chemistry Project. Hardcopy of 1983 version Data extracted from the Log P Parameter Data base Geometric means were calculated for those chemicals with ranges of values listed
cc	Podoll, R T , Jaber, H M , Mill, T 1986 Tetra-chlorodibenzodioxin Rates of Volatilization and Photolysis in the Environment Environ Sci Technol 20 490-492 (Value is geometric mean of two values)
dd	Superfund Chemical Database Matrix 1993
ee	Superfund Chemical Database Matrix cited in Center for Human and Environmental Toxicology Technical Report Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F A C , April 1998
ff	Suntio, L R , Shiu W Y , and Mackay, D 1988 A review of the nature properties of chemicals present in pulp mill effluents Chemosphere 17 1249-1290
gg	Veith, G D , D L DeFoe, and B V Bergstedt 1979 Measuring and estimating the bioconcentration factor of chemicals in fish J Fish Res Board Can 36 1040-1048
hh	Verschueren, K 1983 Handbook of Environmental Data for Organic Chemicals, Second Edition Van Nostrand Reinhold Co , New York
ii	Walters, R W , Ostazeski, S A ,Guiseppi-Elie, A 1989 Sorption of 2,3,7,8-Tetrachlorodibenzo-p-dioxin from Water by Surface Soils Sci Technol 23 480-484
jj	calculated
kk	estimated
ll	ATSDR 1997 Toxicological profile for chlorinated dibenzo-*p*-dioxins U S Dept. of Health & Human Services, Public Health Service, ATSDR, Atlanta, GA
mm	EPA 1995 Hazardous Waste Identification Rule (HWIR)
nn	The Installation Restoration Program (IRP) Toxicology Guide, Volume II, Dept. of the Air Force, May 1987, Arthur D Little, Inc Cambridge, MA
oo	adapted from BCF of Naphthalene

(atm*m3/mol) = atmospheric pressure times cubic meters per molar
(cm3/gm) = centimeters cubed per gram
Koc = octanol carbon coefficient
Kow = octanol water coefficient
Kd = soil/water partition coefficient
(L/kg) = liter per kilogram
(mg\L) = milligram per liter
(cm2/sec) = centimeters squared per second
mm Hg at 20C = millimeters of mercury at 20 degrees Celcius

TABLE 6-3
Correlation of CVOC Occurrences between Media at Dunn Field
Rev 2 Memphis Depot Dunn Field RI

CVOC	Surface Soil	Subsurface Soil	Groundwater
1,1,2,2-Tetrachloroethane	X	X	X
Tetrachloroethene (PCE)		X	X
Trichloroethene (TCE)	X	X	X
1,2-dichloroethene (DCE)		X	X
Carbon Tetrachloride		X	X
Chloroform		X	X
Methylene Chloride		X	X
Vinyl Chloride	X	X	X

TABLE 6-4

Comparison of Subsurface Soil Maximum Detection Values with Soil Saturation Concentrations (Csat)

Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	C_{sat}	Maximum Exceeds C_{sat}?
Volatile Organic Chemicals										
21	SB	MG/KG	1,1,2,2-TETRACHLOROETHANE	20	1	1.10E-02	1.10E-02	1.10E-02	2.00E+03	No
21	SB	MG/KG	ETHYLBENZENE	20	1	1.20E+00	1.20E+00	1.20E+00	4.00E+02	No
21	SB	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	20	2	4.00E-03	1.40E-02	9.00E-03	2.50E+04	No
21	SB	MG/KG	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTAN	20	4	2.00E-03	3.00E-03	2.50E-03	3.60E+03	No
21	SB	MG/KG	METHYLENE CHLORIDE	20	1	6.80E-02	6.80E-02	6.80E-02	2.40E+03	No
21	SB	MG/KG	TETRACHLOROETHYLENE(PCE)	20	7	8.00E-04	1.10E-02	5.26E-03	2.30E+02	No
21	SB	MG/KG	TOLUENE	20	1	1.20E-01	1.20E-01	1.20E-01	6.50E+02	No
21	SB	MG/KG	TOTAL 1,2-DICHLOROETHENE	20	1	2.00E-02	2.00E-02	2.00E-02	1.20E+03	No
21	SB	MG/KG	TRICHLOROETHYLENE (TCE)	20	5	4.00E-04	1.10E-01	4.12E-02	1.30E+03	No
21	SB	MG/KG	XYLENES, TOTAL	20	1	1.30E+00	1.30E+00	1.30E+00	1.40E+02	No
21	SS	MG/KG	1,1,2,2-TETRACHLOROETHANE	9	2	1.00E-03	5.00E-03	3.00E-03	2.00E+03	No
21	SS	MG/KG	BENZENE	9	2	4.00E-03	4.00E-03	4.00E-03	8.70E+02	No
21	SS	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	9	8	5.00E-03	2.10E-02	1.24E-02	2.50E+04	No
21	SS	MG/KG	TETRACHLOROETHYLENE(PCE)	9	3	2.00E-03	6.00E-03	3.33E-03	2.30E+02	No
21	SS	MG/KG	TOTAL 1,2-DICHLOROETHENE	9	1	2.20E-01	2.20E-01	2.20E-01	1.20E+03	No
21	SS	MG/KG	TRICHLOROETHYLENE (TCE)	9	2	4.00E-03	7.00E-01	3.52E-01	1.30E+03	No
21	SS	MG/KG	VINYL CHLORIDE	9	1	8.00E-03	8.00E-03	8.00E-03	1.15E+03	No
22	SB	MG/KG	1,1,2,2-TETRACHLOROETHANE	155	56	3.00E-03	1.60E+02	6.18E+00	2.00E+03	No
22	SB	MG/KG	1,1,2-TRICHLOROETHANE	155	25	3.00E-04	2.20E+00	1.79E-01	1.80E+03	No
22	SB	MG/KG	1,1-DICHLOROETHENE	155	8	4.00E-04	6.00E-02	1.36E-02	1.50E+03	No
22	SB	MG/KG	1,2-DICHLOROETHANE	155	5	1.00E-03	4.60E-02	1.58E-02	1.80E+03	No
22	SB	MG/KG	1,2-DICHLOROPROPANE	155	3	3.00E-04	5.00E-03	1.90E-03	1.10E+03	No
22	SB	MG/KG	2-HEXANONE	155	1	3.50E-02	3.50E-02	3.50E-02	4.20E+03	No
22	SB	MG/KG	ACETONE	154	4	6.51E-02	9.33E-01	3.59E-01	1.00E+05	No
22	SB	MG/KG	BENZENE	155	4	3.00E-04	3.00E-03	1.33E-03	8.70E+02	No
22	SB	MG/KG	BROMODICHLOROMETHANE	155	4	1.00E-03	1.10E-02	5.25E-03	3.00E+03	No
22	SB	MG/KG	CARBON DISULFIDE	155	7	1.00E-03	4.00E-03	2.57E-03	7.21E+02	No
22	SB	MG/KG	CARBON TETRACHLORIDE	155	16	5.00E-04	6.80E+00	5.16E-01	1.10E+03	No
22	SB	MG/KG	CHLOROBENZENE	155	5	4.00E-04	7.00E-03	3.08E-03	6.80E+02	No
22	SB	MG/KG	CHLOROETHANE	155	1	3.00E-03	3.00E-03	3.00E-03	1.50E+03	No
22	SB	MG/KG	CHLOROFORM	154	37	8.00E-04	1.40E+01	9.42E-01	2.90E+03	No
22	SB	MG/KG	cis-1,2-DICHLOROETHYLENE	49	40	7.00E-04	1.32E-01	1.26E-02	1.20E+03	No
22	SB	MG/KG	ETHYLBENZENE	155	2	5.00E-04	4.00E-03	2.25E-03	4.00E+02	No
22	SB	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	155	20	2.00E-03	1.30E-01	1.10E-02	2.50E+04	No
22	SB	MG/KG	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTAN	155	3	1.00E-03	4.00E-03	2.33E-03	3.60E+03	No
22	SB	MG/KG	METHYLENE CHLORIDE	155	20	5.00E-04	3.90E-02	7.07E-03	2.40E+03	No
22	SB	MG/KG	STYRENE	155	10	2.00E-04	7.00E-04	3.80E-04	1.50E+03	No

Functional Unit Numbers 21 = Northeast Open Area, 22 = Disposal Area, 23 = Groundwater; 24 = Stockpile Area, 25 = Offsite

SSL= Soil Screening Level

SS = Surface soil sample

SB = Subsurface soil sample

MG/KG = milligram per kilogram

TABLE 6-4

Comparison of Subsurface Soil Maximum Detection Values with Soil Saturation Concentrations (Csat)

Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	C_{sat}	Maximum Exceeds C_{sat}?
Volatile Organic Chemicals										
22	SB	MG/KG	TETRACHLOROETHYLENE(PCE)	155	56	4.00E-04	4.40E+00	1.63E-01	2.30E+02	No
22	SB	MG/KG	TOLUENE	155	9	4.00E-04	8.00E-03	2.91E-03	6.50E+02	No
22	SB	MG/KG	TOTAL 1,2-DICHLOROETHENE	105	42	6.00E-04	1.90E+02	7.93E+00	1.20E+03	No
22	SB	MG/KG	trans-1,2-DICHLOROETHENE	49	22	6.90E-04	4.44E-02	5.41E-03	3.10E+03	No
22	SB	MG/KG	TRICHLOROETHYLENE (TCE)	155	92	5.00E-04	4.60E+02	7.89E+00	1.30E+03	No
22	SB	MG/KG	VINYL CHLORIDE	155	15	2.00E-03	7.00E+00	6.40E-01	1.15E+03	No
22	SB	MG/KG	XYLENES, TOTAL	106	4	6.00E-04	2.00E-02	6.90E-03	1.40E+02	No
22	SS	MG/KG	1,1,2,2-TETRACHLOROETHANE	45	2	7.00E-03	8.30E-02	4.50E-02	2.00E+03	No
22	SS	MG/KG	1,1,2-TRICHLOROETHANE	45	1	2.00E-03	2.00E-03	2.00E-03	1.80E+03	No
22	SS	MG/KG	1,1-DICHLOROETHENE	45	1	2.00E-03	2.00E-03	2.00E-03	1.50E+03	No
22	SS	MG/KG	1,2-DICHLOROPROPANE	45	1	2.00E-03	2.00E-03	2.00E-03	1.10E+03	No
22	SS	MG/KG	ACETONE	45	2	2.00E-01	4.40E-01	3.20E-01	1.00E+05	No
22	SS	MG/KG	BENZENE	45	4	2.00E-03	2.80E-02	8.75E-03	8.70E+02	No
22	SS	MG/KG	CARBON DISULFIDE	45	1	1.50E-02	1.50E-02	1.50E-02	7.21E+02	No
22	SS	MG/KG	CARBON TETRACHLORIDE	45	2	1.00E-03	3.90E-02	2.00E-02	1.10E+03	No
22	SS	MG/KG	CHLOROFORM	45	7	1.00E-03	8.90E-02	1.60E-02	2.90E+03	No
22	SS	MG/KG	ETHYLBENZENE	45	1	6.00E-03	6.00E-03	6.00E-03	4.00E+02	No
22	SS	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	45	27	2.00E-03	3.90E-02	1.45E-02	2.50E+04	No
22	SS	MG/KG	METHYLENE CHLORIDE	45	1	7.00E-04	7.00E-04	7.00E-04	2.40E+03	No
22	SS	MG/KG	STYRENE	45	4	2.00E-04	8.00E-04	4.75E-04	1.50E+03	No
22	SS	MG/KG	TETRACHLOROETHYLENE(PCE)	45	9	3.00E-04	4.90E-02	1.31E-02	2.30E+02	No
22	SS	MG/KG	TOLUENE	45	4	8.00E-04	2.60E-02	7.95E-03	6.50E+02	No
22	SS	MG/KG	TOTAL 1,2-DICHLOROETHENE	45	7	9.00E-04	8.70E-01	1.63E-01	1.20E+03	No
22	SS	MG/KG	TRICHLOROETHYLENE (TCE)	45	11	9.00E-04	8.50E-01	1.58E-01	1.30E+03	No
22	SS	MG/KG	VINYL CHLORIDE	45	1	1.10E-01	1.10E-01	1.10E-01	1.15E+03	No
22	SS	MG/KG	XYLENES, TOTAL	45	1	1.10E-02	1.10E-02	1.10E-02	1.40E+02	No
24	SB	MG/KG	METHYLENE CHLORIDE	15	2	2.00E-03	3.00E-03	2.50E-03	2.40E+03	No
24	SB	MG/KG	TOLUENE	15	1	3.00E-03	3.00E-03	3.00E-03	6.50E+02	No
24	SB	MG/KG	XYLENES, TOTAL	15	3	2.00E-03	1.40E-02	6.67E-03	1.40E+02	No
24	SS	MG/KG	ACETONE	30	19	2.30E-02	2.80E-01	1.58E-01	1.00E+05	No
24	SS	MG/KG	BENZENE	30	5	1.00E-03	5.00E-03	2.80E-03	8.70E+02	No
24	SS	MG/KG	CARBON DISULFIDE	30	1	3.00E-03	3.00E-03	3.00E-03	7.21E+02	No
24	SS	MG/KG	ETHYLBENZENE	30	4	9.00E-04	5.00E-03	2.48E-03	4.00E+02	No
24	SS	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	30	10	7.00E-03	4.30E-02	1.64E-02	2.50E+04	No
24	SS	MG/KG	METHYLENE CHLORIDE	30	2	9.00E-04	1.00E-03	9.50E-04	2.40E+03	No
24	SS	MG/KG	TOLUENE	30	2	9.00E-04	1.20E-02	6.45E-03	6.50E+02	No
24	SS	MG/KG	XYLENES, TOTAL	30	5	3.00E-03	1.50E-02	8.40E-03	1.40E+02	No

a - cis-1,2-Dichloroethene value (1,200 mg/kg) was used as total 1,2-Dichloroethene value.

Calculated values were used for VINYL CHLORIDE and CARBON DISULFIDE

Csat - Florida state guidance, Table 8 - Technical Report, Csat Chemicals of Concern for Chapter 62-777, F A C

Functional Unit Numbers 21 = Northeast Open Area, 22 = Disposal Area; 23 = Groundwater; 24 = Stockpile Area, 25 = Offsite
SSL= Soil Screening Level
SS = Surface soil sample
SB = Subsurface soil sample
MG/KG = milligram per kilogram

TABLE 6-5
Chemicals Detected Above EPA Soil Screening Level Default Values
Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	Background Concentration	EPA SSL	Number Exceeding Background	Number Exceeding EPA SSL
Dioxins												
22	SS	MG/KG	OCTACHLORODIBENZO-p-DIOXIN	1	1	1 30E-04	1 30E-04	1 30E-04	9 72E-03	5 00E-06	0	1
General Chemistry												
22	SB	MG/KG	TOTAL ORGANIC CARBON	21	12	5 00E+02	3 06E+04	4 41E+03			NA	NA
23	SB	MG/KG	ALKALINITY, TOTAL (AS CaCO3)	2	2	2 34E+01	4 46E+01	3 40E+01			NA	NA
23	SB	PH UNITS	pH	2	2	7 50E+00	7 80E+00	7 65E+00			NA	NA
23	SB	MG/KG	TOTAL ORGANIC CARBON	2	2	5 63E+01	7.29E+01	6 48E+01			NA	NA
23	SB	MEQ/100G	CATION-EXCHANGE CAPACITY	2	2	1 00E+00	2 10E+00	1 55E+00			NA	NA
24	SB	PH UNITS	pH	2	2	5 00E+00	5 16E+00	5 08E+00			NA	NA
24	SB	MG/KG	TOTAL ORGANIC CARBON	5	4	1 20E+03	5 40E+03	3 25E+03			NA	NA
24	SS	PH UNITS	pH	2	2	6 24E+00	7 70E+00	6 97E+00			NA	NA
25	SB	MG/KG	ALKALINITY, TOTAL (AS CaCO3)	2	2	1 92E+02	1 37E+03	7 81E+02			NA	NA
25	SB	PH UNITS	pH	2	2	7 80E+00	8 00E+00	7 90E+00			NA	NA
25	SB	MG/KG	TOTAL ORGANIC CARBON	2	2	2 22E+03	4 76E+03	3 49E+03			NA	NA
25	SB	MEQ/100G	CATION-EXCHANGE CAPACITY	2	2	9 10E+00	1 50E+01	1 21E+01			NA	NA
Metals												
21	SB	MG/KG	ZINC	4	4	1 46E+01	3 04E+01	2 01E+01	1 14E+02	1 20E+04	0	0
21	SS	MG/KG	ALUMINUM	16	16	6 22E+03	1 83E+04	1 09E+04	2 38E+04		0	NA
21	SS	MG/KG	ANTIMONY	17	2	5 10E+00	2 42E+01	1 47E+01	7 00E+00	5 00E+00	1	2
21	SS	MG/KG	ARSENIC	17	17	4 00E+00	1 40E+01	1 02E+01	2 00E+01	2 90E+01	0	0
21	SS	MG/KG	BARIUM	1	1	1 45E+02	1 45E+02	1 45E+02	2 34E+02	1 60E+03	0	0
21	SS	MG/KG	BERYLLIUM	17	16	4 40E-01	1 20E+00	6 47E-01	1 10E+00	6 30E+01	1	0
21	SS	MG/KG	CADMIUM	17	2	2 10E+00	4 80E+00	3 45E+00	1 40E+00	8 00E+00	2	0
21	SS	MG/KG	CALCIUM	1	1	2 74E+03	2 74E+03	2 74E+03	5 84E+03		0	NA
21	SS	MG/KG	CHROMIUM, TOTAL	17	17	8 70E+00	2 39E+02	3 21E+01	2 48E+01	3 80E+01	3	2
21	SS	MG/KG	COBALT	1	1	7 90E+00	7 90E+00	7 90E+00	1 83E+01		0	NA
21	SS	MG/KG	COPPER	17	16	9 10E+00	1 46E+02	3 45E+01	3 35E+01		4	NA
21	SS	MG/KG	IRON	1	1	2 05E+04	2 05E+04	2 05E+04	3 70E+04		0	NA
21	SS	MG/KG	LEAD	17	17	1 40E+01	2 10E+03	1 67E+02	3 00E+01		11	NA
21	SS	MG/KG	MAGNESIUM	1	1	2 41E+03	2 41E+03	2 41E+03	4 60E+03		0	NA
21	SS	MG/KG	MANGANESE	1	1	6 68E+02	6 68E+02	6 68E+02	1 30E+03		0	NA
21	SS	MG/KG	MERCURY	17	4	6 00E-02	2 70E-01	1 23E-01	4 00E-01	2 00E+00	0	0
21	SS	MG/KG	NICKEL	17	15	1 19E+01	3 33E+01	1 84E+01	3 00E+01	1 30E+02	1	0
21	SS	MG/KG	POTASSIUM	1	1	2 20E+03	2 20E+03	2 20E+03	1 82E+03		1	NA
21	SS	MG/KG	SELENIUM	17	1	6 00E-01	6 00E-01	6 00E-01	6 00E-01	5 00E+00	0	0
21	SS	MG/KG	SILVER	17	8	5 80E-01	1 50E+00	1 00E+00	2 00E+00	3 40E+01	0	0
21	SS	MG/KG	THALLIUM	17	9	2 30E-01	6 30E-01	4 89E-01		7 00E-01	NA	0
21	SS	MG/KG	VANADIUM	1	1	3 35E+01	3 35E+01	3 35E+01	4 84E+01	6 00E+03	0	0
21	SS	MG/KG	ZINC	21	20	3 71E+01	1 78E+03	2 29E+02	1 26E+02	1 20E+04	3	0
22	SB	MG/KG	ALUMINUM	53	53	7 21E+02	3 22E+04	1 25E+04	2 18E+04		6	NA
22	SB	MG/KG	ANTIMONY	53	16	1 10E+00	5 90E+00	2 90E+00		5 00E+00	NA	6
22	SB	MG/KG	ARSENIC	53	49	2 20E+00	3 56E+01	9 13E+00	1 70E+01	2 90E+01	1	1
22	SB	MG/KG	BARIUM	50	49	2 80E+00	3 12E+02	1 19E+02	3 00E+02	1 60E+03	1	0
22	SB	MG/KG	BERYLLIUM	53	22	4 30E-01	8 90E-01	5 91E-01	1 20E+00	6 30E+01	0	0
22	SB	MG/KG	CALCIUM	50	48	6 82E+02	4 70E+03	2 12E+03	2 43E+03		13	NA
22	SB	MG/KG	CHROMIUM, TOTAL	53	53	1 60E+00	7 46E+01	1 92E+01	2 64E+01	3 80E+01	8	3
22	SB	MG/KG	COBALT	50	46	4 80E+00	1 30E+01	7 49E+00	2 04E+01		0	NA
22	SB	MG/KG	COPPER	53	25	8 60E+00	6 99E+01	2 00E+01	3 27E+01		1	NA
22	SB	MG/KG	IRON	50	50	2 09E+03	3 24E+04	1 96E+04	3 85E+04		0	NA
22	SB	MG/KG	LEAD	53	53	6 50E-01	1 60E+02	2 53E+01	2 39E+01		12	NA
22	SB	MG/KG	MAGNESIUM	50	47	1 16E+02	3 95E+03	2 58E+03	4 90E+03		0	NA
22	SB	MG/KG	MANGANESE	50	50	2 50E+00	1 09E+03	5 03E+02	1 54E+03		0	NA
22	SB	MG/KG	MERCURY	52	19	3 00E-02	1 50E-01	6 47E-02	2 00E-01	2 00E+00	0	0
22	SB	MG/KG	NICKEL	53	51	1 40E+00	2 94E+01	1 81E+01	3 66E+01	1 30E+02	0	0
22	SB	MG/KG	POTASSIUM	50	36	1 19E+02	3 19E+03	1 36E+03	1 80E+03		10	NA
22	SB	MG/KG	SELENIUM	53	4	5 90E-01	1 40E+00	9 90E-01	6 00E-01	5 00E+00	3	0
22	SB	MG/KG	SILVER	53	4	5 70E-01	1 20E+00	8 65E-01	1 00E+00	3 40E+01	1	0
22	SB	MG/KG	SODIUM	50	33	3 75E+01	6 27E+02	1 63E+02			NA	NA
22	SB	MG/KG	THALLIUM	53	8	3 10E-01	6 40E-01	4 04E-01		7 00E-01	NA	0
22	SB	MG/KG	VANADIUM	50	50	2 00E+00	6 46E+01	2 98E+01	5 13E+01	6 00E+03	1	0
22	SB	MG/KG	ZINC	53	25	2.20E+00	2 65E+03	1 55E+02	1 14E+02	1.20E+04	1	0
22	SS	MG/KG	ALUMINUM	48	48	6 07E+03	3 11E+04	1 38E+04	2 38E+04		4	NA
22	SS	MG/KG	ANTIMONY	48	22	1 50E+00	3 55E+02	2 22E+01	7 00E+00	5 00E+00	3	17

TABLE 6-5
Chemicals Detected Above EPA Soil Screening Level Default Values
Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	Background Concentration	EPA SSL	Number Exceeding Background	Number Exceeding EPA SSL
22	SS	MG/KG	ARSENIC	48	48	1.90E+00	4.37E+01	1.10E+01	2.00E+01	2.90E+01	2	1
22	SS	MG/KG	BARIUM	6	6	1.12E+02	4.23E+02	1.97E+02	2.34E+02	1.60E+03	1	0
22	SS	MG/KG	BERYLLIUM	48	34	2.10E-01	1.30E+00	5.55E-01	1.10E+00	6.30E+01	1	0
22	SS	MG/KG	CADMIUM	48	5	6.40E-01	1.20E+00	9.32E-01	1.40E+00	8.00E+00	0	0
22	SS	MG/KG	CALCIUM	6	6	9.86E+02	6.12E+04	1.54E+04	5.84E+03		3	NA
22	SS	MG/KG	CHROMIUM, TOTAL	47	47	9.50E+00	2.12E+02	3.02E+01	2.48E+01	3.80E+01	20	10
22	SS	MG/KG	COBALT	8	8	3.20E+00	1.08E+01	7.90E+00	1.83E+01		0	NA
22	SS	MG/KG	COPPER	48	44	6.80E+00	7.98E+02	5.44E+01	3.35E+01		16	NA
22	SS	MG/KG	IRON	6	6	1.32E+04	5.10E+04	2.66E+04	3.70E+04		1	NA
22	SS	MG/KG	LEAD	48	48	7.40E+00	1.02E+03	1.08E+02	3.00E+01		27	NA
22	SS	MG/KG	MAGNESIUM	6	6	2.24E+03	2.98E+03	2.66E+03	4.60E+03		0	NA
22	SS	MG/KG	MANGANESE	6	6	2.11E+02	8.66E+02	5.77E+02	1.30E+03		0	NA
22	SS	MG/KG	MERCURY	48	16	3.00E-02	1.30E+00	2.20E-01	4.00E-01	2.00E+00	2	0
22	SS	MG/KG	NICKEL	48	47	3.00E+00	3.71E+01	1.78E+01	3.00E+01	1.30E+02	1	0
22	SS	MG/KG	POTASSIUM	6	6	1.32E+03	3.00E+03	2.23E+03	1.82E+03		4	NA
22	SS	MG/KG	SELENIUM	48	9	2.40E-01	1.30E+00	5.32E-01	8.00E-01	5.00E+00	1	0
22	SS	MG/KG	SILVER	48	14	6.50E-01	8.40E+00	1.42E+00	2.00E+00	3.40E+01	1	0
22	SS	MG/KG	SODIUM	6	4	5.82E+01	4.00E+02	2.44E+02			NA	NA
22	SS	MG/KG	THALLIUM	48	20	2.20E-01	6.80E-01	4.58E-01		7.00E-01	NA	0
22	SS	MG/KG	VANADIUM	6	6	3.18E+01	5.38E+01	4.19E+01	4.64E+01	6.00E+03	1	0
22	SS	MG/KG	ZINC	48	44	4.11E+01	9.35E+02	1.28E+02	1.26E+02	1.20E+04	11	0
24	SB	MG/KG	ALUMINUM	25	25	1.09E+03	2.51E+04	1.19E+04	2.18E+04		1	NA
24	SB	MG/KG	ANTIMONY	25	14	1.10E+00	1.30E+00	1.25E+00		5.00E+00	NA	0
24	SB	MG/KG	ARSENIC	25	24	8.30E-01	1.90E+01	8.17E+00	1.70E+01	2.90E+01	1	0
24	SB	MG/KG	BARIUM	25	25	2.60E+00	2.45E+02	9.60E+01	3.00E+02	1.60E+03	0	0
24	SB	MG/KG	BERYLLIUM	25	10	2.00E-01	1.10E+00	5.84E-01	1.20E+00	6.30E+01	0	0
24	SB	MG/KG	CADMIUM	25	9	2.80E-01	8.90E-01	5.41E-01	1.40E+00	8.00E+00	0	0
24	SB	MG/KG	CALCIUM	25	23	5.33E+02	6.68E+03	1.80E+03	2.43E+03		2	NA
24	SB	MG/KG	CHROMIUM, TOTAL	25	25	7.20E+00	3.58E+01	1.62E+01	2.64E+01	3.80E+01	1	0
24	SB	MG/KG	COBALT	25	24	6.40E-01	1.55E+01	7.35E+00	2.04E+01		0	NA
24	SB	MG/KG	COPPER	25	9	4.20E+00	3.72E+01	1.63E+01	3.27E+01		1	NA
24	SB	MG/KG	IRON	25	25	5.98E+03	4.04E+04	1.97E+04	3.85E+04		1	NA
24	SB	MG/KG	LEAD	25	25	1.10E+00	1.43E+02	1.59E+01	2.39E+01		1	NA
24	SB	MG/KG	MAGNESIUM	25	23	2.28E+02	4.69E+03	2.47E+03	4.90E+03		0	NA
24	SB	MG/KG	MANGANESE	25	25	1.63E+01	1.61E+03	5.52E+02	1.54E+03		1	NA
24	SB	MG/KG	MERCURY	25	3	4.00E-02	6.00E-02	4.67E-02	2.00E-01	2.00E+00	0	0
24	SB	MG/KG	NICKEL	25	25	2.00E+00	3.50E+01	1.68E+01	3.66E+01	1.30E+02	0	0
24	SB	MG/KG	POTASSIUM	25	22	1.91E+02	1.91E+03	1.05E+03	1.80E+03		1	0
24	SB	MG/KG	SELENIUM	25	1	1.20E+00	1.20E+00	1.20E+00	6.00E-01	5.00E+00	1	0
24	SB	MG/KG	SODIUM	25	18	2.37E+01	1.70E+02	1.05E+02			NA	0
24	SB	MG/KG	THALLIUM	25	7	1.40E-01	4.80E-01	2.97E-01		7.00E-01	NA	0
24	SB	MG/KG	VANADIUM	25	25	7.30E+00	5.13E+01	2.98E+01	5.13E+01	6.00E+03	0	0
24	SB	MG/KG	ZINC	25	9	3.90E+00	1.09E+02	4.50E+01	1.14E+02	1.20E+04	0	0
24	SS	MG/KG	ALUMINUM	30	30	2.46E+03	5.26E+04	1.92E+04	2.38E+04		5	NA
24	SS	MG/KG	ANTIMONY	30	3	1.60E+00	3.10E+00	2.10E+00	7.00E+00	5.00E+00	0	0
24	SS	MG/KG	ARSENIC	30	30	1.40E+00	2.55E+01	1.12E+01	2.00E+01	2.90E+01	2	0
24	SS	MG/KG	BARIUM	30	30	2.24E+01	2.97E+02	1.17E+02	2.34E+02	1.60E+03	2	0
24	SS	MG/KG	BERYLLIUM	30	28	1.30E-01	9.20E-01	5.14E-01	1.10E+00	6.30E+01	0	0
24	SS	MG/KG	CADMIUM	30	27	1.60E-01	5.30E-01	2.87E-01	1.40E+00	8.00E+00	0	0
24	SS	MG/KG	CALCIUM	30	30	8.11E+02	1.62E+05	2.05E+04	5.84E+03		14	NA
24	SS	MG/KG	CHROMIUM, TOTAL	32	32	7.30E+00	5.57E+01	1.94E+01	2.48E+01	3.80E+01	7	1
24	SS	MG/KG	COBALT	30	30	1.50E+00	2.03E+01	7.09E+00	1.83E+01		1	NA
24	SS	MG/KG	COPPER	30	28	2.70E+00	2.66E+01	1.49E+01	3.35E+01		0	NA
24	SS	MG/KG	IRON	30	30	6.36E+03	3.64E+04	2.05E+04	3.70E+04		0	NA
24	SS	MG/KG	LEAD	30	30	2.80E+00	1.07E+02	2.94E+01	3.00E+01		9	NA
24	SS	MG/KG	MAGNESIUM	30	30	8.52E+01	1.01E+04	2.70E+03	4.60E+03		2	NA
24	SS	MG/KG	MANGANESE	30	30	3.22E+01	1.08E+03	4.93E+02	1.30E+03		0	NA
24	SS	MG/KG	MERCURY	32	23	3.60E-02	1.00E-01	6.28E-02	4.00E-01	2.00E+00	0	0
24	SS	MG/KG	NICKEL	30	30	2.50E+00	2.57E+01	1.54E+01	3.00E+01	1.30E+02	0	0
24	SS	MG/KG	POTASSIUM	30	28	3.14E+02	4.81E+03	1.30E+03	1.82E+03		4	NA
24	SS	MG/KG	SELENIUM	30	1	5.50E-01	5.50E-01	5.50E-01	8.00E-01	5.00E+00	0	0
24	SS	MG/KG	SILVER	30	1	5.20E-01	5.20E-01	5.20E-01	2.00E+00	3.40E+01	0	0
24	SS	MG/KG	SODIUM	30	19	2.87E+01	2.44E+03	2.25E+02			NA	NA

TABLE 6-5
Chemicals Detected Above EPA Soil Screening Level Default Values
Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	Background Concentration	EPA SSL	Number Exceeding Background	Number Exceeding EPA SSL
24	SS	MG/KG	THALLIUM	30	19	1.50E-01	4.20E-01	3.11E-01		7.00E-01	NA	0
24	SS	MG/KG	VANADIUM	30	30	8.70E+00	9.66E+01	3.15E+01	4.84E+01	6.00E+03	2	0
24	SS	MG/KG	ZINC	30	28	4.30E+00	9.04E+01	5.36E+01	1.26E+02	1.20E+04	0	0
25	SB	MG/KG	ALUMINUM	5	5	3.05E+02	1.56E+04	8.09E+03	2.18E+04		0	NA
25	SB	MG/KG	ANTIMONY	5	1	3.90E+00	3.90E+00	3.90E+00		5.00E+00	NA	0
25	SB	MG/KG	ARSENIC	5	5	1.00E+00	3.80E+00	2.52E+00	1.70E+01	2.90E+01	0	0
25	SB	MG/KG	BARIUM	5	4	1.00E+01	4.94E+01	2.68E+01	3.00E+02	1.60E+03	0	0
25	SB	MG/KG	BERYLLIUM	5	3	8.00E-02	6.70E-01	3.87E-01	1.20E+00	6.30E+01	0	0
25	SB	MG/KG	CADMIUM	5	1	6.20E-01	6.20E-01	6.20E-01	1.40E+00	8.00E+00	0	0
25	SB	MG/KG	CALCIUM	5	4	4.70E+02	1.28E+03	7.62E+02	2.43E+03		0	NA
25	SB	MG/KG	CHROMIUM, TOTAL	5	5	1.80E+00	3.14E+01	1.59E+01	2.64E+01	3.80E+01	1	0
25	SB	MG/KG	COBALT	5	4	1.30E+00	4.10E+00	2.55E+00	2.04E+01		0	NA
25	SB	MG/KG	COPPER	5	4	4.80E+00	1.05E+01	7.63E+00	3.27E+01		0	NA
25	SB	MG/KG	IRON	5	5	3.03E+03	1.61E+04	1.22E+04	3.85E+04		0	NA
25	SB	MG/KG	LEAD	5	4	3.90E+00	5.70E+00	4.98E+00	2.39E+01		0	NA
25	SB	MG/KG	MAGNESIUM	5	4	3.21E+02	1.06E+03	5.81E+02	4.90E+03		0	NA
25	SB	MG/KG	MANGANESE	5	5	6.00E+00	1.11E+02	4.44E+01	1.54E+03		0	NA
25	SB	MG/KG	NICKEL	5	4	1.80E+00	1.02E+01	5.75E+00	3.66E+01	1.30E+02	0	0
25	SB	MG/KG	POTASSIUM	5	4	2.10E+02	3.50E+02	2.91E+02	1.80E+03		0	NA
25	SB	MG/KG	VANADIUM	5	5	1.90E+00	3.00E+01	1.96E+01	5.13E+01	6.00E+03	0	0
OC Pesticides												
21	SS	MG/KG	ALPHA-CHLORDANE	15	3	2.50E-03	7.10E-03	4.87E-03	2.90E-02	1.00E+01	0	0
21	SS	MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHAN	15	7	9.50E-04	5.43E-02	1.17E-02	6.70E-03	1.60E+01	3	0
21	SS	MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHEN	15	12	1.30E-03	2.32E-01	6.75E-02	1.60E-01	5.40E+01	2	0
21	SS	MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOROETH	15	12	2.00E-03	2.96E-01	7.95E-02	7.40E-02	1.10E+01	4	0
21	SS	MG/KG	DIELDRIN	15	13	2.20E-03	4.75E+00	5.40E-01	8.60E-02	4.00E-03	6	11
21	SS	MG/KG	ENDRIN	15	1	5.50E-03	5.50E-03	5.50E-03		1.00E+00	NA	0
21	SS	MG/KG	GAMMA-CHLORDANE	15	3	1.20E-03	3.70E-03	2.73E-03	2.60E-02	1.00E+01	0	0
22	SB	MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHAN	21	8	7.80E-04	7.86E-02	2.13E-02		1.60E+01	NA	0
22	SB	MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHEN	21	9	2.10E-04	2.21E-02	4.80E-03	1.50E-03	5.40E+01	5	0
22	SB	MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICHLOROETH	21	8	5.80E-04	1.64E-02	4.00E-03	7.20E-03	1.10E+01	1	0
22	SB	MG/KG	DIELDRIN	21	6	5.00E-04	1.60E-02	5.36E-03	3.70E-01	4.00E-03	0	3
22	SB	MG/KG	HEPTACHLOR	21	1	1.10E-04	1.10E-04	1.10E-04		2.30E+01	NA	0
22	SB	MG/KG	HEPTACHLOR EPOXIDE	21	1	3.26E-02	3.26E-02	3.26E-02	2.10E-03	7.00E-01	1	0
22	SB	MG/KG	METHOXYCHLOR	21	1	5.02E-02	5.02E-02	5.02E-02		1.60E+02	NA	0
22	SB	MG/KG	TOXAPHENE	21	1	1.67E-01	1.67E-01	1.67E-01		3.10E+01	NA	0
22	SS	MG/KG	ALPHA-CHLORDANE	28	8	2.50E-04	5.80E-03	2.23E-03	2.90E-02	1.00E+01	0	0
22	SS	MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHAN	28	21	2.40E-04	1.26E-01	2.29E-02	6.70E-03	1.60E+01	12	0
22	SS	MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHEN	28	23	5.70E-04	6.00E-01	9.12E-02	1.60E-01	5.40E+01	4	0
22	SS	MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOROETH	28	24	2.90E-04	1.46E+00	1.95E-01	7.40E-02	1.10E+01	12	0
22	SS	MG/KG	DIELDRIN	28	20	5.40E-04	9.64E-01	1.04E-01	8.60E-02	4.00E-03	5	16
22	SS	MG/KG	ENDOSULFAN SULFATE	28	6	4.30E-03	9.11E-02	3.58E-02		1.80E+01	NA	0
22	SS	MG/KG	ENDRIN	28	1	3.60E-03	3.60E-03	3.60E-03		1.00E+00	NA	0
22	SS	MG/KG	ENDRIN KETONE	28	1	3.00E-03	3.00E-03	3.00E-03		1.00E+00	NA	0
22	SS	MG/KG	GAMMA-CHLORDANE	28	7	3.00E-04	4.20E-03	2.13E-03	2.60E-02	1.00E+01	0	0
22	SS	MG/KG	HEPTACHLOR EPOXIDE	28	2	3.40E-03	2.90E-02	1.62E-02	4.50E-03	7.00E-01	1	0
22	SS	MG/KG	METHOXYCHLOR	28	2	4.20E-03	5.43E-02	2.93E-02		1.60E+02	NA	0
24	SS	MG/KG	ALDRIN	30	1	1.50E-03	1.50E-03	1.50E-03		5.00E-01	NA	0
24	SS	MG/KG	ALPHA ENDOSULFAN (ENDOSULFAN I)	30	1	3.10E-04	3.10E-04	3.10E-04		1.80E+01	NA	0
24	SS	MG/KG	ALPHA-CHLORDANE	30	7	1.40E-03	6.70E-03	3.93E-03	2.90E-02	1.00E+01	0	0
24	SS	MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHAN	30	2	4.60E-03	6.50E-03	5.55E-03	6.70E-03	1.60E+01	0	0
24	SS	MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHEN	30	14	3.90E-04	1.40E-01	2.54E-02	1.60E-01	5.40E+01	0	0
24	SS	MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOROETH	30	12	6.50E-04	3.00E-01	5.40E-02	7.40E-02	1.10E+01	2	0
24	SS	MG/KG	DIELDRIN	30	15	8.10E-04	1.30E-01	2.59E-02	8.60E-02	4.00E-03	1	12
24	SS	MG/KG	ENDRIN	30	1	4.60E-04	4.60E-04	4.60E-04		1.00E+00	NA	0
24	SS	MG/KG	ENDRIN KETONE	28	8	1.50E-03	3.30E-02	1.50E-02		1.00E+00	NA	0
24	SS	MG/KG	GAMMA-CHLORDANE	30	1	3.00E-03	3.00E-03	3.00E-03	2.60E-02	1.00E+01	0	0
24	SS	MG/KG	METHOXYCHLOR	30	5	1.80E-03	6.80E-02	3.02E-02		1.60E+02	NA	0
25	SB	MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOROETH	5	1	4.20E-03	4.20E-03	4.20E-03	7.20E-03	1.10E+01	0	0
Organics												
22	SB	MG/KG	1,4-Dithiane	29	3	1.80E-03	1.90E-03	1.87E-03			NA	NA
22	SB	MG/KG	1,4-Oxathiane	29	3	1.00E-03	1.10E-03	1.07E-03			NA	NA
22	SS	MG/KG	1,4-Dithiane	5	1	1.70E-03	1.70E-03	1.70E-03			NA	NA
22	SS	MG/KG	1,4-Oxathiane	5	1	1.00E-03	1.00E-03	1.00E-03			NA	NA

TABLE 8-5
Chemicals Detected Above EPA Soil Screening Level Default Values
Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	Background Concentration	EPA SSL	Number Exceeding Background	Number Exceeding EPA SSL
Polynuclear Aromatic Hydrocarbons												
21	SS	MG/KG	INDENO(1,2,3-c,d)PYRENE	8	1	7 40E-03	7 40E-03	7 40E-03	7 00E-01	1 40E+01	0	0
22	SB	MG/KG	2-METHYLNAPHTHALENE	28	1	1 20E-01	1 20E-01	1 20E-01		6 10E+00	NA	0
22	SB	MG/KG	ACENAPHTHENE	28	1	5 50E-02	5 50E-02	5 50E-02		5 70E+02	NA	0
22	SB	MG/KG	ACENAPHTHYLENE	28	1	7 90E-02	7 90E-02	7 90E-02		2 70E+01	NA	0
22	SB	MG/KG	ANTHRACENE	28	4	4 50E-03	1 10E-01	5 57E-02		1 20E+04	NA	0
22	SB	MG/KG	BENZO(a)ANTHRACENE	28	10	4 10E-03	7 40E-01	1 57E-01		2 00E+00	NA	0
22	SB	MG/KG	BENZO(a)PYRENE	28	9	3 40E-03	9 70E-01	2 12E-01		8 00E+00	NA	0
22	SB	MG/KG	BENZO(b)FLUORANTHENE	28	7	2 00E-02	1 20E+00	3 06E-01		5 00E+00	NA	0
22	SB	MG/KG	BENZO(g h,i)PERYLENE	28	7	1 70E-02	5 70E-01	1 91E-01		3 20E+04	NA	0
22	SB	MG/KG	BENZO(k)FLUORANTHENE	28	7	2 00E-02	9 50E-01	2 70E-01		4 90E+01	NA	0
22	SB	MG/KG	CHRYSENE	28	7	2 40E-02	9 10E-01	2 65E-01		1 60E+02	NA	0
22	SB	MG/KG	DIBENZ(a,h)ANTHRACENE	28	5	4 10E-02	2 00E-01	9 28E-02		2 00E+00	NA	0
22	SB	MG/KG	FLUORANTHENE	28	6	5 20E-02	1.20E+00	3 95E-01	4 50E-02	4 30E+03	8	0
22	SB	MG/KG	FLUORENE	28	1	4 20E-02	4 20E-02	4 20E-02		5 60E+02	NA	0
22	SB	MG/KG	INDENO(1,2,3-c,d)PYRENE	28	7	1 40E-02	6 90E-01	2 09E-01		1 40E+01	NA	0
22	SB	MG/KG	NAPHTHALENE	69	2	6 90E-02	8 20E-02	7 55E-02		8 40E+01	NA	0
22	SB	MG/KG	PHENANTHRENE	28	7	4 10E-02	5 60E-01	2 34E-01		2 50E+02	NA	0
22	SB	MG/KG	PYRENE	28	8	3 80E-02	1 60E+00	3 95E-01	4 20E-02	8 80E+02	7	0
22	SS	MG/KG	2-METHYLNAPHTHALENE	29	2	1 10E-01	3 40E-01	2 25E-01		6 10E+00	NA	0
22	SS	MG/KG	ACENAPHTHENE	29	8	1 40E-02	1 30E+00	2 94E-01		5 70E+02	NA	0
22	SS	MG/KG	ANTHRACENE	29	9	8 40E-03	1 80E+00	4 25E-01	9 60E-02	1 20E+04	6	0
22	SS	MG/KG	BENZO(a)ANTHRACENE	29	19	9 30E-03	5 80E+00	8 17E-01	7 10E-01	2 00E+00	5	2
22	SS	MG/KG	BENZO(a)PYRENE	29	19	5 70E-02	6 70E+00	8 93E-01	9 60E-01	8 00E+00	4	0
22	SS	MG/KG	BENZO(b)FLUORANTHENE	29	17	7 40E-02	8 20E+00	1 17E+00	9 00E-01	5 00E+00	4	2
22	SS	MG/KG	BENZO(g,h,i)PERYLENE	29	20	3 50E-02	3 80E+00	5 80E-01	8 20E-01	3 20E+04	2	0
22	SS	MG/KG	BENZO(k)FLUORANTHENE	29	18	6 90E-02	6 30E+00	8 66E-01	7 80E-01	4 90E+01	5	0
22	SS	MG/KG	CHRYSENE	29	19	6 80E-02	6 30E+00	9 05E-01	9 40E-01	1 60E+02	4	0
22	SS	MG/KG	DIBENZ(a,h)ANTHRACENE	29	15	2 00E-02	1 60E+00	2 65E-01	2 60E-01	2 00E+00	2	0
22	SS	MG/KG	FLUORANTHENE	29	20	9 80E-02	1 70E+01	1 88E+00	1 60E+00	4 30E+03	5	0
22	SS	MG/KG	FLUORENE	29	7	1 00E-02	8 60E-01	2 37E-01		5 60E+02	NA	0
22	SS	MG/KG	INDENO(1,2,3-c,d)PYRENE	29	19	3 80E-02	4 60E+00	6 64E-01	7 00E-01	1 40E+01	2	0
22	SS	MG/KG	NAPHTHALENE	29	3	4 10E-02	2 60E-01	1 84E-01		8 40E+01	NA	0
22	SS	MG/KG	PHENANTHRENE	29	18	1 10E-02	1 30E+01	1 38E+00	6 10E-01	2 50E+02	5	0
22	SS	MG/KG	PYRENE	29	20	7 20E-02	1 20E+01	1 55E+00	1 50E+00	8 80E+02	4	0
24	SS	MG/KG	BENZO(a)ANTHRACENE	30	5	8 60E-01	3 00E+00	1 83E+00	7 10E-01	2 00E+00	5	2
24	SS	MG/KG	BENZO(a)PYRENE	30	5	9 00E-01	3 80E+00	2 22E+00	9 60E-01	8 00E+00	4	0
24	SS	MG/KG	BENZO(b)FLUORANTHENE	30	6	9 80E-01	5 80E+00	2 93E+00	9 00E-01	5 00E+00	6	1
24	SS	MG/KG	BENZO(g,h,i)PERYLENE	30	4	9 20E-01	3 10E+00	1 96E+00	8 20E-01	3 20E+04	4	0
24	SS	MG/KG	BENZO(k)FLUORANTHENE	30	2	1 80E+00	2 30E+00	2 05E+00	7 80E-01	4 90E+01	2	0
24	SS	MG/KG	CHRYSENE	30	5	1 10E+00	5 00E+00	2 82E+00	9 40E-01	1 60E+02	5	0
24	SS	MG/KG	DIBENZ(a h)ANTHRACENE	30	3	7 80E-01	1 10E+00	9 03E-01	2 60E-01	2 00E+00	3	0
24	SS	MG/KG	FLUORANTHENE	30	7	1 10E+00	6 20E+00	3 37E+00	1 60E+00	4 30E+03	6	0
24	SS	MG/KG	INDENO(1,2,3-c,d)PYRENE	30	5	8 10E-01	3 60E+00	2 00E+00	7 00E-01	1 40E+01	5	0
24	SS	MG/KG	PHENANTHRENE	30	6	9 90E-01	2 60E+00	1 85E+00	6 10E-01	2 50E+02	6	0
24	SS	MG/KG	PYRENE	30	7	8 90E-01	6 00E+00	3 04E+00	1 50E+00	8 80E+02	5	0
Polychlorinated Biphenyls												
21	SS	MG/KG	PCB-1260 (AROCHLOR 1260)	15	5	5 10E-03	4 21E-02	1 66E-02	1 10E-01	1 70E+01	0	0
22	SB	MG/KG	PCB-1260 (AROCHLOR 1260)	21	2	8 00E-03	2 01E-02	1 41E-02		1 70E+01	NA	0
22	SS	MG/KG	PCB-1254 (AROCHLOR 1254)	28	1	1 21E-02	1 21E-02	1 21E-02		1 70E+01	NA	0
22	SS	MG/KG	PCB-1260 (AROCHLOR 1260)	28	5	4 50E-03	1 20E-01	4 39E-02	1 10E-01	1 70E+01	1	0
Semivolatile Organics												
21	SB	MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	4	1	2 40E-01	2 40E-01	2 40E-01		3 60E+03	NA	0
22	SB	MG/KG	1,2,4-TRICHLOROBENZENE	69	1	9 40E-02	9 40E-02	9 40E-02		5 00E+00	NA	0
22	SB	MG/KG	2,4,6-TRICHLOROPHENOL	28	1	2 70E-01	2 70E-01	2 70E-01		2 00E-01	NA	1
22	SB	MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	28	5	2 10E-02	1 60E-01	5 46E-02		3 60E+03	NA	0
22	SB	MG/KG	CARBAZOLE	28	2	9 60E-02	9 70E-02	9 65E-02		6 00E-01	NA	0
22	SB	MG/KG	DI-n-BUTYL PHTHALATE	28	2	1 20E-02	3 50E-02	2 35E-02		2 30E+03	NA	0
22	SB	MG/KG	DIBENZOFURAN	28	1	2 30E-02	2 30E-02	2 30E-02	7 20E-01	1 50E+01	0	0
22	SB	MG/KG	DIETHYL PHTHALATE	28	2	8 70E-03	1 60E-01	8 44E-02		4 70E+02	NA	0
22	SB	MG/KG	HEXACHLOROBUTADIENE	69	1	3 09E-03	3 09E-03	3 09E-03			NA	NA
22	SB	MG/KG	PENTACHLOROPHENOL	28	1	2 20E-01	2 20E-01	2 20E-01		3 00E-02	NA	1
22	SB	MG/KG	PHENOL	28	1	2 20E-02	2 20E-02	2 20E-02	1 90E+01	1 00E+02	0	0
22	SS	MG/KG	BENZYL BUTYL PHTHALATE	29	1	3 40E-03	3 40E-03	3 40E-03	6 45E-01	9 30E+02	0	0

TABLE 6-5
Chemicals Detected Above EPA Soil Screening Level Default Values
Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	Background Concentration	EPA SSL	Number Exceeding Background	Number Exceeding EPA SSL
22	SS	MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	29	6	1 60E-02	1 70E-01	1 09E-01		3 60E+03	NA	0
22	SS	MG/KG	CARBAZOLE	29	8	4 90E-02	2 00E+00	5 14E-01	6 70E-02	6 00E-01	6	2
22	SS	MG/KG	DI-n-BUTYL PHTHALATE	29	2	1 00E-02	1 80E-02	1 40E-02		2 30E+03	NA	0
22	SS	MG/KG	DIBENZOFURAN	29	3	7 70E-02	5 20E-01	2 99E-01	6 47E-01	1 50E+01	0	0
22	SS	MG/KG	DIETHYL PHTHALATE	29	2	4 40E-03	1 50E-01	7 72E-02		4 70E+02	NA	0
Volatile Organics												
21	SB	MG/KG	1,1,2,2-TETRACHLOROETHANE	20	1	1 10E-02	1 10E-02	1 10E-02		3 00E-03	NA	1
21	SB	MG/KG	ETHYLBENZENE	20	1	1.20E+00	1 20E+00	1 20E+00		1 30E+01	NA	0
21	SB	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	20	2	4 00E-03	1 40E-02	9 00E-03		1 70E+01	NA	0
21	SB	MG/KG	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANO	20	4	2 00E-03	3 00E-03	2 50E-03		2 60E+00	NA	0
21	SB	MG/KG	METHYLENE CHLORIDE	20	1	6 80E-02	6 80E-02	6 80E-02		2 00E-02	NA	1
21	SB	MG/KG	TETRACHLOROETHYLENE(PCE)	20	7	8 00E-04	1 10E-02	5 26E-03		6 00E-02	NA	0
21	SB	MG/KG	TOLUENE	20	1	1 20E-01	1 20E-01	1 20E-01		1 20E+01	NA	0
21	SB	MG/KG	TOTAL 1,2-DICHLOROETHENE	20	1	2 00E-02	2 00E-02	2 00E-02			NA	NA
21	SB	MG/KG	TRICHLOROETHYLENE (TCE)	20	5	4 00E-04	1 10E-01	4 12E-02		6 00E-02	NA	2
21	SB	MG/KG	XYLENES, TOTAL	20	1	1 30E+00	1 30E+00	1 30E+00	2 00E-03	2 00E-01	1	1
21	SS	MG/KG	1,1,2,2-TETRACHLOROETHANE	9	2	1 00E-03	5 00E-03	3 00E-03		3 00E-03	NA	1
21	SS	MG/KG	BENZENE	9	2	4 00E-03	4 00E-03	4 00E-03		3 00E-02	NA	0
21	SS	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	9	8	5 00E-03	2 10E-02	1 24E-02	2 00E-03	1 70E+01	8	0
21	SS	MG/KG	TETRACHLOROETHYLENE(PCE)	9	3	2 00E-03	6 00E-03	3 33E-03		6 00E-02	NA	0
21	SS	MG/KG	TOTAL 1,2-DICHLOROETHENE	9	1	2 20E-01	2 20E-01	2 20E-01			NA	NA
21	SS	MG/KG	TRICHLOROETHYLENE (TCE)	9	2	4 00E-03	7 00E-01	3 52E-01		6 00E-02	NA	1
21	SS	MG/KG	VINYL CHLORIDE	9	1	8 00E-03	8 00E-03	8 00E-03		1 00E-02	NA	0
22	SB	MG/KG	1,1,2,2-TETRACHLOROETHANE	155	56	3 00E-03	1 60E+02	6 18E+00		3 00E-03	NA	52
22	SB	MG/KG	1,1,2-TRICHLOROETHANE	155	25	3 00E-04	2 20E+00	1 79E-01		2 00E-02	NA	6
22	SB	MG/KG	1,1-DICHLOROETHENE	155	8	4 00E-04	6 00E-02	1 36E-02		6 00E-02	NA	0
22	SB	MG/KG	1,2-DICHLOROETHANE	155	5	1 00E-03	4 60E-02	1 58E-02		2 00E-02	NA	2
22	SB	MG/KG	1,2-DICHLOROPROPANE	155	3	3 00E-04	5 00E-03	1 90E-03		3 00E-02	NA	0
22	SB	MG/KG	2-HEXANONE	155	1	3 50E-02	3 50E-02	3 50E-02		1 40E+00	NA	0
22	SB	MG/KG	ACETONE	154	4	6 51E-02	9 33E-01	3 59E-01		1 60E+01	NA	0
22	SB	MG/KG	BENZENE	155	4	3 00E-04	3 00E-03	1 33E-03		3 00E-02	NA	0
22	SB	MG/KG	BROMODICHLOROMETHANE	155	4	1 00E-03	1 10E-02	5 25E-03		6 00E-01	NA	0
22	SB	MG/KG	CARBON DISULFIDE	155	7	1 00E-03	4 00E-03	2 57E-03	2 00E-03	3 20E+01	4	0
22	SB	MG/KG	CARBON TETRACHLORIDE	155	16	5 00E-04	6 80E+00	5 16E-01		7 00E-02	NA	5
22	SB	MG/KG	CHLOROBENZENE	155	5	4 00E-04	7 00E-03	3 08E-03		1 00E+00	NA	0
22	SB	MG/KG	CHLOROETHANE	155	1	3 00E-03	3 00E-03	3 00E-03			NA	NA
22	SB	MG/KG	CHLOROFORM	154	37	6 00E-04	1 40E+01	9 42E-01		6 00E-01	NA	6
22	SB	MG/KG	cis-1 2-DICHLOROETHYLENE	49	40	7 00E-04	1 32E-01	1 26E-02			NA	NA
22	SB	MG/KG	ETHYLBENZENE	155	2	5 00E-04	4 00E-03	2 25E-03		1 30E+01	NA	0
22	SB	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	155	20	2 00E-03	1 30E-01	1 10E-02		1 70E+01	NA	0
22	SB	MG/KG	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANO	155	3	1 00E-03	4 00E-03	2 33E-03		2 60E+00	NA	0
22	SB	MG/KG	METHYLENE CHLORIDE	155	20	5 00E-04	3 90E-02	7 07E-03		2 00E-02	NA	3
22	SB	MG/KG	STYRENE	155	10	2 00E-04	7 00E-04	3 80E-04		4 00E+00	NA	0
22	SB	MG/KG	TETRACHLOROETHYLENE(PCE)	155	56	4 00E-04	4 40E+00	1 63E-01		6 00E-02	NA	7
22	SB	MG/KG	TOLUENE	155	9	4 00E-04	8 00E-03	2 91E-03		1 20E+01	NA	0
22	SB	MG/KG	TOTAL 1,2-DICHLOROETHENE	105	42	6 00E-04	1 90E+02	7 93E+00			NA	NA
22	SB	MG/KG	trans-1,2-DICHLOROETHENE	49	22	6 90E-04	4 44E-02	5 41E-03			NA	NA
22	SB	MG/KG	TRICHLOROETHYLENE (TCE)	155	92	5 00E-04	4 60E+02	7 89E+00		6 00E-02	NA	43
22	SB	MG/KG	VINYL CHLORIDE	155	15	2 00E-03	7 00E+00	6 40E-01		1 00E-02	NA	9
22	SB	MG/KG	XYLENES, TOTAL	106	4	6 00E-04	2 00E-02	6 90E-03	2 00E-03	2 00E-01	2	0
22	SS	MG/KG	1,1,2,2-TETRACHLOROETHANE	45	2	7 00E-03	8 30E-02	4 50E-02		3 00E-03	NA	2
22	SS	MG/KG	1,1,2-TRICHLOROETHANE	45	1	2 00E-03	2 00E-03	2 00E-03		2 00E-02	NA	0
22	SS	MG/KG	1,1-DICHLOROETHENE	45	1	2 00E-03	2 00E-03	2 00E-03		6 00E-02	NA	0
22	SS	MG/KG	1,2-DICHLOROPROPANE	45	1	2 00E-03	2 00E-03	2 00E-03		3 00E-02	NA	0
22	SS	MG/KG	ACETONE	45	2	2 00E-01	4 40E-01	3 20E-01		1 60E+01	NA	0
22	SS	MG/KG	BENZENE	45	4	2 00E-03	2 80E-02	8 75E-03		3 00E-02	NA	0
22	SS	MG/KG	CARBON DISULFIDE	45	1	1 50E-02	1 50E-02	1 50E-02	2 00E-03	3 20E+01	1	0
22	SS	MG/KG	CARBON TETRACHLORIDE	45	2	1 00E-03	3 90E-02	2 00E-02		7 00E-02	NA	0
22	SS	MG/KG	CHLOROFORM	45	7	1 00E-03	8 90E-02	1 60E-02		6 00E-01	NA	0
22	SS	MG/KG	ETHYLBENZENE	45	1	6 00E-03	6 00E-03	6 00E-03		1 30E+01	NA	0
22	SS	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	45	27	2 00E-03	3 90E-02	1 45E-02	2 00E-03	1 70E+01	26	0
22	SS	MG/KG	METHYLENE CHLORIDE	45	1	7 00E-04	7 00E-04	7 00E-04		2 00E-02	NA	0
22	SS	MG/KG	STYRENE	45	4	2 00E-04	8 00E-04	4 75E-04		4 00E+00	NA	0
22	SS	MG/KG	TETRACHLOROETHYLENE(PCE)	45	9	3 00E-04	4 90E-02	1 31E-02		6 00E-02	NA	0

TABLE 6-5
Chemicals Detected Above EPA Soil Screening Level Default Values
Rev 1 Memphis Depot Dunn Field RI

Functional Unit	Sample Matrix	Units	Parameter	Number Analyzed	Number Detected	Minimum Detected	Maximum Detected	Mean Detected	Background Concentration	EPA SSL	Number Exceeding Background	Number Exceeding EPA SSL
22	SS	MG/KG	TOLUENE	45	4	8 00E-04	2 60E-02	7 95E-03	2 00E-03	1 20E+01	2	0
22	SS	MG/KG	TOTAL 1,2-DICHLOROETHENE	45	7	9 00E-04	8 70E-01	1 63E-01			NA	NA
22	SS	MG/KG	TRICHLOROETHYLENE (TCE)	45	11	9 00E-04	8 50E-01	1 58E-01		6 00E-02	NA	4
22	SS	MG/KG	VINYL CHLORIDE	45	1	1 10E-01	1 10E-01	1 10E-01		1 00E-02	NA	1
22	SS	MG/KG	XYLENES, TOTAL	45	1	1 10E-02	1 10E-02	1 10E-02	9 00E-03	2 00E-01	1	0
24	SB	MG/KG	METHYLENE CHLORIDE	15	2	2 00E-03	3 00E-03	2 50E-03		2 00E-02	NA	0
24	SB	MG/KG	TOLUENE	15	1	3 00E-03	3 00E-03	3 00E-03		1 20E+01	NA	0
24	SB	MG/KG	XYLENES, TOTAL	15	3	2 00E-03	1 40E-02	6 67E-03	2 00E-03	2 00E-01	2	0
24	SS	MG/KG	ACETONE	30	19	2 30E-02	2 80E-01	1 58E-01		1 60E+01	NA	0
24	SS	MG/KG	BENZENE	30	5	1 00E-03	5 00E-03	2 80E-03		3 00E-02	NA	0
24	SS	MG/KG	CARBON DISULFIDE	30	1	3 00E-03	3 00E-03	3 00E-03	2 00E-03	3 20E+01	1	0
24	SS	MG/KG	ETHYLBENZENE	30	4	9 00E-04	5 00E-03	2 48E-03		1 30E+01	NA	0
24	SS	MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	30	10	7 00E-03	4 30E-02	1 64E-02	2 00E-03	1 70E+01	10	0
24	SS	MG/KG	METHYLENE CHLORIDE	30	2	9 00E-04	1 00E-03	9 50E-04		2 00E-02	NA	0
24	SS	MG/KG	TOLUENE	30	2	9 00E-04	1 20E-02	6 45E-03	2 00E-03	1 20E+01	1	0
24	SS	MG/KG	XYLENES, TOTAL	30	5	3 00E-03	1 50E-02	8 40E-03	9 00E-03	2 00E-01	3	0

Functional Units 21 = Northeast Open Area 22 = Disposal Area 23 = Groundwater 24 = Stockpile Area, 25 = Offsite
SS = Surface soil sample
SB = Subsurface soil sample
MG/KG = milligram per kilogram
SSL = Soil screening level
MEQ/100G = milliequivalents per 100 grams

TABLE 6-6

Screening Level for Presence of NAPL Using Solubility Limits for CVOCs

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Parameter	Water Solubility (mg/L)	Screening Level for Potential Presence of NAPL (mg/L)	Maximum Observed Groundwater Concentration (mg/L)
1,1,2,2-Tetrachloroethane	2,970	29.7	33
Trichloroethene	1,100	11	12

Notes

Screening level based on 1% solubility

mg/L	milligram per liter
NAPL	nonaqueous phase liquid

TABLE 6-7
Half-life Estimates for PAHs
Rev 0 Memphis Depot Dunn Field RI

Media	Naphthalene	Anthracene	Benzo(a)pyrene
Soil (aerobic)	17	50	57
Groundwater	1	100	114
Aqueous (anaerobic)	25	200	228
Surface Water	<0 5 to 2	<0.5 to 2	<0 5 to 5

Notes: Biodegradation half-life estimates in days.
Surface water attenuation primarily attributed to volatilization and photolysis in the water column. Does not consider sediment partitioning.

TAB

Section 7

7.0 Overview of Human Health Risk Assessment Approach

A human health and ecological RA approach memorandum for Dunn Field was prepared and submitted for BCT review prior to implementation (see Appendix C-1). In general, the approach is similar to that implemented at the Main Installation (Final RI report, CH2M HILL, 2000). This section describes in further detail the human health and ecological risk assessment (ERA) approach used at Dunn Field. The ERA was performed in parallel with the human health RA, and each is discussed in this report. The following subsections provide an overview of each RA component and associated assumptions. Site-specific applications of the RA and the results of the risk evaluations are included in Sections 8.0 through 13.0, the Area-specific discussions.

Separate RAs were prepared for each Area of Dunn Field, as shown on Figure 1-3 and described in Section 1-1. A quantitative evaluation was performed on each area. The contiguous areas of Dunn Field were divided into separate units (Areas) for quantitative evaluations. The location of each Area is shown on Figure 1-3, and the Areas are described in Section 1-1

7.1 Different Exposure Units within an Area

An exposure unit in an RA is the geographical area about which a receptor moves and contacts a contaminated medium at random during a specified period of time referred to as "exposure duration."

The human health effects considered in these RAs are generally those related to long-term exposure, and end points of interest are cancer and chronic health (noncarcinogenic) effects. Hence, the most appropriate expression for the exposure point concentration (EPC) is the true long-term average concentration to which receptors may be exposed. Generally, for soil exposure, receptors are assumed to have an equal probability of contacting any area within the exposure unit. The exposure concentration within the area is estimated using the upper-bound estimate on the average concentrations (e g , upper confidence limits at 95 percent [UCL 95 percent]), or the maximum observed concentrations, to ensure conservatism in the RAs. Groundwater under Dunn Field is treated as one unit, and exposure point concentrations (EPCs) for groundwater were averaged from the center of a contaminant plume for chemicals that occur in plumes, or the UCL95 percent concentrations for the other chemicals, such as metals, at the site

Similar to the approach implemented at the Main Installation, in lieu of conducting an individual RA at each of the identified 39 sites within Dunn Field, a surrogate approach was used to conservatively assess potential human health risks. The selection of the surrogate site is based on the exposure unit concept and the high-end contamination areas. The surrogate site and Area-wide RAs are based on exposure units· the maintenance worker's exposure unit is the entire area within the boundaries of the study area (e.g., Northeast Open Area), whereas an industrial worker/residential exposure is assumed to be a smaller exposure unit represented by a surrogate site. The surrogate site is assumed be a 1.0-acre lot, represented by an area around the highest preliminary risk evaluation (PRE) data point within the Area. Figures identifying the exposure units within each Area are included in the Area-specific human health RA sections.

A PRE was conducted, following EPA Region IV guidance, on individual surface soil samples collected from Dunn Field. The results of the PRE calculations are included in Appendix C-2 The samples with highest PRE values for carcinogens and noncarcinogens are selected as the center point for a surrogate site. A 1-acre lot around this highest PRE value point is used as the surrogate site. Any soil samples collected within this 1-acre area are included for chemical of potential concern selection and risk calculations. Table 7-1 summarizes the step-wise surrogate site selection method for Dunn Field. An RA was conducted for each Area using the data collected within the physical unit. These Area-wide RAs evaluated the current and future industrial land use scenarios.

If the risks from a surrogate site are acceptable, the other sites they represent have lower acceptable risks, and therefore, all the sites present acceptable risks. If the risks at the surrogate site are unacceptable, then target concentrations are estimated for the COPCs and applied at areas exceeding the target concentrations at other sites and consolidated locations for estimating risks to acceptable levels.

Surrogate sites were selected for two Areas, Northeast Open Area and Disposal Area, and are presented in Table 7-2. The selected surrogate site per Area was used for the current and future industrial land use scenario-based risk estimations.

This risk assessment evaluates the risks from exposure to chemicals that have been investigated, identified, and addressed as part of this remedial investigation. However, some areas of Dunn Field, such as the Disposal Area, were identified in the Archives Search Report as areas that may contain buried wastes from historical operations. Some uncertainty is still associated residual buried waste. Therefore, intrusive activities in these areas may pose some physical hazard, especially if the waste is located within the shallow depths (<10 ft) as typically involved during construction type activities.

The groundwater under Dunn Field, as well as offsite, was evaluated for potential future exposures under industrial and residential land use scenarios. The organic contaminant plumes identified were evaluated separately for each plume, whereas chemicals that do not occur as plumes were evaluated based on their site-wide distribution. Total cumulative risks from potential exposure to multiple media are summarized per receptor in the Area-specific sections. Two groundwater contaminant plumes have been identified at Dunn Field The Northeast Plume is associated with the Northeast Open Area (wooded and open areas including likely offsite sources of groundwater contamination), and the West Plume is associated with the Disposal Area (landfill/disposal area) The West Plume is divided into a Northwest Plume and Southwest plume to reflect probable source areas and plume characteristics (direction of flow, COPCs present, etc.).

7.2 Introduction–Risk Assessment Process

In the context of hazardous waste sites, an RA is a systematic approach to assessing the potential effects from exposures to hazardous constituents on human health and the environment. A conceptual site model (CSM) describes the potential source areas of contamination, the secondary sources affected by the primary source areas, and the potential exposure pathways and receptors CSMs are presented as flowchart diagrams in Area-specific Sections 9.0 through 11.0 and for groundwater in Section 15.0.

This subsection presents the general information used in the RA conducted at each Area and surrogate site. The approach used in this RA was discussed with EPA Region IV and TDEC before implementation. The RA has the following four primary components:

- **Identifying COPCs.** In this step, the list of COPCs is developed for further evaluation. COPCs are selected for inclusion on the list based on several factors such as their historical reported use or occurrence at the site, frequency of their detection in the samples, and relative concentrations at which they were detected. The list may be shortened by comparing the relative toxicity to the human health (RBC) values of the various chemicals. A detailed account of this COPC selection is provided in Section 7.3.
- **Conducting an exposure assessment.** In this the potential for a human receptor to come into contact with the COPCs identified is evaluated, taking into consideration current and future land uses at the site. The contaminant migration pathways, potential receptors, and magnitude of exposures to the identified receptors are also described. The results of the exposure assessment provide intake (dose) estimates for the identified potentially complete exposure pathways. These dose estimates are then used in a comparison with the toxicity criteria
- **Conducting a toxicity assessment.** In this step, the toxicity criteria are identified and compared with dose estimates from the exposure assessment. This step often involves the compilation of toxicity factors from EPA databases.
- **Characterizing risk.** In this step, risks and hazard indices (HIs) are estimated using information from the exposure assessment and toxicity assessment. Uncertainties associated with the RA are also identified

For the human health RA at the Northeast Open Area, the Disposal Area, the Stockpile Area, and representative surrogate sites, the above steps were completed following CERCLA procedures and using EPA's *Risk Assessment Guidance (RAGS) for Superfund, Human Health Evaluation Manual, Part A* (USEPA 1989).

As part of the RA, remedial goal options (RGOs) are evaluated for COPCs presenting excessive cumulative risks or HIs in all Areas at Dunn Field, including surrogate sites with each of the three Areas. A preliminary list of RGOs estimated for chemicals commonly present in site soils is included for risk management decisions at Dunn Field (see Section 7.9).

7.3 Identifying COPCs

The COPCs are the chemicals detected in the site media that may be hazardous to human health if exposures were to occur Historical information is useful in selecting the compounds to be expected in the environment of a particular Area. Identifying hazards and selecting COPCs involves several systematic steps, which are covered under data collection and data evaluation in *RAGS* (USEPA, 1989). The data collection and evaluation by medium

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are discussed as part of the "nature and extent" section for each Area. The issues related to QA/QC are identified in Section 5.0. The data used for selecting COPCs were validated in accordance with the DQE. The soil gas data collected to locate a soil sample in the field were not used for quantitative risk assessments, because the data do not meet the required QA/QC criteria However, these data were used qualitatively during RI field activities to locate areas with the highest levels of contamination to reduce uncertainty regarding location of buried waste within Dunn Field.

A list of COPCs was compiled for each Area medium, including surface soil, subsurface soil, surface water, sediments, and groundwater. Consistency was maintained throughout the RI by focusing on chemicals of primary interest. The selection of the chemicals was based on preliminary sampling results defining nature and extent and ecological and human health RAs. Comparing the detected site concentrations from individual samples with a background concentration and health-based screening criteria, COPC lists were developed. These criteria and comparison process components are as follows:

- Background values for all media, which were approved and in some cases modified by the BCT, were included in the background report (CH2M HILL, 1998c). These background values are compared with sample-specific concentrations.
- The human health direct exposure RBCs were selected from EPA Region III RBC tables (October 1998 update); following Region IV guidance, the noncarcinogenic RBC values were divided by a factor of 10 (HI=0.1), and carcinogenic RBC values were set at a risk level of 1 x 10^{-6}
- GWP-based RBC values for soils are default SSLs from USEPA (1996c).
- Site surface soils were screened for exceedances of ecological protection criteria from the latest Region IV ecological guidance document (USEPA, 1998d).
- Groundwater concentration values were compared with the following criteria RBC-based values from the EPA Region III RBC table, MCLs, maximum contaminant level goals (MCLGs); for noncarcinogenic chemicals- the RBC was set at HI=0.1
- Sediments from the site were screened for direct human exposure in a manner similar to that used for surface soils, using the applicable soil RBC values, whereas ecological criteria were selected from the Region IV guidance (USEPA, 1998d).
- Surface water concentration values from the drainage ditches were compared against groundwater criteria for human health protection for potential future unlimited land use and freshwater screening criteria from Region IV for ecological protection (USEPA, 1998d).

Criteria used for comparison are included in the Appendix D - COPC Selection for All Areas and Surrogate Sites as Appendix D-1. A chemical is selected as a COPC if it exceeds background and at least one of the other comparison criteria listed above, indicated by "Yes" in the last column of the tables (see decision tables in Appendix D-2 through D-15). A "No" in that column indicates that it is not a COPC. If values are unavailable for either screening criteria or background, the decision to make a particular compound a COPC is indicated by "a value not available" (N/A). If a constituent is assigned an N/A when a toxicity value is not available, it is included as a COPC for further discussion regarding its frequency of detection (FOD), concentration, and uncertainty associated with not including a quantitative analysis The tables comparing the detected concentrations per analyte for each applicable sample to the background concentration and the human health risk-based and ecological protection-based screening criteria are included in Appendix D. These lists of chemicals with concentrations exceeding comparison criteria in each sample were used in defining the nature and extent of contamination. Separate COPC selection tables were prepared following EPA Region IV guidance (USEPA, 1995e). These tables are included in the Area-specific sections and the surrogate site sections as well as for on and offsite groundwater (see Tables 9-1 through 9-5, Tables 11-1 through 11-5, Tables 13-1 through 13-5, and Tables 15-1 through 15-5). The basis for these COPC selections is similar to the one described above; however, only maximum detected concentrations within an Area and the surrogate site were compared with background and screening criteria. Thus, a constituent was selected as a COPC if it met the following conditions:

- Detected maximum concentration was above the background value (included for further comparisons with RBC values as described below); and
- Chemical concentrations exceeded one of two types of RBC values:
  - The leachability criteria for groundwater protection (GWP/ SSLs)
  - The direct exposure-based RBC value (carcinogens at 10^{-6} level and noncarcinogens at 0 1 HI level).

Table 7-3 presents a master list of COPCs selected by medium across Dunn Field Individual COPCs at the Areas and surrogate sites are presented in the individual Area sections and are listed in Appendix D-2 through D-15. The only COPC that met the above criteria, but was not included as a COPC, is iron. Because of the highly provisional nature of the reference dose for iron, it was not further addressed in the human health RAs. Both environmental samples and field duplicates were included in these comparisons.

Including COPCs that are based on the GWP/SSL criteria for quantitative risk evaluation represents a conservative approach because these chemicals are not direct exposure concerns. Each chemical in every sample was compared with the criteria to ensure that all detected concentrations were considered for nature and extent, while defining the extent of contamination and potential risks associated with the contamination.

The most frequently detected chemicals in groundwater are VOCs and metals While metals were mostly naturally occurring, VOCs were detected at high concentrations in the subsurface soil in the Disposal Area, indicating that the soil may act as a source for VOCs in groundwater. The groundwater COPCs were selected for three groundwater contaminant plumes identified beneath Dunn Field. Select wells from the center of plumes were chosen to represent average and maximum VOC concentrations. The monitoring wells MW-02, MW-03, MW-07, MW-08, MW-10, MW-29, MW-30, MW-31, MW-68, and MW-78, were selected to represent the center of the North Plume. The monitoring wells MW-12, MW-70, MW-73, and MW-75 were selected to represent the center of the Northwest Plume Groundwater wells selected for the Southwest Plume included MW-06, MW-15, MW-57. When multiple rounds of monitoring are available for offsite wells, the maximum concentration is used for COPC selection and an average of the detected concentrations was used as the exposure point concentration.

The groundwater contaminant plume has reached offsite areas downgradient of Dunn Field. Chlorinated solvents are observed in offsite monitoring wells in downgradient locations extending beyond the property boundary of the Disposal and Stockpile Areas Each individual well that is located downgradient from the site and that has detectable contaminant levels was evaluated separately for potential risks and hazards.

There are no surface water bodies within Dunn Field. The data collected from drainage ditches at Sites SDLHA, SDLHB, SWLHA, and SWLHB were included as part of the Northeast Open Area. Sediment and surface water samples collected during historical sampling events were not included in this analysis.

Samples collected from drainage ditches (lined or unlined) were evaluated as sediments and surface water. However, most onsite drainage ditches are wet only during storm events Chemicals detected in the two sediment samples were compared with the soil criteria because there are no human health-based criteria specific to sediment exposures, and this evaluation conservatively selects the COPCs for sediment for protection against human exposures because soil criteria typically assume higher exposures. The surface water concentrations were compared against the drinking water standards or human health-based AWQCs. There is no potable use for surface water at the facility, and this process of selecting COPCs conservatively represents potential human health effects. Even when a chemical exceeded criteria in only a single sample from a site, the chemical was included in the COPC list for further evaluation.

7.4 Overview of Exposure Assessment

7.4.1 Introduction

Exposure assessment is the estimation of the likelihood, magnitude, frequency, duration, and routes of exposure to a chemical. "Exposure" refers to the potential contact of an individual (or receptor) with a chemical Human exposure to chemicals typically is evaluated by estimating the amount of chemical that could come into contact with skin or that could enter the lungs or gastrointestinal tract during a specified period of time. An exposure pathway can be described as the physical course that a COPC takes from the point of release to a receptor. Site history, physical setting, and background are discussed in greater detail in Sections 1.0 and 2.0 and are described briefly below. The potential for human exposure is a function of several factors, as follows·

- **The general geographic, geologic, physical, and meteorological setting of the facility.** These factors influence both the behavior and fate of chemicals released into the environment, as well as the human activity patterns that could lead to direct or indirect contact with affected environmental media. The general characteristics and physical setting of the facility are described in detail in the Area-specific discussions.

- **The onsite operations and activities that have occurred from past uses, such as storage, production, or disposal of chemicals, and the types of chemicals used in such activities.** Much of the historical use of pesticides and storage of Army supplies related to operations is no longer occurring; therefore, the potential is not applicable at most of the sites within Dunn Field.

- **The subsurface buried wastes could continue as potential sources of future contamination, mostly to groundwater.** The continued release of subsurface contamination could occur into the future, continuing to contaminate groundwater and eventually entering uncontaminated areas; however, this potential is reduced due to the groundwater extraction system currently being operated. Another potential release pathway for subsurface contamination is the release of VOCs to ambient air. Also, if the disposal areas were built on, indoor air could be a potential exposure medium. VOC contaminated groundwater migrating under existing or future offsite buildings could result in a potential indoor air exposure pathway.

- **The potential for human exposure relative to the fate and transport of chemicals released to environmental media, as well as human activity patterns.** This includes the pathways by which chemicals released into the environment may migrate or be transported to locations at which contact or exposure could occur. A detailed discussion of the fate and transport of COPCs is presented in Section 16.0 and a brief summary of potential migration pathways is also included in Sections 9 and 11 in the site conceptual models.

- **Human activities that are occurring or could occur under reasonably foreseeable future conditions that could lead to direct or indirect contact with affected media.** Due to the BRAC process under way at Dunn Field, future land use is likely to be light industrial and commercial; however, portions of Dunn Field may be available for unrestricted land use

- **Characteristics of current or hypothetical future human populations at each site that could be exposed to COPCs.**

- **EPCs assumed to be at the high end of the detected concentrations (95 percent UCL on the average) for soils, sediments, surface water, and chemicals in groundwater that do not occur as plumes.** For the COPCs that occur as plumes in groundwater (e.g., CVOCs), the EPCs were the average concentrations in wells within the central area of the contaminant plume.

To identify potentially complete exposure pathways at Dunn Field, a conceptual exposure model was developed for the three Areas and the corresponding surrogate sites. A conceptual exposure model presents an overview of site conditions, potential contaminant migration pathways, and exposure pathways to potential receptors. The potential contaminant migration pathways are those by which a contaminant could migrate through various media. The exposure pathways represent the mechanism by which a contaminant could reach a potential receptor Both current and future conditions are evaluated in the conceptual exposure model. Chemical intakes and associated risks have been quantified for all exposure pathways considered potentially complete. This section describes the methods used to evaluate the potential for human exposure to COPCs originating from soil and groundwater at Dunn Field and involves the following steps:

- Developing a CSM;
- Estimating EPCs; and
- Quantifying chemical intakes for each potential exposure pathway

7.4.2 Developing a CSM

A CSM presents an overview of site conditions, potential contaminant migration pathways, and exposure pathways to potential receptors The site conditions include both current and future conditions. The potential contaminant migration pathways are those by which a contaminant could migrate through various media. The exposure pathways represent the mechanism by which a contaminant could reach a potential receptor. The CSMs presented in each Area-specific RA section were formulated using professional judgment, but relied heavily onsite characterization data, including information on contaminant sources, release mechanisms, routes of migration, potential exposure points, potential routes of exposure, and potential receptor groups associated with the site.

7.4.2.1 Elements of an Exposure Pathway

An exposure pathway may be described as the physical course that a COPC takes from the point of release to a receptor. Chemical intake, or the route of exposure, is the means by which a COPC enters a receptor. To be complete, an exposure pathway must include all of the following components:

- A source;
- A mechanism of a chemical release and transport;
- An environmental transport medium;
- An exposure point;
- An exposure route; and
- A receptor or exposed population.

If one or more of these components is absent, then an exposure pathway is considered incomplete and, by definition, there is no risk or hazard. In some cases, a receptor may contact a source directly, limiting the release and transport pathways It should be noted, however, that not all exposure scenarios and receptor groups are relevant to all sites. A site-specific exposure assessment and conceptual exposure model are presented for each Area and representative surrogate site.

7.4.2.2 Release Mechanisms

There are four primary release mechanisms that serve to transport COPCs through environmental media to secondary sources:

- Infiltration, percolation, and leaching (from soil to groundwater);

- Spills, leaks, and surface application (to surface and subsurface soil);

- Volatilization and release to indoor and ambient air from subsurface CVOC contamination; and

- Surface runoff (to surface water and sediment in ponds and ditches).

There are three secondary release mechanisms that serve to transport COPCs through environmental media to potential receptors·

- Downgradient off site flow of shallow groundwater;

- Volatilization and release to indoor and ambient air from shallow groundwater CVOC contamination in the on site and offsite areas; and
- Wind or mechanical erosion (particulate emissions to ambient air) to on site and off site areas

7.4.2.3 Potentially Exposed Populations

The Memphis Depot currently is an inactive facility. Likely potential receptors at the facility include a limited number of personnel retained to supervise the Dunn Field property, mow the grounds, establish grass cover in previously denuded areas of Dunn Field, and maintain the groundwater extraction system Maintenance workers are likely to continue to maintain the property to prevent overgrowth. All the fluorspar and bauxite piles have been removed from the southeast corner of the Stockpile Area of Dunn Field.

Dunn Field property is currently zoned for light industrial and recreational land use (Northeast Open Area) and is likely to remain so in the future. The wooded area in the northeast is likely to remain recreational area with amenities for picnics.

Potential current exposures include onsite workers who may come into contact with surface media while performing routine occupational duties at the facility Several categories of onsite workers were identified on the basis of their specific job responsibilities, the locations where they may work, and the environmental media they may contact.

No unusually sensitive subpopulations were identified within the receptor groups considered relevant for surface media exposures from onsite areas of Dunn Field. Hypothetical future exposure scenarios that were considered in the analysis include continued industrial and commercial occupational activities, residential development, and recreational use of wooded areas. Such hypothetical future exposures also include evaluations of exposure of sensitive populations (e.g., pregnant workers) to on site lead, following EPA guidance (EPA, 1996a)

The groundwater at the site is found to have a CVOC plume, part of which has migrated to off site areas. A portion of the plume that extends beyond the property boundary of Dunn Field has migrated under some of the nearby residences. There are no direct exposures to these residents at the present time, as the residents are supplied with city drinking water. However, indirect exposure to VOCs reaching the surface through the soil column at low levels could constitute a potentially complete exposure pathway Potential off site resident's exposure through inhalation and ingestion is assessed as part of the off site contaminant plume risk evaluation, and results are included in Section 15

Dunn Field consists of mostly open areas with some off-site, adjacent wooded areas. A wooded area is adjacent to the residential areas in the off-property boundary areas, and is likely to be used as picnicking grounds and a park for local residents when Dunn Field is open for leasing and public use. The stockpiles of mineral ores have been removed, and the soils have been seeded for grass growth. On the basis of the planned future development, future receptors at the site are expected to be maintenance and industrial workers, and future recreational users of the wooded area in the Northeast Open Area. The Stockpile Area is likely to be used for light industrial and commercial purposes. The generic industrial/commercial worker's exposure scenario is the most conservative of the potential

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industrial/commercial exposure scenarios and, therefore, will be used as the basis of site management decisions related to industrial uses

As part of the property leasing, some of the areas could be modified for the installation of new utilities and for landscaping purposes. Workers involved in these activities are likely to be exposed to the contamination within the area.

The *Memphis Depot Redevelopment Plan* prepared for the Memphis Depot Redevelopment Agency by Pathfinders in May 1997 indicated future land use for majority of Dunn Field (including the Disposal Area and Stockpile Area) will be industrial, with development beginning beyond 2007. The Northeast Open Area is likely to be available for public use as open space/Public Park. This public access area of Dunn Field may be considered for other unrestricted uses in the future, such as residential development, although such future use is not indicated in the redevelopment plan. This evaluation will include a future recreational and residential use related exposure evaluations for site management purposes.

Hypothetical future exposure scenarios that were considered to represent these future site uses include utility workers involved in future redevelopment, recreational receptors in the public open space, industrial/commercial workers in the industrial areas, and residential exposures for all areas, although it is more applicable to the Northeast Open Area than the other portions of Dunn Field

The following subsections describe potential current and future receptors at Dunn Field. All possible exposure scenarios were considered in this exposure assessment. In the interest of efficiency in providing adequate information for the risk management decisions, only the conservative representative scenarios were quantified for risk estimations The remaining exposure scenarios are addressed qualitatively in this report. Appendix E presents a comparison of each potential receptor with the selected representative exposure scenarios to ensure that selected exposure scenarios are protective of all potential current and future exposure receptors.

Tables 7-4a, 7-4b, and 7-4c summarize exposure assumptions for selected exposure scenarios. Exposure assumptions used to calculate intake estimates typically are upperbound or reasonable maximum exposure (RME) values; therefore, the results of this analysis should be considered a conservative estimate of the potential for human exposure to facility-related COPCs.

Current/Immediate Future Land Use: Maintenance Worker. The *Memphis Depot Redevelopment Plan* (The Pathfinders et al., 1997) provides the basic premise for site future use. Onsite maintenance workers include current Dunn Field employees and contractors who are involved in the general maintenance of facility property, including maintenance activities in ditches and grassy areas. Routine activities may include a variety of tasks at any given site, including lawn mowing and upkeep of property.

Based on these occupational duties, it is assumed that the maintenance worker would have the potential for direct or indirect contact with all of the media except subsurface soils (soils more than 1 foot bgs). Maintenance activities undertaken at a site could involve the physical disturbance of surface soils, resulting in the generation of dust particles from soils contaminated with metals, pesticides, and SVOCs. Additionally, volatile COPCs in surface and subsurface soils may become air-borne as vapors and could be inhaled by outdoor workers. There are no buildings within the Disposal Area at the present time. Subsurface

VOCs are not a concern in the other two areas . Thus, indoor air exposure pathways are incomplete under current conditions.

Direct contact (incidental ingestion and dermal contact) with affected surface soils also may occur. Activities in drainage ditches also could result in direct contact with and incidental ingestion of surface water and sediments, although it is considered unlikely that these would occur during most routine maintenance activities. Depending on the COPCs selected for a site, exposure could occur through one or more of the following routes incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.

Under this scenario, based on best professional judgment, it is assumed that contact with affected surface soil would occur 8 hours/day for 50 working days/year (approximately once a week) at a given site over the course of an occupational lifetime (25 years). Contact with ditch sediment and surface water may occur 2 hours/day for 12 days/year during an occupational lifetime.

Future Land Use: Utility Worker. Future workers at Dunn Field will include utility workers who may come into contact with surface and subsurface soils (zero to 10 feet bgs) during site redevelopment. Routine utility maintenance workers are likely to participate in excavation, maintenance, and upkeep activities for underground utilities and pipelines. It is assumed that utility workers, while performing these duties, could be subject to exposure through direct contact with surface and subsurface soils via incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions. Contact with subsurface soils is assumed to occur 8 hours/day, twice per month (24 days/year) over the course of an occupational lifetime.

Future Land Use: Industrial/Commercial Worker. In accordance with the *Memphis Depot Redevelopment Plan* (The Pathfinders et al., 1997), future development at Dunn Field will include commercial/light industrial facilities. Under this exposure scenario, it is assumed that the site's physical characteristics would be unchanged and that worker activities could result in exposure to environmental media (surface soil, groundwater, surface water, and sediment) via direct contact and inhalation of particulate and volatile emissions from surface soil. It is also assumed that exposure may occur for 8 hours/workday for soil and 2 hours/day for ditch sediment and surface water each for 250 days/year over an occupational lifetime of 25 years Potential exposure to potable groundwater is assumed to occur 250 days/year over an occupational lifetime. It is assumed that an adult worker will ingest 1 liter/day. Inhalation intake for VOCs is assumed to be equal to ingestion intake. The dermal intake assumes hands, feet, and face washed for about 10 minutes during the workday, based on professional judgment.

The volatile COPCs in surface and subsurface soils may become air-borne as vapors and could be inhaled by outdoor workers, as well as indoor workers. There are no buildings within the Disposal Area at the present time. Thus, indoor air exposure pathways are incomplete. In the future, if the site is to be re-developed with buildings for commercial/light industrial purposes, indoor air VOCs could become a complete exposure pathway for the future workers Volatile emissions from subsurface media (soil or groundwater) to indoor air were estimated using the Johnson-Ettinger subsurface vapor intrusion model provided by EPA (1997d) Conservative input assumptions were used and site-specific data included where appropriate and available. Results of the estimates are included in the Northeast Open Area (Section 9 0) and the Disposal Area (Section 11.0) risk assessments.

Future Land Use: Residential. there are currently no plans to develop Dunn Field for future residential land use, and unrestricted land use scenario is considered to support site management decisions. Both adult and child receptors were evaluated for this exposure scenario. Residential receptors could come into contact with COPCs in surface soil via direct contact and inhalation of particulate emissions from surface soil. The soil ingestion rate is 114 (mg-year/Kg-day), which is age-adjusted to account for a higher ingestion rate among children. Children are assumed to ingest 200 mg/day for 6 years of their lives, with a body weight of 15 kg. It is assumed that skin contact with backyard soils in the contaminated areas could occur for 4 hours/day for 350 days/year, over 30- and 6-year residence times for adults and children, respectively. All residential adult exposure carcinogenic estimates were age-adjusted for 6 years as a child and 24 years as an adult. Potential exposure to potable groundwater is assumed to occur 350 days/year for 30 years and 6 years for adults and children, respectively. It is assumed that an adult and child will ingest 2 and 1 liters/day, respectively. For VOC intake from potable groundwater, inhalation intake is assumed to be equal to ingestion intake.

Future Land Use: Recreational. Redevelopment of Dunn Field may result in a wooded area kept for future outdoor recreational use. Under this land use, future recreational users may come in contact with surface soils within the northeast wooded area, and surface water and sediment in the adjacent ditches via direct contact. Exposures of future park visitors are assumed to occur once a week for half a day. It is assumed that recreational activities occur 45 days/year for 4 hours/day, over a 30-year exposure period for adults, a 10-year exposure period for youths, and a 6-year exposure period for children

Current/Future Offsite Residential: Groundwater samples collected from offsite wells located west of Dunn Field were evaluated for residential exposure. Groundwater exposure through potable use was evaluated for the COPCs identified in these groundwater samples Ingestion, dermal contact and inhalation exposure routes were included for risk estimations. Potential exposure to potable groundwater is assumed to occur 350 days/year for 30 years and 6 years for adults and children, respectively. It is assumed that an adult and child will ingest 2 and 1 liters/day, respectively Dermal exposure is assumed at a 10 minute shower, once daily, with exposure to the entire surface body area. For VOC intake, inhalation intake is assumed to be equal to ingestion intake during potable use. Additionally, subsurface volatile emissions from groundwater to indoor air was also evaluated for residential scenario.

7.4.2.4 Summary of Potentially Exposed Populations

Table 7-5 summarizes potentially exposed populations for each area of Dunn Field. As noted previously, all potential pathways were identified based on site-specific information When more than one type of worker exposure population was identified at a surrogate site or Area, the most conservative one was quantified as representative of the other receptors. Site-specific land use identified was included for risk estimations. For example, possible recreational use of the Northeast Open Area was included for risk estimations.

At Dunn Field, there exists a possibility that a maintenance or other type of worker could be exposed to multiple exposure units due to occupational activities. For example, a worker could have duties in the wooded Northeast Open Area, or Main Installation Golf Course, etc. that would extend across multiple exposure units The evaluation presented herein assumes that a receptor spends all of their time within a given exposure unit. Such a worker located in the exposure unit with the highest risk would be considered representative of a worker that spends only part of their time in that unit. Thus, the worker with the highest risk could be reasonably assumed to be protective of workers that spend time in multiple exposure units

7.4.3 Quantitation of Potentially Complete Exposure Pathways

Potentially complete exposure pathways were identified on an Area-specific basis and are discussed in the Area-specific sections.

7.4.3.1 Exposure Point Concentration

Chemical intakes were estimated, where possible, from direct chemical measurements in the soil, groundwater, surface water, and sediments. The upperbound estimate on the mean concentration was used for the EPC. For solid media, these EPCs were estimated as the upper confidence limit at the 95th percentile on the mean (UCL 95 percent), calculated following EPA guidance In estimating UCL concentrations, a value of one-half the sample quantitation limit (SQL) was assumed for non-detects. These estimates were performed using the underlying data distributions (normal versus lognormal) according to the EPA guidance. The lower of the maximum detected concentrations and the UCL 95 percent estimate was selected as the EPC. The UCL 95 percent calculation methodology is summarized in Appendix F. Individual EPCs calculated by this method are included in each of the Area and surrogate site RA sections, as well as in Appendix F Field duplicates were not included in these calculations, so results are for environmental samples only.

For volatile organic COPCs in groundwater, instead of a statistical estimate as the EPC value, average concentrations from the wells within the center of a contaminant plume were selected as the EPCs. For constituents that do not typically exhibit plume behavior (e.g., inorganic chemicals) and are not identified with any site-related activities, but are detected throughout the site, the UCL 95 percent estimate of onsite Dunn Field monitoring wells was used as the EPC Although groundwater is not currently used, future potential use was evaluated.

The EPC values for future industrial, recreational, and residential receptors are calculated for the surrogate site, which is a 1-acrecircular area around the maximum PRE risk ratio sample (see Table 7-2). Samples from within the 1-acre circle were used to estimate the UCL95 percent, which is the EPC.

7.4.3.2 Intake Estimates

Chronic exposure (that is, chronic daily intake) is expressed in terms of milligrams of chemicals contacting the body/kilogram body weight each/day (mg/kg-day). Appendix G presents medium-specific equations that were used to estimate exposure for potential receptors at Dunn Field. For the exposure routes evaluated, the following generic equation was used:

$$\text{Exposure}\left({}^{\text{mg}}\!/_{\text{kg body weight-day}}\right)=\frac{\text{C}\times\text{IR}\times\text{EF}\times\text{ED}}{\text{BW}\times\text{AT}}$$

where:

C = concentration of chemical (e.g., mg/kg soil)
IR = media intake rate (e.g, kg soil ingested/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (period over which exposure is averaged, in days)

An example calculation is provided in Appendix G before the scenario-specific calculations.

7.4.3.3 Exposure Routes

Ingestion. Ingestion exposures to the surface soil, sediment, and surface water were evaluated for all of the receptors and media identified at each site. Ingestion intake by a worker for soil or sediment was assumed to be 50 mg/day, a default exposure factor obtained from EPA guidance (USEPA, 1997c; also see Tables 7-4a through Table 7-4c for detailed references) Incidental ingestion of soil by a utility worker was assumed to be 100 mg/day. Residential intake of surface soil or sediment was assumed to be 100 mg/day for adults and 200 mg/day for children. Incidental ingestion of surface water was assumed to be 10 milliliters/day (mL/day) for recreational wading and 10 mL/day for workers, both of which are default factors. The groundwater ingestion rate was 2 liters/day (L/day) for adults and 1 L/day for children and workers. A list of exposure factors is included in Appendix H and Tables 7-4a through 7-4c.

Dermal Contact. Skin surface area available for contact was estimated based on professional judgment using current practice from available guidance. The applicable surface areas for the corresponding body parts for various scenarios are listed in Appendix H. Separate tables are provided for the various surface area estimates per receptor. The surface areas used were selected from the *Exposure Factors Handbook* (EPA, 1997c) The soil adherence factors were estimated using body-part and activity-specific data provided in the *Exposure Factors Handbook* (EPA, 1997c). The UCL 90 percent values for adsorption factors for the receptor group also were estimated from the geometric mean and standard deviation values provided in the *Exposure Factors Handbook* (EPA, 1997c) for various exposure populations listed. The closest possible similar receptor's adsorption factor was selected as the representative for the exposure population identified at Dunn Field. Appendix H summarizes the estimated UCL 90 percent levels for the soil adherence factors. The skin permeability factors for various chemicals and chemical groups are the dermal absorption factors (ABS) from soil and sediments and permeability constants (PC) from water. These factors represent values for the absorption of the chemical across the skin from soil and water media, respectively. The chemical-specific values were adapted from technical literature. When a chemical-specific value was not available, default ABS values provided in Region IV guidance were used (EPA, 1995e); these values are summarized in Appendix H. The estimated dermal dose was compared with the calculated dermal toxicity factors to estimate the risks and HIs.

Inhalation. Inhalation of dust was estimated for both current and future workers, using the default inhalation rate of 20 cubic meters/8-hour workday (m^3/8-hr workday). For the smaller sites, the time spent within the site is expected to be shorter; thus, the resulting inhalation from the site was modified by the fraction of the workday spent in the contaminated area. For example, if a worker spends 4 hours (half of a workday) in the contaminated area, of the total inhaled air per workday of 20 m^3, only half (10 m^3) is assumed to be from a contaminated area The dust inhalation rate was estimated using the default particulate emission factor (PEF) of 1.32 x 10^{+9} cubic meters per kilogram (m^3/kg), and the dose was estimated using the soil RME concentrations and inhalation rate estimates. Inhalation of the VOC was estimated using the volatile emission factors for soil volatilization into the ambient air. These volatilization factors assume an area of contamination and size of the exposure unit for either an occupational worker or a resident. The volatilization factors were adapted from the Florida Department of Environmental Protection's (FDEP) Ch 62-777 rule, Table 5, 1999. Further details about these exposure factors are included in Appendix H.

Volatile COPC inhalation intake from groundwater was assumed to be equal to that of ingestion intake, following EPA Region IV guidance (EPA, 1995e). Thus, in the groundwater risk estimations, the oral dose from groundwater is doubled and this dose is compared with inhalation toxicity factors.

Inhalation intake of VOCs in indoor air from subsurface vapor intrusion was estimated for future onsite industrial workers, future onsite residents, and future offsite residents. Inhalation rates for workers were assumed to be 6.6 m3/workday. This assumes a 20 m3/day inhalation rate adjusted by an eight-hour workday ((20 m3/day)/24 h * 8 h = 6.6 m3/workday). Inhalation rates for residential adults and children were standard EPA default inhalation rates assumed to be 20 and 15 m3/day and assumes that residents spend all day indoors, a conservative assumption All other exposure factors are EPA recommended default values and are listed in Appendix H

7.5 Overview of Toxicity Assessment

This toxicity assessment evaluates the relationship between the magnitude of exposure to a chemical at Dunn Field and the likelihood of adverse health effects to potentially exposed populations. A numerical estimate of the increased likelihood of adverse effects associated with chemical exposure is provided where possible (EPA, 1989).

Toxicity assessment involves two steps identifying the hazard and assessing the dose-response. Identifying the hazard is the process of determining the potential adverse effects from exposure to the chemical along with the type of health effect involved. Assessing dose-response is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the contaminant administered or received and the incidence of adverse health effects in the exposed population. Toxicity values, such as reference doses (RfDs) and slope factors (SFs), are derived by EPA from quantitative toxicological studies establishing the dose-response relationship.

For the toxicity assessment, chemicals can be divided into two broad groups based on their effects on human health. noncarcinogens and carcinogens. This classification was selected because health risks are calculated quite differently for carcinogenic and noncarcinogenic effects, and separate toxicity values have been developed for each Carcinogens are those chemicals suspected of causing cancer following exposure; noncarcinogenic effects cover a wide variety of systemic effects, such as liver toxicity and developmental effects Some chemicals (e g., arsenic) are capable of eliciting both carcinogenic and noncarcinogenic responses; therefore, chemicals were evaluated for both carcinogenic and systemic (noncarcinogenic) effects.

Toxicity values used in the RA were obtained from these sources:

- The Integrated Risk Information System (IRIS), a database available through the EPA Environmental Criteria and Assessments Office (ECAO) in Cincinnati, Ohio IRIS, prepared and maintained by EPA, is an electronic database containing health risk and EPA regulatory information regarding specific chemicals (USEPA, 1999).
- The Health Effects Assessment Summary Tables (HEAST), provided by the EPA Office of Solid Waste and Emergency Response (OSWER) (USEPA, 1997a). HEAST compiles toxicity values published in various health effects documents issued by EPA.

The primary source of toxicity values was EPA's IRIS database. If a toxicity value was not available from IRIS, then the latest available HEAST was used. For some chemicals, no toxicity value from either IRIS or HEAST was available; as a result, toxicity values provided by EPA's Superfund Technical Support Center as provisional RfDs were used (see Appendix I).

The magnitude of toxicity of a chemical depends on the dose to a receptor. "Dose" refers to exposure to a chemical concentration over a specified period of time. Exposures are generally classified as acute (typically less than 2 weeks), subchronic (about 2 weeks to 7 years), or chronic (usually 7 years to a lifetime). This RA specifically addresses chronic exposure Acute exposures and risks are evaluated only when chronic exposure estimates pose a high risk. A dose-response describes the relationship between the degree of exposure (the dose) and the incidence of the toxic effect (the response) in the exposed population. This dose-response information is used by EPA to establish toxicity values for particular chemicals, as described in the following subsections.

7.5.1 Toxicity Information for Carcinogenic Effects

For cancer effects, EPA has developed a carcinogen classification system (USEPA, 1986b) using a weight-of-evidence (WoE) approach to classify the likelihood that a chemical is a human carcinogen. Information considered in developing the classification includes human studies of the association between cancer incidence and exposure, as well as long-term animal studies under controlled laboratory conditions. Other supporting evidence considered includes short-term tests for genotoxicity, metabolic and pharmacokinetics properties, toxicological effects other than cancer, structure-activity relationships, and physical and chemical properties of the chemical. Table 7-6 describes the WoE classification. The carcinogenicity grouping of the COPCs identified is presented in Table 7-7. Currently, EPA is considering replacing the six alphanumeric categories with three descriptors for classifying human carcinogenic potential ("known/likely," "cannot be determined," and "not likely") (USEPA, 1995e).

The dose-response relationship for cancer effects is expressed as a cancer slope factor (CSF) that converts estimated exposures directly to incremental lifetime cancer risk. SFs are presented in units of risk per level of exposure (or intake) The data used for estimating the dose-response relationship are taken from lifetime animal studies or human occupational or epidemiological studies where excess cancer risk has been associated with exposure to the chemical. However, because risk at low intake levels cannot be directly measured in animal or human epidemiological studies, a number of mathematical models and procedures have been developed to extrapolate from the high doses used in the studies to the low doses typically associated with environmental exposures.

EPA assumes linearity at low doses and uses the linearized multistage procedure when uncertainty exists concerning the mechanism of action of a carcinogen and when information suggesting nonlinearity is absent. Thus, it is assumed that if a cancer response occurs at the dose levels used in the study, then there is some probability that a response will occur at all lower exposure levels (i.e., a dose-response relationship with no threshold is assumed). Moreover, the dose-response slope chosen is usually the UCL on the dose-response curve observed in the laboratory studies. As a result, uncertainty and conservatism are built in to EPA's risk extrapolation approach. EPA has stated that cancer risks estimated by this method will produce estimates that "provide a rough but plausible upper limit of risk." In other words, it is not likely that the true risk would be much more than the estimated risk, but "the true value of the risk is unknown and may be as low as zero" (USEPA, 1986b). Table 7-7 lists the CSFs used in this assessment.

7.5.2 Toxicity Information for Noncarcinogenic Effects

For noncarcinogenic effects, toxicity values are derived based on the critical toxic endpoint (i. e., the most sensitive adverse effect following exposure). The COPCs detected at Dunn Field during the RI that were identified as having documented systemic effects are listed in Table 7-8, along with their critical toxic effects. The toxicity value describing the dose-response relationship for noncancer effects is the RfD. For most noncarcinogenic effects, the body's protective mechanisms must be overcome before an adverse effect is manifested. Once these protective mechanisms, or thresholds, are exceeded, adverse health effects may occur. Therefore, EPA attempts to identify the upperbound of this tolerance range (i.e , maximum subthreshold level) in developing noncancer toxicity values. The apparent toxic threshold value is used, in conjunction with uncertainty factors based on the strength of the toxicological evidence by EPA to derive an RfD. EPA (1989) defines an RfD as follows:

> *In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfD is generally expressed in units of milligram per kilogram of body weight each day (mg/kg-day).*

Various types of RfDs are available from EPA, depending on the exposure route, the length of exposure, and the concern for critical (e.g , developmental) effects. In this RA, available chronic RfDs were used for the oral and inhalation exposure routes. Because no toxicity values specific to skin contact have been derived by EPA, oral RfDs were used for the dermal route The RfDs for the COPCs identified at Dunn Field are listed in Table 7-8.

7.5.3 Lead

Lead is the only COPC that does not have toxicity factors for quantitative risk or HI evaluation; therefore, lead concentrations were screened against the screening criteria for residential and industrial receptors. Sites with elevated lead concentrations (in exceedance of residential or industrial screening criteria) were evaluated as a special case using EPA's *Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (EPA, 1996a). Table 7-16 presents the adult lead exposure model for target concentration estimates for the Depot; this model is also used for Dunn Field Elevated lead concentrations were observed

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in the old Firing Range area, where the lead could be from spent bullet casings strewn across the area around Sites 60/85

7.5.4 Summary of Toxicity Information

The most frequently encountered COPCs at Dunn Field sites are listed in Table 7-3, and lists of toxicity factors are presented in Tables 7-7 and 7-8. Based on the contribution to the cumulative risk at each of the sites, chemicals resulting in risks greater than one in one million, or an HI above 1.0, are referred to as "risk drivers." The toxicity profiles for chemicals for which provisional toxicity values are used can typically be found on the Internet at http://www.epa.gov/iris/subst/index.html. A brief toxicity profile for COPCs at Dunn Field is included in Appendix I.

7.5.5 Uncertainties Related to Toxicity Information

Uncertainties in toxicological data can influence the reliability of risk management decisions. The toxicity values used for quantifying risk in this assessment have varying levels of confidence that affect the usefulness of the resulting risk estimates. Sources of uncertainty associated with toxicity values used in the toxicity assessment include the following:

- Extrapolation of dose-response data derived from high dose exposures to adverse health effects that may occur at the low levels present in the environment;
- Extrapolation of dose-response data derived from short-term tests to predict effects of chronic exposures;
- Extrapolation of dose-response data derived from animal studies to predict effects in humans, and
- Extrapolation of dose-response data from homogeneous populations to predict effects in the general population

The levels of uncertainty for RfDs for Dunn Field COPCs, established by EPA and based on uncertainty factors and modifying factors, are listed in Table 7-8. For those chemicals suspected of resulting in cancer effects, uncertainty is in part expressed in terms of EPA's WoE classification (Table 7-7). As noted previously, models that extrapolate toxicological data between species, doses, and/or exposure duration also contribute to the models themselves uncertainty.

Toxicity equivalent factors (TEFs), shown in Table 7-9, were used for a carcinogenic RA of PAHs (USEPA, 1989, 1993). TEFs are used to account for the carcinogenic potency of PAHs, defined by BaP Because the available data are unsuitable for calculating CSFs for any carcinogenic PAHs, TEFs are multiplied by their respective CSFs to calculate an adjusted CSF for use in estimating the risks from exposure to the other carcinogens

Dermal exposures are different from oral exposures in that (1) not all of the chemical that comes into contact with a person's skin travels across the various layers of epidermal tissue, as indicated by a dermal absorption factor, and (2) the toxic effects produced from this route of exposure may not be the same as when the chemical is ingested. Adjustments of oral toxicity values were considered to estimate the effects of dermally available chemicals.

Recommended gastrointestinal absorption values from Bast and Borges (1996) were used to adjust oral toxicity values when appropriate. These values are provided in Table 7-10. Such adjustments may result in an underestimate or overestimate of risks, depending on whether a chemical is more or less toxic by the dermal route versus ingestion.

The dermal RfD is calculated as follows:

$$RfD_{dermal} = RfD_{oral} \text{ X } ABS_{GI}$$

$$SF_{dermal} = SF_{oral}/ABS_{GI}$$

The dermal SF and RfD values calculated are included in Tables 7-7 and 7-8.

7.6 Overview of Risk Characterization

7.6.1 Introduction

The risk characterization process combines the results of the exposure and toxicity assessments to yield estimates of excess lifetime cancer risks (ELCRs) for carcinogenic COPCs and a cumulative HI for noncarcinogenic COPCs. For this assessment, cancer risks and noncarcinogenic health hazards were calculated for the three Areas (including groundwater) and two three surrogate sites to facilitate remedial decisions. Consistent with the exposure assessment results, cumulative ELCRs and HIs were calculated for each COPC as a summation of media-specific results for each receptor.

For the purposes of regulatory decision-making at contaminated sites, EPA uses an acceptable risk range of 10^{-4} to 10^{-6} (one chance in 10,000 to one chance in 1,000,000). Typically, results falling within or below this range are considered a reasonable basis for NFA, depending on the degree of conservatism and uncertainty associated with the estimates. Likewise, a total HI value of 1 0 or less is typically considered as not requiring further evaluation in the RI, and, vice versa, any exceedance of a 1.0 may be considered for further evaluation. The remedial goal options (RGOs) are calculated for noncarcinogenic chemicals with target HIs ranging between 0.1 and 3, to provide risk management options. Therefore, for risk characterization, any HI value equal to or less than 1 0 will be considered to present acceptable hazard level, where as any HI greater than 1 0 will be recommended for future consideration during site management decisions. The conservatism and uncertainties inherent in the analysis again are considered when interpreting the results.

7.6.2 Carcinogenic Risk Calculation for Carcinogens

ELCR is defined as the unitless upperbound probability of the individual receptor developing cancer over a lifetime under the specified exposure conditions This risk is above the background lifetime cancer risk of approximately 1 in 3. The ELCR is derived for each carcinogenic COPC as follows·

$$ELCR = CDI * CSF$$

Where:

CDI = Route- and media-specific cumulative daily intake (dose) of a COPC (mg/kg/day)

CSF = Route-specific CSF $(mg/kg/day)^{-1}$ for the COPC

Summing all of the route- and media-specific ELCR estimates provides a total ELCR for a given COPC for each receptor. The summation of total ELCRs for all of the COPCs provides the total ELCR for the receptor at a site.

7.6.3 Hazard Index Calculation for Noncarcinogens

The upperbound noncarcinogenic health hazard is estimated initially by calculating HQs on a route- and media-specific basis for each COPC for each receptor, as follows:

HQ = CDI/RfD

Where:

CDI = Route- and media-specific cumulative daily intake (dose) of a COPC (mg/kg/day)

RfD = Route-specific reference dose (mg/kg/day) (daily intake considered unlikely to cause adverse effects over a lifetime of exposure) for the COPC

Summing the route- and media-specific HQs provides an estimate of a total HI for a given COPC for each receptor The summation of HIs across COPCs provides a total HI for the receptor at the site This procedure ignores toxicological endpoints and mechanisms of action as the basis for estimating the noncarcinogenic hazard from multi-contaminant exposure, thus providing a highly conservative estimate of potential effects.

The results of the risk and noncarcinogenic hazard calculations are provided on a media-, receptor-, and route-specific basis for each site in Appendix G. Cancer risks and HIs are summarized in tabular format for each site in the respective Area-specific sections.

Generic factors contributing to the uncertainty and conservatism inherent in the risk characterization results are presented in Table 7-11. Any additional unique, site-specific factors are presented with the discussion of the results for that site

7.7 Uncertainty and Conservatism in Risk Assessment

Numerous sources of uncertainty are inherent in the RA, due to the assumptions made. These generic uncertainty factors (and their relative effect on the risks and noncarcinogenic health hazards estimated for each site) are summarized in Table 7-11 and described qualitatively in further detail below. In the absence of measured data for exposures, risk calculations include conservative assumptions. Thus, when the actual situation is not known (uncertain), bias toward conservatism was used (e.g , future exposure scenarios and pathways, frequency of grass mowing, duration of time spent in a small area, exposure concentrations). The uncertainties associated with toxicity factors estimated by EPA include a bias to be conservative in RfD and CSF estimations

7.7.1 Uncertainties Associated with Analyzing Data, Selecting COPCs, and Deriving EPCs

Analytical data were compiled to characterize the nature and extent of contamination to ensure that locations where the highest chemical concentrations would be expected were sampled Sampling stations were located in areas with suspected contamination or highest site use (and thus possible contamination) to provide conservative estimates of site contamination. It is likely, therefore, that data sets for each site may be biased toward locations with the highest concentrations, or "hot spots," and under-representative of lower-concentration or uncontaminated areas.

Maximum measured concentrations of each analyte were used as the basis to compare background or risk-based criteria for the purpose of selecting COPCs. This method has the potential to include areas that might not actually present a risk

Chemical-specific, risk-based criteria were developed to compare measured concentrations to select COPCs. These values are based on the assumption of multi-pathway, residential exposure conditions As a result, the media-specific concentrations derived using such an approach tend to be low (highly health-protective). Exceedances of these criteria and the inclusion of an analyte as a COPC may represent an overestimate of exposure, particularly for the occupationally related scenarios included in the analysis. Also, the COPC selection approach for surface and subsurface soil includes criteria protective against soil-to-groundwater migration. Some of the chemicals exceeding these leachability-based values are lower than direct-exposure-based values (e.g., most CVOCs, dieldrin).

The EPCs for the surrogate sites include data collected from the individual site. The EPC was estimated using one-half the detection limit value for all nondetect values, including those samples with elevated reporting limits because of matrix interference. This approach tends to overestimate average or upper 95 UCL values. The EPCs selected for a COPC at a given site were the lower of two values. the upper 95 UCL or maximum measured concentration. Either concentration is likely to significantly over-represent likely media concentrations across the site. Moreover, no consideration was given to natural attenuation or degradation processes over the time frames reflected in the assumed exposure duration for the various receptor groups. This approach tends to result in uncertainty, biased toward being conservative regarding exposure concentration estimates

Most of the surface soil data were collected from zero to 1 ft and only rarely from deeper than 1 ft The EPCs for mixed soils, evaluated for a utility worker exposure, generally were estimated on the basis of all of the data points collected from surface to a depth to water or to 10 ft bgs Because construction and excavation activities associated with contact with subsurface soils typically occur at depths less than 10 ft bgs, including data for deeper samples may have resulted in added uncertainty, depending on the data set for a given site.

The samples collected and analyzed for surface water were unfiltered samples, which could have included contaminant mass adsorbed to suspended sediments. Such samples over-represent dissolved contaminant concentrations, the fraction that is most bioavailable to receptors. The use of unfiltered data as the basis for the derivation of surface water EPCs represents uncertainty biased toward conservatism

The EPCs for VOCs in the subsurface assume volatilization at steady state without accounting for source depletion over time. This introduces additional conservatism into the intake and risk estimates.

7.7.2 Uncertainties Associated with Toxicity Analysis

A significant source of uncertainty pertains to the use of EPA-sanctioned toxicity criteria for each COPC (RfDs and CSFs). In some cases, route-specific criteria are unavailable for a contaminant, thus excluding it from the total cumulative ELCR or HI estimated for a receptor group at a given site. In most instances, oral toxicity factors are used for dermal dose estimates using adjustments based on the absorption difference between the skin and the digestive tract. The extrapolation methodology used by EPA in the toxicity value derivation yields conservative toxicity criteria. For example, the assumed SF for carcinogens typically is the UCL 95 percent of the slope of the "best fit" dose-response curve from one animal study, assuming low-dose linearity and a zero y-intercept. Statistically, the value adopted for this CSF is likely to be nearly two orders of magnitude lower than the value adopted for the compound by EPA. Therefore, the carcinogenic potential of potentially carcinogenic COPCs may be overestimated. Given the uncertainties associated with the empirical toxicological data for most chemicals, this approach is considered by EPA to be protective of health.

Similarly, for noncarcinogenic substances, RfDs typically are derived through the application of "uncertainty factors" of between 3 and 10,000 to "no effect" doses observed through clinical or occupational studies on humans or in animal bioassays. The RfD values so derived probably are conservative estimates of true no effect doses for low level and largely intermittent chronic environmental exposures, but are considered by EPA to be protective, given the uncertainties associated with the empirical toxicological data for most chemicals

The toxic effects of all of the COPCs were assumed to be additive across media and exposure pathways, both for carcinogenic and for noncarcinogenic endpoints. This approach ignores both potential synergistic and antagonistic effects that may occur as a result of multi-contaminant exposure. It further ignores the segregation of noncarcinogenic substances by target organ or mechanism of action. Cumulative HIs so derived probably are significant overestimates of the potential for systemic health effects in exposed populations

7.7.3 Uncertainties Associated with Exposure Assessment

The most significant source of uncertainty associated with the exposure assessment is the underlying assumption that contact with affected media would occur under current land use conditions, and that the land use and human activity patterns assumed for the hypothetical future scenarios would occur. Future land use at the Depot currently is unknown. As such, the presumption of exposure at any level for current or hypothetical future receptors should be considered to be biased toward being highly conservative. For example, EPC estimates presume that the site is uniformly contaminated

Dermal contact was shown to be a driving pathway for the point estimates of ELCRs and noncarcinogenic health hazards for numerous COPCs at several sites. The assumptions regarding skin surface area exposed for various receptor groups and the assumed durations and frequency of exposures contributed significantly to these results. For example, for current maintenance workers, it was assumed that the entire surface area of the forearms, hands, and face will be covered with a layer of soil. These same body parts plus the feet are assumed to be covered with a layer of sediment and in direct contact with surface water. Depending on matrix, exposure would occur for a full or partial workday, once per month, for an entire 25-year occupational lifetime Likewise, hypothetical future onsite trespassers and offsite recreational users are assumed to have their arms, hands, legs, feet, and face in contact with affected soil, sediment, or surface water for 2 hours per day for 26 or 45 days per year, for a minimum of 10 years. Hypothetical future residents also were assumed to have routine dermal exposure to these body parts for 4 hours per exposure event, 350 days per year, over a 30-year residential period. These assumptions typically served to elevate the dermal contact pathway to the most significant contributor to cumulative dose and health effects for the RME receptors at most sites.

Assumptions regarding contact rates and frequencies of exposure for surface water bodies are highly conservative, particularly as they relate to the hypothetical future scenarios assumed. Likewise, the default contact rates adopted for incidental ingestion and skin adherence for sediments essentially assume that sediment exposure would be equivalent to that for surface soils.

The default assumptions used to predict airborne-concentrations of entrained particulates (PEFs) did not take into account any site-specific information regarding the physicochemical characteristics of the soils or the physical configuration of the sites (contaminated area). The default value based on "typical" conditions published by EPA (1996c) was applied. This may under- or overestimate the emission rates for particulates, but is generally a highly conservative representation of site conditions.

Assumptions regarding exposure times and exposure frequencies for various receptors were based on best professional judgment, taking into account the future redevelopment plans for the Depot Although these assumptions are realistic based on best judgment concerning the planned future use, they probably are overestimates of actual contact, if any, that routinely would occur with affected media over an extended duration. It also should be noted that the use of the RME EPC essentially assumes that all exposure occurs at the most heavily affected location for the entire duration.

7.7.4 Uncertainty in Risk Characterization

The point estimates of dose, ELCR, and noncarcinogenic hazards were based on assumptions and endpoint estimates for parameter values that, individually, are generally highly conservative default values chosen to intentionally avoid underestimating the mean or median value of a population distribution for that parameter. Combining upperbound or maximum values in the course of deriving quantitative estimates of exposure and risk tends to compound this conservatism, so that the final results are likely to be reasonable maximum estimates of actual risk or hazard. As such, the calculated cumulative ELCRs and noncarcinogenic hazards should be considered highly unlikely, upperbound estimates, with actual risks or hazards, if any, between zero and the values presented.

7.8 Ecological Risk Assessment Approach

7.8.1 Introduction

An ERA was conducted at Dunn Field to evaluate whether contaminants detected in surface soil, surface water, and/or sediments may pose adverse ecological effects. The ERA was conducted within the three areas of Dunn Field: Northeast Open Area, Disposal Area, and

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Stockpile Area. Although there is minimal, poor quality ecological habitat throughout Dunn Field, an ERA was conducted as a conservative measure. The methodology for the ERA is discussed in this subsection An Ecological Assessment Checklist was developed based on the site visit for the ERA and the checklist can be found as Appendix J.

The primary objective of the ERA was to identify and characterize the potential risks posed to environmental receptors as a result of the hazardous substance releases. An ecological risk does not exist unless the stressor: (1) has the ability to cause one or more adverse effects, and (2) co-occurs or contacts an ecological component long enough and at sufficient intensity to elicit the identified adverse effect (USEPA, 1997b). As part of this RI, the ERA is used to document whether actual or potential ecological risks exist and to identify which contaminants present at the site pose ecological risks. If the estimated risks for ecological receptors indicate a need for further action, the ERA also serves as part of the baseline used to develop, evaluate, and select appropriate remedial alternatives. This ERA was conducted in accordance with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1997b). The current EPA ERA model includes eight steps; for this RI, Steps 1, 2, and 3 were completed:

- Screening-level problem formulation and toxicity evaluation;
- Screening-level exposure estimate and risk calculation; and
- Baseline risk assessment problem formulation.

The first two steps are a streamlined version of a complete ERA and are intended to allow a rapid, conservative determination of which contaminants pose negligible ecological risk and which contaminants and exposure pathways require further evaluation. These two screening steps use existing site data and minimal risk management input Step 3 continues with only those contaminants found to have a potential for adverse ecological effects and refines the screening-level problem formulation developed in Step 1.

7.8.2 Step 1: Screening-Level Problem Formulation and Effects Evaluation

This is the initial step in the ERA and includes all the elements of a problem formulation and ecological effects analysis, but on a screening level. This means the evaluation was conducted using existing data and conservative assumptions regarding exposure The results of this step support the exposure estimates and risk calculation in Step 2.

7.8.2.1 Screening-Level Problem Formulation

For the screening-level problem formulation, a CSM is developed that addresses the issues outlined below:

- **Environmental Setting and Contaminants at the Site.** An overall characterization of the environmental setting and chemical contamination is developed from existing site reports, as well as from a completed site environmental checklist Information includes onsite and offsite land uses, chemical contaminants detected at the site, potential contaminant migration pathways, a description of natural and man-made ecological habitats (e g., wetlands, impoundments) that can act as stressors to the environment, a description of observed or potentially occurring plant and animal species, and identification of any protected species or critical habitats. Information supporting the problem formulation presented elsewhere in the RI is appropriately referenced and briefly summarized, if needed, in the ERA sections

- **Contaminant Fate and Transport.** Potential pathways for migration of site contaminants are identified (e.g., surface water runoff and soil erosion). A list of detected contaminants in surface soil, surface water, and/or sediment is compiled, along with the maximum detected concentrations to be used as ecological EPCs in the screening assessment.

- **Complete Exposure Pathways.** An evaluation of potential ecological exposure pathways is conducted. For a pathway to be complete, a contaminant must travel from the source medium or media to an ecological receptor, and be taken up by the receptor via one or more exposure routes. Although ecological habitats are minimal to nonexistent at Dunn Field, a conservative approach was used in this screening evaluation so that potential ecological risks were not missed. More realistic exposure assumptions are considered in Step 3, if needed.

- **Assessment and Measurement Endpoints.** Assessment endpoints, which are expressions of the environmental values to be protected, are developed based on those ecological exposure pathways considered potentially complete. Measurement endpoints are measurable ecological characteristics of the assessment endpoint. In this screening-level evaluation, the measurement endpoint is the comparison of maximum EPCs to conservative screening-level benchmarks, as per EPA guidance (1997b).

7.8.2.2 Screening-Level Ecological Effects Evaluation

In this subsection, conservative thresholds for adverse ecological effects, or screening ecotoxicity values, are established for contaminants detected in each of the site media (surface water, sediment, and surface soil). These values are as follows:

- **Surface Water.** The surface water ecotoxicity screening values were chronic values obtained from the *EPA Region 4 Supplemental Guidance to RAGS. Region 4 Bulletins, Freshwater Surface Water Screening Values for Hazardous Waste Sites* (USEPA, 1995a). Table 7-12 presents the detected surface water contaminants at Dunn Field and the associated surface water chronic screening criteria.

- **Sediment.** The sediment ecotoxicity screening values were obtained from the *EPA Region 4 Supplemental Guidance to RAGS· Region 4 Bulletins, Sediment Screening Values for Hazardous Waste Sites* (USEPA, 1995b). These values are generally protective of sediment-dwelling macroinvertebrates. Table 7-13 presents the detected sediment contaminants at Dunn Field and the associated sediment screening criteria.

- **Soil.** The soil ecotoxicity values were obtained from the *Region 4, Draft Ecological Screening Levels for Soil from "Memorandum – Ecological Risk Assessment at Military Bases· Process Considerations, Timing of Activities, and Inclusion of Stakeholders"* (USEPA, 1998d) These values are generally protective of terrestrial plants and soil invertebrates. Table 7-14 presents the detected surface soil contaminants at Dunn Field and the associated soil screening criteria, if available

7.8.2.3 Uncertainty Assessment

Uncertainty is inherent in each step of the screening-level ERA. Professional judgment is used to assess the uncertainty associated with information taken from the literature and any extrapolations used in developing screening ecotoxicity values.

7.8.3 Step 2: Screening-Level Exposure Estimate and Risk Calculation

This step includes estimating exposure levels and screening for ecological risks as the last two phases of the screening level ERA At the end of Step 2, a scientific management decision point (SMDP) is developed to evaluate whether ecological risks are negligible or if further evaluation is warranted.

7.8.3.1 Screening-Level Exposure Estimate

The highest measured contaminant concentration is used as the EPC. Only potentially complete exposure pathways are addressed.

The maximum concentrations of all chemicals detected in soil, surface water, or sediment at Dunn Field were used as the EPCs for estimating risk to fish, aquatic invertebrates, and directly exposed terrestrial organisms.

7.8.3.2 Screening-Level Risk Characterization

The quantitative screening-level risk estimate is conducted using the hazard quotient (HQ) approach. This approach divides the EPCs by the screening ecotoxicity values. An HQ less than one indicates that the contaminant is unlikely to cause adverse effects; therefore, these contaminants are not assessed further (USEPA, 1997b). Contaminants with an HQ greater than or equal to one are considered a potential ecological risk and are carried forward as COPCs to Step 3, as are contaminants that do not have ecotoxicity screening criteria

7.8.3.3 Scientific Management Decision Point

At the end of Step 2, a decision is made about whether the information available is adequate to make a risk management decision. The three possible decisions at this point include the following:

- There is adequate information to conclude that ecological risks are negligible and thus there is no need for remediation on the basis of ecological risk;
- The information is not adequate to make a decision at this point, and the ERA process will continue to Step 3, and
- The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

7.8.4 Step 3: Baseline Risk Assessment Problem Formulation

Step 3 refines the problem formulation developed in the screening level assessment. In this step, the results of the screening level assessment and additional site-specific information are used to assess the scope and goals of the baseline ERA.

7.8.4.1 Refinement of Preliminary Constituents of Concern

Because of the conservative assumptions used during screening Steps 1 and 2, some COPCs retained for Step 3 may still pose negligible risk. Therefore, in this first phase of Step 3, further evaluation of the assumptions used and other site-specific information are used to refine the list of COPCs. For example, the risk management team may decide to eliminate from further consideration those contaminants for which the HQ drops to near or below one.

In this refinement phase, the revised assumptions and site-specific considerations to be used are as follows:

- Arithmetic average contaminant concentrations are considered, along with maximum concentrations;
- Contaminant concentrations are compared to background;
- FOD is considered;
- Acute or lowest observable adverse effects level (LOAEL) ecotoxicity screening values are considered from various literature sources; and
- Other literature sources of ecotoxicity screening values may be included where appropriate (e.g., if no ecotoxicity screening value was available in Step 2).

The following additional considerations are used to calculate a range of HQs:

- Maximum versus chronic criteria/no observable adverse effects level (NOAEL),
- Maximum versus acute criteria/LOAEL;
- Average versus chronic criteria/NOAEL, and
- Average versus acute criteria/LOAEL

Maximum and average values also are compared to background concentrations.

In addition, the conservative ecological exposure pathways used in Step 2 are reevaluated based on actual site conditions All this information provides a WoE to determine which, if any, contaminants should be recommended for further evaluation in a baseline ERA. If there are no constituents or exposure pathways of concern following the refinement process, an SMDP is described indicating that ecological risks are negligible and, therefore, there is no need for remediation on the basis of ecological risk.

If COPCs remain following the Step 3 refinement process, further baseline risk evaluation should be completed within the remaining phases of Step 3, as well as all of Steps 4 through 8. These evaluations are outside the scope of this RI and would, therefore, be conducted separately.

7.9 Remedial Goal Options

The RGOs are the target concentration values for remedial alternative analysis. Achieving these goals should achieve compliance with state and federal standards and satisfy National Contingency Plan (NCP) requirements to promote the protection of human health and the environment at hazardous waste sites. The RGOs calculated for the Depot are in accordance with *RAGS, Part-B* (USEPA, 1991b) and the *EPA Region IV Supplemental Guidance to RAGS* (USEPA, 1994b).

The RGOs are developed only for the chemicals detected at the site that had concentrations above the applicable state or federal standards or that present risks or HIs above the acceptable levels The acceptable risks are defined as risk levels above 100 in one million (1 x 10^{-4}) or an HI above 1.0, for either current or future exposure pathways (e.g , industrial land use) analyzed in the RA. Chemical-specific RGOs are developed for each medium at the site with underlying assumptions regarding land use (industrial versus residential) at the site. The two general sources of RGOs are concentrations based on state and federal standards and concentrations based on site-specific RAs. If chemicals present excessive risks, Area-specific RGOs will be included in Sections 9, 11, 13, and 15. At the end of each of these sections, remedial action objectives (RAOs) are identified and tabulated for use during Feasibility Study and for assisting in site management evaluations.

7.9.1 Site-specific Risk-based RGOs

No quantitative RGOs were estimated for site media because no excessive risks were present at any of the sites for a future industrial worker, although conservative exposure assumptions were used.

7.9.2 State and Federal Standards as Potential RGOs

No state or federal standards exist for soils or sediments. A preliminary list of applicable or relevant and appropriate requirements (ARARs) for surface water and groundwater is presented in Table 7-15. The AWQCs protective of human health and ecological organisms were listed for general information Their applicability will be identified after an Area-specific ERA The applicability of these AWQCs is based on the classification of the water body of interest. However, there are no natural water bodies within Dunn Field

The groundwater has MCLs that are applicable to public water supply wells, which are completed into deeper aquifers that have not been shown to be impacted by shallow groundwater contamination at Dunn Field. For example, Allen Well Field wells located northwest of the site are typically more than 200 ft deep. Contamination has been detected mostly in the shallow groundwater (75-ft bgs). Also, the groundwater flow direction is generally to the west, indicating that the downgradient direction is also west. Therefore, the applicability of the MCLs should be evaluated as part of the risk management decision, based on what is detected in the site's downgradient wells. Table 7-15 presents a preliminary list of groundwater ARARs, regardless of their applicability to the site. There are no ARARs for soils and sediments protective of human health Therefore, if the RA indicates excess risks, target remedial goals will be established following EPA Region IV and *RAGS*, Part B methodology. RGOs for individual COPCs for each Area will be reviewed as necessary in the following Area-specific RAs. The residential screening based default value of 400 mg/kg is used as the target RGOs for residential land use scenario. A lead target RGO for an adult worker was calculated using an adult lead model with formulas and is presented in Table 7-16. Site average concentrations are used for comparison with target RGOs during site management in determining the need for remedial actions based on the IEUBK model approach.

Tables

TABLE 7-1
Summary of Area Risk Assessment and Surrogate Site Selection Steps
Rev 1 Memphis Depot Dunn Field RI

STEP NUMBER	DESCRIPTION
Step 1	Compile environmental data from RI, Screening, and BRAC sampling events
Step 2	Select samples collected within an Area for an Area-wide risk assessment under the industrial use scenario
Step 3	Calculate preliminary risk at each sample location for all chemicals exceeding background using PRE methodology (EPA, 1994)
Step 4	For evaluation of the (current and future) industrial worker/ residential exposure unit, select the RI surrogate site with maximum risk based on the PRE ratio. Selection is based on elevated single-sample PRE ratios with consideration of COPCs detected in the sample with the highest PRE
Step 5	This surrogate site is assumed to be about 1 0 acre in size. Select samples associated with the highest PRE and the surrounding area to represent this exposure unit
Step 6	Calculate industrial and residential land use risks at the selected sites using all the surrogate site data and calculating the UCL 95%.

TABLE 7-2
Surrogate Sites and Highest PRE Sample Selected to Represent an Exposure Unit within Areas

Rev 1 Memphis Depot Dunn Field RI

Area	Area-wide RA	Surrogate Sites for Industrial/Residential Land Use RA	Basis
Northeast Open Area	Soils, sediments, surface waters in Northeast Open Area	60/85	a
Disposal Area	Soils in Disposal Area	61 and associated sites	a
Stockpile Area	Soils in Stockpile Area	SSLFF	

Risks were calculated for each Area using all data, and for a surrogate site using data from the site for an industrial and residential exposure scenario risks

PRE results are included in Appendix B

a = surrogate site for industrial/residential land use risk assessment selected based on highest PRE for both carcinogenic scenarios

TABLE 7-3
Sitewide COPCs
Rev 1 Memphis Depot Dunn Field RI

Contaminants of Potential Concern	Onsite Media				
	Surface Soil	Subsurface Soil	Sediment	Surface Water	Groundwater
1,1,2,2-TETRACHLOROETHANE	X	X			X
1,1,2-TRICHLOROETHANE		X			X
1,1-DICHLOROETHENE					X
1,2-DICHLOROETHANE		X			X
2,4,6-TRICHLOROPHENOL[1]		X			
2-NITROPHENOL				X	
ALUMINUM	X			X	X
ANTIMONY	X	X			
ARSENIC	X	X	X		X
BARIUM					X
BENZO(a)ANTHRACENE	X		X		
BENZO(a)PYRENE	X		X		
BENZO(b)FLUORANTHENE	X		X	X	
BENZO(k)FLUORANTHENE			X		
BERYLLIUM				X	X
CADMIUM					X
CARBAZOLE	X		X		
CARBON TETRACHLORIDE		X			X
CHLOROETHANE		X			
CHLOROFORM		X			X
CHROMIUM, TOTAL	X				X
CHRYSENE	X		X	X	
COBALT					X
COPPER					X
DIBENZ(a,h)ANTHRACENE	X		X		
DIELDRIN	X		X	X	X
HEPTACHLOR EPOXIDE					X
INDENO(1,2,3-c,d)PYRENE	X		X	X	
LEAD	X	X			
MANGANESE					X
MERCURY					X
METHYLENE CHLORIDE		X			
NICKEL					X
PENTACHLOROPHENOL		X			
PHENANTHRENE				X	X
SILICON					X
TETRACHLOROETHYLENE(PCE)		X			X
THALLIUM	X				
TOTAL 1,2-DICHLOROETHENE		X			X
TOTAL XYLENES		X			
TRICHLOROETHYLENE (TCE)	X	X			X
VANADIUM					X
VINYL CHLORIDE	X	X			

Note

1 = This compound included in the Disposal Area soil column data has not been evaluated for risk assessment at this time, due to the presence of surrogate site soil column data (61LE)

Table 7-4a

Exposure Factors for Soil

Rev 1 Memphis Depot Dunn Field RI

Symbols	Parameter	CURRENT		FUTURE															
		Maintenance Worker		Utility Worker		Industrial Worker		Onsite Residential Adult		Offsite Residential Adult		Onsite Recreational Adult		Onsite Residential Child		Onsite Recreational Child		Onsite Recreational Youth	
BW	Body Weight (kg)	70	a	70	a	70	a	70	a	70	a	70	a	15	a	15	a	45	a
IR_Inh	Inhalation Rate (m^3/day)	20	a	20	a	20	a	20	a	20	a	20	a	15	a	15	a	20	a
IR_Inh_adj	Age-adjusted Inhalation Rate (m^3-yr/kg-day)	N/A		N/A		N/A		12 86	a,o	N/A		N/A		N/A		N/A		N/A	
AT_C	Averaging Time - Carcinogenic	70x365	a	70x365	a	70x365	a	70x365	a	70x365	a	70x365	a	N/A	a	N/A	a	70x365	a
AT_NC	Averaging Time - Noncarcinogenic	25x365	a	25x365	a	25x365	a	30x365	a	30x365	a	30x365	a	6x365	a	6x365	a	10x365	a
	Soils																		
IR_Ing	Incidental Ingestion Rate (mg/day)	50	b	100	b	50	b	100	b	N/A		100	b	200	b	200	b	100	b
IR_adj_Ing	Age-adjusted Incidental Ingestion Rate (mg-yr/kg-day)	N/A		N/A		N/A		114 29	b,p	N/A		N/A		N/A		N/A		N/A	
FI	Fraction Ingested	0 5	c	0 5	c	1	c	1	c	N/A		1	c	1	c	1	c	1	c
SA	Skin Surface Area (cm^2)	2,679	d	2,679	d	2 679	d	5,049	e	N/A		5,049	e	2,351	f	2 351	f	4 478	f
SA_adj	Age-adjusted Skin Surface Area (cm^2-yr/kg)	N/A		N/A		N/A		2,671	e,q	N/A		N/A		N/A		N/A		N/A	
AF	Adherence Factor for dry soil (mg/cm^2)	0 03	h	0 1	i	0 03	h	0 03	h	0 03	h	0 03	h	0 15	j	0 15	j	0 15	j
PEF	Particulate Emission Factor (m^3/kg)	1 32E+09	k	1 32E+09	k	1 32E+09	k	1 32E+09	k	1 32E+09	k	1 32E+09	k	1 32E+09	k	1 32E+09	k	1 32E+09	k
ET	Exposure Time (hours/day)	8	a	8	a	8	a	4	l	8	a	4	l	4	l	4	l	4	l
EF	Exposure Frequency (days/year)	50	m	24	n	250	a	350	a	350	a	45	b	350	a	45	b	45	b
ED	Exposure Duration (years)	25	a	25	a	25	a	30	a	30	a	30	a	6	a	6	a	10	a

Notes All current scenario exposure factors are subject to re-evaluation based on site-specific information

a Default exposure factors adapted from EPA, Human Health Evaluation Manual, Supplemental Guidance "Standard Default Exposure Factors" OSWER Directive 9285 6-03, March 25, 1991

b Adapted from EPA Supplemental Guidance to RAGS Region 4 Bulletins, Human Health Risk Assessment, Interim November 1995

c Fraction ingested assumed by the nature of the activity

d Worker soil exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of 1/2 head (face) hands & forearms (see Appendix G)

e Residential/recreational adult soil exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of 1/2 head (face), hands forearms & lower legs (see Appendix G)

f Residential/recreational child soil exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of 1/2 head (face), hands, forearms, lower legs & feet (see Appendix G)

g Recreational youth soil exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of 1/2 head (face), hands, forearms lower legs & feet. (see Appendix G)

h 0 03 = Groundskeeper No 2 (exposure scenarios similar to urban horticulture center, campus grounds, arboretum) AFs chosen from Soil Loading calculations (see Appendix G)

i 0 1 = Construction Worker (heavy digging exposure to mixed bare earth concrete surfaces dust & debris) AFs chosen from Soil Loading calculations (see Appendix G)

j 0 15 = Daycare Kids No 1b (indoor exposure to linoleum, outdoor exposure to grass, bare earth, no shoes) AFs chosen from Soil Loading calculations (see Appendix G)

k PEF adapted from EPA 1996, Soil Screening Guidance Technical Background Document

l 4 hours soil exposure are assumed for residential dermal contact and inhalation exposure time

m Worker soil exposure is assumed to be once a week per year, minus vacation time

n Worker soil exposure is assumed to be twice a month

o Age-adjusted inhalation rate for residential adult.

$$IR\text{-}Inh\ adj = \frac{IR\text{-}Inhc \times EDc}{BWc} + \frac{IR\text{-}Inha \times (EDa - EDc)}{BWa} = \frac{15 \times 6}{15} + \frac{20 \times (30-6)}{70} = 12.86\ \textit{(m3-year)/(kg-day)}$$

p Age-adjusted ingestion rate for residential adult

$$IRadj = \frac{IRc \times EDc}{BWc} + \frac{IRa \times (EDa - EDc)}{BWa} = \frac{200 \times 6}{15} + \frac{100 \times (30-6)}{70} = 114\ 29\ \textit{(mg-year)/(kg-day)}$$

q Age-adjusted dermal contact for residential adult

$$SAadj = \frac{SAc \times EDc}{BWc} + \frac{SAa \times (EDa - EDc)}{BWa} = \frac{2351 \times 6}{15} + \frac{5049 \times (30-6)}{70} = 2671\ \textit{(cm2-year)/(kg)}$$

cm^2	centimeters squared
days/year	days per year
hours/day	hours per day
kg	kilograms
m^3/day	cubic meters per day
m^3/kg	cubic meters per kilogram
mg/cm^2	milligrams per centimeters squared
mg/day	milligrams per day
N/A	Not applicable for this receptor

Table 7-4b

Exposure Factors for Sediment and Surface Water

Rev 1 Memphis Depot Dunn Field RI

Symbols	Parameter	CURRENT		FUTURE							
		Maintenance Worker - ditches		Industrial Worker - ditches		Onsite Recreational Adult		Onsite Recreational Child		Onsite Recreational Youth	
BW	Body Weight (kg)	70	a	70	a	70	a	15	a	45	a
IR_Inh	Inhalation Rate (m^3/day)	20	a	20	a	20	a	15	a	20	a
AT_C	Averaging Time - Carcinogenic	70x365	a	70x365	a	70x365	a	N/A		70x365	a
AT_NC	Averaging Time - Noncarcinogenic	25x365	a	25x365	a	30x365	a	6x365	a	10x365	a
	Surface Water										
IR_Ing_w	Incidental Ingestion - Wading (L/hour)	0.01	b	0.01	b	0.01	b	0.01	b	0.01	b
SA_w	Skin Surface Area - Wading (cm^2)	2,679	c	2,679	c	5,671	d	1,851	e	4,785	f
ET	Exposure Time (hours/day)	2	g	2	g	2	g	2	g	2	g
EF	Exposure Frequency (days/year)	12	h	50	i	45	j	45	j	45	j
ED	Exposure Duration (years)	25	a	25	a	30	a	6	a	10	j
	Sediments										
IR_Ing	Incidental Ingestion - Wading (mg/day)	50	k	50	k	100	k	200	k	100	k
FI	Fraction Ingested	1	l	1	l	1	l	1	l	1	l
SA	Skin Surface Area - Wading (cm^2)	2,679	c	2,679	c	5,671	d	1,851	e	4,785	f
AF	Adherence Factor for wet soil (mg/cm^2)	0.1	m	0.1	m	0.1	m	0.1	m	0.1	m
ET	Exposure Time (hours/day)	2	g	2	g	2	g	2	g	2	g
EF	Exposure Frequency (days/year)	12	h	50	i	45	j	45	j	45	j
ED	Exposure Duration (years)	25	a	25	a	30	a	6	a	10	j

Notes:	All current scenario exposure factors are subject to re-evaluation based on site-specific information
a	Default exposure factors adapted from EPA, Human Health Evaluation Manual, Supplemental Guidance "Standard Default Exposure Factors" OSWER Directive 9285 6-03, March 25, 1991
b	Surface water ingestion while wading adapted from Supplemental Guidance to RAGS Region 4 Bulletins, Human Health Risk Assessment, Interim, November 1995
c	Worker surface water/sediment exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of 1/2 head (face), hands & forearms (see Appendix G)
d	Recreational adult sediment/surface water exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of hands, forearms, lower legs & feet (see Appendix G)
e	Recreational youth sediment/surface water exposure is adapted from EPA Exposure Factor Handbook, August 1997 &is protective of hands, forearms, lower legs & feet (see Appendix G)
f	Recreational child sediment/surface water exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of hands, forearms, lower legs & feet (see Appendix G)
g	2 hours exposure to drainage ditch sediment/surface water is assumed for workers/recreational visitors based on the nature of the activities
h	Maintenance Worker surface water/sediment exposure is assumed to be once a month
i	Industrial Worker surface water & sediment exposure is assumed to be once a week
j	Recreational factors adapted from Supplemental Guidance to RAGS Region 4 Bulletins, Human Health Risk Assessment, Interim, November 1995
k	Sediment ingestion rates adapted from Supplemental Guidance to RAGS Region 4 Bulletins, Human Health Risk Assessment, Interim, November 1995
l	Fraction ingested assumed by the nature of the activity
m	0.1 = Construction Worker (heavy digging, exposure to mixed bare earth, concrete surfaces, dust & debris) AFs chosen from Soil Loading calculations (see Appendix G)
cm^2	centimeters squared
days/year	days per year
hours/day	hours per day
kg	kilograms
L/hour	liters per hour
m^3/day	cubic meters per day
m^3/kg	cubic meters per kilogram
mg/cm^2	milligrams per centimeters squared
mg/day	milligrams per day
N/A	Not applicable for this receptor

Table 7-4c

Exposure Factors for Groundwater

Rev 1 Memphis Depot Dunn Field RI

Symbols	Parameter	FUTURE					
		Industrial Worker		Onsite Residential Adult		Onsite Residential Child	
BW	Body Weight (kg)	70	a	70	a	15	a
IR_Inh	Inhalation Rate (m^3/day)	*		*		*	
AT_C	Averaging Time - Carcinogenic	70x365	a	70x365	a	N/A	
AT_NC	Averaging Time - Noncarcinogenic	25x365	a	30x365	a	6x365	a
	Groundwater						
IR_Ing	Ingestion Rate of Water (L/day)	1	a	2	a	1	a
IR_adj_Ing	Age-adjusted Incidental Ingestion Rate (L-yr/kg-day)	N/A		1.1	a,f	N/A	
SA	Skin Surface Area (cm^2)	2679	b	20,000	c	6,557	d
SA_adj	Age-adjusted Skin Surface Area (cm^2-yr/kg)	N/A		9480	c,g	N/A	
ET	Exposure Time (hours/day)	0.007	e	0.007	e	0.007	e
EF	Exposure Frequency (days/year)	250	a	350	a	350	a
ED	Exposure Duration (years)	25	a	30	a	6	a

Notes

* Inhalation exposures to volatiles in the groundwater are equal to the ingestion exposures as per EPA Region IV policy

a Default exposure factors adapted from EPA, Human Health Evaluation Manual, Supplemental Guidance "Standard Default Exposure Factors" OSWER Directive 9285 6-03, March 25, 1991

b Worker groundwater exposure is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of 1/2 head (face), hands & forearms (see Appendix G)

c Residential adult total body surface area is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of all body parts (see Appendix G)

d Residential child total body surface area is adapted from EPA Exposure Factor Handbook, August 1997 & is protective of all body parts (see Appendix G)

e Calculation for Shower dermal exposure time 10 minute event x 1 hour/60 minutes x 1 day/ 24 hours = 0.007 event/day

f Age-adjusted ingestion rate for residential adult $IRadj = \frac{IRc \times EDc}{BWc} + \frac{IRa \times (EDa - EDc)}{BWa} = \frac{1 \times 6}{15} + \frac{2 \times (30-6)}{70} = 1.1$ *(L-year)/(kg-day)*

g Age-adjusted dermal contact for residential adult $SAadj = \frac{SAc \times EDc}{BWc} + \frac{SAa \times (EDa - EDc)}{BWa} = \frac{6557 \times 6}{15} + \frac{20000 \times (30-6)}{70} = 9480$ *(cm^2-year)/(kg)*

cm^2	centimeters squared
days/year	days per year
hours/day	hours per day
kg	kilograms
L/day	liters per day
m^3/day	cubic meters per day
N/A	Not applicable for this receptor

TABLE 7-5
Potential Receptors
Rev 1 Memphis Depot Dunn Field RI

Area/(Surrogate Site)	Current/Immediate Future Land Use	Future Land Use				
	Maintenance Worker	Utility Worker	Landscaper	Industrial	Recreational	Residential
21	**X**	X	X	**X**	**X**	
Sites 60/85	X	**X**	X	**X**		**X**
22	**X**	X	X	**X**	**X**	
Site 61 and associated sites	X	**X**	X	**X**		**X**

Notes

X **Boldface** indicates pathways quantified as conservative representatives of the other similar receptor populations

TABLE 7-6
EPA Weight-of-Evidence Classification System for Carcinogenicity
Rev 1 Memphis Depot Dunn Field RI

Group	Description
A	Human carcinogen, based on evidence from epidemiological studies
B1 or B2	Probable human carcinogen B1 indicates that limited human data are available B2 indicates sufficient evidence in animals and inadequate or no evidence in humans
C	Possible human carcinogen, based on limited evidence in animals
D	Not classifiable as to human carcinogenicity
E	Evidence of noncarcinogenicity for humans

Note

Source EPA, 1986

Table 7-7
Carcinogenic Toxicity Factors
Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Class	CAS Number	Oral SF kg-day/mg	Oral Slope Factor Source	Inhal SF kg-day/mg	Inhal SF Source	Weight-of-Evidence Basis	Weight-of-Evidence Class	Weight-of-Evidence Source
1,1,2 2-Tetrachloroethane	Voa	79-34-5	2 00E-01	IRIS, 1999	2 03E-01	IRIS, 1999 (calculated from unit risk)	Increased incidence of hepatocellualr carcinomas in mice	C	IRIS, 1999
1,1 2-Trichloroethane	Voa	79-00-5	5 70E-02	IRIS 1999	5 60E-02	IRIS, 1999 (calculated from unit risk)	Hepatocellular carcinomas and pheochromocytomas in one strain of mice Carcinogenicity was not shown in rats 1,1,2-Trichloroethane is structurally related 1 2-dichloroethane, a probable human carcinogen	C	IRIS 1999
1 1-Dichloroethene	Voa	75-35-4	6 00E-01	IRIS, 1999	1 75E-01	IRIS, 1999 (calculated from unit risk)	Tumors observed in one mouse strain after inhalation exposure Other studies were of inadequate design Vinylidene chloride is mutagenic, and a metabolite is known to alkylate and to bind covalently to DNA It is structurally related to the known human carcinogen, vinyl chloride	C	IRIS, 1999
1 2 Dichloroethane	Voa	107-06-2	9 10E-02	IRIS 1999	9 10E-02	IRIS 1999 (calculated from unit risk)	Induction of several tumor types in rats and mice treated by gavage and lung pappilomas in mice after topical application	B2	IRIS, 1999
2,4 6-Trichlorophenol	Semi-Voa	88-06-2	1 10E 02	IRIS, 1999	1 00E-02	IRIS, 1999 (calculated from unit risk)	No human data and sufficient evidence in animals, namely, increased incidence of lymphomas or leukemias in male rats and hepatocellular adenomas or carcinomas in male and female mice	B2	IRIS 1999
Arsenic	Inorganic	7440-38-2	1 50E+00	IRIS 1999	1 51E+01	IRIS, 1999 (calculated from unit risk)	Based on observation of increased lung cancer mortality in populations exposed primarily through inhalation and on increased skin cancer incidence in several populations consuming drinking water with high arsenic concentrations	A	IRIS, 1999
Benzo(a)anthracene	Semi-Voa	56-55-3	7 30E-01	USEPA Region IV, November 1995	3 10E-01	USEPA Region IV, November 1995, TEF of Benzo(a)pyrene	No human data from animal bioassays B(a)A produced tumors in mice exposed by gavage i p subcutaneous, or intramuscular injection & topical application B(a)A produced mutations in bacteria and mammalian cells, & transformed mammalian cells in culture	B2	IRIS, 1999
Benzo(a)pyrene	Semi-Voa	50-32-8	7 30E+00	IRIS 1999	3 10E+00	USEPA Region IV, November 1995	Human data specifically linking BAP to a carcinogenic effect are lacking There are however, multiple animal studies in many species demonstrating BAP to be carcinogenic following administration by numerous routes BAP has produced positive results in numerous genotoxicity assays	B2	IRIS, 1999
Benzo(b)fluoranthene	Semi-Voa	205-99-2	7 30E-01	USEPA Region IV, November 1995	3 10E-01	USEPA Region IV, November 1995, TEF of Benzo(a)pyrene	No human and sufficient data from animal bioassays B(b)F produced tumors in mice after lung implantation i.p or subcutaneous injection and skin painting	B2	IRIS, 1999
Benzo(k)fluoranthene	Semi-Voa	207-08-9	7 30E-02	USEPA Region IV, November 1995	3 10E-02	USEPA Region IV, November 1995 TEF of Benzo(a)pyrene	No human data & sufficient data from animal bioassays B(k)F produced tumors after lung implantation in mice and when administered with a promoting agent in skin-painting studies Equivocal results have been found in a lung adenoma assay in mice Benzo[k]fluoranthene is mutagenic in bacteria	B2	IRIS, 1999
Beryllium	Inorganic	7440-41-7	withdrawn from IRIS 1999		8 40E+00	IRIS, 1999 (calculated from unit risk)	Based on the limited evidence of carcinogenicity in humans exposed to airborne beryllium (lung cancer) and sufficient evidence of carcinogenicity in animals (lung cancer in rats and monkeys inhaling beryllium lung tumors in rats exposed to beryllium via intratracheal instillation, and osteosarcomas in rabbits and possibly mice receiving intravenous or intramedullary injection)	B1	IRIS, 1999
Cadmium	Inorganic	7440-43-9			6 30E+00	IRIS, 1999 (calculated from unit risk)	Limited evidence from occupational epidemiologic studies of cadmium is consistent across investigators and study populations There is sufficient evidence of carcinogenicity in rats and mice by inhalation and intramuscular and subcutaneous injection Seven studies in rats and mice wherein cadmium salts (acetate sulfate, chloride) were administered orally have shown no evidence of carcinogenic response	B1	IRIS, 1999
Carbazole	Semi-Voa	86-74-8	2 00E-02	HEAST, 1997				B2	HEAST, 1997
Carbon tetrachloride	Voa	56-23 5	1 30E-01	IRIS, 1999	5 25E-02	IRIS, 1999 (calculated from unit risk)	Carcinogenicity in rats, mice and hamsters	B2	IRIS, 1999
Chloroethane	Voa	75-00-3	2 90E-03	H Choudhury, STSC-NCEA to Ted Simon, Region 4			Uncommon carcinomas of the uterus and liver tumors	B2	STSC-NCEA 1999
Chloromethane	Voa	74-87-3	1 30E-02	HEAST, 1997	6 00E-03	HEAST, 1997		C	HEAST, 1997

Table 7-7
Carcinogenic Toxicity Factors
Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Class	CAS Number	Oral SF kg-day/mg	Oral Slope Factor Source	Inhal SF kg-day/mg	Inhal SF Source	Weight-of-Evidence Basis	Weight-of-Evidence Class	Weight-of-Evidence Source
Chromium (total)	Inorganic	18540-29-9			4 20E+01	IRIS, 1999 (calculated from unit risk)	Results of occupational epidemiologic studies of chromium-exposed workers are consistent across investigators and study populations Dose-response relationships have been established for chromium exposure and lung cancer Chromium-exposed workers are exposed to both Cr(III) and Cr(VI) compounds Because only Cr(VI) has been found to be carcinogenic in animal studies, however, it was concluded that only Cr(VI) should be classified as a human carcinogen	A	IRIS 1999
Chrysene	Semi-Voa	218-01-9	7 30E-03	USEPA Region IV, November 1995	3 10E 03	USEPA Region IV, November 1995, TEF of Benzo(a)pyrene	No human data and sufficient data from animal bioassays Produced carcinomas and malignant lymphoma in mice after intraperitoneal injection and skin carcinomas in mice following dermal exposure Produced chromosomal abnormalities in hamsters and mouse germ cells after gavage exposure positive responses in bacterial gene mutation assays and transformed mammalian cells exposed in culture	B2	IRIS, 1999
Dibenz(a,h)anthracene	Semi-Voa	53-70-3	7 30E+00	USEPA Region IV, November 1995	3 10E+00	USEPA Region IV, November 1995, TEF of Benzo(a)pyrene	No human data & sufficient data from animal bioassays Produced carcinomas in mice following oral or dermal exposure & injection site tumors in several species following subcutaneous or intramuscular administration Has induced DNA damage and gene mutations in bacteria as well as gene mutations and transformation in several types of mammalian cell cultures	B2	IRIS, 1999
Dieldrin	Pest/PCB	60-57-1	1 60E+01	IRIS, 1999	1 60E+01	IRIS 1999 (calculated from unit risk)	Carcinogenic in seven strains of mice when administered orally Structurally related to compounds (aldrin, chlordane, heptachlor, heptachlor epoxide, and chorendic acid) which produce tumors in rodents	B2	IRIS, 1999
Heptachlor epoxide	Pest/PCB	1024-57-3	9 10E+00	IRIS, 1999	9 10E+00	IRIS 1999 (calculated from unit risk)	Sufficient evidence exists from rodent studies in which liver carcinomas were induced in two strains of mice of both sexes and in CFN female rats Several structurally related compounds are liver carcinogens	B2	IRIS, 1999
Indeno(1,2,3-c,d)pyrene	Semi-Voa	193-39-5	7 30E-01	USEPA Region IV, November 1995	3 10E-01	USEPA Region IV, November 1995, TEF of Benzo(a)pyrene	No human data and sufficient data from animal bioassays Produced tumors in mice following lung implants, subcutaneous injection and dermal exposure Tested positive in bacterial gene mutation assays	B2	IRIS 1999
Lead	Inorganic	7439-92-1					Sufficient animal evidence Ten rat bioassays and one mouse assay have shown statistically significant increases in renal tumors with dietary and subcutaneous exposure to several soluble lead salts Animal assays provide reproducible results in several laboratories, in multiple rat strains with some evidence of multiple tumor sites Short term studies show that lead affects gene expression Human evidence is inadequate	B2	IRIS, 1999
Methylene chloride	Voa	75-09-2	7 50E-03	IRIS, 1999	1 65E-03	IRIS, 1999 (calculated from unit risk)	Inadequate human data and sufficient evidence of carcinogenicity in animals increased incidence of hepatocellular neoplasms and alveolar/bronchiolar neoplasms in male and female mice, and increased incidence of benign mammary tumors in both sexes	B2	IRIS, 1999
Pentachlorophenol	Semi-Voa	87-86-5	1 20E-01	IRIS, 1999			Inadequate human data and sufficient evidence of carcinogenicity in animals statistically significant increases in the incidences of multiple biologically significant tumor types (hepatocellular adenomas and carcinomas adrenal medulla pheochromocytomas and malignant pheochromocytomas, and/or hemangiosarcomas and hemangiomas) in one or both sexes of B6C3F1 mice using two different preparations of pentachlorophenol (PeCP) In addition, a high incidence of two uncommon tumors (adrenal medulla pheochromocytomas and hemangiomas/hemangiosarcomas) was observed with both preparations This classification is supported by mutagenicity data, which provides some indication that PeCP has clastogenic potential	B2	IRIS, 1999
Silicon	Inorganic	7440-21-3							

Table 7-7

Carcinogenic Toxicity Factors

Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Class	CAS Number	Oral SF kg-day/mg	Oral Slope Factor Source	Inhal SF kg-day/mg	Inhal SF Source	Weight-of-Evidence Basis	Weight-of-Evidence Class	Weight-of-Evidence Source
Tetrachloroethene	Voa	127-18-4	5 20E-02	Provisional SF Memo from H Choudhury, STSC-NCEA to Ted Simon, Region 4 EPA, Feb 23 1999	2 00E-03	Provisional SF Memo from H Choudhury, STSC-NCEA to Ted Simon Region 4 EPA, Feb 23, 1999		C-B2	Withdrawn from IRIS Value listed in HEAST 1991 is used
Trichloroethene	Voa	79-01-6	1 10E 02	Provisional SF Memo from H Choudhury, STSC-NCEA to Ted Simon, Region 4 EPA, Feb 23 1999	6 00E-03	Provisional SF Memo from H Choudhury STSC-NCEA to Ted Simon Region 4 EPA, Feb 23, 1999		B2	Withdrawn from IRIS Value listed in HEAST 1991 is used
Vinyl chloride	Voa	75-01-4	1 90E+00	HEAST, 1997	3 00E-01	IRIS, 1999 (calculated from unit risk)		A	HEAST 1997

Note

CAS	Chemical Abstract System number
DDD	dichlorodiphyldichloroethene
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphynyltrichloroethene
EPA	Environmental Protection Agency
HEAST	Health Effects Assessment Summary Table
Inhal	Inhalation
IRIS	Integrated Risk Information System
Kg-day/mg	kilogram per day per milligram
NC	No Comment
NCEA	National Center for Environmental Assessment
PCB	polychlorinated biphenyl
RBC	risk-based concentration
SF	Slope Factor
STSC	Superfund Technical Support Center
SVOC	semivolatile organic compound
TEF	toxicity equivalent factor
VOC	volatile organic compound

Table 7-8

Noncarcinogenic Toxicity Factors

Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Class	CAS Number	C Oral RfD mg/kg-day	C Oral RfD Critical Effect	C Oral RfD Uncert Factor	C Oral RfD Modify Factor	C Oral RfD Source	C Inhal RfD mg/kg-day	C Inhal RfD Critical Effect	C Inhal RfD Uncert Factor	C Inhal RfD Modify Factor	C Inhal RfD Source	Weight-of-Evidence Basis	Weight-of Evidence Class	Weight-of Evidence Source
2-Nitrophenol	Semi-Voa	88-75-5													
1 1 2-Trichloroethane	Voa	79-00-5	4 00E-03	Clinical serum chemistry	1000	1	IRIS 1999						Hepatocellular carcinomas and pheochromocytomas in one strain of mice Carcinogenicity was not shown in rats 1 1 2 Trichloroethane is structurally related 1 2-dichloroethane a probable human carcinogen	C	IRIS 1999
1 1-Dichloroethene	Voa	75-35-4	9 00E-03	Hepatic lesions	1000	1	IRIS 1999						Tumors observed in one mouse strain after inhalation exposure Other studies were of inadequate design Vinylidene chloride is mutagenic and a metabolite is known to alkylate and to bind covalently to DNA It is structurally related to the known human carcinogen vinyl chloride	C	IRIS 1999
1 2-Dichloroethane	Voa	107-06-2	3 00E-02				Provisional RfD Memo from H Choudhury STSC-NCEA to Ted Simon, Region 4 EPA Aug 20 1999	1 40E-03				Provisional RfD Memo from H Choudhury STSC-NCEA to Ted Simon, Region 4 EPA, Aug 20 1999	Induction of several tumor types in rats and mice treated by gavage and lung pappillomas in mice after topical application	B2	IRIS 1999
1 2-Dichloroethene (total)	Voa	540-59-0	9 00E-03	Liver lesions.	1000	1	HEAST 1997								
Aluminum	Inorganic	7429-90-5	1 00E+00	Minimal neurotoxicity in offspring of mice	100	1	Provisional RfD Memo from J Dollarhide ECAO to Carol Sweeny, Region 10 EPA, Jan 5 1995	1 00E+00				Oral reference dose for Aluminum also applied as inhalation reference dose			
Antimony	Inorganic	7440-36-0	4 00E-04	Longevity blood glucose and cholesterol	1000	1	IRIS 1999		Pulmonary toxicity chronic interstitial inflammation					D	DWHA 1992
Arsenic	Inorganic	7440-38-2	3 00E-04	Hyperpigmentation keratosis and possible vascular complications	3	1	IRIS 1999						Based on observation of increased lung cancer mortality in populations exposed primarily through inhalation and on increased skin cancer incidence in several populations consuming drinking water with high arsenic concentrations	A	IRIS 1999
Barium	Inorganic	7440-39-3	7 00E-02	Increased blood pressure	3	1	IRIS 1999	1 43E-04	Fetus - Fetotoxicity	1000		Alternate value from Heast, 1997		D	DWHA (3/1987)
Beryllium	Inorganic	7440-41 7	2 00E-03	Small intestinal lesions	300	1	IRIS 1999	5 70E-06	Beryllium sensitization and progression to chronic beryllium disease	10	1	IRIS, 1999 (calculated from RfC)	Based on the limited evidence of carcinogenicity in humans exposed to airborne beryllium (lung cancer) and sufficient evidence of carcinogenicity in animals (lung cancer in rats and monkeys inhaling beryllium, lung tumors in rats exposed to beryllium via intratracheal instillation and osteosarcomas in rabbits and possibly mice receiving intravenous or intramedullary injection)	B1	IRIS 1999
Cadmium	Inorganic	7440-43-9	1 00E-03	Human studies involving chronic exposures	10	1	IRIS 1999						Limited evidence from occupational epidemiologic studies of cadmium is consistent across investigators and study populations There is sufficient evidence of carcinogenicity in rats and mice by inhalation and intramuscular and subcutaneous injection. Seven studies in rats and mice wherein cadmium salts (acetate sulfate chloride) were administered orally have shown no evidence of carcinogenic response	B1	IRIS 1999
Carbon tetrachloride	Voa	56-23-5	7 00E-04	Liver lesions	1000	1	IRIS 1999	5.71E-04				EPA-NCEA provisional value from USEPA Region LI Risk Based Concentrations Table October 1998 not verified by Region IV yet	Carcinogenicity in rats mice and hamsters	B2	IRIS 1999
Chloroethane	Voa	75-00-3	4 00E-01		3000		Provisional RfD Memo from H Choudhury STSC-NCEA to Ted Simon, Region 4 EPA Feb 23 1999	2 90E+00	Delayed fetal ossification			IRIS, 1999 (calculated from RfC)		B2	STSC NCEA, 1999

Table 7-6
Noncarcinogenic Toxicity Factors
Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Class	CAS Number	C Oral RfD mg/kg-day	C Oral RfD Critical Effect	C Oral RfD Uncert Factor	C Oral RfD Modify Factor	C Oral RfD Source	C Inhal RfD mg/kg-day	C Inhal RfD Critical Effect	C Inhal RfD Uncert Factor	C Inhal RfD Modify Factor	C Inhal RfD Source	Weight-of-Evidence Basis	Weight-of-Evidence Class	Weight-of-Evidence Source
Chromium (total)	Inorganic	18540 29-9	3 00E-03	No effects reported	300	3	IRIS 1999	2 86E-05	Lactate dehydrogenase in bronchioalveolar lavage fluid	300	1	IRIS 1999 (calculated from RfC)	Results of occupational epidemiologic studies of chromium-exposed workers are consistent across investigators and study populations Dose-response relationships have been established for chromium exposure and lung cancer Chromium-exposed workers are exposed to both Cr(III) and Cr(VI) compounds Because only Cr(VI) has been found to be carcinogenic in animal studies however it was concluded that only Cr(VI) should be classified as a human carcinogen	A	IRIS 1999
Cobalt	Inorganic	7440-48-4	6 00E-02				EPA-NCEA provisional value from USEPA Region III Risk Based Concentrations Table October 1998 not verified by Region IV yet								
Copper	Inorganic	7440-50-8	3 70E-02	Gastrointestinal system - Irritation			Value adapted from MCL as in HEAST 1997						No human data inadequate animal data from assays of copper compounds and equivocal mutagenicity data	D	IRIS 1999
Dieldrin	Pest/PCB	60-57-1	5 00E-05	Liver lesions	100	1	IRIS 1999						Carcinogenic in seven strains of mice when administered orally Structurally related to compounds (aldrin chlordane heptachlor heptachlor epoxide, and chorendic acid) which produce tumors in rodents	B2	IRIS 1999
Heptachlor epoxide	Pest/PCB	1024-57-3	1 30E-05	Increased liver/body weight ratio in both males and females	1000	1	IRIS 1999						Sufficient evidence exists from rodent studies in which liver carcinomas were induced in two strains of mice of both sexes and in CFN female rats Several structurally related compounds are liver carcinogens	B2	IRIS 1999
Lead	Inorganic	7439-92 1											Sufficient animal evidence Ten rat bioassays and one mouse assay have shown statistically significant increases in renal tumors with dietary and subcutaneous exposure to several soluble lead salts Animal assays provide reproducible results in several laboratories in multiple rat strains with some evidence of multiple tumor sites. Short term studies show that lead affects gene expression Human evidence is inadequate	B2	IRIS 1999
Manganese	Inorganic	7439-96-5	1 40E-01	CNS effects	1	1	IRIS 1999	1 43E-05	Increased prevalence of respiratory symptoms and psychomotor disturbances	300	3	IRIS 1999 (calculated from RfC)	Existing studies are inadequate to assess the carcinogenicity of manganese	D	IRIS 1999
Mercury	Inorganic	7439-97-6	value no longer in HEAST 1997					8 57E-05	Nervous system - Neurotoxicity	30	1	IRIS 1999 (calculated from RfC)	No human data are available Animal and supporting data are inadequate	D	IRIS 1999
Methylene chloride	Voa	75-09-2	6 00E-02	Liver toxicity	100	1	IRIS 1999	8 57E-01	Liver toxicity	100	1	HEAST, 1997	Inadequate human data and sufficient evidence of carcinogenicity in animals increased incidence of hepatocellular neoplasms and alveolar/bronchiolar neoplasms in male and female mice and increased incidence of benign mammary tumors in both sexes	B2	IRIS 1999
Nickel	Inorganic	7440-02-0	2 00E-02	Decreased body and organ weights	300	1	IRIS 1999							D	IRIS 1999

Table 7-4

Noncarcinogenic Toxicity Factors

Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Class	CAS Number	C Oral RfD mg/kg-day	C Oral RfD Critical Effect	C Oral RfD Uncert Factor	C Oral RfD Modify Factor	C Oral RfD Source	C Inhal RfD mg/kg-day	C Inhal RfD Critical Effect	C Inhal RfD Uncert Factor	C Inhal RfD Modify Factor	C Inhal RfD Source	Weight-of-Evidence Basis	Weight-of Evidence Class	Weight-of Evidence Source
Pentachlorophenol	Semi-Voa	87-86-5	3 00E-02	Liver and kidney pathology	100	1	IRIS 1999						Inadequate human data and sufficient evidence of carcinogenicity in animals statistically significant increases in the incidences of multiple biologically significant tumor types (hepatocellular adenomas and carcinomas, adrenal medulla pheochromocytomas and malignant pheochromocytomas and/or hemangiosarcomes and hemangiomas) in one or both sexes of B6C3F1 mice using two different preparations of pentachlorophenol (PeCP) In addition a high incidence of two uncommon tumors (adrenal medulla pheochromocytomas and hemangiomas/hemangiosarcomas) was observed with both preparations. This classification is supported by mutagenicity data which provides some indication that PeCP has clastogenic potential	B2	IRIS 1999
Phenanthrene	Semi-Voa	85-01-8											No human data and inadequate data from a single gavage study in rats and skin painting and injection studies in mice	D	IRIS 1999
Silicon	Inorganic	7440-21-3													
Tetrachloroethene	Voa	127 18-4	1 00E-02	Hepatotoxicity in mice weight gain in rats	1000	1	IRIS 1999	1 71E-01				Provisional RfD Memo from H Choudhury STSC-NCEA to Ted Simon, Region 4 EPA, Feb 23 1999		C B2	Withdrawn from IRIS Value listed in HEAST 1991 is used
Thallium	Inorganic	7440-28-0	8 00E-05				Value for Thallium chloride adapted from IRIS 1998							D	DWHA (4/1992)
Trichloroethene	Voa	79-01-6	6 00E-03	Liver - Toxicity	1000	3	EPA-NCEA provisional value from USEPA Region III Risk Based Concentrations Table October 1998, not verified by Region IV yet							B2	Withdrawn from IRIS Value listed in HEAST 1991 is used
Vanadium	Inorganic	7440-62 2	7 00E-03	NOAEL	100	1	HEAST 1997								
Xylenes (total)	Voa	1330-20-7	2 00E+00	Hyperactivity decreased body weight and increased mortality (males).	100	1	IRIS 1999						Orally administered technical xylene mixtures did not result in significant increased in incidences in tumor responses in rats or mice of both sexes	D	IRIS 1999

Note

C	Chronic
CAS	Chemical Abstract System number
DDT	dichlorodiphenyltrichloroethene
DWHA	Drinking Water Health Advisory
ECAO	Environmental Criteria and Assessment Office
EPA	Environmental Protection Agency
ESOD	erthrocyte superoxide dismutase
HEAST	Health Effects Assessment Summary Table
Inhal	Inhalation
IRIS	Integrated Risk Information System
Mg/kg-day	milligrams per kilograms per day
NC	No Comment
NCEA	National Center for Environmental Assessment
NOAEL	no observed adverse effects level
RBC	risk-based concentration
RFC	reference concentration
RfD	Reference Dose
STSC	Superfund Technical Support Center
SVOC	semivolatile organic compound
TEF	toxicity equivalent factor
Uncert	uncertainty
VOC	volatile organic compound

TABLE 7-9
Recommended Toxicity Equivalent Factors for Carcinogenic PAHs

Rev 1 Memphis Depot Dunn Field RI

Compound	**Toxicity Equivalent Factors**
PAHs	
Benzo(a)anthracene	0 1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	0 1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenzo(a,h)anthracene	1
Indeno(1,2,3-cd)pyrene	0 1

Notes

Based on the recommendation in *Supplemental Guidance to RAGS. Region 4 Bulletins* (EPA, 1995)

PAH polynuclear aromatic hydrocarbon

TABLE 7-10
Recommended Dermal Gastrointestinal Absorption Values for Toxicity
Rev 1 Memphis Depot Dunn Field RI

Chemical Name	DE
2,4,6-Trichlorophenol	90%
2-Nitrophenol	N/A
1,1,2,2-Tetrachloroethane	70%
1,1,2-Trichloroethane	81%
1,1-Dichloroethene	100%
1,2-Dichloroethane	100%
Aluminum	10%
Antimony	2%
Arsenic	41%
Barium	7%
Benzo(a)anthracene	31%
Benzo(a)pyrene	31%
Benzo(b)fluoranthene	31%
Benzo(k)fluoranthene	31%
Beryllium	1%
Cadmium	1%
Carbazole	70%
Carbon tetrachloride	65%
Chloroethane	80%[a]
Chloromethane	80%[a]
Chloroform	20%
Chromium, total	2%
Chrysene	31%
Cobalt	80%
Copper	30%
Dibenz(a,h)anthracene	31%
Dieldrin	50%
Heptachlor epoxide	72%
Indeno(1,2,3-cd)pyrene	31%
Lead	15%
Manganese	4%
Mercury	0.01%
Methylene chloride	95%
Nickel	27%
Pentachlorophenol	100%
Phenanthrene	73%
Silicon	N/A
Tetrachloroethene	100%
Thallium	15%
Total 1,2-Dichloroethene	100%
Total Xylenes (Xylene, Mixture)	92%
Trichloroethene	15%
Vanadium	1%
Vinyl chloride	100%
Zinc	20%

Notes

Dermal GI Values adapted from Bast and Borges, 1996 C B Bast and H T Borges 1996

Derivation of toxicity values for dermal exposure The Toxicologist, Vol 30, No 1, Part 2, March 1996

a = *Chloroethane & chloromethane values adapted from USEPA Region IV default values (USEPA November 1995)*

TABLE 7-11
Sources of Uncertainty and their Contribution to Conservatism in Risk Assessment
Rev 1 Memphis Depot Dunn Field RI

Sources of Uncertainty in Risk Assessment	Degree to which Factor May Result in Overestimated Risk	Degree to which Factor May Result in Underestimated Risk	Degree to which Factor May Result in Overestimated or Underestimated Risk
Hazard Identification			
Field sampling location bias	Moderate-High		
Inclusion of soil data from depths outside realistic exposure intervals			Low-Moderate
Use of one-half reporting limit for nondetects	Moderate-High		
Determination of background conditions			Moderate
Comparison criteria used in selecting COPCs			Moderate
Exposure Assessment			
Selection of site-specific exposure pathways			Low-moderate
Estimation of exposure to multiple substances			Moderate
Assumption that exposure scenarios and contact with affected media will occur	High		
Assumption of frequent, routine exposure over prolonged durations	High		
Assumption of equivalency of physicochemical characteristics of soil and sediment	Moderate-High		
Selection of UCL 95% or maximum concentration for EPC	Moderate-High		
Use of default exposure values for physiologic parameters:			Low-high
- Skin surface area exposed	Moderate-High		
- Inhalation rates	Moderate		
- Sediment ingestion rates	High		
- Soil ingestion rates	Moderate		
Toxicity Assessment			
Factors used in derivation of toxicity values (e g., inner-species extrapolation)	Moderate-High		
Weight of evidence for human carcinogenicity	Moderate-High		
Extrapolation of less than lifetime exposure to lifetime cancer risks	High		
Interaction of multiple chemical substances		Moderate	
Use of published RfDs and SFs derived by standard EPA methods	Moderate-High		
Derivation of dermal SFs and RfDs using GI absorption factors			Moderate
Derivation of inhalation RfDs from published RfC values			Uncertain
Lack of toxicity values for some chemicals or exposure routes		Low-Moderate	

TABLE 7-11
Sources of Uncertainty and their Contribution to Conservatism in Risk Assessment
Rev. 1 Memphis Depot Dunn Field RI

Sources of Uncertainty in Risk Assessment	Degree to which Factor May Result in Overestimated Risk	Degree to which Factor May Result in Underestimated Risk	Degree to which Factor May Result in Overestimated or Underestimated Risk
Assumption of additivity of toxicological effects	Moderate-High		
Use of default PEFs			Low-Moderate
Risk Characterization			
Addition of risks across multiple exposure pathways	Moderate -High		
Addition of risks from multiple chemical substances			Low-High
Lack of consideration of source depletion, natural degradation, or attenuation of COPCs over time	Moderate		

Notes

95UCL	95% of the upper confidence limit	PEF	particulate emission factor
COPC	contaminant of potential concern	RfC	reference concentration
EPC	exposure point concentration	RfD	reference dose
GI	gastrointestinal	SF	slope factor

TABLE 7-12
Screening Ecotoxicity Criteria for Surface Water
Rev 1 Memphis Depot Dunn Field RI

Detected Parameter	Screening Criterion (mg/L)
Aluminum	0.087
Arsenic	0.19
Chlordane	0.0000043
Chromium, Total	0.011
Dieldrin	0.0000019
Fluoranthene	0.0398
Lead	0.00132
Phenanthrene	0.017
Pyrene	0.017
Zinc	0.05891

Source. Surface water ecotoxicity screening values were obtained from EPA Region 4 Supplemental Guidance to RAGS (EPA, 1998) Region 4 Bulletins, Surface Water Screening Values for Hazardous Waste Sites (November 1995), chronic screening values used

mg/L milligrams per liter

TABLE 7-13
Screening Ecotoxicity Criteria for Sediment
Rev 1 Memphis Depot Dunn Field RI

Detected Parameter	Screening Criterion (mg/kg)
Acenaphthene	0.33
Alpha-chlordane	0.0017
Aluminum	NA
Anthracene	0 33
Antimony	12
Arsenic	7.24
Benzo(a)anthracene	0 33
Benzo(a)pyrene	0 33
Benzo(b)fluoranthene	0.33
Benzo(g,h,I)perylene	0 33
Benzo(k)fluoranthene	0.33
Benzyl butyl phthalate	NA
Beryllium	NA
bis(2-Ethylhexyl) phthalate	0 182
Cadmium	1
Carbazole	NA
Chromium, Total	52.3
Chrysene	0.33
Copper	18 7
Dieldrin	0 0033
Fluoranthene	0.33
Fluorene	0.33
Gamma-chlordane	0 0017
Indeno(1,2,3-c,d)pyrene	0.33
Lead	30 2
Nickel	15 9
PCB-1260 (Aroclor 1260)	0.033
Phenanthrene	0.33
Pyrene	0.33
Selenium	NA
Zinc	124

Source Sediment ecotoxicity screening values were obtained from EPA Region 4 Supplemental Guidance to RAGS (EPA, 1998) Region 4 Bulletins, Sediment Screening Values for Hazardous Waste Sites (November 1995)

mg/kg	milligrams per kilogram
NA	not available in the literature reviewed

TABLE 7-14
Screening Ecotoxicity Criteria for Surface Soil
Rev 1 Memphis Depot Dunn Field RI

Detected Parameter	Screening Criterion (mg/kg)
1,1,2,2-Tetrachloroethane	0.1
2-Methylnaphthalene	0 1
Acenaphthene	20
Acetone	NA
Alpha-Chlordane	0 1
Aluminum	50
Anthracene	0 1
Antimony	3.5
Arsenic	10
Barium	165
Benzene	0 05
Benzo(a)anthracene	0.1
Benzo(a)pyrene	0.1
Benzo(b)fluoranthene	0 1
Benzo(g,h,i)perylene	0 1
Benzo(k)fluoranthene	0.1
Benzyl butyl phthalate	0 1
Beryllium	1.1
bis(2-Ethylhexyl) phthalate	0.1
Cadmium	1 6
Calcium	NA
Carbazole	NA
Carbon disulfide	NA
Carbon tetrachloride	1000
Chloroform	0 001
Chromium, Total	0.4
Chrysene	0 1
Cobalt	20
Copper	40
Dichlorodiphenyldichloroethane (DDD)	0.0025
Dichlorodiphenyldichloroethene (DDE)	0.0025
Dichlorodiphenyltrichloroethane (DDT)	0 0025
Dibenz(a,h)anthracene	0 1
Dibenzofuran	0 1
Dieldrin	0.0005
Diethyl phthalate	0 1
Di-n-butyl phthalate	0 1
Endosulfan sulfate	NA

TABLE 7-14
Screening Ecotoxicity Criteria for Surface Soil
Rev. 1 Memphis Depot Dunn Field RI

Detected Parameter	Screening Criterion (mg/kg)
Endrin	0.001
Endrin ketone	0.001
Ethylbenzene	0.05
Fluoranthene	0.1
Fluorene	0.1
Gamma-chlordane	0.1
Heptachlor epoxide	NA
Indeno(1,2,3-c,d)pyrene	0.1
Iron	200
Lead	50
Magnesium	NA
Manganese	100
Mercury	0.1
Methoxychlor	NA
Methyl ethyl ketone (2-butanone)	NA
Methylene chloride	0.1
Naphthalene	0.1
Nickel	30
PCB-1254 (Aroclor 1254)	0.02
PCB-1260 (Aroclor 1260)	0.02
Phenanthrene	0.1
Potassium	NA
Pyrene	0.1
Selenium	0.81
Silver	2
Sodium	NA
Styrene	0.1
Tetrachloroethene	0.01
Thallium	1
Toluene	0.05
Total 1,2-dichloroethene	0.1
Total Xylenes	NA
Trichloroethene	0.001
Vanadium	2
Vinyl chloride	0.01
Zinc	50

Source: soil ecotoxicity values were obtained from EPA Region 4, Draft Ecological Screening Levels for Soil from "Memorandum - Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders", December 22, 1998 (EPA, 1998)
mg/kg milligrams per kilogram, NA not available in the literature reviewed

TABLE 7-15
Applicable or Relevant and Appropriate Requirements for Groundwater and Surface Water
Rev 1 Memphis Depot Dunn Field RI

Parameters Detected	Maximum Contaminant Level (mg/L)	REF	Maximum Contaminant Level Goal (mg/L)	REF	TN-Surface Water and Organism (mg/L)	REF	TN-Organism only (mg/L)	REF	EPA-Surface Water and Organism (mg/L)	REF	EPA-Organism only (mg/L)	REF
Aluminum	NA		NA		NA		NA		NA		NA	
Arsenic	5.00E-02	a	NA		1.80E-04	c	1.40E-03	d	2.20E-06	e	1.75E-05	f
Barium	2.00E+00		2.00E+00		NA		NA		1.00E+00	e	NA	
Beryllium	4.00E-03	a	4.00E-03	b	NA		NA		NA		NA	
Cadmium	5.00E-03	a	5.00E-03	b	NA		NA		1.00E-02	e	1.70E-01	f
Chromium, Trivalent	NA		NA		NA		NA		5.00E-02	e	NA	
Chromium, Hexavalent	NA		NA		NA		NA		1.70E+02	e	3.43E+03	f
Chromium, Total	1.00E-01	a	1.00E-01	b	NA		NA		NA		NA	
Cobalt	NA		NA		NA		NA		NA		NA	
Copper	1.30E+00		1.30E+00		NA		NA		1.30E+00	e	NA	
Manganese	NA		NA		NA		NA		5.00E-02	e	1.00E-01	f
Mercury	2.00E-03	a	2.00E-03	b	1.40E-04	c	1.50E-04	d	1.44E-04	e	1.46E-04	f
Nickel	1.00E-01	a	1.00E-01	b	6.10E-01	c	4.60E+00	d	1.34E-02	e	1.00E-01	f
Thallium	2.00E-03	a	5.00E-04	b	1.70E-03	c	6.30E-03	d	1.30E-02	e	4.80E-02	f
Vanadium	NA		NA		NA		NA		NA		NA	
Dieldrin	NA		NA		1.40E-06	c	1.40E-06	d	7.10E-08	e	7.60E-07	f
Benzo(a)Anthracene	NA		NA		4.40E-05	c	4.90E-04	d	2.80E-06	e	3.11E-05	f
Benzo(a)Pyrene	2.00E-03	a	0.00E+00	b	4.40E-05	c	4.90E-04	d	2.80E-06	e	3.11E-05	f
Benzo(b)Fluoranthene	NA		NA		NA		NA		2.80E-06	e	3.11E-05	f
Benzo(k)Fluoranthene	NA		NA		4.40E-05	c	4.90E-04	d	2.80E-06	e	3.11E-05	f
Chrysene	NA		NA		4.40E-05	c	4.90E-04	d	2.80E-06	e	3.11E-05	f
1,1,2,2-Tetrachloroethane	NA		NA		1.70E-03	c	1.10E-01	d	1.70E-04	e	1.07E-02	f
1,1,2-Trichloroethane	5.00E-03	a	3.00E-03	b	6.00E-03	c	4.20E-01	d	NA		NA	
1,1-Dichloroethene	7.00E-03	a	7.00E-03	b	5.70E-04	c	3.20E-02	d	3.30E-05	e	1.85E-03	f
1,2-Dichloroethene (total)	*cis 0.07/ trans 0.1	a	*cis 0.07/ trans 0.1	b	NA	c	NA	d	7.00E-01	e	1.40E+02	f
1,2-Dichloroethane	5.00E-03	a	0.00E+00	b	3.80E-03	c	9.90E-01	d	9.40E-04	e	2.43E-01	f
Carbon tetrachloride	5.00E-03	a	0.00E+00	b	2.50E-03	c	4.40E-02	d	4.00E-04	e	6.94E-03	f
Chloroform	1.00E-01	a	0.00E+00	b	5.70E-02	c	4.70E+00	d	1.90E-04	e	1.57E-02	f
Chloromethane	NA		NA		NA		NA		NA		NA	
Heptachlor epoxide	2.00E-04	a	0.00E+00	b	2.10E-06	c	2.10E-06	d	2.80E-07	e	2.90E-07	f
Tetrachloroethylene (PCE)	5.00E-03	a	0.00E+00	b	8.00E-03	c	8.85E-02	d	8.00E-04	e	8.85E-03	f
Trichloroethylene (TCE)	5.00E-03	a	0.00E+00	b	2.70E-02	c	8.10E-01	d	2.70E-03	e	8.07E-02	f

Parameters Detected	Maximum Contaminant Level (mg/L)	REF	Maximum Contaminant Level Goal (mg/L)	REF	TN-Surface Water and Organism (mg/L)	REF	TN-Organism only (mg/L)	REF	EPA-Surface Water and Organism (mg/L)	REF	EPA-Organism only (mg/L)	REF

Notes

REF – references

a EPA 1996 - Maximum Contaminant Levels (MCLs)

b EPA 1996 – MCLGs

c ELR TN Environmental, 1996 Surface Water and Organism

d ELR TN Environmental 1996, Organism only

e EPA 1991 Water Quality Criteria Summary, Surface Water & Organism

f EPA 1991 Water Quality Criteria Summary, Organism only

TCDD	Tetrachlorodibenzo-p-dioxin
mg/L	Milligrams per liter

Table 7-16
Remedial Goal Options for Lead
Rev 2 Memphis Depot Dunn Field RI

$$RBRG = PbS = \frac{PbB_{adult,\,central,\,goal} - PbB_{adult} * AT}{\left(BKSF * IR_s * AF_s * EF_s\right)}$$

where,

$$PbB_{adult,\,central,\,goal} = \frac{PbB_{fetal,0.95,\,goal}}{GSD_{i,adult}^{1\ 645} * R_{fetal\,/\,maternal}}$$

Exposure Parameter	Description	Adult Worker[2]	Source[1]
RBRG	**Risk-Based Remedial Goals (RBRGs) expressed in mg/kg; or PbS = Soil Lead Concentration (mg/kg)**	**1536**	**Calc.**
$PbB_{adult\ central,goal}$	Goal for central estimate of Blood Lead Concentration expressed in ug/dl,	4 23	Calc
$PbB_{adult\ 0}$	Typical Blood Lead Concentration (ug/dL) in adults, (i e , women of child-bearing age) in absence of exposures to the sit	1 7	A
$PbB_{fetal\ 0\ 95,goal}$	Goal for 95%blood lead concentration (ug/dL) in fetuses from exposures to women workers of childbearing age	10	A
BKSF	Biokinetic Slope Factor expressed in (ugdL) per (ug/day) or day/dl,	0 4	A
IR_s	Intake rate for soil, including both indoor and outdoor soil-derived dust (g/day) (50 mg/day)	0 05	A
AFs	Absolute gastrointestinal absorption fraction for ingested lead in soil and lead in dust derived from soil (dimensionless)	0 12	A
EFs	Exposure Frequency for contact with assessed soils and/or dust derived par from site soils (days/year)	250	B
AT	Averaging time, 365 days/year	365	B
$GSD^{1\ 645}_{i,adult}$	Geometric standard deviation of the responses to lead exposure, on-site an offsite (unitless) 1 8-uniform population, 2 1 -heterogeneous population	2 63	A
$R_{fetal/maternal}$	Constant proportionality between fetal blood lead concentration at birth an maternal blood lead concentration (dimensionless)	0 9	A

[1] Sources

A. USEPA 1996 Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil December 1996

B USEPA 1991 Human Health Evaluation Manual, Part B· "Development of Risk-based Preliminary Remedial Goals" Office of Solid Waste and Emergency Response OSWER Directive 9285 7-01B December 13, 1991

[2] - An adult worker is assumed to spend 250 days/year, and resulting target lead levels will likely be protective of other recreational adult users spending lesser amount of time (less frequently, and for shorter period of time) Also, if remedial actions achieve residential (unrestricted land use based) levels, it also be protective of recreational users

TAB

Section 8

8.0 Nature and Extent of Contamination in Northeast Open Area

This section addresses the nature and extent of contamination within the Northeast Open Area (Figure 8-1). The subsections below describes how the Northeast Open Area was defined, the probable sources of contamination that exist within the Northeast Open Area, and potential contaminants and their distribution in the Northeast Open Area.

To facilitate the investigation of the Northeast Open Area, several historic Dunn Field sites were consolidated into "Locations"(Figure 8-2) as described in Table 8-1, taken from the *Final Field Sampling Plan for OU-1 Addendum* (CH2M HILL, 1999) and investigated as possible sources of contaminant releases to the environment. This section describes the nature and extent of contamination within the Northeast Open Area by evaluating the current and historical site data.

8.1 Northeast Open Area Background

8.1.1 Northeast Open Area Physical Description

The Northeast Open Area consists of the mowed and wooded area in the northeast section of Dunn Field. The topography (Figure 8-2) is generally level over the entire area, exhibiting maximum and minimum surface relief features in the form of manmade berms and drainage ditches, respectively. Ground elevation ranges from approximately 310 feet msl measured at the southern boundary of the Northeast Open Area to 275 feet msl in a drainage area adjacent to the northern boundary.

The dominant manmade features within the Northeast Open Area are the former firing range (Sites 60 and 85) and two concrete drainage ditches (Site 50). The firing range is in the center of the area, approximately 400 feet south of the northern boundary of Dunn Field. The two concrete ditches originate at the eastern boundary at points approximately 350 feet and 900 feet south of the northeast corner, proceed individually in a generally northwest direction; join about 175 feet from the north fence line to form a single drainageway; and terminate into an open ditch outside the northern boundary and just south of Person Avenue. The underground conveyance system for the groundwater extraction system, including the meter and by-pass station, is located along the north boundary of the Northeast Open Area

8.1.2 Northeast Open Area History

This portion of Dunn Field was used in the past for firearms target practice and handling and disposal of military supplies and equipment. The Northeast Open Area contains the following Dunn Field historical sites as identified in previous RI activities and documents:

- Site 19 (Former Tear Gas Canister Burn Site) now within Location G;
- Site 20 (Asphalt Burial Site) now within Location G;

- Site 21 (XXCC-3 Burial Site),
- Site 50 (Dunn Field Northeast Quadrant Drainage Ditch) now within Location H,
- Site 60 (Pistol Range Impact Area and Bullet Stop),
- Site 62 (Bauxite Storage) now partially in Location G; and
- Site 85 (Old Pistol Range/Bldg. 1184-Temporary Pesticide Storage).

8.2 Summary of Remedial Investigations at Northeast Open Area

8.2.1 Historical Remedial Investigations

Past characterization of potential contamination in the Northeast Open Area has been limited to the following:

- Initial sampling of surface water through collection of storm water runoff at Site 50 occurred as part of the Law Environmental RI in 1990 (Law Environmental, 1990a). Surface water sample analytical results showed dieldrin and metals were present.
- A surface soil sample was collected to the east of Site 85 between the road and the concrete ditch as part of the Law Environmental RI in 1990 (Law Environmental, 1990a). Analytical results showed DDE, DDT, dieldrin, and metals were present.
- A background surface soil sample (SS-8) was collected adjacent existing monitoring well MW-9, north of Site 20, east of the railroad tracks as part of the Parsons ES EE/CA in 1998 (Parsons, June 1999). The sample was analyzed for TAL metals, explosives and CWM breakdown products. Analytical results showed lead and potassium were present at concentrations greater than the established background for Dunn Field. No explosives or CWM breakdown products were detected.

No previous investigations have been performed specifically at Sites 19, 20, 21, 60, 62 and 85

8.2.2 Summary of Findings from Past Remedial Investigations

The results of limited soil data collected during the Law Environmental RI indicated that certain areas of soil in the Northeast Open Area were slightly contaminated with metals and pesticides. On the basis of fate and transport analysis, Law Environmental concluded that the metals were capable of migration, but that pesticides were not, and it was concluded that these compounds were detected at locations near their original sources of contamination.

Law Environmental did not define the extent of contamination in the Northeast Open Area in their RI report. However, results from this report were used to evaluate potential problem areas within the Northeast Open Area and provided part of the rationale for additional sampling Additional sampling was conducted for areas where data gaps existed and where sampling and analyses were required to characterize the nature and extent of contaminants from past activities at the site

8.2.3 Current Remedial Investigations

The sampling rationale for Dunn Field was developed so that the recommendations from the 1995 FSPs and the 1999 FSP addendum could be accomplished. In addition, passive soil gas results obtained from a screening survey conducted in 1998 (see Section 4.1) that focused on chlorinated solvents were used to guide the RI sampling effort and analyte selection. Therefore, the selection of sampling points and analytes for this RI is a culmination of both direct and indirect sources of information

The sites within the Northeast Open Area were investigated by CH2M HILL from February 1999 through April 1999. At that time, the surface soil was sampled to assess the nature and horizontal extent of contamination within the Northeast Open Area, and the subsurface soil was sampled to assess the vertical extent of contamination Surface water and sediment samples were collected at the onsite origin and terminus of a concrete drainage ditch that transects the Northeast Open Area. The sampling and analysis summary, including sampling objectives for the Northeast Open Area, is presented in Table 8-2. The analyte groups investigated within the Northeast Open Area are presented in Table 8-3.

8.3 Potential Sources of Contamination

Because hazardous materials were handled, stored, and possibly disposed at Sites 19, 20, 21, 50, 60, 62, and 85 within the Northeast Open Area of Dunn Field, hazardous materials could have been released to soils at each site. Other potential sources of contamination within the Northeast Open Area (and all of Dunn Field) include releases associated with railroad activities and pesticide/herbicide application in grassy areas

Table 8-1 lists the potential sources of contamination within the Northeast Open Area. The following sections provide a description of operations that have taken place at these sites and at other areas of potential contamination (Figure 8-2) within the Northeast Open Area.

8.3.1 Site 19 - Former Tear Gas Canister Burn Site

This site is located at the southern boundary of the Northeast Open Area, approximately 525 feet from the eastern boundary and 825 feet from the northern boundary of Dunn Field The aerial photo review indicated evidence of ground disturbance suggesting past burial activity Historical disposal records suggest a maximum burial depth of 10 feet below ground surface (bgs).

Depot records indicate that this site was used from 1955 -1960 for the disposal of sanitary wastes, construction debris, smoke pots, and tear gas canisters The EPA RFA states that the tear gas canisters were placed directly on the ground and burned before burial.

During the 1999 RI sampling program, two borings were drilled and sampled at Site 19.

8.3.2 Site 20 - Asphalt Burial Site

According to Depot records, Site 20 is a former asphalt burial site located approximately 570 feet from the eastern boundary and 360 feet from the northern boundary of Dunn Field. According to the *Installation Assessment* (USATHMA, 1982) both asphalt and roofing gravel were dumped in surface fill at this location The maximum burial depth as stated in historical records is 10 feet bgs

During the 1999 RI sampling program, one boring was drilled and sampled at Site 20.

8.3.3 Site 21 - XXCC-3 Burial Site

Site 21 is approximately 350 feet from the northern boundary of Dunn Field, adjacent to the eastern boundary. The boundary of Site 21 was estimated using the *Installation Assessment* (USATHMA, 1982). This site includes two trenches, each 260 feet long by 25 feet wide. The depth of burial is not indicated; however, it is believed to be less than 10 feet because the deepest documented burial site is 8 feet for Site 12. The impregnite (XXCC-3), a wax-covered textile, is also believed to have been buried here.

XXCC-3 was produced by mixing CC-2 with zinc oxide (ZnO). CC-2 was a chemical produced by E. I. DuPont de Nemours during the 1940s and 1950s. CC-2, (sym. dichlor-bis(2,4,6 trichlorphenyl)urea) a labile (unstable) organic compound, is difficult to detect because of its instability. The results of SVOC analysis are used to evaluate whether refractory organics are present that could have resulted from the breakdown of the structure of the urea. In particular, semivolatile chlorinated phenyl compounds and chlorinated aromatics probably would be present if the substance has undergone degradation

During the 1999 RI sampling program, four borings were drilled and sampled to investigate Site 21.

8.3.4 Site 50 - Dunn Field Northeast Quadrant Drainage Ditch

This site is a concrete-lined drainage ditch that carries storm water runoff from the eastern part of Dunn Field and from the adjoining property on the east to the storm water discharge point at the northern boundary of Dunn Field. The ditch is primarily located in the rolling grassy area of Dunn Field and collects storm water runoff from Sites 19, 20, 21, 60, 62, and 85. Pesticides and other constituents from these sites may have been transmitted to receiving waters through Site 50.

Site 50 is approximately 1,000 feet long (about 3 feet wide) and is located in the northeastern corner of Dunn Field. The concrete channel was constructed in the 1940s and has been used since then for storm water runoff.

During the 1999 RI sampling program, two sets of surface water and sediment samples were collected to investigate Site 50.

8.3.5 Site 60 - Pistol Range Impact Area and Bullet Stop and Site 85 - Old Pistol Range/Bldg. 1184 - Temporary Pesticide Storage

According to Depot records, Site 60 is a former pistol range used for marksmanship training The aerial photograph review indicated that the range was constructed between 1953 and 1958. The time period that Site 60 was used for target practice is unknown, but the Installation Assessment report (USATHMA, 1982) states that the "area was abandoned in the late 1970s and the building [1184] is currently being used for pesticide storage " There is no documented evidence that this site was used for storage or handling of hazardous materials

From historical documents, Site 85 appears to be the location of a former pistol range that preceded the range now designated as Site 60, and Building 1184 was either the range or a part of the range Building 1184 is no longer used for temporary storage of pesticides.

During the 1999 RI sampling program, six surface soil samples were collected to investigate Sites 60 and 85, and at the request of EPA, CH2M HILL searched for spent bullets and casings

8.3.6 Site 62 - Bauxite Storage

Site 62 was comprised of three bauxite stockpiles covering approximately 4 acres located in the eastern half of Dunn Field. These storage areas contained only bauxite, a nonhazardous commodity. Bauxite is a naturally occurring mixture of hydrous aluminum oxides (diaspra, gibbsite, and boehmite) that contains iron. The primary use of bauxite is aluminum ore production. Bauxite was stored continuously from June 14, 1950, until 1999, when it was removed from the Depot. The reader is referred to Section 12 for a discussion of the sampling that was performed in Site 62 in the Stockpile Area.

8.3.7 Potential Contamination not Directly Associated with an Historical Site

The passive soil gas survey results indicated several areas of potential contamination in the Northeast Open Area that were not associated with a Dunn Field historical site. During the 1999 RI sampling program, two borings were drilled and sampled within the soil gas contours in Location G and three borings were drilled and sampled within the soil gas contours in Location H.

8.4 Basis and Objectives for Northeast Open Area Sampling

The following sections provide an overview of the field sampling conducted in the Northeast Open Area. Overall objectives for the investigation at Dunn Field are presented in Section 4.2. Location- and site-specific objectives in the Northeast Open Area are presented in this section.

8.4.1 Location G–Asphalt Burial Site and Tear Gas Canister Burn Area Description

Location G encompasses Site 20 (Probable Asphalt Burial Site), Site 19 (Tear Gas Burn Site), a portion of Site 62 (Bauxite Storage), and a small portion of Site 60 (Pistol Range Impact Area and Bullet Stop) A soil gas plume of low to moderate PCE concentrations encompasses these two sites and the former incinerator area identified by TEC aerial photographs

The specific sampling objective within Location G was to delineate the horizontal and vertical extent of VOCs in the surface and subsurface soils associated with the PCE soil gas plume

Field Investigation

Six borings were drilled within the soil gas PCE plume to include the following samples· one in Site 20, one in Site 19, one in the former incinerator area, and one each in the northern, eastern, and western perimeter of Location G All samples from the six borings were analyzed for VOCs. All surface soil samples were analyzed for metals. Surface soil samples from borings SBLGA and SBLGD were analyzed for pesticides.

At Site 20, samples were collected at the 0- to 1-foot and 8- to 10-foot intervals. The 8- to 10-foot interval samples were collected to characterize the suspected disposal pit at that depth. At the other locations, samples were collected at 0- to 1-foot, 3- to 5-foot, and 8- to 10-foot intervals. The 0- to 1-foot and 3- to 5-foot samples were analyzed first with 24-hour turnaround. The 8- to 10-foot samples were analyzed if VOCs were detected in the 3- to 5-foot samples to assess worker exposure criteria.

The three perimeter samples were collected to evaluate the extent of the PCE area of impact in the soil. Sample intervals are the same as discussed above.

Parsons also collected a sample from the northern portion of Location G. The sample (SS-8) was collected from the 0- to 1-foot bgs zone at the location of MW-9, and was analyzed for TAL metals, explosives and CWM breakdown products. This sample was intended as a background sample for the EE/CA investigation activities, which Parsons conducted in 1998.

8.4.2 Location H–Drainage Culvert Discharge Area Description

The TCE, PCE, and CHCl3 soil gas area of potential concern is located west of Site 50 (Dunn Field Northeast Quadrant Drainage Ditch). This location is based on a review of the soil gas survey data and historical information (Figures 4-3 and 4-6). The TCE and PCE soil gas concentrations were detected west of Site 50 and may not be associated with the drainage ditch. The Site 50 drainage ditch routes surface flow from the neighborhood east of Dunn Field, from Hays Road, and also to a lesser extent surface water flow from the Northeast Open Area.

Specific sampling objectives within Location H were:

- Evaluate the potential sources of VOCs associated with the TCE and PCE soil gas plume.
- Delineate the horizontal and vertical extent of VOCs in the surface and subsurface soils associated with the TCE and PCE soil gas plume.
- Evaluate the potential impact on sediment and surface water quality from the drainage ditch comprising Site 50.

Field Investigation

Three soil borings were drilled and sampled within the area of potential concern as defined by the soil gas contours in Location H Samples were collected at 0- to 1-foot and 8- to 10-foot intervals. All samples were analyzed for VOCs. If debris was observed in the boring, then a sample was to be collected from that depth and analyzed for TCL organic and TAL metals to identify a broad range of potential contaminants. No debris was observed. All surface soil samples were analyzed for metals and pesticides.

For Site 50, two samples (one sediment and one surface water) were collected where the drainage ditch enters Dunn Field along Hays Road, and two samples (one sediment and one surface water) were collected where the drainage ditch exits Dunn Field along Person Avenue These samples were analyzed for SVOCs, pesticides, and metals

8.4.3 Pesticide Survey Areas–Sites 21, 60, and 85

The sampling conducted to characterize these three sites was not associated with the passive soil gas survey but with past operations or disposal activities.

Specific sampling objectives at Sites 21, 60, and 85 were.

- At Site 21, determine if XXCC-3-related contaminants have migrated from the Disposal Area to surface and subsurface soils.
- At Sites 60 and 85, evaluate the extent of pesticides and metals in surface soil.
- At Site 60, determine if bullets or bullet fragments are present in the surface soil that may present an exposure risk

At Site 21, four 20-foot soil borings located in ground depressions were drilled and sampled to evaluate past disposal of XXCC-3 The surface samples (0 to 1 foot) and the subsurface samples (18 to 20 feet) were analyzed for zinc and SVOCs. At Sites 60 and 85, which are adjacent to each other, six surface soil samples were collected and analyzed for pesticides and metals. Soil from the pistol range was sieved onsite, verifying the presence of lead bullets and casings.

8.5 Nature and Extent of Contamination in Surface and Subsurface Soils

To characterize the nature and extent of contaminants within the Northeast Open Area, surface and subsurface soil samples were collected and analyzed for analyte groups that included VOCs, SVOCs, metals, and the TCL/TAL parameters (including organochlorine pesticides, herbicides, PCBs, and hexavalent chromium). Figure 8-3 shows the sample locations for the Northeast Open Area. Appendix B presents an analytical summary of all surface and subsurface soil samples as well as the surface water and sediment samples collected at the Northeast Open Area. Table 8-4 presents the sampling results within the Northeast Open Area that exceeded the screening criteria, listed by boring and sample interval. The nature and extent of the Northeast Open Area contaminant groups and/or individual contaminants that were detected above background values are discussed below.

8.5.1 Surface Soils Metals Results

In the Northeast Open Area, 16 surface soil samples (including duplicates) were collected and analyzed for all the Priority Pollutant Metals–antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc–or a subset of the Priority Pollutant Metals depending on the data required from a given location. In addition, zinc was analyzed for in 4 other samples and aluminum in 15 other samples. The FOD for these metals is presented in Table 8-5 Figure 8-4 presents the locations within the Northeast Open Area where samples were collected for metals analysis and highlights the metals with concentrations above background.

The metals detected were divided into three categories based on the number of sample concentrations that exceeded background values and the relative importance of the metal as a potential contaminant. Each metal was classified as a primary metal of concern, a distributed metal, or a naturally occurring mineral as defined below:

- Primary metals of concern were detected above background values in a significant number of samples and may indicate a release from a source area.
- Distributed metals were detected above background values in a relatively small and insignificant number of samples.
- Naturally occurring minerals were metals associated with the natural soil conditions that were detected above background levels.

8.5.1.1 Primary Metals of Concern

On the basis of the results of the surface and subsurface soil sampling and subsequent screening against background, only lead was found to be a primary metal of concern, indicating a potential release from a potential source area in the surface soils of the Northeast Open Area (see Table 8-5).

Lead. Of the 16 surface soil samples analyzed for lead, 11 samples contained lead concentrations that exceeded the background value of 30 mg/kg. The lead concentrations ranged from 14 mg/kg to 2,100 mg/kg, with the maximum value recorded in samples from the former Pistol Range.

8.5.1.2 Distributed Metals

Antimony, cadmium, silver, and thallium were detected at concentrations that exceeded background; however, the elevated concentrations for these constituents occurred infrequently and were widely dispersed. As a result, these constituents were classified as distributed metals The following discussion references Table 8-5 and Figure 8-4.

Antimony. Antimony was detected in 2 of 16 surface soil samples collected within the Northeast Open Area, but at only one concentration that exceeded the background value of 7 mg/kg This J-qualified concentration of 24 2 mg/kg was detected in soil boring SBLGE at Location G.

Cadmium. This metal (background level of 1 mg/kg) was detected in 2 of 16 samples (SBLGE and 6085D) in the Northeast Open Area, and exceeded background with concentrations of 2 1 mg/kg and 4.8 mg/kg, respectively.

Thallium. This metal (that has no background level) was detected in 9 of 16 samples (one of these as a duplicate of sample SBLHA) in the Northeast Open Area as shown in Figure 8-4. The thallium concentrations were all J-qualified and ranged from 0.44 mg/kg to 0.63 mg/kg.

8.5.1.3 Naturally Occurring Metals

Six naturally occurring metals (i.e., aluminum, beryllium, chromium, copper, nickel, and zinc) were detected in surface soil concentrations; however, few of these detections were above background. Figure 8-4 shows the naturally occurring metals with concentrations above background

Aluminum. Aluminum detection occurred in 15 of 15 samples collected for this metal. Concentrations ranged from 6,220 mg/kg to 18,300 mg/kg. None of the samples was above the background concentration of 23,810 mg/kg.

Beryllium. This metal was detected in 16 of 16 samples. One result (at sample Location 6085B) with a concentration of 1 2 mg/kg slightly exceeded the background of 1.1 mg/kg.

Chromium. Total chromium was detected 16 of 16 surface soil samples, but only exceeded the background value of 24.8 mg/kg in 3 surface soil samples as shown on Figure 8-4 The chromium concentrations ranged from 9 mg/kg to 239 mg/kg.

Copper. Copper in the surface soils was detected 16 of 16 samples, but only exceeded the background value of 34 mg/kg in 4 surface soil samples, as shown on Figure 8-4. The copper concentrations ranged from 9.1 mg/kg to 146 mg/kg.

Nickel. Nickel was detected in the surface soils in 14 of 16 samples, but only exceeded the background value of 30 mg/kg in surface soil Sample SBLGE, as shown on Figure 8-4

Zinc. Zinc in the surface soils was detected in 20 of 20 samples, but only exceeded the background value of 126 mg/kg in 3 surface soil samples (SBLGE, 6085B and 6085D) as shown on Figure 8-4. The zinc concentrations were 711 mg/kg, 884 mg/kg, and 1,780 mg/kg

8.5.1.4 Summary

The highest concentration of lead was found (predictably) in the pistol range sampling results. At Site 21, zinc was present as expected based on the known history; however, it was not detected above background in surface samples and was even less concentrated at depth The presence of thallium in surface soil is attributed to the past use of rodenticide or ant killer that may have contained thallium sulfide. Except at the former firing range, slight metals contamination in surface soils occurs at random and isolated locations in the Northeast Open Area.

8.5.2 Subsurface Soils Metals Results

With one exception, historical records do not indicate that subsurface waste disposal occurred in the Northeast Open Area. The exception is the burial of impregnite (XXCC-3) at Site 21 Therefore, metals were not measured in the Northeast Open Area subsurface except at Site 21, and then only for zinc.

As shown in Table 8-5, zinc was detected in 4 of 4 subsurface samples at Site 21. However, none of the concentrations were above the background level of 114 mg/kg

8.5.3 Surface Soils Pesticide and PCB Results

A total of 7 pesticides were detected in 15 surface soil samples (including duplicates) within the Northeast Open Area· DDT, DDE, DDD, alpha-chlordane, gamma-chlordane, dieldrin, and endrin. PCBs were also analyzed in 15 surface soil samples The FODs for these pesticides and PCBs are shown in Table 8-5. Figure 8-5 presents the locations within the Northeast Open Area where samples were collected for pesticides/PCB analysis, and highlights the pesticides/PCBs with concentrations above background or with any detectable concentration if no background concentration is available

The pesticides detected at concentrations above background are discussed below.

Dieldrin. This common pesticide was detected in 13 of 15 samples, and exceeded the background value of 0.086 mg/kg at 6 locations. The range of concentrations above background was from 0 101 mg/kg to 4.75 mg/kg

DDD. This pesticide was detected in 7 of 15 samples, and exceeded the background value of 0.0067 mg/kg at 3 locations The range of concentrations above background was from 0.0068 mg/kg to 0 543 mg/kg.

DDE. This pesticide was detected in 12 of 15 samples, and exceeded the background value of 0.16 mg/kg at 2 locations. The concentrations above background were 0.219 mg/kg and 0.232 mg/kg.

DDT. This pesticide was detected in 12 of 15 samples, and was either at or exceeded the background value of 0.074 mg/kg at 5 locations. The range of concentrations at or above background was from 0.074 mg/kg to 0.296 mg/kg.

PCBs were detected in 5 of 15 samples analyzed; however, all results were reported with a J - qualifier and none were reported above the background value.

8.5.3.1 Summary

Dieldrin, DDD, DDE, and DDT were detected across the Northeast Open Area, but are not associated with discrete releases from source areas within the Northeast Open Area In the past, these pesticides were sprayed routinely on grassy areas and around buildings (see distribution on the Main Installation), and a wide range of variability was observed (CH2M HILL, 1999, Main Installation RI Report). The high dieldrin concentration near the Former Pistol Range (6085D) may result from increased application in this area because of frequent activity and is not indicative of releases specifically from pesticide handling at Site 85.

8.5.4 Surface and Subsurface Soils VOC Results

8.5.4.1 VOCs in Surface Soil

Nine surface soil samples including duplicates were collected for VOC analyses at nine soil boring locations. Figure 8-6 presents the locations where surface soil samples were collected for VOC analyses and highlights the VOCs with concentrations above background or with any detectable concentration if no background concentration is available The FOD for VOCs in surface soils is shown in Table 8-5.

Seven VOCs were detected in surface soil samples. These VOCs and their respective concentrations or range of concentrations are as follows:

- TCE - 0.004 mg/kg and 0.7 mg/kg in two samples,
- PCE – 0.002 mg/kg to 0.006 mg/kg in three samples,
- 1,1,2,2-PCA - two J-qualified concentrations at 0.001 and 0.005 mg/kg;

- Vinyl chloride - a single concentration of 0 008 mg/kg,
- Methyl ethyl ketone (2-butanone) - detected in 8 of 9 samples in concentrations ranging from 0 005 mg/kg to 0 016 mg/kg;
- Total 1,2-dichloroethene - a single concentration of 0.22 mg/kg; and
- Benzene - two J-qualified concentrations of 0.004 mg/kg

8.5.4.2 VOCs in Subsurface Soil

Twenty subsurface soil samples including duplicates were collected for VOC analyses at nine soil boring locations. Figure 8-7 presents the locations where subsurface soil samples were collected for VOC analyses and highlights the VOCs with concentrations above background or with any detectable concentration if no background concentration is available. The FOD for VOCs in subsurface soils is shown in Table 8-5.

Ten VOCs were detected in subsurface soil samples. These VOCs, their respective concentrations, and the sample depth intervals are presented in Figure 8-7. The detected compounds were reported with a J- qualifier, except for four compounds (PCE, 1,1,2,2-PCA, total 1,2-DCE, and TCE) detected in samples from SBLGC and one PCE detection in the 8- to 10-foot bgs interval sample from boring SBLGF. The highest detection of all VOC compounds in subsurface soils was 1 3J of total xylenes in the 3- to 5-foot bgs zone from boring SBLGE.

8.5.4.3 Summary of VOC Nature and Extent

VOCs were found in both surface and subsurface soil samples. In particular, as shown on Figure 8-7, PCE and TCE were detected at 3 to 5 feet bgs and/or 8 to 10 feet bgs at multiple locations These VOC concentrations do not appear to be high enough to indicate the a release from a definable source area. However, the VOC results confirm the PCE soil gas plume indicated by the passive soil gas survey (see Figure 4-3) and suggest that incidental surface waste disposal of chlorinated solvents may have occurred in the Northeast Open Area during the long period of operations at Dunn Field VOCs detected along the western boundary of the Northeast Open Area may be associated with waste disposal operations in the adjacent Disposal Area. The relationship between VOCs in soil and groundwater is further discussed in Section 14

8.5.5 SVOC Results

SVOCs and PAHs were measured at a limited number of locations in surface soil, subsurface soil, surface water and sediments, based on past operational activities A summary of the SVOC sample analysis results in surface soils and subsurface soils and the corresponding analytical results follows SVOC sampling and analyses for surface water and sediments are discussed in the next subsection.

Surface soils. No SVOCs or PAHs were detected above background in any surface soil samples collected at Site 21 or within Location "H."

Subsurface soils. At Site 21, the surface samples from all four borings were analyzed for SVOCs. The single detection was in SB21C for bis(2-ethylhexyl)phthalate at a J-qualified concentration of 0.24 mg/kg. No SVOCs were detected in the subsurface soil samples collected within Location "H."

8.5.6 Surface Water Runoff and Sediments

Following a rain event, two surface water runoff and sediment samples were collected from within the Site 50 concrete drainage ditches, as described in Section 8 3.4, to evaluate potential contamination in surface water runoff One surface water runoff and sediment sample was collected at the southeast end of the ditch, near the fence along the eastern boundary of Dunn Field; the other surface water runoff and sediment sample was collected at the north end of the ditch. Figure 8-8 presents the two locations where surface water runoff and sediment samples were collected for metals, pesticides, PCBs, and SVOC analysis, and highlights all analytical results above background or with any detectable concentration if no background concentration is available. Sample Locations SWLHA and SDLHA are upgradient of most of the drainage received by the ditch and, therefore, represent surface water and sediment flowing onto Dunn Field.

The contaminants detected in the surface water runoff and sediments are shown in Table 8-4. The FOD is shown in Table 8-5. As shown in Figure 8-8, detections included the following:

- Metals - Copper was found at a concentration slightly above background in the sediment sample at both ends of the Site 50 drainage ditch. Lead was detected at both ends of the drainage ditch in samples SDLHA and SDLHB. The concentrations ranged from 76.5 to 82 3 mg/kg, respectively.
- Pesticides – Dieldrin and alpha chlordane were detected at concentrations of 0.152 mg/kg and 0.0309 mg/kg, respectively, in the sediments at the upper or southeast end (Location "HA") of the Site 50 drainage ditch. At the northwest or terminal end (Location "HB") of the ditch, dieldrin and alpha chlordane were detected in the sediment sample at concentrations of 0 0807 mg/kg and 0.0076 mg/kg, respectively. No pesticides were detected in the surface water at Location SWLHA; however, at surface water sampling Location SWLHB, dieldrin and gamma-chlordane were detected at very low J-qualified concentrations. The downgradient Location HB does not show elevated pesticide concentrations relative to the upgradient sample location.
- PCBs - Arochlor 1260 was detected in the sediment samples at both locations at concentrations less than 0.05 mg/kg
- SVOCs - Fluoranthene, phenanthrene, and pyrene were detected in both surface water samples at concentrations less than 0.0006 mg/kg. Benzyl butyl phthalate and bis(2-ethylhexyl)phthalate were detected in the Location SDLHA sediment sample at concentrations of 0.15 mg/kg and 1.6 mg/kg, respectively.

No discrete onsite releases from sources within the Northeast Open Area appear to be contributing to offsite contamination via runoff through the drainage ditches. Past applications of dieldrin have established a ubiquitous source of ambient dieldrin at Dunn Field It should be noted that Site 50, the northwest-trending drainage ditch, appears to capture the surface water runoff from a major portion of the residential neighborhood that borders the Northeast Open Area and this could be the source of the contaminants (other than pesticides) present in the surface water and sediments.

8.6 Nature and Extent Conclusions

Conclusions regarding the nature and extent of contamination in soils, sediments and surface water, relative to the objectives of the RI established in Section 8.4, are as follows:

- Surface and subsurface VOC analyses confirm the presence of VOCs identified in soil gas plumes at Locations G and H. Soil VOCs were detected along the western portion of the Northeast Open Area, probably associated with waste disposal operations (e.g. spreading of surface soils containing VOCs) in the adjoining Disposal Area VOCs were detected in the subsurface to a depth of 8 to 10 feet. Since concentrations in surface and subsurface soil are distributed and generally well below 0.094 mg/kg, specific disposal areas for VOCs were not identified in the Northeast Open Area.
- There is no indication that zinc or SVOCs have migrated from the XXCC-3 disposal area at Site 21.
- Lead was elevated at Site 60, the pistol range. The extent of the lead is adequately characterized given the known dimension of the range.
- The distribution of pesticides across the Northeast Open Area is similar to that at the Main Installation, indicating widespread surficial pesticide application rather than releases from the temporary pesticide storage area, Site 85.

Contaminant concentrations in samples of surface water and sediment coming onto Dunn Field at Site 50 are equivalent to or greater than concentrations in surface water and sediment leaving Dunn Field Thus there is no evidence that Site 50 is contributing to offsite contamination

Tables

TABLE 8-1
Site Consolidation and Rationale in Northeast Open Area
Rev. 1 Memphis Depot Dunn Field RI

Consolidated Location ID	Historical Site Designation	Rationale for Consolidation
Location G-Asphalt Burial Site and Tear Gas Canister Burn Area	19, 20	PCE soil gas plume encompasses these sites and the incinerator disposal area identified by TEC aerial photographs. Low-level soil gas implies surface soil contamination. PCE contamination is west of Site 50 and may not be associated with the drainage ditch.
Location H-Perimeter TCE	50	TCE and PCE soil gas plume encompasses the end of the drainage ditch Low-level soil gas implies surface soil contamination.
Sites not consolidated	21, 60, 62, 85	Sites are isolated and not associated with soil gas VOC detections or geophysical anomalies.

Table 8-2
Sampling and Analysis Summary
Northeast Open Area of Dunn Field
Rev 1 Memphis Depot Dunn Field RI

Site Consolidation Identification	Sites Consolidated	Sampling Objective	Number of Borings	Surface soil (0 - 1ft)	Sub-surface soil (>1-30 ft)	Sample Interval (ft)	Analyses							
							VOC	PPM Metal	Pest/ PCB	SVOC	Zinc	MS/MSD	Field Duplicates	Comments
G-Asphalt Burial Site and Tear Gas Canister Burn Area	19, 20, 62	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent Data will support human health and ecological risk assessment of exposure to surface soil during construction activities	6	5	6(6held)	0 0-1 0, 3 0-5 0, 8 0-10	17	5	4			1	1	
H-Drainage Culvert Discharge Area	50	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent Data will support human health and ecological risk assessment of exposure to surface soil during construction activities	3	3	6	0 0-1 0, waste, 8 0-10	9	3	3	3			2	
Surface Water		Develop baseline data on presence or absence of contamination in surface water at site						2	2	2				
Sediment		Develop baseline data on presence or absence of contamination in sediment at site						2	2	2				
Pesticide Survey Areas	21, 60, 85	Evaluate pesticide and metals contamination in surface soil – confirm horizontal and vertical extent Data will support human health and ecological risk assessment of exposure to surface soil during construction activities	10	10	4	0 0-1 0, 18 0-20		6	6	8	8			

TABLE 8-3
Analyte Groups for the Northeast Open Area
Rev 1 Memphis Depot Dunn Field RI

Matrix	StationID	SampleID	Date Collected	Explosives	Metals, Total	OC Pesticides	PCBs	Semivolatiles	Volatiles
SB	SB21A	DJA174	03/30/1999		X			X	
SB	SB21B	DJA177	03/30/1999		X			X	
SB	SB21C	DJA180	03/30/1999		X			X	
SB	SB21D	DJA183	04/01/1999		X			X	
SB	SBLGA	DJA143	03/29/1999						X
SB	SBLGA	DJA144	03/29/1999	X					X
SB	SBLGB	DJA146	03/29/1999						X
SB	SBLGB	DJA147	03/29/1999						X
SB	SBLGC	DJA149	03/29/1999						X
SB	SBLGC	DJA150	03/29/1999	X					X
SB	SBLGC	DJA238FD	03/29/1999						X
SB	SBLGD	DJA152	03/29/1999						X
SB	SBLGD	DJA153	03/29/1999	X					X
SB	SBLGE	DJA155	03/29/1999						X
SB	SBLGE	DJA156	03/29/1999	X					X
SB	SBLGF	DJA158	04/01/1999						X
SB	SBLGF	DJA159	04/01/1999						X
SB	SBLHA	DJA161	03/30/1999						X
SB	SBLHA	DJA162	03/30/1999	X					X
SB	SBLHB	DJA164	03/30/1999						X
SB	SBLHB	DJA165	03/30/1999						X
SB	SBLHC	DJA167	03/30/1999						X
SB	SBLHC	DJA168	03/30/1999						X
SB	SBLHC	DJA284FD	03/30/1999						X
SE	SDLHA	DJA169	03/15/1999		X	X	X	X	
SE	SDLHB	DJA171	03/15/1999		X	X	X	X	
SS	SB21A	DJA173	03/30/1999		X			X	
SS	SB21B	DJA176	03/30/1999		X			X	
SS	SB21C	DJA179	03/30/1999		X			X	
SS	SB21D	DJA182	04/01/1999		X			X	
SS	SBLGA	DJA142	03/29/1999	X	X	X	X		X
SS	SBLGB	DJA145	03/29/1999		X	X	X		X
SS	SBLGC	DJA148	03/29/1999	X	X	X	X		X
SS	SBLGD	DJA151	03/29/1999	X	X	X	X		X
SS	SBLGE	DJA154	03/29/1999	X	X				X
SS	SBLHA	DJA160	03/30/1999	X	X	X	X	X	X
SS	SBLHA	DJA239FD	03/30/1999		X	X	X	X	X
SS	SBLHB	DJA163	03/30/1999		X	X	X	X	X
SS	SBLHC	DJA166	03/30/1999		X	X	X	X	X
SS	SS6085A	DJA185	04/01/1999		X	X	X		
SS	SS6085B	DJA186	04/01/1999		X	X	X		
SS	SS6085C	DJA187	04/01/1999		X	X	X		
SS	SS6085D	DJA188	04/01/1999		X	X	X		
SS	SS6085E	DJA189	04/01/1999		X	X	X		
SS	SS6085F	DJA190	04/01/1999		X	X	X		
SS	SS6085F	DJA288FD	04/01/1999		X	X	X		
WS	SWLHA	DJA170	03/13/1999		X	X	X	X	
WS	SWLHB	DJA172	03/13/1999		X	X	X	X	

SB = Subsurface soil boring
SS= Surface soil
SW = Surface Water
SE = Sediment

TABLE 8-4

Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Metals								
Subsurface Soils								
SB21A	DJA174	8 0 to 10 0	ZINC	14 6	=	MG/KG	114	
SB21B	DJA177	8 0 to 10 0	ZINC	16 1	=	MG/KG	114	
SB21C	DJA180	8 0 to 10 0	ZINC	30 4	=	MG/KG	114	
SB21D	DJA183	8 0 to 10 0	ZINC	19 4	J	MG/KG	114	
Sediments								
SDLHA	DJA169	0 0 to 1 0	ALUMINUM	5700	=	MG/KG	10085	
SDLHA	DJA169	0 0 to 1 0	ANTIMONY	7 3	J	MG/KG	7 6	
SDLHA	DJA169	0 0 to 1 0	ARSENIC	4 6	=	MG/KG	12	
SDLHA	DJA169	0 0 to 1 0	BERYLLIUM	0.23	J	MG/KG	1 3	
SDLHA	DJA169	0 0 to 1 0	CADMIUM	0 88	J	MG/KG	28 9	
SDLHA	DJA169	0 0 to 1 0	CHROMIUM, TOTAL	11 1	=	MG/KG	20	
SDLHA	DJA169	0 0 to 1 0	COPPER	68	=	MG/KG	58	X
SDLHA	DJA169	0 0 to 1 0	LEAD	76 5	=	MG/KG	35 2	X
SDLHA	DJA169	0 0 to 1 0	NICKEL	14	=	MG/KG	30 5	
SDLHA	DJA169	0 0 to 1 0	SELENIUM	0 4	J	MG/KG	1 7	
SDLHA	DJA169	0 0 to 1 0	ZINC	196	=	MG/KG	797	
SDLHB	DJA171	0 0 to 1 0	ALUMINUM	1170	=	MG/KG	10085	
SDLHB	DJA171	0 0 to 1 0	ARSENIC	2 3	J	MG/KG	12	
SDLHB	DJA171	0 0 to 1 0	CHROMIUM, TOTAL	4 9	=	MG/KG	20	
SDLHB	DJA171	0 0 to 1 0	LEAD	82 3	=	MG/KG	35 2	X
SDLHB	DJA171	0 0 to 1 0	NICKEL	2 7	J	MG/KG	30 5	
SDLHB	DJA171	0 0 to 1 0	ZINC	45 9	=	MG/KG	797	
Surface Soils								
SB21A	DJA173	0 0 to 1 0	ZINC	60 4	=	MG/KG	126	
SB21B	DJA176	0 0 to 1 0	ZINC	68 4	=	MG/KG	126	
SB21C	DJA179	0 0 to 1 0	ZINC	66 4	=	MG/KG	126	
SB21D	DJA182	0 0 to 1 0	ZINC	65 5	J	MG/KG	126	
SBLGA	DJA142	0 0 to 1 0	ALUMINUM	14400	=	MG/KG	23810	
SBLGA	DJA142	0 0 to 1 0	ARSENIC	11 1	=	MG/KG	20	
SBLGA	DJA142	0 0 to 1 0	BERYLLIUM	0 81	J	MG/KG	1 1	
SBLGA	DJA142	0 0 to 1 0	CHROMIUM, TOTAL	239	=	MG/KG	24 8	X
SBLGA	DJA142	0 0 to 1 0	COPPER	54 5	=	MG/KG	33 5	X
SBLGA	DJA142	0 0 to 1 0	LEAD	47 7	=	MG/KG	30	X
SBLGA	DJA142	0 0 to 1 0	NICKEL	21 4	=	MG/KG	30	
SBLGA	DJA142	0 0 to 1 0	SILVER	1 1	J	MG/KG	2	
SBLGA	DJA142	0 0 to 1 0	THALLIUM	0 63	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	ZINC	97 2	=	MG/KG	126	
SBLGB	DJA145	0 0 to 1 0	ARSENIC	12 8	=	MG/KG	20	
SBLGB	DJA145	0 0 to 1 0	BERYLLIUM	0 86	J	MG/KG	1 1	
SBLGB	DJA145	0 0 to 1 0	CHROMIUM, TOTAL	16 9	=	MG/KG	24 8	
SBLGB	DJA145	0 0 to 1 0	COPPER	23 9	=	MG/KG	33 5	
SBLGB	DJA145	0 0 to 1 0	LEAD	143	=	MG/KG	30	X
SBLGB	DJA145	0 0 to 1 0	NICKEL	15 8	=	MG/KG	30	
SBLGB	DJA145	0 0 to 1 0	SILVER	0 71	J	MG/KG	2	
SBLGB	DJA145	0 0 to 1 0	THALLIUM	0 44	J	MG/KG		
SBLGB	DJA145	0 0 to 1 0	ZINC	84 6	=	MG/KG	126	
SBLGC	DJA148	0 0 to 1 0	ALUMINUM	11900	=	MG/KG	23810	
SBLGC	DJA148	0 0 to 1 0	ARSENIC	11 4	=	MG/KG	20	
SBLGC	DJA148	0 0 to 1 0	BERYLLIUM	0 57	J	MG/KG	1 1	
SBLGC	DJA148	0 0 to 1 0	CHROMIUM, TOTAL	14 3	=	MG/KG	24 8	
SBLGC	DJA148	0 0 to 1 0	COPPER	17	=	MG/KG	33 5	
SBLGC	DJA148	0 0 to 1 0	LEAD	29 2	=	MG/KG	30	
SBLGC	DJA148	0 0 to 1 0	NICKEL	19 7	=	MG/KG	30	
SBLGC	DJA148	0 0 to 1 0	THALLIUM	0 5	J	MG/KG		
SBLGC	DJA148	0 0 to 1 0	ZINC	101	=	MG/KG	126	
SBLGD	DJA151	0 0 to 1 0	ALUMINUM	9900	=	MG/KG	23810	
SBLGD	DJA151	0 0 to 1 0	ARSENIC	8 6	=	MG/KG	20	
SBLGD	DJA151	0 0 to 1 0	BERYLLIUM	0 48	J	MG/KG	1 1	
SBLGD	DJA151	0 0 to 1 0	CHROMIUM, TOTAL	16 3	=	MG/KG	24 8	
SBLGD	DJA151	0 0 to 1 0	COPPER	13 2	=	MG/KG	33 5	
SBLGD	DJA151	0 0 to 1 0	LEAD	72 1	=	MG/KG	30	X
SBLGD	DJA151	0 0 to 1 0	NICKEL	16 3	=	MG/KG	30	
SBLGD	DJA151	0 0 to 1 0	THALLIUM	0 44	J	MG/KG		
SBLGD	DJA151	0 0 to 1 0	ZINC	63 8	=	MG/KG	126	
SBLGE	DJA154	0 0 to 1 0	ALUMINUM	11700	=	MG/KG	23810	
SBLGE	DJA154	0 0 to 1 0	ANTIMONY	24 2	J	MG/KG	7	X
SBLGE	DJA154	0 0 to 1 0	ARSENIC	9 9	=	MG/KG	20	
SBLGE	DJA154	0 0 to 1 0	BERYLLIUM	0 63	J	MG/KG	1 1	
SBLGE	DJA154	0 0 to 1 0	CADMIUM	2 1	=	MG/KG	1 4	X
SBLGE	DJA154	0 0 to 1 0	CHROMIUM, TOTAL	71 2	=	MG/KG	24 8	X
SBLGE	DJA154	0 0 to 1 0	COPPER	146	=	MG/KG	33 5	X
SBLGE	DJA154	0 0 to 1 0	LEAD	102	=	MG/KG	30	X
SBLGE	DJA154	0 0 to 1 0	MERCURY	0 07	J	MG/KG	0 4	
SBLGE	DJA154	0 0 to 1 0	NICKEL	33 3	=	MG/KG	30	X
SBLGE	DJA154	0 0 to 1 0	SILVER	1 5	J	MG/KG	2	
SBLGE	DJA154	0 0 to 1 0	THALLIUM	0 53	J	MG/KG		

TABLE 8-4
Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLGE	DJA154	0 0 to 1 0	ZINC	711	=	MG/KG	126	X
SBLHA	DJA160	0 0 to 1 0	ALUMINUM	18300	=	MG/KG	23810	
SBLHA	DJA160	0 0 to 1 0	ARSENIC	11 6	=	MG/KG	20	
SBLHA	DJA160	0 0 to 1 0	BERYLLIUM	0 78	J	MG/KG	1 1	
SBLHA	DJA160	0 0 to 1 0	CHROMIUM, TOTAL	17 1	=	MG/KG	24 8	
SBLHA	DJA160	0 0 to 1 0	COPPER	18 8	=	MG/KG	33 5	
SBLHA	DJA160	0 0 to 1 0	LEAD	14	=	MG/KG	30	
SBLHA	DJA160	0 0 to 1 0	MERCURY	0 09	J	MG/KG	0 4	
SBLHA	DJA160	0 0 to 1 0	NICKEL	18	=	MG/KG	30	
SBLHA	DJA160	0 0 to 1 0	THALLIUM	0 52	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	ZINC	67 8	=	MG/KG	126	
SBLHA	DJA239FD	0 0 to 1 0	ALUMINUM	6220	=	MG/KG	23810	
SBLHA	DJA239FD	0 0 to 1 0	ARSENIC	4 5	=	MG/KG	20	
SBLHA	DJA239FD	0 0 to 1 0	BERYLLIUM	0 51	J	MG/KG	1 1	
SBLHA	DJA239FD	0 0 to 1 0	CHROMIUM, TOTAL	19 7	=	MG/KG	24 8	
SBLHA	DJA239FD	0 0 to 1 0	COPPER	9 9	=	MG/KG	33 5	
SBLHA	DJA239FD	0 0 to 1 0	LEAD	19 4	=	MG/KG	30	
SBLHA	DJA239FD	0 0 to 1 0	THALLIUM	0.23	J	MG/KG		
SBLHA	DJA239FD	0 0 to 1 0	ZINC	37 1	=	MG/KG	126	
SBLHB	DJA163	0 0 to 1 0	ALUMINUM	17000	=	MG/KG	23810	
SBLHB	DJA163	0 0 to 1 0	ANTIMONY	5 1	J	MG/KG	7	
SBLHB	DJA163	0 0 to 1 0	ARSENIC	13.2	=	MG/KG	20	
SBLHB	DJA163	0 0 to 1 0	BERYLLIUM	0 7	J	MG/KG	1 1	
SBLHB	DJA163	0 0 to 1 0	CHROMIUM, TOTAL	17.8	=	MG/KG	24 8	
SBLHB	DJA163	0 0 to 1 0	COPPER	21 7	=	MG/KG	33 5	
SBLHB	DJA163	0 0 to 1 0	LEAD	22 2	=	MG/KG	30	
SBLHB	DJA163	0 0 to 1 0	NICKEL	20 9	=	MG/KG	30	
SBLHB	DJA163	0 0 to 1 0	THALLIUM	0 58	J	MG/KG		
SBLHB	DJA163	0 0 to 1 0	ZINC	63 4	=	MG/KG	126	
SBLHC	DJA166	0 0 to 1 0	ALUMINUM	14000	=	MG/KG	23810	
SBLHC	DJA166	0 0 to 1 0	ARSENIC	9 6	=	MG/KG	20	
SBLHC	DJA166	0 0 to 1 0	BERYLLIUM	0 66	J	MG/KG	1 1	
SBLHC	DJA166	0 0 to 1 0	CHROMIUM, TOTAL	15 5	=	MG/KG	24 8	
SBLHC	DJA166	0 0 to 1 0	COPPER	20 5	=	MG/KG	33 5	
SBLHC	DJA166	0 0 to 1 0	LEAD	16 4	=	MG/KG	30	
SBLHC	DJA166	0 0 to 1 0	NICKEL	22 3	=	MG/KG	30	
SBLHC	DJA166	0 0 to 1 0	THALLIUM	0 53	J	MG/KG		
SBLHC	DJA166	0 0 to 1 0	ZINC	71 1	=	MG/KG	126	
SS6085A	DJA185	0 0 to 1 0	ALUMINUM	7040	=	MG/KG	23810	
SS6085A	DJA185	0 0 to 1 0	ARSENIC	9 3	=	MG/KG	20	
SS6085A	DJA185	0 0 to 1 0	BERYLLIUM	0 49	J	MG/KG	1 1	
SS6085A	DJA185	0 0 to 1 0	CHROMIUM, TOTAL	12 2	=	MG/KG	24 8	
SS6085A	DJA185	0 0 to 1 0	COPPER	16 7	J	MG/KG	33 5	
SS6085A	DJA185	0 0 to 1 0	LEAD	44 2	=	MG/KG	30	X
SS6085A	DJA185	0 0 to 1 0	NICKEL	14	=	MG/KG	30	
SS6085A	DJA185	0 0 to 1 0	SILVER	0 92	J	MG/KG	2	
SS6085A	DJA185	0 0 to 1 0	ZINC	67 3	J	MG/KG	126	
SS6085B	DJA186	0 0 to 1 0	ALUMINUM	8960	=	MG/KG	23810	
SS6085B	DJA186	0 0 to 1 0	ARSENIC	4	=	MG/KG	20	
SS6085B	DJA186	0 0 to 1 0	BERYLLIUM	1.2	=	MG/KG	1 1	X
SS6085B	DJA186	0 0 to 1 0	CHROMIUM, TOTAL	8 7	=	MG/KG	24 8	
SS6085B	DJA186	0 0 to 1 0	COPPER	9 1	J	MG/KG	33 5	
SS6085B	DJA186	0 0 to 1 0	LEAD	21 6	=	MG/KG	30	
SS6085B	DJA186	0 0 to 1 0	SILVER	0 58	J	MG/KG	2	
SS6085B	DJA186	0 0 to 1 0	ZINC	884	J	MG/KG	126	X
SS6085C	DJA187	0 0 to 1 0	ALUMINUM	9370	=	MG/KG	23810	
SS6085C	DJA187	0 0 to 1 0	ARSENIC	10	=	MG/KG	20	
SS6085C	DJA187	0 0 to 1 0	BERYLLIUM	0 62	J	MG/KG	1 1	
SS6085C	DJA187	0 0 to 1 0	CHROMIUM, TOTAL	25	=	MG/KG	24 8	X
SS6085C	DJA187	0 0 to 1 0	COPPER	43 9	J	MG/KG	33 5	X
SS6085C	DJA187	0 0 to 1 0	LEAD	45 7	=	MG/KG	30	X
SS6085C	DJA187	0 0 to 1 0	NICKEL	17 5	=	MG/KG	30	
SS6085C	DJA187	0 0 to 1 0	SILVER	1 2	J	MG/KG	2	
SS6085C	DJA187	0 0 to 1 0	ZINC	105	J	MG/KG	126	
SS6085D	DJA188	0 0 to 1 0	ALUMINUM	8690	=	MG/KG	23810	
SS6085D	DJA188	0 0 to 1 0	ARSENIC	14	=	MG/KG	20	
SS6085D	DJA188	0 0 to 1 0	BERYLLIUM	0 56	J	MG/KG	1 1	
SS6085D	DJA188	0 0 to 1 0	CADMIUM	4 8	=	MG/KG	1 4	X
SS6085D	DJA188	0 0 to 1 0	CHROMIUM, TOTAL	23 7	=	MG/KG	24 8	
SS6085D	DJA188	0 0 to 1 0	COPPER	115	J	MG/KG	33 5	X
SS6085D	DJA188	0 0 to 1 0	LEAD	2100	=	MG/KG	30	X
SS6085D	DJA188	0 0 to 1 0	MERCURY	0.27	=	MG/KG	0 4	
SS6085D	DJA188	0 0 to 1 0	NICKEL	19 4	=	MG/KG	30	
SS6085D	DJA188	0 0 to 1 0	SELENIUM	0 6	J	MG/KG	0 8	
SS6085D	DJA188	0 0 to 1 0	SILVER	1 2	J	MG/KG	2	
SS6085D	DJA188	0 0 to 1 0	ZINC	1780	J	MG/KG	126	X
SS6085E	DJA189	0 0 to 1 0	ALUMINUM	6550	=	MG/KG	23810	
SS6085E	DJA189	0 0 to 1 0	ARSENIC	9 7	=	MG/KG	20	

TABLE 8-4
Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SS6085E	DJA189	0 0 to 1 0	BERYLLIUM	0 44	J	MG/KG	1 1	
SS6085E	DJA189	0 0 to 1 0	CHROMIUM, TOTAL	9 7	=	MG/KG	24 8	
SS6085E	DJA189	0 0 to 1 0	COPPER	13 2	J	MG/KG	33 5	
SS6085E	DJA189	0 0 to 1 0	LEAD	39 2	=	MG/KG	30	X
SS6085E	DJA189	0 0 to 1 0	NICKEL	13 2	=	MG/KG	30	
SS6085E	DJA189	0 0 to 1 0	SILVER	0 82	J	MG/KG	2	
SS6085E	DJA189	0 0 to 1 0	ZINC	60 3	J	MG/KG	126	
SS6085F	DJA190	0 0 to 1 0	ALUMINUM	8410	=	MG/KG	23810	
SS6085F	DJA190	0 0 to 1 0	ARSENIC	11.3	=	MG/KG	20	
SS6085F	DJA190	0 0 to 1 0	BERYLLIUM	0 56	J	MG/KG	1 1	
SS6085F	DJA190	0 0 to 1 0	CHROMIUM, TOTAL	12 1	=	MG/KG	24 8	
SS6085F	DJA190	0 0 to 1 0	COPPER	15	J	MG/KG	33 5	
SS6085F	DJA190	0 0 to 1 0	LEAD	40 4	=	MG/KG	30	X
SS6085F	DJA190	0 0 to 1 0	NICKEL	15 5	=	MG/KG	30	
SS6085F	DJA190	0 0 to 1 0	ZINC	66 2	J	MG/KG	126	
SS6085F	DJA288FD	0 0 to 1 0	ALUMINUM	6780	=	MG/KG	23810	
SS6085F	DJA288FD	0 0 to 1 0	ARSENIC	9 7	=	MG/KG	20	
SS6085F	DJA288FD	0 0 to 1 0	BERYLLIUM	0 48	J	MG/KG	1 1	
SS6085F	DJA288FD	0 0 to 1 0	CHROMIUM, TOTAL	9 4	=	MG/KG	24 8	
SS6085F	DJA288FD	0 0 to 1 0	COPPER	12 9	J	MG/KG	33 5	
SS6085F	DJA288FD	0 0 to 1 0	LEAD	39 3	=	MG/KG	30	X
SS6085F	DJA288FD	0 0 to 1 0	NICKEL	11 9	=	MG/KG	30	
SS6085F	DJA288FD	0 0 to 1 0	ZINC	57 9	J	MG/KG	126	
SS-8	DDMT-081098-SS8	0 0 to 1 0	ALUMINUM	15500	J	MG/KG	23810	
SS-8	DDMT-081098-SS8	0 0 to 1 0	ARSENIC	12 6	=	MG/KG	20	
SS-8	DDMT-081098-SS8	0 0 to 1 0	BARIUM	145	=	MG/KG	234	
SS-8	DDMT-081098-SS8	0 0 to 1 0	CALCIUM	2740	=	MG/KG	5840	
SS-8	DDMT-081098-SS8	0 0 to 1 0	CHROMIUM, TOTAL	17 8	=	MG/KG	24 8	
SS-8	DDMT-081098-SS8	0 0 to 1 0	COBALT	7 9	=	MG/KG	18 3	
SS-8	DDMT-081098-SS8	0 0 to 1 0	IRON	20500	=	MG/KG	37040	
SS-8	DDMT-081098-SS8	0 0 to 1 0	LEAD	41 4	=	MG/KG	30	X
SS-8	DDMT-081098-SS8	0 0 to 1 0	MAGNESIUM	2410	=	MG/KG	4600	
SS-8	DDMT-081098-SS8	0 0 to 1 0	MANGANESE	668	=	MG/KG	1304	
SS-8	DDMT-081098-SS8	0 0 to 1 0	MERCURY	0 06	=	MG/KG	0 4	
SS-8	DDMT-081098-SS8	0 0 to 1 0	NICKEL	17 5	=	MG/KG	30	
SS-8	DDMT-081098-SS8	0 0 to 1 0	POTASSIUM	2200	=	MG/KG	1820	X
SS-8	DDMT-081098-SS8	0 0 to 1 0	VANADIUM	33 5	=	MG/KG	48 4	
Surface Water								
SWLHA	DJA170	Not Applicable	ALUMINUM	0 957	=	MG/L	5 077	
SWLHA	DJA170	Not Applicable	ARSENIC	0 0022	J	MG/L	0 018	
SWLHA	DJA170	Not Applicable	ZINC	0 0329	=	MG/L	0 2873	
SWLHB	DJA172	Not Applicable	ALUMINUM	1 04	=	MG/L	5 077	
SWLHB	DJA172	Not Applicable	ARSENIC	0 0047	J	MG/L	0 018	
SWLHB	DJA172	Not Applicable	CHROMIUM, TOTAL	0 0027	J	MG/L	0 0361	
SWLHB	DJA172	Not Applicable	LEAD	0 0068	=	MG/L	0 0186	
SWLHB	DJA172	Not Applicable	ZINC	0 026	=	MG/L	0 2873	
OC Pesticides								
Sediments								
SDLHA	DJA169	0 0 to 1 0	ALPHA-CHLORDANE	0 0309	J	MG/KG	0 0052	X
SDLHA	DJA169	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 0186	J	MG/KG		
SDLHA	DJA169	0 0 to 1 0	DIELDRIN	0 152	=	MG/KG	0 011	X
SDLHA	DJA169	0 0 to 1 0	GAMMA-CHLORDANE	0 0337	=	MG/KG	2	
SDLHA	DJA169	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 005	J	MG/KG	0 23	
SDLHB	DJA171	0 0 to 1 0	ALPHA-CHLORDANE	0 0076	J	MG/KG	0 0052	X
SDLHB	DJA171	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0053	J	MG/KG	0 0072	
SDLHB	DJA171	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 028	J	MG/KG		
SDLHB	DJA171	0 0 to 1 0	DIELDRIN	0 0807	=	MG/KG	0 011	X
SDLHB	DJA171	0 0 to 1 0	GAMMA-CHLORDANE	0 0115	J	MG/KG	2	
SDLHB	DJA171	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 0026	J	MG/KG	0 23	
Surface Soils								
SBLGA	DJA142	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0048	J	MG/KG	0 0067	
SBLGA	DJA142	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0893	=	MG/KG	0 16	
SBLGA	DJA142	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 155	J	MG/KG	0 074	X
SBLGA	DJA142	0 0 to 1 0	DIELDRIN	0 0022	J	MG/KG	0 086	
SBLGB	DJA145	0 0 to 1 0	ALPHA-CHLORDANE	0 0071	J	MG/KG	0 029	
SBLGB	DJA145	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0068	J	MG/KG	0 0067	X
SBLGB	DJA145	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 232	=	MG/KG	0 16	X
SBLGB	DJA145	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2,2-TRICHLO	0 296	J	MG/KG	0 074	X
SBLGB	DJA145	0 0 to 1 0	DIELDRIN	0 0547	=	MG/KG	0 086	
SBLGB	DJA145	0 0 to 1 0	GAMMA-CHLORDANE	0 0037	J	MG/KG	0 026	
SBLGC	DJA148	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLORO	0 0169	J	MG/KG	0 16	
SBLGC	DJA148	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 026	J	MG/KG	0 074	

702 314

TABLE 8-4
Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLGC	DJA148	0 0 to 1 0	DIELDRIN	0 68	=	MG/KG	0 086	X
SBLGD	DJA151	0 0 to 1 0	ALPHA-CHLORDANE	0 005	J	MG/KG	0 029	
SBLGD	DJA151	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0066	J	MG/KG	0 0067	
SBLGD	DJA151	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 219	=	MG/KG	0 16	X
SBLGD	DJA151	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 223	J	MG/KG	0 074	X
SBLGD	DJA151	0 0 to 1 0	DIELDRIN	0 118	=	MG/KG	0 086	X
SBLGD	DJA151	0.0 to 1 0	GAMMA-CHLORDANE	0 0033	J	MG/KG	0 026	
SBLHA	DJA239FD	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0013	J	MG/KG	0 16	
SBLHA	DJA239FD	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 002	J	MG/KG	0 074	
SBLHA	DJA239FD	0 0 to 1 0	DIELDRIN	0 0253	=	MG/KG	0 086	
SBLHB	DJA163	0 0 to 1 0	DIELDRIN	0 0022	J	MG/KG	0 086	
SS6085A	DJA185	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0045	J	MG/KG	0 16	
SS6085A	DJA185	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 0072	J	MG/KG	0 074	
SS6085A	DJA185	0 0 to 1 0	DIELDRIN	0 0729	=	MG/KG	0 086	
SS6085B	DJA186	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 007	J	MG/KG	0 0067	X
SS6085B	DJA186	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0178	J	MG/KG	0 16	
SS6085B	DJA186	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 0364	J	MG/KG	0 074	
SS6085B	DJA186	0 0 to 1 0	DIELDRIN	0 607	=	MG/KG	0 086	X
SS6085B	DJA186	0 0 to 1 0	ENDRIN	0 0055	J	MG/KG		
SS6085B	DJA186	0 0 to 1 0	GAMMA-CHLORDANE	0 0012	J	MG/KG	0 026	
SS6085C	DJA187	0 0 to 1 0	ALPHA-CHLORDANE	0 0025	J	MG/KG	0 029	
SS6085C	DJA187	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0543	J	MG/KG	0 0067	X
SS6085C	DJA187	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 122	=	MG/KG	0 16	
SS6085C	DJA187	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 074	J	MG/KG	0 074	
SS6085C	DJA187	0 0 to 1 0	DIELDRIN	0 101	=	MG/KG	0 086	X
SS6085D	DJA188	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0747	J	MG/KG	0 16	
SS6085D	DJA188	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 0819	J	MG/KG	0 074	X
SS6085D	DJA188	0 0 to 1 0	DIELDRIN	4 75	=	MG/KG	0 086	X
SS6085E	DJA189	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 009	J	MG/KG	0 16	
SS6085E	DJA189	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 014	J	MG/KG	0 074	
SS6085E	DJA189	0 0 to 1 0	DIELDRIN	0 552	=	MG/KG	0 086	X
SS6085F	DJA190	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0011	J	MG/KG	0 0067	
SS6085F	DJA190	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0128	=	MG/KG	0 16	
SS6085F	DJA190	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 022	J	MG/KG	0 074	
SS6085F	DJA190	0 0 to 1 0	DIELDRIN	0 0259	J	MG/KG	0 086	
SS6085F	DJA288FD	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 00095	J	MG/KG	0 0067	
SS6085F	DJA288FD	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLORO	0 0108	=	MG/KG	0 16	
SS6085F	DJA288FD	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLO	0 0159	J	MG/KG	0 074	
SS6085F	DJA288FD	0 0 to 1 0	DIELDRIN	0 0272	J	MG/KG	0 086	
Surface Water								
SWLHB	DJA172	Not Applicable	DIELDRIN	0 000065	J	MG/L		
SWLHB	DJA172	Not Applicable	GAMMA-CHLORDANE	0 0000027	J	MG/L		
Polynuclear Aromatic Hydrocarbons								
Sediments								
SDLHA	DJA169	0 0 to 1 0	BENZO(a)ANTHRACENE	0.23	J	MG/KG	2 9	
SDLHA	DJA169	0 0 to 1 0	BENZO(a)PYRENE	0.28	J	MG/KG	2 5	
SDLHA	DJA169	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 17	J	MG/KG	2 21605	
SDLHA	DJA169	0 0 to 1 0	BENZO(g,h,i)PERYLENE	0 32	J	MG/KG	1 8	
SDLHA	DJA169	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 37	J	MG/KG	2 3	
SDLHA	DJA169	0 0 to 1 0	CHRYSENE	0 36	J	MG/KG	3 2	
SDLHA	DJA169	0 0 to 1 0	FLUORANTHENE	0 55	J	MG/KG	7 1	
SDLHA	DJA169	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	0.25	J	MG/KG	1 7	
SDLHA	DJA169	0 0 to 1 0	PHENANTHRENE	0.28	J	MG/KG	6 9	
SDLHA	DJA169	0 0 to 1 0	PYRENE	0 58	J	MG/KG	2 882	
SDLHB	DJA171	0 0 to 1 0	ACENAPHTHENE	0 11	J	MG/KG	0 77	
SDLHB	DJA171	0 0 to 1 0	ANTHRACENE	0 3	J	MG/KG	1 6	
SDLHB	DJA171	0 0 to 1 0	BENZO(a)ANTHRACENE	0 75	=	MG/KG	2 9	
SDLHB	DJA171	0 0 to 1 0	BENZO(a)PYRENE	0 79	=	MG/KG	2 5	
SDLHB	DJA171	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 85	=	MG/KG	2 21605	
SDLHB	DJA171	0 0 to 1 0	BENZO(g,h,i)PERYLENE	0 55	J	MG/KG	1 8	
SDLHB	DJA171	0.0 to 1 0	BENZO(k)FLUORANTHENE	0 83	=	MG/KG	2 3	
SDLHB	DJA171	0 0 to 1 0	CHRYSENE	0 87	=	MG/KG	3 2	
SDLHB	DJA171	0 0 to 1 0	FLUORANTHENE	1 8	=	MG/KG	7 1	
SDLHB	DJA171	0 0 to 1 0	FLUORENE	0 1	J	MG/KG	0 87	
SDLHB	DJA171	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	0 54	J	MG/KG	1 7	
SDLHB	DJA171	0 0 to 1 0	PHENANTHRENE	1 3	=	MG/KG	6 9	
SDLHB	DJA171	0 0 to 1 0	PYRENE	1 6	=	MG/KG	2 882	
Surface Soils								
SB21A	DJA173	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	0 0074	J	MG/KG	0 7	
Surface Water								
SWLHA	DJA170	Not Applicable	FLUORANTHENE	0 00055	J	MG/L		
SWLHA	DJA170	Not Applicable	PHENANTHRENE	0 00046	J	MG/L		
SWLHA	DJA170	Not Applicable	PYRENE	0 00042	J	MG/L		
SWLHB	DJA172	Not Applicable	FLUORANTHENE	0 0002	J	MG/L		

TABLE 8-4

Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Polchlorinated Biphenyls								
Sediments								
SDLHA	DJA169	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0436	=	MG/KG		
SDLHB	DJA171	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0116	J	MG/KG		
Surface Soils								
SBLGC	DJA148	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0088	J	MG/KG	0 11	
SBLGD	DJA151	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0421	J	MG/KG	0 11	
SS6085A	DJA185	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0051	J	MG/KG	0 11	
SS6085B	DJA186	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0133	J	MG/KG	0 11	
SS6085C	DJA187	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0138	J	MG/KG	0 11	
Semivolatile Organics								
Subsurface Soils								
SB21C	DJA180	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 24	J	MG/KG		
Sediments								
SDLHA	DJA169	0 0 to 1 0	BENZYL BUTYL PHTHALATE	0 15	J	MG/KG		
SDLHA	DJA169	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	1 6	=	MG/KG	0 48	X
SDLHB	DJA171	0 0 to 1 0	CARBAZOLE	0 2	J	MG/KG	1 1	
Volatile Organics								
Subsurface Soils								
SBLGB	DJA146	3 0 to 5 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 003	J	MG/KG		
SBLGB	DJA147	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG		
SBLGC	DJA149	3 0 to 5 0	TETRACHLOROETHYLENE(PCE)	0 011	=	MG/KG		
SBLGC	DJA150	8 0 to 10 0	1,1,2,2-TETRACHLOROETHANE	0 011	=	MG/KG		
SBLGC	DJA150	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 008	J	MG/KG		
SBLGC	DJA150	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 02	=	MG/KG		
SBLGC	DJA150	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 094	=	MG/KG		
SBLGC	DJA238FD	3 0 to 5 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 002	J	MG/KG		
SBLGC	DJA238FD	3 0 to 5 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLGD	DJA152	3 0 to 5 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 002	J	MG/KG		
SBLGD	DJA153	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SBLGD	DJA153	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	ETHYLBENZENE	1 2	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	METHYLENE CHLORIDE	0 068	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	TOLUENE	0 12	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	TRICHLOROETHYLENE (TCE)	0 11	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	XYLENES, TOTAL	1 3	J	MG/KG	0 002	X
SBLGE	DJA156	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 0004	J	MG/KG		
SBLGF	DJA158	3 0 to 5 0	METHYL ETHYL KETONE (2-BUTANONE)	0 014	J	MG/KG		
SBLGF	DJA158	3 0 to 5 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLGF	DJA158	3 0 to 5 0	TRICHLOROETHYLENE (TCE)	0 001	J	MG/KG		
SBLGF	DJA159	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 006	=	MG/KG		
SBLHB	DJA164	3 0 to 5 0	TRICHLOROETHYLENE (TCE)	0 0007	J	MG/KG		
SBLHB	DJA165	8 0 to 10 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 003	J	MG/KG		
Surface Soils								
SBLGA	DJA142	0 0 to 1 0	1,1,2,2-TETRACHLOROETHANE	0 001	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	BENZENE	0 004	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 016	J	MG/KG	0 002	X
SBLGA	DJA142	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 004	J	MG/KG		
SBLGB	DJA145	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 009	J	MG/KG	0 002	X
SBLGC	DJA148	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SBLGC	DJA148	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 006	=	MG/KG		
SBLGD	DJA151	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 021	=	MG/KG	0 002	X
SBLGE	DJA154	0 0 to 1 0	BENZENE	0 004	J	MG/KG		
SBLGE	DJA154	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG	0 002	X
SBLHA	DJA160	0 0 to 1 0	1,1,2,2-TETRACHLOROETHANE	0 005	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	TOTAL 1,2-DICHLOROETHENE	0 22	=	MG/KG		
SBLHA	DJA160	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 7	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	VINYL CHLORIDE	0 008	=	MG/KG		
SBLHA	DJA239FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 01	J	MG/KG	0 002	X
SBLHB	DJA163	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 014	J	MG/KG	0 002	X
SBLHC	DJA166	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 011	J	MG/KG	0 002	X

(=) Definite detection

J = Estimated detection Contaminant detected at or below laboratory detection limit

MG/KG = milligrams per kilogram

MG/L = milligrams per liter

Table 8-5

Frequency of Detection for All Media (except Groundwater) Sampled in the Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
Metals							
Subsurface Soils							
MG/KG	ZINC	4	4	15	30	20	114
Sediments							
MG/KG	ALUMINUM	2	2	1170	5700	3435	10085
MG/KG	ANTIMONY	2	1	7	7	7	7.6
MG/KG	ARSENIC	2	2	2	5	3	12.0
MG/KG	BERYLLIUM	2	1	0.2	0.2	0.2	1.3
MG/KG	CADMIUM	2	1	0.9	0.9	0.9	28.9
MG/KG	CHROMIUM, TOTAL	2	2	5	11	8	20.0
MG/KG	COPPER	2	1	68	68	68	58.0
MG/KG	LEAD	2	2	77	82	79	35.2
MG/KG	NICKEL	2	2	3	14	8	30.5
MG/KG	SELENIUM	2	1	0.4	0.4	0.4	1.700
MG/KG	ZINC	2	2	46	196	121	797
Surface Soils							
MG/KG	ALUMINUM	15	15	6220	18300	10615	23810
MG/KG	ANTIMONY	16	2	5	24	15	7.0
MG/KG	ARSENIC	16	16	4	14	10	20.0
MG/KG	BERYLLIUM	16	16	0.4	1	0.6	1.1
MG/KG	CADMIUM	16	2	2	5	3	1.4
MG/KG	CHROMIUM, TOTAL	16	16	9	239	33	24.8
MG/KG	COPPER	16	16	9	146	34	33.5
MG/KG	LEAD	16	16	14	2100	175	30.0
MG/KG	MERCURY	16	3	0.07	0.3	0.1	0.4
MG/KG	NICKEL	16	14	12	33	19	30.0
MG/KG	SELENIUM	16	1	0.6	0.6	0.6	0.8
MG/KG	SILVER	16	8	0.6	2	1	2.0
MG/KG	THALLIUM	16	9	0.2	0.6	0.5	
MG/KG	ZINC	20	20	37	1780	229	126.000
Surface Water							
MG/L	ALUMINUM	2	2	1	1	1	5.077
MG/L	ARSENIC	2	2	0.002	0.005	0.003	0.018
MG/L	CHROMIUM, TOTAL	2	1	0.003	0.003	0.003	0.036
MG/L	LEAD	2	1	0.007	0.007	0.007	0.019
MG/L	ZINC	2	2	0.03	0.03	0.03	0.287
OC Pesticides							
Sediments							
MG/KG	ALPHA-CHLORDANE	2	2	0.008	0.03	0.02	0.005
MG/KG	DDE	2	1	0.005	0.005	0.005	0.007
MG/KG	DDT	2	2	0.02	0.03	0.02	
MG/KG	DIELDRIN	2	2	0.08	0.2	0.1	0.011
MG/KG	GAMMA-CHLORDANE	2	2	0.01	0.03	0.02	2.000
MG/KG	HEPTACHLOR EPOXIDE	2	2	0.003	0.005	0.004	0.230
Surface Soils							
MG/KG	ALPHA-CHLORDANE	15	3	0.003	0.007	0.005	0.029
MG/KG	DDD	15	7	0.001	0.05	0.01	0.007
MG/KG	DDE	15	12	0.001	0.2	0.07	0.160
MG/KG	DDT	15	12	0.002	0.3	0.08	0.074
MG/KG	DIELDRIN	15	13	0.002	5	1	0.086
MG/KG	ENDRIN	15	1	0.006	0.006	0.006	
MG/KG	GAMMA-CHLORDANE	15	3	0.001	0.004	0.003	0.026
Surface Water							
MG/L	DIELDRIN	2	1	0.00007	0.00007	0.00007	
MG/L	GAMMA-CHLORDANE	2	1	0.000003	0.000003	0.000003	
Polychlorinated Biphenyls							
Sediments							
MG/KG	PCB-1260 (AROCLOR 1260)	2	2	0.01	0.04	0.03	
Surface Soils							
MG/KG	PCB-1260 (AROCLOR 1260)	15	5	0.005	0.04	0.02	0.110
Polynuclear Aromatic Hydrocarbons							
Sediments							
MG/KG	ACENAPHTHENE	2	1	0.1	0.1	0.1	0.770
MG/KG	ANTHRACENE	2	1	0.3	0.3	0.3	1.600
MG/KG	BENZO(a)ANTHRACENE	2	2	0.2	0.8	0.5	2.900
MG/KG	BENZO(a)PYRENE	2	2	0.3	0.8	0.5	2.500
MG/KG	BENZO(b)FLUORANTHENE	2	2	0.2	0.9	0.5	2.216
MG/KG	BENZO(g,h,i)PERYLENE	2	2	0.3	0.6	0.4	1.800
MG/KG	BENZO(k)FLUORANTHENE	2	2	0.4	0.8	0.6	2.300
MG/KG	CHRYSENE	2	2	0.4	0.9	0.6	3.200
MG/KG	FLUORANTHENE	2	2	0.6	2	1	7.100
MG/KG	FLUORENE	2	1	0.1	0.1	0.1	0.870
MG/KG	INDENO(1,2,3-c,d)PYRENE	2	2	0.3	0.5	0.4	1.700
MG/KG	PHENANTHRENE	2	2	0.3	1	0.8	6.900

Table 8-5

Frequency of Detection for All Media (except Groundwater) Sampled in the Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
MG/KG	PYRENE	2	2	0 6	2	1	2 882
Surface Soils							
MG/KG	INDENO(1,2,3-c,d)PYRENE	8	1	0 007	0 007	0 007	0 700
Surface Water							
MG/L	FLUORANTHENE	2	2	0 0002	0 0006	0 0004	
MG/L	PHENANTHRENE	2	1	0 0005	0 0005	0 0005	
MG/L	PYRENE	2	1	0 0004	0 0004	0 0004	
Semivolatile Organics							
Subsurface Soils							
MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	4	1	0 2	0 2	0 2	
Sediments							
MG/KG	BENZYL BUTYL PHTHALATE	2	1	0 2	0 2	0 2	
MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	2	1	2	2	2	0 480
MG/KG	CARBAZOLE	2	1	0 2	0.2	0 2	1 100
Volatile Organics							
Subsurface Soils							
MG/KG	1,1,2,2-TETRACHLOROETHANE	20	1	0 01	0 01	0 01	
MG/KG	ETHYLBENZENE	20	1	1	1	1	
MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	20	2	0 004	0 01	0 009	
MG/KG	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	20	4	0 002	0 003	0 003	
MG/KG	METHYLENE CHLORIDE	20	1	0 07	0 07	0 07	
MG/KG	TETRACHLOROETHYLENE(PCE)	20	7	0 0008	0 01	0 005	
MG/KG	TOLUENE	20	1	0 1	0 1	0 1	
MG/KG	TOTAL 1,2-DICHLOROETHENE	20	1	0 02	0 02	0 02	
MG/KG	Total Xylenes	20	1	1	1	1	0 002
MG/KG	TRICHLOROETHYLENE (TCE)	20	5	0 0004	0 1	0 04	
Surface Soils							
MG/KG	1,1,2,2-TETRACHLOROETHANE	9	2	0 001	0 005	0 003	
MG/KG	BENZENE	9	2	0 004	0 004	0 004	
MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	9	8	0 005	0 02	0 01	0 002
MG/KG	TETRACHLOROETHYLENE(PCE)	9	3	0 002	0 006	0 003	
MG/KG	TOTAL 1,2-DICHLOROETHENE	9	1	0 2	0 2	0 2	
MG/KG	TRICHLOROETHYLENE (TCE)	9	2	0 004	0 7	0 4	
MG/KG	VINYL CHLORIDE	9	1	0 008	0 008	0 008	

Note Data evaluated includes field duplicates and normal samples (2 feet and below)

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

Figures

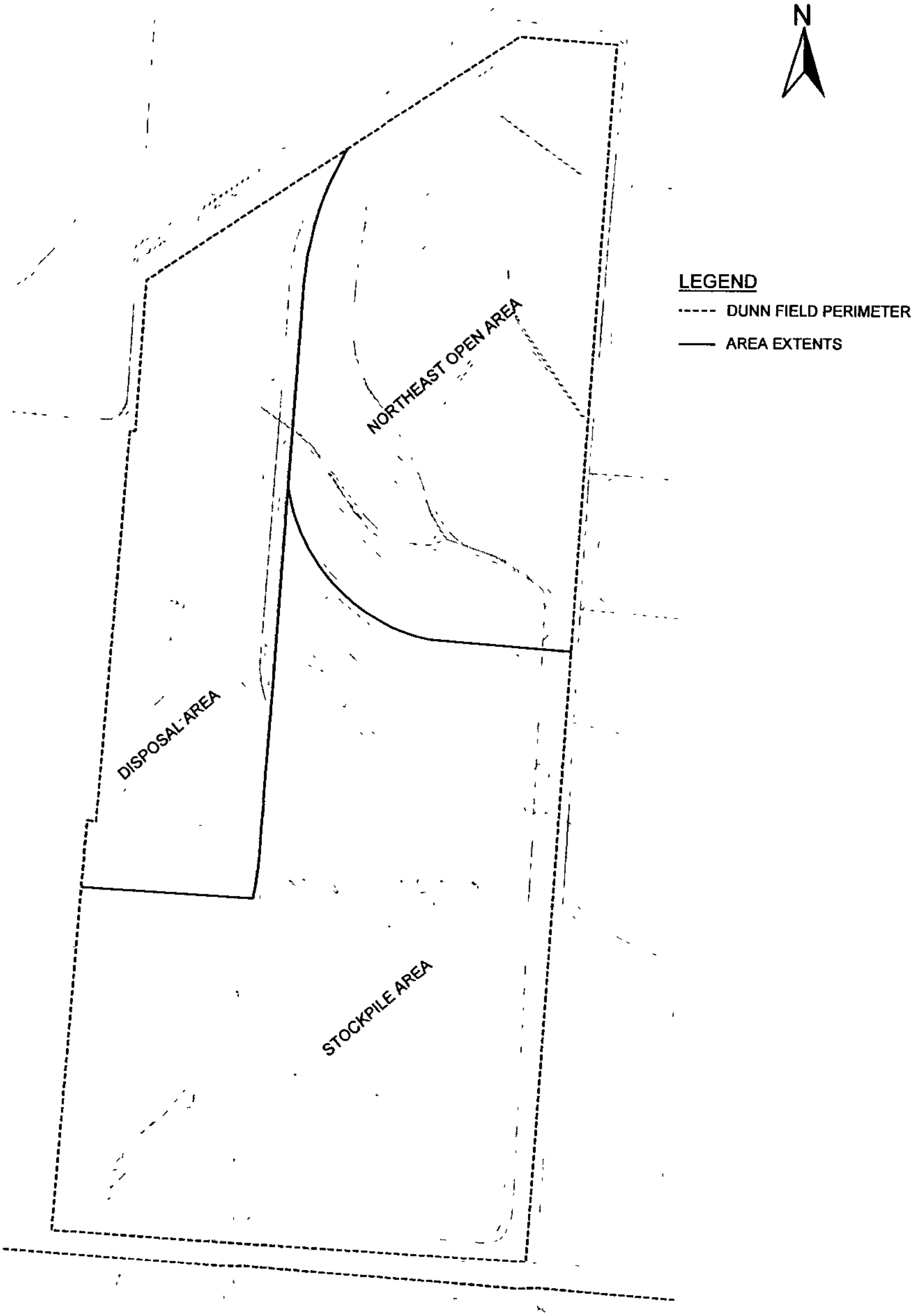

FIGURE 8-1
Area Designations at Dunn Field
Rev 0 Memphis Depot
Dunn Field RI

Source RI Report, 1990

ATL/CAD1/PROJECTS/148071 DDMT/DunnField RI 2001/8071DFRI01-1-3 dgn

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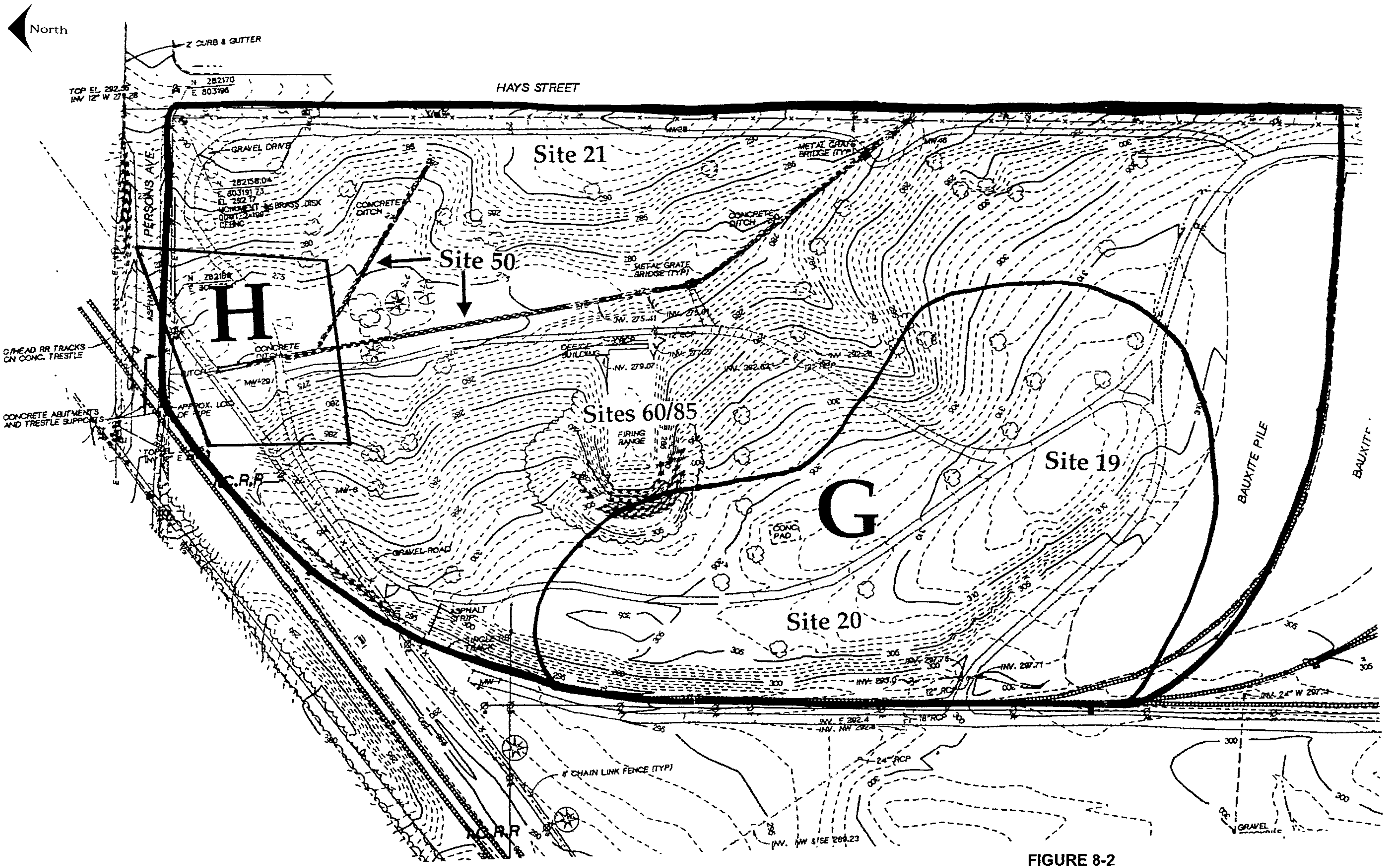

FIGURE 8-2
NORTHEAST OPEN AREA OF DUNN FIELD TOPOGRAPHY, CONSOLIDATIONS LOCATIONS G AND H, AND HISTORICAL SITES 10, 20, 21, 50, 60 & 85
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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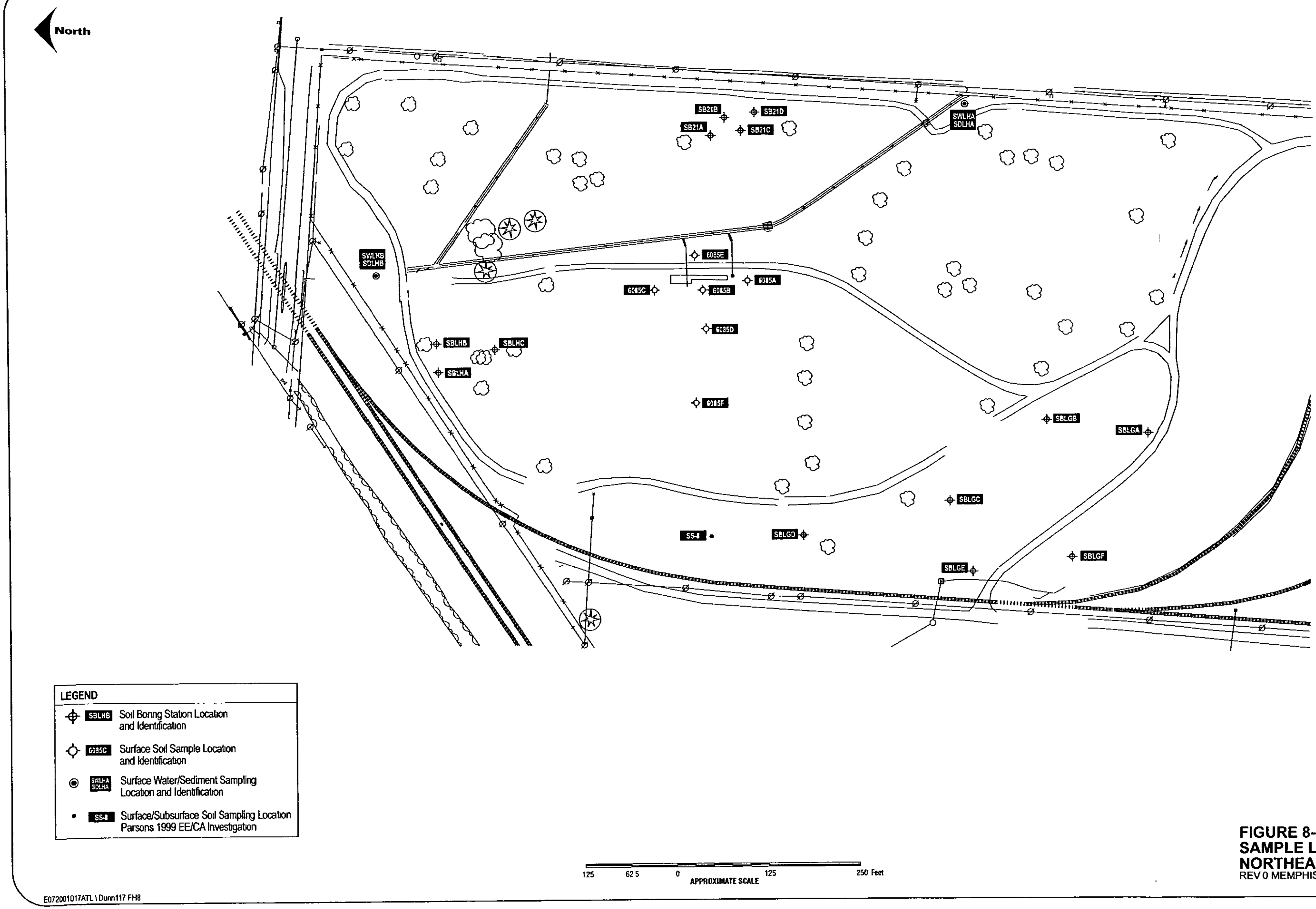

FIGURE 8-3
SAMPLE LOCATIONS
NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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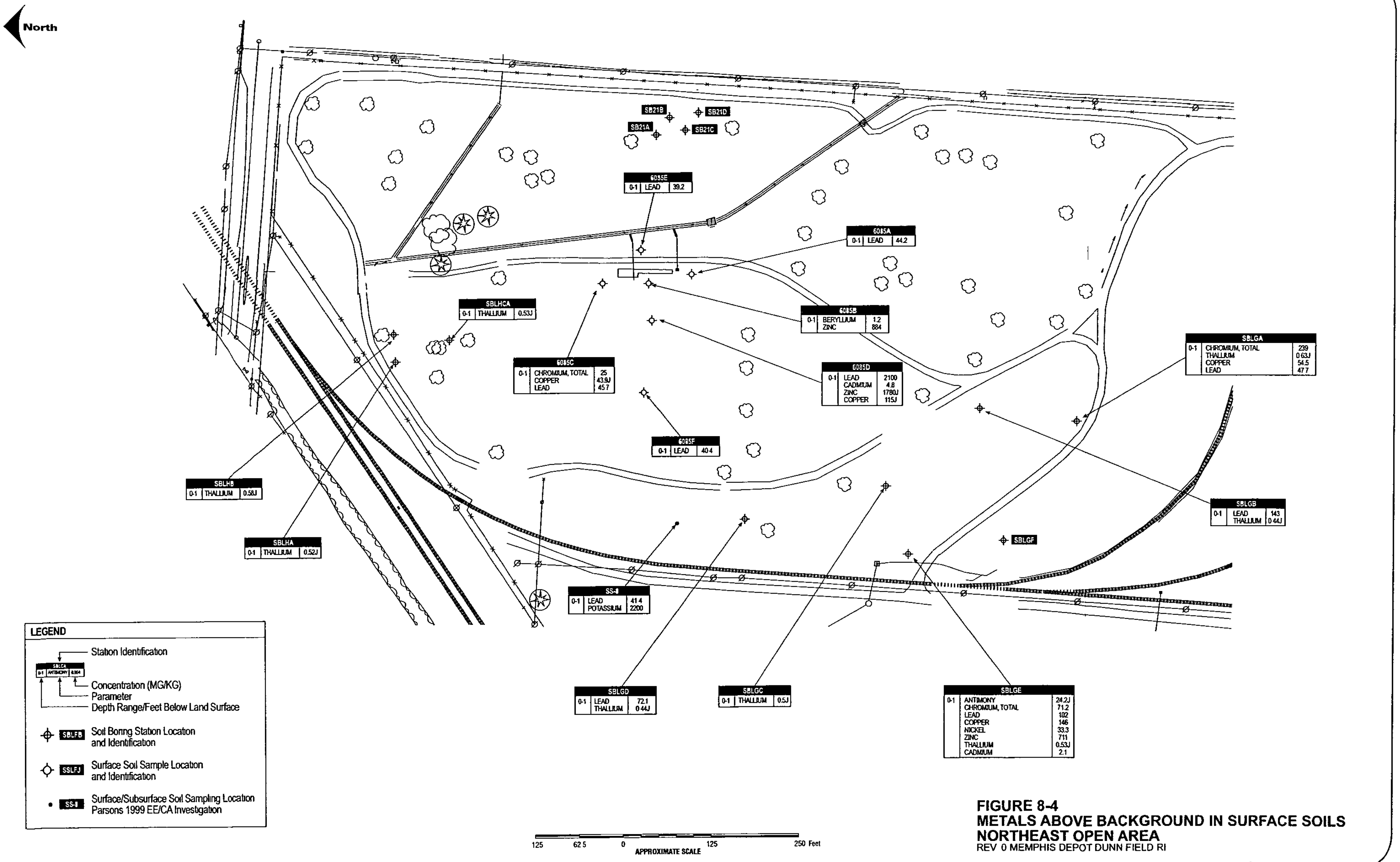

FIGURE 8-4
METALS ABOVE BACKGROUND IN SURFACE SOILS NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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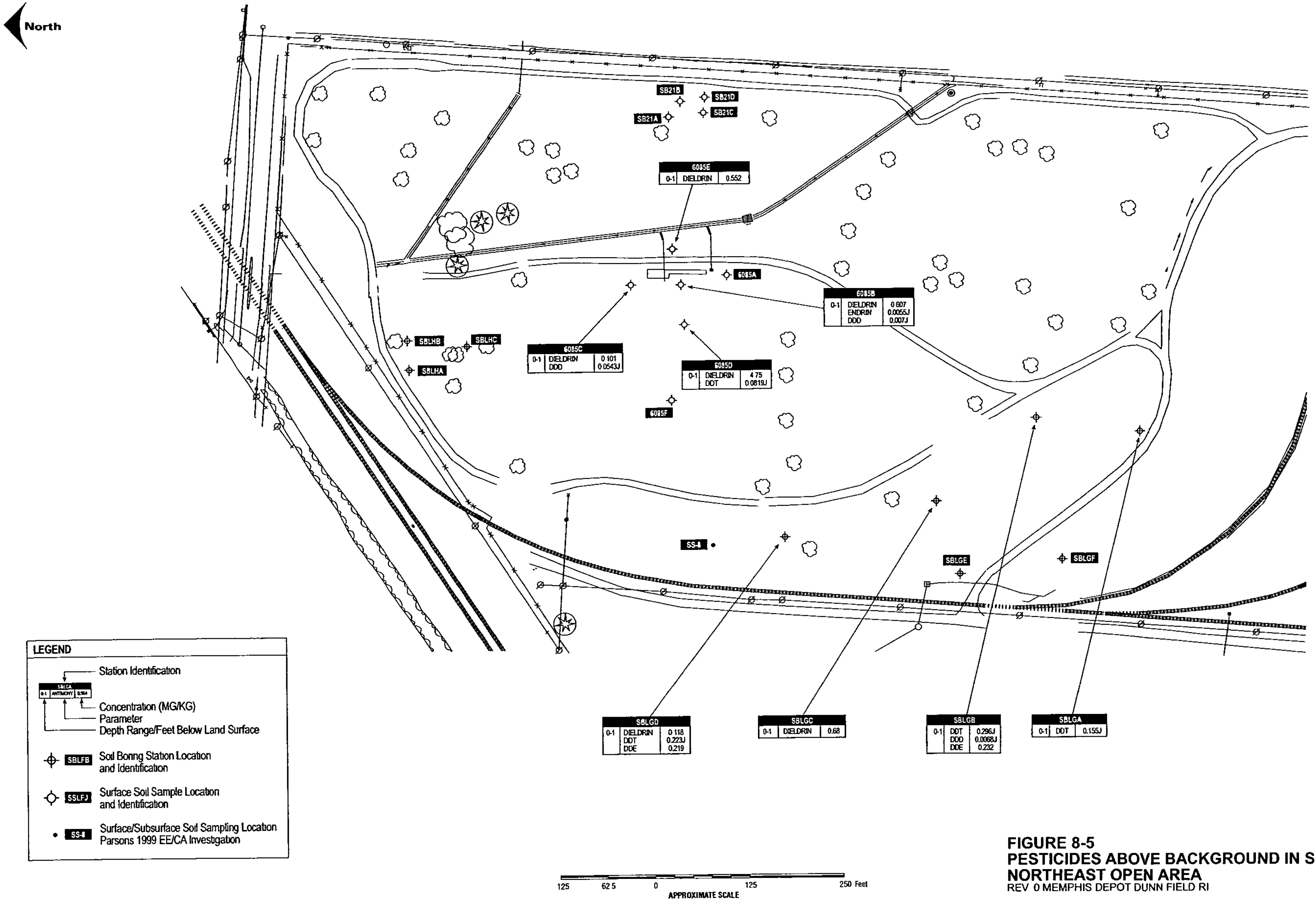

FIGURE 8-5
PESTICIDES ABOVE BACKGROUND IN SURFACE SOILS NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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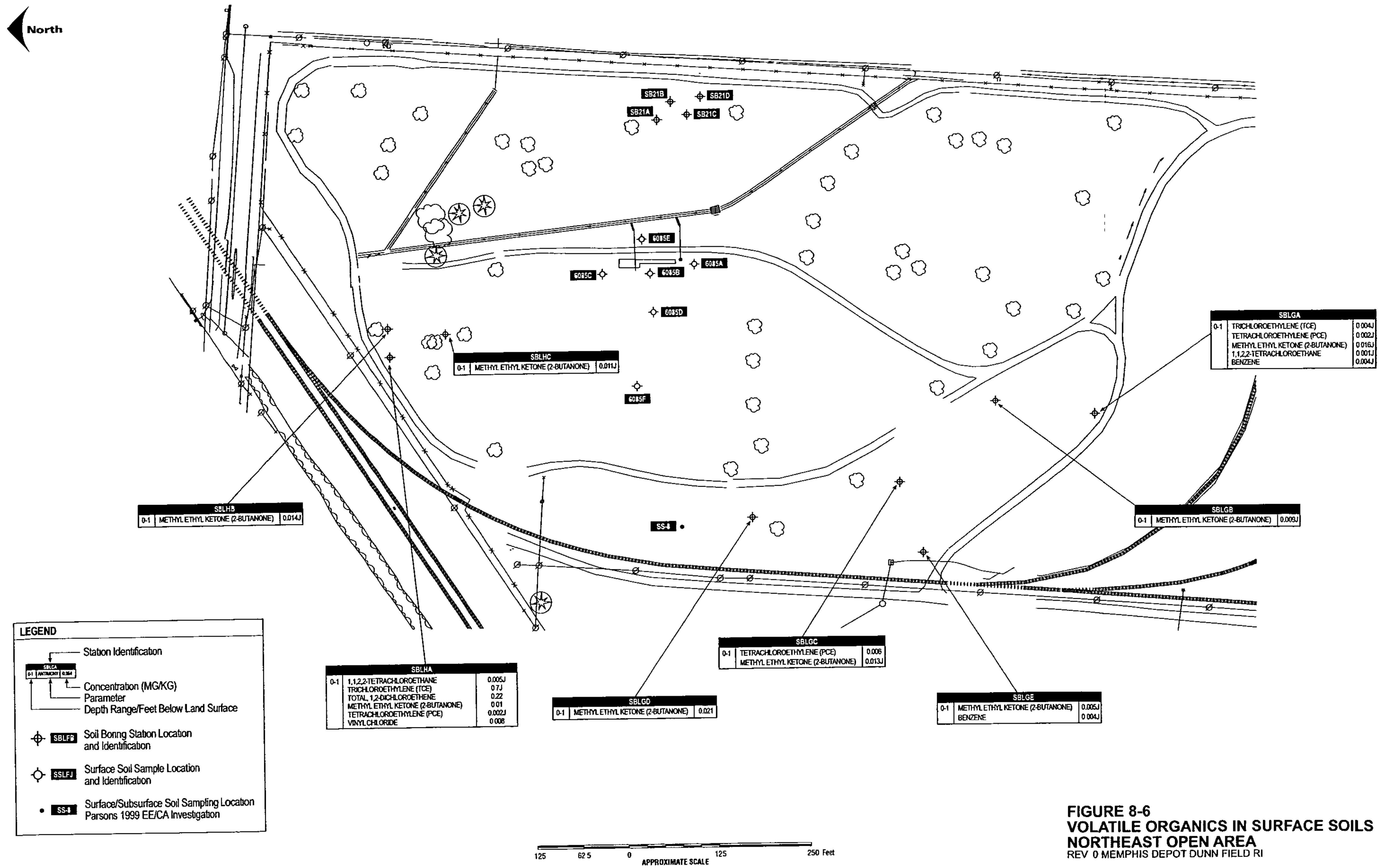
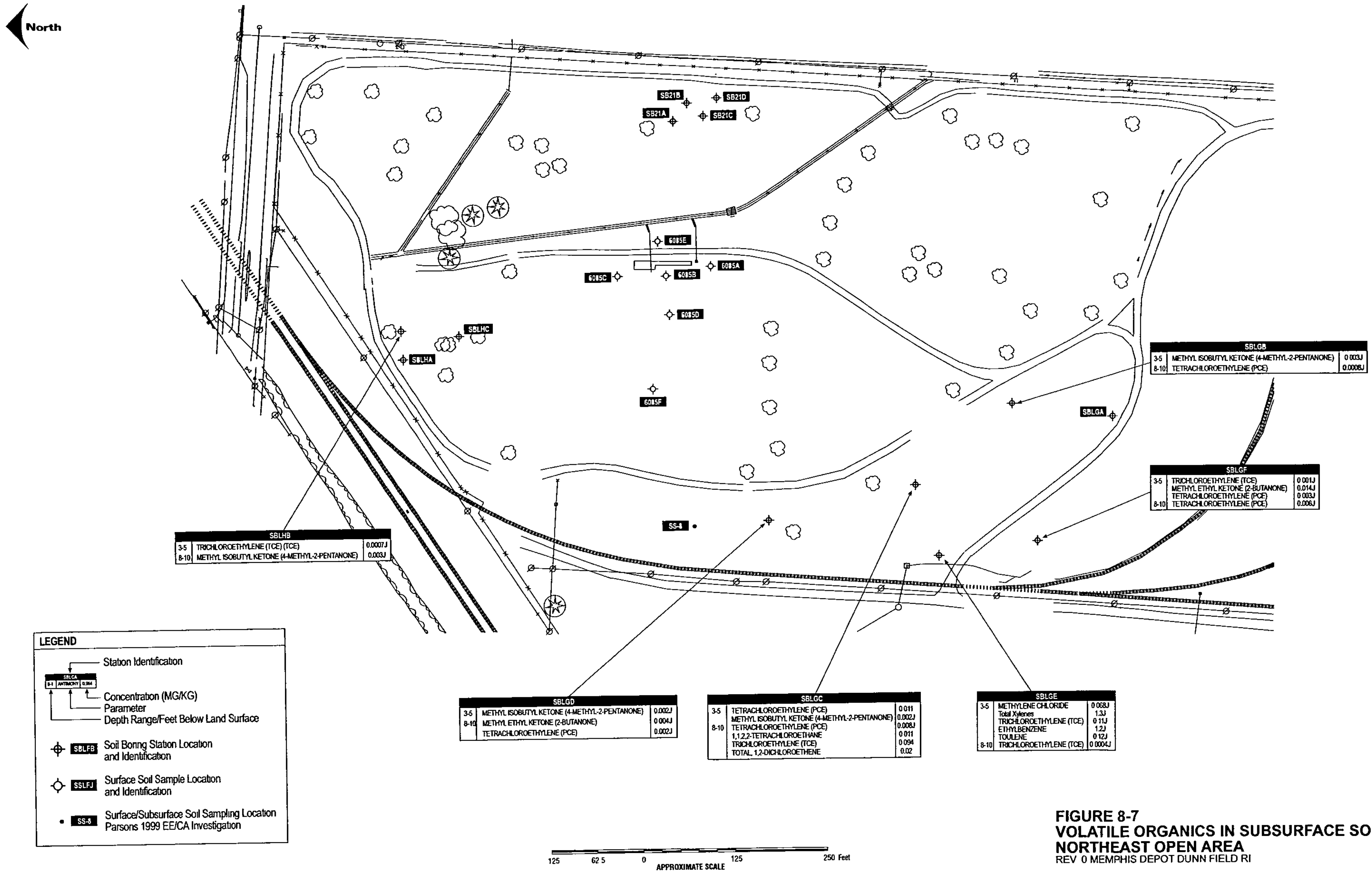


FIGURE 8-6
VOLATILE ORGANICS IN SURFACE SOILS
NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



SBLGB

3-5	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	0.003J
8-10	TETRACHLOROETHYLENE (PCE)	0.0008J

SBLGF

3-5	TRICHLOROETHYLENE (TCE)	0.001J
	METHYL ETHYL KETONE (2-BUTANONE)	0.014J
	TETRACHLOROETHYLENE (PCE)	0.003J
8-10	TETRACHLOROETHYLENE (PCE)	0.006J

SBLHB

3-5	TRICHLOROETHYLENE (TCE) (TCE)	0.0007J
8-10	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	0.003J

SBLGD

3-5	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	0.002J
8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.004J
	TETRACHLOROETHYLENE (PCE)	0.002J

SBLGC

3-5	TETRACHLOROETHYLENE (PCE)	0.011
	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	0.002J
8-10	TETRACHLOROETHYLENE (PCE)	0.008J
	1,1,2,2-TETRACHLOROETHANE	0.011
	TRICHLOROETHYLENE (TCE)	0.094
	TOTAL 1,2-DICHLOROETHENE	0.02

SBLGE

3-5	METHYLENE CHLORIDE	0.068J
	Total Xylenes	1.3J
	TRICHLOROETHYLENE (TCE)	0.11J
	ETHYLBENZENE	1.2J
	TOULENE	0.12J
8-10	TRICHLOROETHYLENE (TCE)	0.0004J

FIGURE 8-7
VOLATILE ORGANICS IN SUBSURFACE SOILS
NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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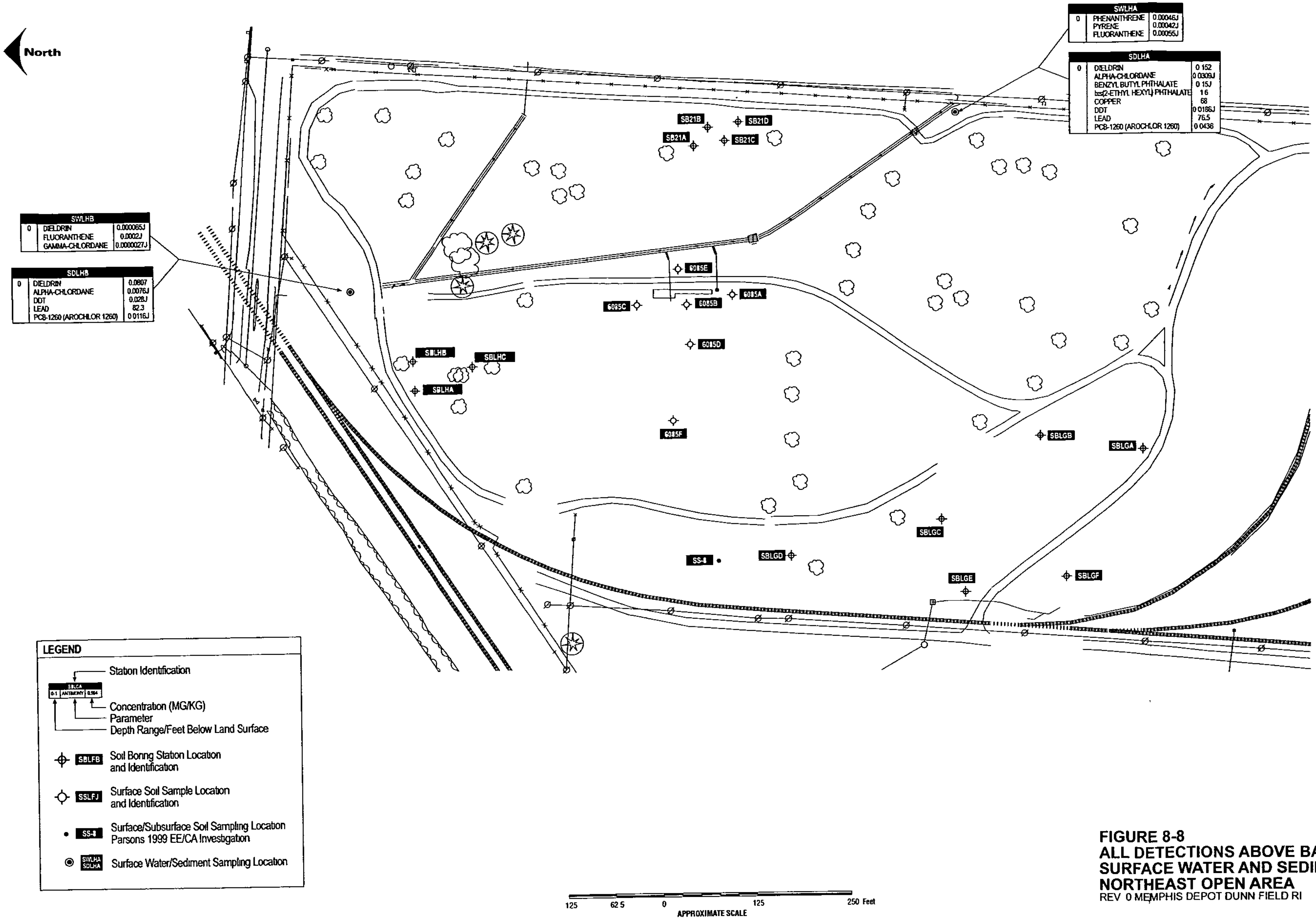
E072001017ATL \ Dunn121 FH8



SWLHA		
0	PHENANTHRENE	0.00046J
	PYRENE	0.00042J
	FLUORANTHENE	0.00055J

SDLHA		
0	DIELDRIN	0 152
	ALPHA-CHLORDANE	0 0309J
	BENZYL BUTYL PHTHALATE	0 15J
	bis(2-ETHYL HEXYL) PHTHALATE	1 6
	COPPER	68
	DDT	0 0186J
	LEAD	76.5
	PCB-1260 (AROCHLOR 1260)	0 0436

SWLHB		
0	DIELDRIN	0.000065J
	FLUORANTHENE	0.0002J
	GAMMA-CHLORDANE	0.0000027J

SDLHB		
0	DIELDRIN	0.0807
	ALPHA-CHLORDANE	0.0076J
	DDT	0.028J
	LEAD	82.3
	PCB-1260 (AROCHLOR 1260)	0 0116J

FIGURE 8-8
ALL DETECTIONS ABOVE BACKGROUND IN SURFACE WATER AND SEDIMENT
NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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TAB

Section 9

9.0 Baseline Risk Assessment for Northeast Open Area

9.1 Human Health Evaluation for Northeast Open Area

The Northeast Open Area is over 20 acres in size, and includes Sites 19, 20, 21, 60, 85, Location G, Location H, and a surface drainage ditch system (Site 50).

The exposure unit concepts used for this evaluation are similar to those used for the Main Installation, and described in Section 7.0. Figure 9-1 presents the two exposure units identified in the Northeast Open Area: the Area-wide exposure unit, and the surrogate site selected around Sites 60/85 (Former Pistol Range and Temporary Pesticide Storage Shop) as a high-end exposure representative of a reasonable upper-bound estimate of the exposure/risks from the Northeast Open Area for different exposure populations identified. The exposure populations evaluated include future industrial and utility workers, recreational users, and future hypothetical residential receptors.

Section 7.1 presented the approach for the surrogate site selection. The site presenting the highest PRE risk ratio within the Northeast Open Area was selected as the surrogate site. The PRE results used as the basis for the surrogate site are presented in Appendix C-2.

A major portion of the Northeast Open Area is occupied by approximately 20 acres of open space and lightly wooded areas. Surface and subsurface soil samples collected within the Northeast Opens Area, associated sites listed above, and the two surface water and sediment samples collected from the drainage ditches are included in this risk analysis.

The Northeast Open Area as an exposure unit was evaluated for exposures to current/immediate future maintenance workers, future industrial and utility workers, and future recreational adult and child users. A future utility worker exposure was evaluated for Sites 60/85 in addition to the default industrial worker exposure. RGOs were calculated for COPCs presenting risks above the upper limit of the acceptable range of 10^{-6} to 10^{-4} within the Northeast Open Area and/or Sites 60/85 risk estimates. Groundwater under the Northeast Open Area is addressed in Section 15.

9.1.1 Selection of COPCs for Northeast Open Area

Analytical data from the samples collected were used for the risk assessment. The media of interest were soil (surface and subsurface), sediment, surface water, and groundwater. Groundwater is discussed in Section 15 Samples collected (see Figures 8-2 through 8-7) from the following were used for selection of COPCs.

- The surface soil samples were collected from the wooded and open areas, including the pistol range;
- The soil column samples were collected from the sample locations at the boundaries of the Northeast Open Area; and

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- The sediment and surface water samples were collected from drainage ditches within the Northeast Open Area.

The concentrations of all detected chemicals in soils, sediment, and surface waters at the Area and/or surrogate site levels were compared against background values (discussed in Section 3.0, Table 3-8) and health-based criteria (i.e., Region III RBC), as described in Section 7.0. COPCs for surface soil, subsurface soil, sediment, and surface water are presented in Tables 9-1 through 9-4, respectively. A more detailed table showing human health screening criteria by medium and the results of the COPC selection screening is provided in Appendix D.

A total of 9 surface soil samples were analyzed for VOCs (one duplicate); where as 16 surface soil samples were analyzed for SVOCs, pesticides, and inorganic chemicals (2 duplicate samples). All of these samples were combined to evaluate risks from surface soil from the Northeast Open Area. The COPCs for the surface soils are antimony, chromium, lead, thallium, dieldrin, TCE, and 1,1,2,2-PCA. A total of 20 samples were analyzed for VOCs (2 duplicates), from subsurface soils in the Northeast Open Area. The COPCs for the Area subsurface soils are 1,2-DCE, methylene chloride, TCE, total xylenes and 1,1,2,2-PCA. COPCs for soil column exposures are a combination of both surface and subsurface soil COPCs. A total of 2 surface water and 2 sediment samples were collected from the Northeast Open Area. The COPC for the sediment is dieldrin, and the COPCs for the surface water are dieldrin and phenanthrene.

9.2 Exposure Assessment for Northeast Open Area

The regional land use within a 3-mile radius of the Depot is presented in Figure 2-17. The historical activities in the Northeast Open Area can be generalized as grounds maintenance, personnel training in the pistol range area, and recreational use of the open and wooded areas. Interim pesticide storage activities were reported for the pistol range area. Cement-lined drainage ditches are situated in the northeastern portion of the site. The following discussion presents a CSM for the Northeast Open Area, and potentially exposed human receptors under current and future land use scenarios.

9.2.1 Conceptual Site Model and Fate and Transport Overview

Figure 9-2 presents the conceptual site (exposure) model for the Northeast Open Area. Each of the components of a CSM is discussed below, including the primary and secondary sources of contamination, primary and secondary release pathways, mechanisms, potential receptors, and routes of exposure.

The primary sources of COPCs in the soil at the Northeast Open Area are suspected to be the pesticides applied to the grassy areas within the vicinity of the pistol range, as well as the rest of the wooded areas. Although temporary pesticide storage was reported, no site-specific elevation of pesticide concentrations was observed around these sites (see Figure 8-4). Lead at elevated concentrations from spent bullets in the Former Pistol Range was mixed with soils in the wooded area. Another form of release is the surface runoff of pesticides and herbicides from the grassy areas around the ditches. Dieldrin was detected in the ditch samples at low levels, which could be from local surface runoff.

Specific migration pathways for VOCs are as a concentrated liquid from a disposal site, leachate from soil via water infiltrating from the surface, volatilization into ambient air or indoor building air from surface contamination or subsurface soils after disturbance or exposure, or, if contaminants exist in surface soil, entrainment with dust particles. Volatilization is perhaps the more prominent migration pathway for the Northeast Open Area These migration pathways tend to significantly reduce surface soil VOC levels within a short period of time (hours to days) after the release to surface soil. Therefore, VOCs are rarely found in surface at concentrations above screening criteria at sites with historical operations. However, low level (near detection limits of 10 ug/kg) VOCs may be detected as artifacts in surface soil.

Chemicals that tend to remain bound to soil particles (e.g. SVOCs, inorganic chemicals) in the surface soil could migrate through erosion to low lying areas such as drainage ditches and accumulate in the sediments. These potential migration pathways were evaluated by sampling various media at the site, and are further discussed below.

Since primary migration pathways for chlorinated pesticides, SVOCs, and inorganic chemicals are through surface runoff and/or dust emission to air of particulate bound COPCs, samples were collected from drainage ditches to determine if any of the site COPCs are present in the ditch bottom sediments. The dust emission pathway was included to assess possible exposures to dust-borne COPCs, as addressed in the following dose and risk estimation portions of this risk assessment. No other potential migration pathways are identified for surface soil COPCs.

Chlorinated solvents were detected in subsurface soil samples collected closer to the Disposal Area in the southwest corner. These COPCs are highly soluble and, hence, mobile into the groundwater underneath; and because they are also highly volatile, they could become air-borne. The migration to groundwater is evaluated using monitoring data from wells. The potential for continued leaching was also evaluated for these subsurface soils. The potential for volatilization and entry into air is evaluated as part of the inhalation exposure pathway in this risk evaluation.

Potential exposure points onsite include areas where human activities and/or ecological receptor occurrences are likely and could result in physical contact with one or more contaminated media. Most of the Area is inactive and the current human activity here is limited to maintenance workers performing routine activities such as lawn mowing, weed cutting, and maintenance in the Northeast Open Area The potential for direct human exposure depends on the presence of exposed contaminated surface soil and the types of activities within the contaminated areas. Pavement and grass cover limit direct human exposure. Much of the surface area is covered by grass, so exposures to soils could occur during maintenance activities. Since the subsurface soil CVOCs are from historical disposal activities, potential release to ambient air could be occurring from the subsurface media. However, soils in the area are clayey, relatively low porosity, and high density and the contaminated area is approximately 15 feet bgs; these factors serve as barriers to the free release of the CVOCs. However, low-level ambient releases could be occurring. As a result, inhalation exposure to the CVOCs in the ambient air is a potentially complete pathway for the human receptors in the area, such as maintenance workers. The indoor and outdoor air emissions from the surface and subsurface VOCs were modeled using ASTM-RBCA Model

(GSI, 1998), and risks were estimated (see Appendix G) for various receptors. Most of the default assumptions included in the model were used for the air release estimates.

Current and future exposures were evaluated assuming unrestricted land use. Exposures under a future land use are therefore assumed for recreational receptors using the open and wooded areas, maintenance and industrial workers, and future residential receptors (CH2M HILL, 1999e). The maintenance, industrial, and utility workers can work anywhere in the Area and therefore can be exposed to the larger exposure unit. However, Sites 60/85 were used as a surrogate, potential RME site to evaluate both the industrial and utility workers' exposures. Based on the nature of the buildings in the area and planned reuse activities described in The Memphis Depot Redevelopment Plan (The Pathfinders *et al.*, 1997), the site is likely to remain recreational. Potential exposure routes for the maintenance worker include incidental ingestion and dermal contact with surface soil, sediment, and surface water, and inhalation of particulate emissions via dust from surface soil. Due to the presence of pavement and established grass cover over the Northeast Open Area, dust generation is anticipated to be limited.

9.2.2 Potentially Exposed Population and Identification of Complete Exposure Pathways

Currently the wooded areas in the Northeast Open Area are not in use and the facility is inactive. Potentially exposed populations under current conditions include maintenance workers occasionally cutting grass. Based on the overgrowth of the grass and weeds in some of the areas, the site may not be under a regular maintenance program. Under foreseeable future conditions, potentially exposed receptors could include maintenance workers, similar to those identified under current land use. A future redevelopment plan, entitled the *Memphis Depot Redevelopment Plan*, was developed in May 1997 by The Pathfinders and indicated that the Northeast Open Area could be opened for public use as public Open Area/Park based on the attractive physical attributes this area offers Thus, this area future land use could include either industrial or recreational use. Since public access is allowed, it is reasonable to assume site may be used as a residential area at a future time. Therefore, an assumption was made that this site may be available for unrestricted land use, which could include residential use at some point in the future. Therefore, current and future potentially exposed populations could include industrial workers, recreational visitors, and residential receptors.

For conservative risk estimation purposes, future workers are assumed to contact soils on grass areas routinely on a daily basis, during their entire exposure duration (25 years). A general description of activities to be performed by a maintenance worker within Dunn Field was provided in Section 7.0.

As noted previously, future base redevelopment recognizes the Northeast Open Area for use as public open space area. The Area may be converted to a public open space that will be used for recreational purposes by the public in the area. In addition, this land use would require workers to spend more time performing maintenance duties. Potential exposures Routes of exposure include incidental ingestion, dermal contact, and inhalation of dust from surface soils, inhalation of volatiles from subsurface soil, and ingestion of and dermal contact with sediments/surface waters. Exposure factors used were the default values for industrial workers from the *Exposure Factors Handbook* (EPA, 1997c) and other published sources as referenced in Appendix H. Under these assumptions, this hypothetical receptor category would represent the maximum or most conservative degree of exposure that would be associated with this site

If Dunn Field is released for unrestricted land use, potential future use of the Northeast Open Area will likely remain public recreational park area. For conservative risk estimation purposes, the area is assumed to be used for industrial use purposes. Also, a hypothetical residential use scenario was evaluated for comparison purposes during risk management decisions.

Based on *The Memphis Depot Redevelopment Plan* (The Pathfinders *et al.*, 1997), future recreational use of the Northeast Open Area is very likely. Hypothetical future industrial, recreational, and residential (surrogate site) receptors were evaluated for their potential exposure to soils, sediments, and surface waters. Exposure factors used were the default values for recreational visitors from the Region IV Supplemental Guidance (EPA, 1995) and other published sources as referenced in Appendix H. Recreational receptors included for risk estimation are adults, youths, and children.

The nearest residential areas in the vicinity of the Northeast Open Area are to the northeast, across Persons Avenue, and east, across Hays Street. The only potentially complete exposure pathway for offsite residents is inhalation of air-borne particulate emissions from surface soil and volatilized CVOCs from subsurface soil. Evaluation of the inhalation pathway for a hypothetical future onsite resident is protective against potential offsite residential exposure.

Table 9-5 summarizes potential current and future exposure pathways for the Northeast Open Area. Receptors were conservatively selected to be protective of the relatively lower exposure receptor population for quantitative risk evaluation for this Area Appendix E compares each potential receptor to the selected representative exposure scenarios to ensure that selected exposure scenarios are protective against all potential current and future exposures. Under these assumed conditions for exposure under current and future land use, the receptor groups that were considered in deriving estimates of exposure and health risk for the Northeast Open Area were as follows:

- Current/immediate future onsite maintenance worker;
- Future onsite commercial/industrial worker;
- Future onsite recreational adult, youth, and child;
- Future residential adult and child assuming unlimited land use (at Site 60/85); and
- Offsite residential inhalation exposure to VOCs in site soils.

A residential scenario for the Northeast Open Area is evaluated using the surrogate site (Site 60/85) for a conservative risk evaluation using PRE results, as discussed below in Section 9.8.

9.2.2.1 Maintenance Worker

Recreational land use requires grounds maintenance, and the Northeast Open Area was evaluated for a future maintenance worker in this risk assessment All data sets were combined for these pathways (area-wide). A default future maintenance worker is assumed to have a soil ingestion rate of 50 mg/day, for 50 days per year (once a week; best

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professional judgement), with an exposure duration of 25 years. A soil ingestion rate is assumed to be similar to default industrial worker, as the area is mostly wooded and other areas are grass covered, and direct contact with soils is likely to be minimal. Therefore, a soil ingestion rate assumption of 50 mg/day is adequately protective for a maintenance worker involved in facility upkeep related work. Dermal contact with soils was estimated for the exposed skin area (2,679 cm^2/event) on hands, feet, and face. Dust exposure intake estimations were based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day. Surface media exposure factors and their associated sources/justification are discussed in Section 7 and presented in Table 7-4a

Based on occupational duties, it is assumed that a maintenance worker spends 4 hours of an 8-hour workday in contaminated areas of the Northeast Open Area, so half of the total incidentally ingested soil is assumed to come from the contaminated soil. Thus, the fraction ingested (FI) or exposure time (ET) term of the dose estimates is 0.5. Site-specific factors used for exposure frequency and duration as discussed above (e.g., ½ a work-day) are based on best professional judgment. Exposure factors and the rationale for their selection are presented in Section 7.0, Tables 7-4a and 7-4b and in Appendix H.

9.2.2.2 Industrial Worker

Because future land use is open for other industrial uses, default exposure scenarios were evaluated for a future industrial use of the Northeast Open Area. A default future industrial worker is assumed to have a soil ingestion rate of 50 mg/day, for 8 hours a day, for 250 days per year, with an exposure duration of 25 years. Dermal contact with soils was estimated for the exposed skin area (2,679 cm^2/event). Dust exposure intake estimations were based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day.

9.2.2.3 Recreational Adult, Youth, and Child

Surface soil exposure to a recreational visitor is expected to occur at the site if it is converted to a public park. On the basis of this receptor's expected activities, such as picnics, it is assumed that the adult, youth, and children visitors would have the potential for direct and indirect contact with surface soils at the wooded area.

Adults and youths are assumed to have an ingestion rate of 100 mg/day of sediment and surface soil. The inhalation exposure is for 4 hours during a single event at an inhalation rate of 20 cubic meters (m^3)/day.

Recreational adults are assumed to wear casual clothing. The assumed surface area is 5,049 cm^2/event. The adherence factor of 0.03 mg/cm^2 is assumed. This scenario is conservative based on the assumptions of soil ingestion rate, the large surface area exposed, and the extended duration of exposure over a 30-year period.

The **youth** are assumed to have an exposed surface area of 4,478 cm^2/event. The adherence factor of 0.15 mg/cm^2 is assumed, due to a higher amount of physical activities (e.g., engaging in sports and walking along the ditches). This scenario is conservative based on the assumptions of soil ingestion rate, the large surface area exposed, and the extended duration of exposure over a 10-year period.

The default **child for the recreational scenario** may be male or female, between 1 and 6 years of age, the exposure duration is expected to be throughout the entire 6 years. It is assumed the child is exposed to surface soils by playing for 2 hours per event. Events are assumed to occur 2 days a week during warmer months of the year, which can be 8 months of the year, for a total of 64 days per year. Realistically, younger children would not be at the wooded areas for 2 hours at a time. The assumed surface area is 2,351 cm^2/event. The adherence factor of 0.15 mg/cm^2 is assumed. On the basis of this receptor's expected activities, it is assumed that the recreational child would have the potential for direct and indirect contact with surface soils. Typical behavior of the children (e.g., running, playing, and sitting in the soil, sand, or grass) is expected, and would involve some physical disturbance of the surface soils, resulting in the generation of dust. The default inhalation rate of 15 m^3/day results in an inhalation rate of 2.5 m^3/event. The default soil ingestion rate of 200 mg/event has been assumed for the child receptor in the area, and should be sufficient for this risk calculation.

This is a very conservative scenario based on the assumed high frequency of playtime, the large surface area exposed, and the default inhalation and ingestion assumptions. Exposure factors and the rationale for their selection are included in tables in Appendix H.

The exposure assumptions for a recreational child for sediment and surface water exposures were adapted from default factors and Region IV guidance. Exposure factors and the rationale for their selection are included in tables in Appendix H

9.2.2.4 Residential Scenario

The onsite residential risk evaluation is included as part of the surrogate site risk assessment below in Section 9.8.

A default exposure scenario was evaluated for offsite air-borne VOC releases from surface and subsurface soil contamination in the Northeast Open Area. The offsite resident's exposure is assumed to be through inhalation of volatiles and dust coming from the site. Inhalation rates for noncarcinogenic chemical-related intake estimates of 20 m^3/day and 15 m^3/day were assumed for an adult and a child, respectively. Further details of the exposure factors are included in Appendix H.

The results of the quantitative exposure analysis (dose estimates), along with the risk calculations, are included in Appendix G.

9.2.2.5 Exposure Quantification

The EPCs were the UCL 95 percent concentrations for sediment, surface water, and surface soils. EPCs are either the UCL 95 percent estimates or maximum concentrations for the COPCs detected in the surface and subsurface soil, sediment, and surface water. The UCL95 normal value was used in place of the maximum detected value for dieldrin for surface soils. A description of the UCL 95 percent calculation is provided in Appendix F.

The ambient and indoor air concentrations were estimated for VOCs using the average concentration across various soil depths from the surface to the water table (soil column) as the input into the RBCA model (GSI, 1998). Further details of the model input and output printouts, and exposure assumptions, are included in Appendix G.

The estimated EPCs are listed in Tables 9-6 through 9-9. The dose (intake) was estimated for each of the complete exposure pathways (see Appendix G).

9.3 Toxicity Assessment for Northeast Open Area

Table 9-10 presents the toxicity factors for COPCs, and the WoE classifications for each. Detailed information on the basis of toxicity classification and the uncertainty associated with the listed toxicity factors based on the EPA toxicity database are presented in the master toxicity tables (see Tables 7-7 and 7-8). All toxicity values used for the COPCs are chronic values Acute and subchronic values are deemed inappropriate for use based on the long-term exposures assumed for dose estimations

Toxicity factors of the Northeast Open Area sediment and surface water COPCs, and the surface and subsurface soils, are listed in Table 9-10. Oral CSFs are available for dieldrin, methylene chloride, TCE, and 1,1,2,2,-tetrachloroethane. Inhalation CSFs are also available for these COPCs as well as for total chromium The oral RfD values are available for dieldrin, antimony, total chromium, thallium, 1,2-DCE, methylene chloride, TCE, and total xylenes. Inhalation RfDs were available for total chromium and methylene chloride.

Oral toxicity factors were adjusted by the gastrointestinal dermal absorption (ABS_{GI}) factors to account for differences in absorption efficiency. These adjusted toxicity factors are used for comparisons with dermal intake estimates. These values can be found in Table 7-10. Twelve carcinogenic and 7 noncarcinogenic inorganic and organic chemicals were identified as COPCs at the Northeast Open Area and the North Plume. All of the chemicals were analyzed for their potential toxicity contribution to represent the combined effect of all site-related chemicals.

The toxicity equivalency factors (TEFs) for various carcinogenic PAHs were selected from EPA Region IV and EPA's provisional guidance (EPA/600/R-93/089) and can be found in Table 7-9. They were selected and applied to the toxicity factor for benzo(a)pyrene (B(a)P) to estimate risks from individual PAH compounds Alternatively, TEFs may be applied to the concentration of individual PAH compounds to convert them to B(a)P concentration, a practice recommended by EPA Region IV. However, since other less toxic PAHs often occur at higher concentrations than B(a)P, to present individual contributions to the total risk, TEFs were applied to the toxicity factors.

EPA RAGS guidance recommends discussion of chemicals without toxicity factors. Of the COPCs, only lead did not have toxicity criteria. However, lead was addressed by comparing detected concentrations with target levels. The soil target concentrations protective of an adult worker were calculated using EPA's Technical Review Work-group (TRW) recommended lead model (EPA, 1996a).

9.4 Risk Characterization for Northeast Open Area

The methodology used for risk and HI calculations is described in Section 7.0, and risk and HI calculations are included in Appendix G. The carcinogenic risks and noncarcinogenic HI results from Appendix G are summarized in Table 9-11. A set of histograms of the risks and HIs is presented in Figures 9-3 and 9-4. The Northeast Open Area was evaluated as one exposure unit. Workers and residents were assumed to have equal possibility to randomly contact any area of an exposure unit with exposures occurring over long-term, and the EPCs were protective estimates of the average concentration (e.g., UCL95%) within an exposure unit (EU), for example the Northeast Open Area These are conservative assumptions since most soil is covered by grass interspersed with lightly wooded areas, restricting direct contact with soil.

For the surface soil, risk to an onsite **maintenance worker** was estimated to be 6 x 10^{-7}, which is below the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HI of 0.004 is well below the standard threshold of 1.0. Given the conservatism inherent in the assumptions and parameter values used in this analysis, these results suggest that no significant risks of adverse health impacts exist at this site for maintenance workers from exposure to surface soil.

The ELCRs from sediment and surface waters to a maintenance worker from the Northeast Open Area are estimated at 3 x 10^{-8} for each. These carcinogenic risks are far below the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HIs are estimated to be 0.00009 and 0.0001, respectively. Thus, maintenance worker exposure to the site sediments and surface waters is not a concern, given that the risks and HIs are below acceptable limits.

Combined risks from surface soil, sediment, and surface water exposure pathways for the maintenance worker resulted in a total ELCR of 6 x 10^{-7} and a total HI of 0.004. The cumulative surface media exposure is within acceptable limits stated above.

The ELCR to a future hypothetical onsite **industrial worker** from the surface soils was estimated to be 5 x 10^{-6}, primarily due to dieldrin. The estimated risk is within the 10^{-6} to 10^{-4} acceptable range. Total noncarcinogenic HI was estimated at 0.04, which is well below the value of 1.0. Given the conservatism inherent in the assumptions and parameter values used in this analysis, these results suggest that no significant risks of adverse health impacts exist at this site for future industrial/commercial workers from exposure to surface soil.

The estimated ELCRs to an industrial worker from sediment and surface waters are 1 x 10^{-7} and 1 x 10^{-7}, respectively. Both are within the acceptable risk limit range of 10^{-6} to 10^{-4}. The noncarcinogenic HIs are 0 0004 and 0.0005, respectively, both of which are well below 1.0. Thus, the Northeast Open Area sediments and surface waters do not pose a health threat to future industrial workers, despite the conservative exposure assumptions used.

Combined risks from surface soil, sediment, and surface water exposure pathways for the industrial worker resulted in a total ELCR of 5 x10^{-6} and a total HI of 0.04. The cumulative surface media exposure is within acceptable limits stated above. Inhalation risks associated with volatilization from subsurface soils are discussed at the end of this risk characterization. Since a worker can spend the entire workday either indoors or outdoors, only outdoor exposure to ambient air was included in the cumulative risk estimations. The exposure to indoor air to an office worker is included below.

A **utility worker** exposure was evaluated using soil concentrations in surface and subsurface soils. No subsurface soils were evaluated for the surrogate site selected. Therefore, both **industrial and utility workers** were evaluated using Area-wide data. The total ELCRs to an industrial worker and utility worker from mixed soil are estimated to be 4 x 10^{-6} and 7 x 10^{-7}, respectively, primarily from dieldrin in surface soil. The estimated risk level of the industrial worker is well within the acceptable range of 10^{-6} to 10^{-4} Total noncarcinogenic HIs for these receptors were estimated well below a value of 1.0. These results suggest that no significant risks of adverse health impacts exist at this site for industrial and utility workers from exposure to subsurface soil.

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The total ELCR to a **recreational adult** from the surface soil at the Northeast Open Area is estimated to be 1 x 10^{-6}. The estimated risks are associated with ingestion of dieldrin. The estimated risk level is well within the acceptable range of 10^{-6} to 10^{-4}, typically considered adequately protective of public health. Total noncarcinogenic HI was estimated at approximately 0.01, which is well below the value of 1.0. These results suggest that no significant risks of adverse health impacts exist at this site for future recreational adults from exposure to soil.

The ELCRs from sediment and surface waters to a recreational adult at the Northeast Open Area are estimated at 2 x 10^{-7} and 3 x 10^{-7}, respectively. The carcinogenic risks are below the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HIs for the recreational adult are estimated to be 0.0006 and 0.0009, respectively. Thus, recreational adult exposure to site sediments and surface waters is not a concern, given that the risks and HIs are below acceptable limits.

Combined risks from surface soil, sediment, and surface water exposure pathways for the recreational adult resulted in a total ELCR of 2 x 10^{-6} and a total HI of 0 01. The cumulative surface media exposure to a future recreational adult is within acceptable limits stated above.

The total ELCR to a **recreational youth** from surface soil is estimated to be 9 x 10^{-7}, primarily from dieldrin. This risk level is well within the acceptable range of 10^{-6} to 10^{-4}, typically considered adequately protective of public health. Total noncarcinogenic HI was estimated at approximately 0.02, which is well below a value of 1.0. These results suggest that no significant risks of adverse health impacts exist at this site for a recreational youth under existing conditions from exposure to soil.

The ELCRs from sediment and surface waters to a recreational youth at the Northeast Open Area are estimated at 1 x 10^{-7} and 1 x 10^{-7}, respectively. The carcinogenic risks are below the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HIs for the recreational youth are estimated to be 0.0009 and 0.001, respectively. Thus, recreational youth exposure to the site sediments and surface waters is not a concern, given that the risks and HIs are below acceptable limits.

Combined risks from surface soil, sediment, and surface water exposure pathways for the recreational youth resulted in a total ELCR of 1 x 10^{-6} and a total HI of 0.02. The cumulative surface media exposure is within acceptable limits stated above.

The total ELCR to a **recreational child** from surface soil is estimated to be 2 x 10^{-6}, mostly from dieldrin. This risk level is well within the acceptable range of 10^{-6} to 10^{-4}, typically considered adequately protective of public health. Total noncarcinogenic HI was estimated at approximately 0.1, which is below a value of 1.0 These results suggest that no significant risks of adverse health impacts exist at this site for a child under existing conditions from exposure to soil.

The ELCRs from sediment and surface waters to a recreational child at the Northeast Open Area are estimated at 3 x 10^{-7} and 1 x 10^{-7}, respectively. The carcinogenic risks are below the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HIs for the recreational child are estimated to be 0.005 and 0 001 for sediment and surface waters, respectively. Thus, recreational child exposure to site sediments and surface waters is not a concern, given that the risks and HIs are below acceptable limits.

Combined risks from surface soil, sediment, and surface water exposure pathways for the recreational child resulted in a total ELCR of 2 x 10^{-6} and a total HI of 0 1. The cumulative surface media exposure is within acceptable limits stated above.

Inhalation of VOCs within the soil column was estimated using the Risk-based Corrective Action (RBCA) model from ASTM (GSI, 1998). Using the model, an inhalation ELCR (volatiles in mixed soil) for ambient air to the **industrial worker** was 1 x 10^{-7}, and noncarcinogenic HI was estimated at 0.0001, whereas risk was 5 x 10^{-10} and HI was 0.000004 for the **utility worker.** Inhalation of **indoor air** by a hypothetical future industrial worker was estimated to have an ELCR of 1 x 10^{-5} and an HI of 0.009.

The model estimated **offsite residents' risk** from inhalation of vapors from the site as 3 x 10^{-8} and the HI as 0.00002. Overall inhalation risks and HI to offsite residents are negligible.

Risks and HIs to maintenance workers, utility workers, and recreational receptors were all below the industrial worker risk levels. These risk levels are well within the acceptable range of 10^{-6} to 10^{-4}, typically considered adequately protective of public health. The total noncarcinogenic HI was also below a value of 1.0. These results suggest that no significant risks of adverse health impacts exist at this site for any of the receptors identified as potentially occurring under current or future land use conditions. Risks to **offsite residents** from inhalation exposure to COPCs from the Northeast Open Area are negligible.

9.5 Health-based Evaluation for Lead

The maximum recorded lead concentration in surface soil at the Northeast Open Area is 2,100 mg/kg, with an estimated arithmetic mean of 196 mg/kg. All concentrations except the maximum are below a residential exposure-based screening level of 400 mg/kg and an industrial worker exposure-based target concentration of 1,536 mg/kg. The lead is possibly associated with spent munitions casings in the firing range, as the elevated concentrations were limited to this area. However, the maximum observed lead levels at the site are expected to pose health hazards for any of the receptors mentioned because both screening levels have been exceeded.

The lead risk evaluation for the Northeast Open Area was based primarily on a limited number of samples collected from the backstop area of the pistol range. Since lead in the form of spent bullets could randomly land in any give area within the pistol range, occurrence of lead in soil associated with bullets could be difficult to characterize with certainty. Thus, there is some uncertainty associated with the soil lead concentration estimates due to the limited sampling and characterization of this site, where there could be other areas with higher lead concentrations that were not identified However, lead in metallic form (e.g., bullet casings) is less soluble, and more stable, thus likely to not leach, or absorbed when ingested, which also contributes to uncertainty, where the actual doses could be lower than those assumed in this evaluation.

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9.6 Uncertainty Analysis

Section 7.0 presents the general concepts and sources of uncertainty at a given site. The following are the major points pertaining to the Northeast Open Area.

9.6.1 Contaminants of Potential Concern

Data were collected from 1996 to 1999. Many of the COPCs, such as PAHs and metals, were also detected in background soils. Dieldrin was not used in the pistol range operations; however, it was applied as part of routine maintenance of the grassy areas, which are not directly related to the site operations within Dunn Field. Likewise, site-wide data statistical evaluations indicated that the contaminants were similarly distributed in the background samples.

Surface soils in this data set were defined as those from 0 to 2 feet The EPA defines a surface soil as being in the 0- to 1-foot range Most of the contaminants at this site have been located in the first 6 inches of the soil. Therefore, there is some added uncertainty in the actual concentrations of contaminants evaluated because the 2-foot interval was analyzed. Soil samples collected were associated with suspected activity areas. Subsurface contamination observed is associated with the southwest area next to the Disposal Area, and could be associated with disposal activities.

The drainage ditch in the Northeast Open Area is dry most of the year and is cement-lined. The surface water COPCs were dieldrin and phenanthrene, both of which have low solubility, indicating they may be associated with suspended particulates.

The surrogate site was selected based on the highest PRE in surface soil. The subsurface soil was not sampled at this site, as the soil-gas data did not have elevated soil gas readings.

9.6.2 Exposure Assessment

There are no routine exposures under current conditions other than occasional maintenance activities. Most of the area within the Northeast Open Area is wooded or grass-covered. Some of the samples collected were from grassy areas, which were assumed to be readily available for exposure. There are no human receptors in the Northeast Open Area, as mentioned previously, and this site is not currently planned to be used for residential purposes, however, the future reuse may include such a use. The proposed future redevelopment plans for this area of Dunn Field proposed by Pathfinders study for the wooded or grassy areas within the Northeast Open Area is as a public open space. Thus, future exposure population also include recreational users from nearby residential areas. Utility and future industrial worker exposure to the subsurface soil becoming surface soil is a conservative risk estimation scenario that would apply to the surrogate site if samples were collected in and compounds were detected in subsurface soil. However, in the case of the Northeast Open Area where 20 subsurface soil samples were collected, none were located within the surrogate site area. The soil-gas data collected for the entire Dunn Field, and in the Northeast Area in particular, did not indicate subsurface buried wastes within this surrogate site. Therefore, no subsurface soil samples were collected. Most of the quantitative exposure values such as exposure frequency (EF) and exposure duration (ED) are assumed values, and actual likely exposure of a receptor is not known. Most of the uncertainty within risk assessments is attributable to this exposure quantitation step. The

RBCA model used for air estimations assumes default soil properties, which are conservative, compared to the site-specific soils that are clayey in nature. Also, the reduction in the VOCs at the source with time is not accounted for in the model assumptions.

9.6.3 Toxicity Assessment

The toxicity criteria used are those recommended by EPA through the toxicity databases; therefore, the uncertainty associated with toxicity assessment is pre-determined by the methods used and the studies selected by EPA in calculating these toxicity factors. The quantitative uncertainty factors (UF) associated with toxicity factors are included in the master toxicity factors tables (Tables 7-7 and 7-8). Some of the primary sources of uncertainty are listed here. Most of the toxicity factors are based on studies from animals extrapolated to humans using arbitrary assumptions (e.g., UF, or modification factor [MF]), which introduces a major uncertainty. In extrapolating from carcinogenic dose to estimate slope factor, no threshold for toxicity is assumed. Some of the metal toxicity factors are based on evidence of toxicity from occupational exposures (e.g., chromium) involving a high level of exposures to chromic acid fumes and air-borne particles. Application of these data to environmental exposures introduced substantial uncertainty.

9.6.4 Risk Characterization

Tables 9-11 and 9-15 present risk and HI estimates for all media and receptors identified. As noted previously, the risks and hazards estimated in this assessment are conservative. Several scenarios were evaluated to simulate possible alternative future land uses for the Northeast Open Area. The fact that samples were collected from biased locations within suspected past activity/spill areas near warehouses adds to the conservatism of the estimates. Thus, the samples evaluated in the combined assessment at the Northeast Open Area represent the areas of highest contamination within the Area.

9.7 Remedial Goal Options

RGOs are the target concentration values for remedial alternative analysis. Achieving these goals should achieve compliance with state and federal standards and satisfy NCP requirements to ensure protection of human health and the environment at hazardous waste sites. The RGOs calculated for the Northeast Open Area are in accordance with *Risk Assessment Guidance for Superfund, Part-B* (USEPA, 1991b) and *EPA Region IV Supplemental Guidance to RAGS* (USEPA, 1994b).

The RGOs are developed only for the chemicals that are detected at the site at concentrations either above the applicable state or federal standards or that present risks or HIs above the acceptable levels "Acceptable" risks are defined as risk levels below 100 in one million (10^{-4}) or HI below 1.0, for either current or future exposure pathways analyzed in the risk assessment.

The risk evaluations under future land use conditions included potential exposures of maintenance, industrial, and utility workers within the Northeast Open Area based on activities observed to be applicable to the site. Offsite residential exposures to volatiles and dust from the site were also evaluated None of these exposure scenarios resulted in risks above acceptable levels. Therefore, site-specific risk-based RGOs were not calculated for the

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site. Table 9-11 and 9-15 present combined risks and HI for all media in the Northeast Open Area.

Groundwater underneath the Northeast Open Area has CVOCs exceeding MCLs. Groundwater from the site flows to the west and northwest, toward the Disposal Area, which also has CVOCs at higher concentrations. Groundwater at Dunn Field is addressed in Sections 14 through 16 and RGOs for groundwater are addressed in those sections. There are no other media of concern within the Northeast Open Area.

Based on the results of the risk assessment, remedial action objectives (RAOs) were identified for the Northeast Open Area and are included in Table 9-15A.

9.8 Human Health Evaluation for Sites 60/85

Sites 60/85 are the surrogate sites for the Northeast Open Area because they resulted in the highest human health risk ratio during the PRE (see Appendix C). These site PRE risks and HI ratios were high primarily due to dieldrin in surface soils at these sites.

9.8.1 Selection of COPCs for Sites 60/85

Six surface soil (0 to 1 foot deep) samples were included for analysis of SVOCs, and fewer samples were analyzed for other chemical groups at Sites 60/85. The maximum detected chemical concentration within this data group was compared against background concentrations and the RBCs for direct exposure, as well as groundwater protection concentrations (SSLs). Because these sites are located in the Former Pistol Range and temporary storage area for pesticides, only surface soils were sampled for the initial investigations and no subsurface soil data were collected for these sites, as the soil gas data did not indicate the presence of buried wastes.

The COPC selection indicated that surface soils at these sites contained lead and dieldrin exceeding the background levels and comparison criteria (see Table 9-12 and Appendix C) for direct exposures.

9.8.2 Exposure Assessment for Sites 60/85

Figure 9-1 depicts the sites and their relative locations within the Northeast Open Area. Figure 9-5 presents the conceptual site (exposure) model for Sites 60/85. The concepts of EU and the selection process used for Dunn Field were previously discussed in Section 7.0. Based on these criteria, Site 60/85 is identified as the EU for future residential land use.

9.8.2.1 Potentially Exposed Human Population and Identification of Potentially Complete Exposure Pathways

Dunn Field has been inactive since the closure of the Depot. There are no potentially exposed populations under current conditions specific to this site.

Under assumed immediate future use conditions, maintenance workers for Dunn Field involved in weed control and other maintenance-related activities could be present for limited periods of time Although this is a potentially complete exposure scenario, the maintenance worker scenario was not quantitative within this surrogate site due to:

- The larger number of COPCs identified in the Area-wide data;
- The higher concentrations of the detected chemicals, and
- The longer period of time spent in the Area-wide exposure unit.

Thus, a maintenance worker exposure scenario was quantified for the Northeast Open Area as a conservative representative of the potential risks from the surrogate site.

Potentially exposed populations under future land use are unknown at this time. On the basis of *The Memphis Depot Redevelopment Plan* (The Pathfinders *et al.*, 1997), it is likely that Sites 60/85 will be used in the future as public open space, probably as recreational area open to the public. Under such a scenario, offsite residents could visit the site. This scenario was also conservatively quantitated under the Area-wide risk evaluations presented above. The surrogate site was evaluated for a future industrial worker exposure. The exposure assumptions for the future industrial worker are the default values, which assume 8 hr/day spent in the contaminated area for 25 yr. for 250 days/yr. As discussed above, the future land use identified for this area in the redevelopment plan is as an open public space, indicating unrestricted public access to the site. Since the site provides an attractive area for future unrestricted development, as part of the future unrestricted land use scenario, a residential land use is also included. The residential land use scenario evaluated represents the worst-case exposure scenario during the site risk management. Tables 7-4a through 7-4c include details of the exposure assumptions. Intake estimates for each pathway are included in Appendix G. A detailed list of exposure factors and the rationale for their selection are included in tables in Appendix H. A summary of exposure pathways for Sites 60/85 is included in Table 9-13.

The EPCs were estimated using data collected from surface soils at Sites 60/85. A UCL 95 percent concentration was estimated for EPC for surface soil (0 to 1 foot) data for the COPCs identified The EPC selection criteria did not identify the statistical estimate, and as a result defaulted to the maximum detected concentrations for COPCs. This could possibly be due to the relatively small sample size (6 samples) and high variation in concentrations within the data set. However, the normal distribution-based UCL 95 percent concentration for dieldrin was near maximum, but was slightly below. Therefore, it was selected to represent the dieldrin EPC in surface soils. These values are listed in Table 9-14, and the generic estimation methodology is described in Appendix F. The dose (intake) was estimated for each of the complete exposure pathways. The dose estimates are included in Appendix G.

9.8.3 Toxicity Assessment for Sites 60/85

Table 9-10 presents the toxicity factors for dieldrin identified at Sites 60/85. There are no toxicity factors for lead. However, lead is addressed by comparing the detected concentration with the target levels estimated, using the blood-lead uptake model. There are no other COPCs at Sites 60/85.

9.9 Risk Characterization for Sites 60/85

The carcinogenic risks and noncarcinogenic HIs are summarized in Table 9-15. A set of histograms is included in Figures 9-6 and 9-7 The ELCRs and HIs were estimated for a future industrial worker, as well as for residential adult and child scenarios.

The carcinogenic risks for industrial worker exposures to Sites 60/85 surface soil resulted in an estimated risk of 9 x 10^{-6} and a noncarcinogenic HI of 0.03. The carcinogenic risks are from dieldrin. The resulting risks are well within the acceptable limits for cancer risks of 1 to 100 in one million and an HI of 1.0. Thus, the overall Sites 60/85 surface soils do not pose a health threat to future industrial workers.

The total ELCR to future hypothetical onsite adult and child residents at Sites 60/85 was estimated for an adult using age-adjusted soil ingestion, dermal surface area, and inhalation rate factors. The estimated cancer risk is 7 x 10^{-5}, which is within the acceptable range of 10^{-6} to 10^{-4}. A separate child cancer risk was not estimated because the adult risk represents a time-adjusted exposure. The estimated risk is due to dieldrin at EPC concentration of 2.54 mg/kg. The total noncarcinogenic health hazard was estimated to be an HI of 0.07 for an adult and an HI of 0.7 for a child, from dieldrin.

Shallow groundwater contamination identified as part of the Northeast Plume presents direct exposure-based risks above acceptable levels, indicating shallow groundwater in this area is not suitable for potable use.

Overall risks and HIs to future industrial workers and residents from surface media are well within the acceptable limits for the Surrogate Sites 60/85. This is not necessarily the case when exposure to groundwater beneath this site is considered. The groundwater risk evaluation is contained in Section 15 and risks associated with exposure to groundwater is discussed there. The combined risks from exposures to all media, including groundwater are included in Tables 9-11 and 9-15 for Northeast Open Area.

Lead detected at sample Location 6085D is reported at 2,100 mg/kg. This particular sample concentration is well above a residential screening concentration of 400 mg/kg, and is also above the Memphis Depot industrial worker target value of 1,536 mg/kg. Though a recreational-use based target level was not calculated for the site, achieving unrestricted land use based levels will be protective for recreational users. The area average does not appear to be above these target levels.

Limited biased uncertainty for lead at the backstop area may exist due to the limited sampling of this area and random distribution of source, lead bullets. The single sample from this area may underestimate the importance of this area's contribution to lead exposure at this site. Due to the randomly occurring nature of lead (in the form of bullets) at the backstop, increased sampling may not necessarily improve the true characterization of lead distribution at this site due to the form it is in.

Uncertainties associated with this risk assessment are similar to those listed in the Northeast Open Area risk assessment section (Section 9 6). RGOs for surface media were not calculated for receptors at Sites 60/85 because risks were not excessive.

9.10 Environmental Evaluation for Northeast Open Area

9.10.1 Introduction

An ERA was conducted at the Northeast Open Area to evaluate whether contaminants detected in surface soil, surface water, and sediment potentially pose adverse ecological effects to terrestrial or aquatic receptors. The Northeast Open Area is a routinely mowed, generally inactive portion of Dunn Field that provides low quality terrestrial and aquatic habitat. The large maintained grassy areas however can provide foraging habitat for terrestrial avian species that feed on soil invertebrates. EPA ERA guidance (EPA, 1997d) recommends a screening-level ERA for risk management decisions. Although the Northeast Open Area does not provide significant habitat, a screening-level ERA was initiated to aid in risk management decisions. This ERA was conducted in accordance with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (*Process Document* (USEPA, 1997b). Steps 1, 2, and 3 of the EPA ERA model were completed, as summarized in Section 7.8

9.10.2 Step 1: Screening-Level Problem Formulation and Effects Evaluation

This is the initial step in the ERA and includes all the elements of a problem formulation and ecological effects analysis, but on a screening level. The results of this step support the exposure estimates and risk calculation in Step 2.

9.10.2.1 Environmental Setting and Contaminants at the Site

The environmental setting at the Depot is described in Section 2. An ecological assessment checklist was completed as described in the *Process Document* (USEPA, 1997b) and is provided in Appendix J. Site characteristics most relevant to the ERA are discussed here.

The Northeast Open Area is a relatively inactive portion of Dunn Field that is completely covered by planted grasses with patches of mature hardwood trees. The area is approximately 20 acres in size and is generally open with a sloping terrain that is routinely maintained by mowing. There are no open water bodies onsite; an onsite system of concrete lined stormwater drainageways is typically dry except during rainfall events. The site is surrounded by residential areas to the north and east (beyond the perimeter fence), and by Dunn Field property to the west and south. Overall, the maintained terrestrial areas provide minimal ecological habitat for plants or animals. This site is expected to serve as a future public open space for recreational purposes, so no future improvement in wildlife habitat quality is expected.

A few urban adapted wildlife species have been observed at Dunn Field Although habitat quality is poor, the Northeast Open Area is the least disturbed portion of Dunn Field, where light to heavy industrial activities are typically ongoing. Therefore, the occurrence of terrestrial wildlife in the Northeast Open Area is more probable than in other portions of the facility. Species observed at Dunn Field include eastern gray squirrel, red fox, northern mockingbird, American kestrel, boat-tailed grackle, European starling, mourning dove, common bobwhite, rock dove, and killdeer. It is possible that other small mammals (e.g., mice, shrews, rabbits), birds (e.g., American robin, sparrows), and reptiles (e.g., five-lined skink, eastern garter snake) may also occur in the grassed areas at the site. The entire facility is fenced and therefore reduces use by large mammals (e.g., whitetail deer). A few wild dogs have been consistently observed roaming the Northeast Open Area. Overall, the terrestrial habitat within the Northeast Open Area is of poor quality and provides limited habitat value for terrestrial wildlife.

There are no wetlands, and no state or federally listed or proposed endangered or threatened species are known to inhabit the area of the site (TDEC, 1996; USFWS, 1996-Appendix T)

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Land use within a one-mile radius of Dunn Field is highly developed and is primarily residential or industrial. A few undeveloped and isolated forested areas also occur in the general area. The largest is located to the north of Dunn Field at Person Avenue and Rozelle Street. Other areas are located south of Dunn Field along Ball Road and Ketchum Road in the vicinity of the Orchid Manor Apartments and east of Dunn Field on Dwight Street. Large undeveloped forested and grassed areas associated with the floodplains of Nonconnah Creek and its tributaries occur at least one mile to the south and west of the facility.

Surface soil, surface water, and sediment sampled in the Northeast Open Area are the media to which terrestrial and aquatic ecological receptors could be exposed and are, therefore, the only media evaluated in this ERA. A list of COPCs at this site is provided in Section 8. These generally include several metals and a few organic compounds (pesticides, PCBs, PAHs, and volatiles).

9.10.2.2 Contaminant Fate and Transport

An overview of contaminant fate and transport of chemicals detected at Dunn Field is provided in Section 6.0. The pathways most significant to ecological receptors are presented here.

Chemicals present in surface soils of the Northeast Open Area will likely remain in place over time because they are expected to be bound to the soil particles and soil organic carbon. In addition, the site is completely grassed, which serves to reduce transport of surface soil via wind erosion and storm water flow. However, the potential remains for COPCs in the surface soil to migrate via storm water runoff overland into the concrete-lined drainage ditches onsite. These ditches are intermittent and dry during most of the year. Stormwater runoff could migrate from these onsite ditches through the northern perimeter fence and toward Cane Creek via a small drainage ditch. Cane Creek is approximately 0 5 mile north of the Northeast Open Area, is an intermittently flowing stream, and contains a small forested, possibly wetland habitat, area at the confluence of the ditch and Cane Creek. Offsite drainage pathways have been monitored at the property boundary for potential runoff from the site. Low levels of persistent pesticides were the only detected organic COPCs.

The classes of chemicals found at the site include inorganics, pesticides, PCBs, PAHs, and volatiles.

The toxicity of metals and other inorganic constituents in the environment depends on the specific element and the environmental form in which it is found A number of inorganic elements are essential in small amounts for animal nutrition because they are an integral part of at least one enzyme. Examples include arsenic, calcium, chromium, copper, iron, magnesium, manganese, potassium, sodium, and zinc. Nevertheless, some of these essential elements in high concentrations can produce toxic effects in wild birds and mammals.

Specific considerations in regard to inorganic chemical behavior in the terrestrial environment are summarized as follows (ICF, 1989):

- Plant roots are not entirely selective in extracting substances from soil. The roots of a plant extract essential and nonessential chemicals.

- Soil pH is often the most important factor affecting the transfer of heavy metals to plants; metal solubility generally increases by a factor of 10 as pH decreases by 1 unit Metals with strongly pH-dependent solubility and mobility include manganese, aluminum, copper, nickel, lead, zinc, and possibly arsenic. The availability and toxicity of chromium to plants appears to increase as soil pH increases.
- Ingestion of plants can be an important exposure route for some metals. Zinc, cadmium, manganese, selenium, and boron are easily absorbed and translocated to food-chain plant tissues, while others such as iron, lead, mercury, aluminum, chromium III, and silver are not easily adsorbed and translocated.
- Several metals are toxic to terrestrial plants at concentrations in edible tissues that are below those toxic to animals that might ingest them. This effectively creates a soil to plant toxicity barrier for chromium III, copper, iron, nickel, lead, arsenic, boron, vanadium, and zinc.
- Contaminated invertebrates facilitate metal uptake in predatory species in a form that can exert toxic effects. Results of field studies indicate that invertebrates can accumulate metals in their tissues at varying concentrations without adverse toxic effects.

Specific considerations in regard to inorganic chemical behavior in the aquatic environment, and the mobility of metals in aquatic food chains, are summarized as follows (USEPA, 1984):

- Divalent metals in polluted water often form complexes with a variety of organic and inorganic ligands. The bioavailability of the metal is dependent on water hardness, pH, cation exchange capacity, and other factors
- Metals often partition to sediments or suspended solids through sorption onto hydrous complexes, The transport of a metal within the aquatic environment is controlled by the speciation of the ion. In natural waters, complexing agents such as humic acid can bind metals.

Pesticides detected include chlordane, dieldrin, DDE, DDD, and DDT.

Chlordane is a broad spectrum insecticide of the group of polycyclic chlorinated hydrocarbons called cyclodiene insecticides. Chlordane is highly persistent in soils, with a half-life of about 4 years It does not chemically degrade and is not subject to biodegradation in soils. Chlordane molecules usually remain adsorbed to clay particles or to soil organic matter in the top soil layers and slowly volatilize into the atmosphere. Chlordane is moderately to slightly toxic to birds, and is very highly toxic to fresh water invertebrates and fish. Chlordane bioaccumulates in bacteria and in freshwater fish species, with expected bioaccumulation factors in excess of 3,000 times background water concentrations. Chlordane accumulates in the fatty tissues of terrestrial and aquatic wildlife

Dieldrin is a man-made compound in the group of cyclodiene insecticides that were primarily used for control of insect pests of corn and citrus trees. Dieldrin has a low volatility, low solubility in water, and high lipophilicity (affinity for fatty materials). Strong adsorption to soil particles prevents significant leaching to groundwater. These properties cause dieldrin to evaporate slowly and accumulate in fatty tissues of animals and other organic matter in the environment, including the organic portions of sediment and soils.

Plants uptake and store dieldrin from the soil. Accumulation in fatty tissues and organic matter results in progressive accumulation in the food chain. Target organs and organ systems most affected by dieldrin toxicity include the central nervous system, liver, kidneys, and skin. Major acute toxic effects are on the central nervous system.

Dichlorodiphenyldichloroethane (DDE) is a high molecular weight, chlorinated pesticide. It is also a congener of dichlorodiphenyltrichloroethane (DDT), a full-spectrum pesticide. DDE is stable, accumulates in soil and sediment, and concentrates in fatty tissue. DDE has a low water solubility, and is adsorbed strongly in soils and sediments. Soil and benthic organisms accumulate DDE from soil and sediment. Wildlife accumulate DDE in fatty tissue. Following chronic exposure by wildlife to DDE, an equilibrium between absorption and excretion may occur; however, concentrations continue to increase because accumulation is related to fat content, which increases with age.

PCBs are mixtures of different congeners of chlorobiphenyl. PCBs are a group of highly fat-soluble, semi-volatile compounds that readily bioaccumulate and biomagnify in ecological receptors, especially upper-trophic-level carnivores in aquatic food webs. In general, PCBs adsorb strongly to soil and sediment, and are soluble in fatty tissues. Volatilization and biodegradation of the lower chlorinated congeners also occur. Biological responses to individual isomers or mixtures vary widely, even among closely related taxonomic species. PCBs can bioaccumulate to significant levels in aquatic species, reptiles, mammals, and birds. The primary biochemical effect of PCBs is to induce hepatic mixed function oxidase systems, and to induce hepatic microsomal enzymes systems that are most likely correlated with adverse reproductive effects.

Polynuclear aromatic hydrocarbons (PAH) are a class of semi-volatile compounds that have a high affinity for soil and sediment particles. PAHs have low water solubility. Low molecular weight PAHs volatilize and photolyze from soil and surface water, and may be biodegraded as well. High molecular weight PAHs are resistant to volatilization, photolysis, and biodegradation. PAHs can be bioconcentrated to high concentrations by some aquatic organisms. However, many aquatic organisms can metabolize PAHs. The main PAH exposure route for upper-trophic-level receptors is ingestion. However, wildlife can readily metabolize PAHs and eliminate the by-products. Therefore, food chain transfer and biomagnification are anticipated to be minimal.

VOCs detected include vinyl chloride, TCE, methyl ethyl ketone, and others. These highly water-soluble constituents have relatively high vapor pressures and high Henry's Law constants, and they tend to volatilize rapidly from soil or water. Aquatic organisms may take up VOCs. Routes of exposure for wildlife include inhalation, ingestion, and dermal exposure. Bioaccumulation in terrestrial and aquatic organisms is not an important process in the environmental fate of VOCs because of the high volatility and the rapid metabolism by higher-tropic-level receptors.

9.10.2.3 Complete Exposure Pathways

For a pathway to be complete, a contaminant must travel from the source medium or media to an ecological receptor and be taken up by the receptor via one or more exposure routes. Although ecological habitats are minimal at the Northeast Open Area, a conservative assumption was made that a potentially complete exposure pathway may exist for direct contact of terrestrial plants and invertebrates with contaminants detected in surface soil throughout the site, as well as direct contact of aquatic species with surface water and sediment in the stormwater drainageways.

9.10.2.4 Assessment and Measurement Endpoints

Assessment endpoints are expressions of the environmental value(s) to be protected The assessment endpoint for the Northeast Open Area is to sustain soil, surface water, and sediment quality and achieve COPC concentrations that are below adverse effect thresholds for terrestrial plants, soil invertebrates, fish, and aquatic invertebrates. Measurement endpoints are measurable ecological characteristics of the assessment endpoint. In this screening-level evaluation, the measurement endpoint is the ratio of maximum media concentrations for the entire area to conservative screening-level benchmarks for these media. An exceedance of COPC concentrations compared to the benchmarks would be a "measure" of a potential effect. If an exceedance occurs, it can be inferred that a possible adverse effect to exposed ecological receptors may occur.

9.10.2.5 Screening-Level Ecological Effects Evaluation

Conservative thresholds for adverse ecological effects, or screening ecotoxicity values, were used for contaminants detected in surface soil, surface water, and sediment. These values were determined as follows:

- **Surface Soil:** The soil ecological screening values are those recommended by EPA Region IV (1998) and are generally protective of terrestrial plants and invertebrates. The EPA values were obtained from a variety of sources, including the US Fish and Wildlife Service (USFWS), the Oak Ridge National Laboratory (ORNL),the Canadian Council of Ministers of the Environment, the Netherlands Ministry of Housing, and the Netherlands National Institute of Public Health and Environment (RIVM);

- **Surface Water.** The surface water ecotoxicity screening values are those recommended by EPA Region IV (1998). These values are generally protective of aquatic fish and invertebrates. The EPA values were obtained from *EPA Region 4 Supplemental Guidance to RAGS: Region 4 Bulletins, Freshwater Surface Water Screening Values for Hazardous Waste Sites* (EPA, 1995a); and

- **Sediment.** The sediment ecotoxicity screening values are those recommended by EPA Region IV (1998) and are generally protective of benthic macroinvertebrates. The EPA values were obtained from *EPA Region 4 Supplemental Guidance to RAGS: Region 4 Bulletins, Sediment Screening Values for Hazardous Waste Sites* (EPA, 1995b).

The screening ecotoxicity values are presented in Section 7.8.

9.10.2.6 Uncertainty Assessment

Uncertainty is inherent in each step of the ERA The following text presents major factors contributing to uncertainty in this assessment

EPCs were assumed to be maximum media concentrations for the entire area. This is a highly conservative assumption that may overestimate risk. Under this assumption, the receptor spends 100 percent of its life cycle at the highest concentration area; although this can be true for plants, most terrestrial wildlife and aquatic receptors are mobile and are likely to be exposed to the complete range of soil concentrations

The ecological screening values used were obtained from various sources in the literature, and may not be representative of actual site conditions. Exposure pathways to terrestrial and aquatic plants and animals were assumed to be potentially complete, even though the maintained (e.g., mowed) grass areas provide low quality habitat in this generally disturbed and industrial setting, and the aquatic habitat provided by the stormwater drainageways is inadequate for sustaining fish or invertebrate populations.

9.10.3 Step 2: Screening-Level Exposure Estimate and Risk Calculation

This step includes estimating exposure levels and screening for ecological risks as the last two phases of the screening-level ERA. At the end of Step 2, an SMDP will be made to determine if ecological risks are negligible or if further evaluation is warranted.

9.10.3.1 Screening-Level Exposure Estimate

The maximum concentration of all chemicals detected in surface soil, surface water, and sediment at the Northeast Open Area was used as the EPC for estimating risk to directly exposed organisms.

9.10.3.2 Screening-Level Risk Characterization

The quantitative screening-level risk estimate was conducted using the hazard quotient (HQ) approach. This approach divides the EPCs (maximum detected media value) with the EPA screening ecotoxicity values.

Tables 9-16, 9-17, and 9-18 summarize the results of the surface soil, surface water, and sediment screening-level risk calculations. These tables provide information on the FOD, range of detection, selected ecotoxicity values, and HQs based on comparison of the maximum concentration to the screening criteria. An HQ less than 1.0 indicates that the contaminant is unlikely to cause adverse effects and is therefore not considered further in the ERA. Contaminants with HQs greater than or equal to 1 0, or contaminants for which criteria were not available, were identified as COPCs and were carried forward to Step 3.

Surface Soil Screening Results - A total of 31 contaminants were detected in surface soil in the Northeast Open Area, and of these 67 percent were identified as surface soil COPCs. The COPCs included 14 inorganic and 17 organic compounds. No screening criteria were available for 2 of the organic compounds, so these compounds were included on the COPC list.

Surface Water Screening Results - A total of 10 contaminants were detected in surface water in the Northeast Open Area stormwater drainageways, and of these 30 percent were identified as surface water COPCs. The COPCs included 2 inorganic and 1 organic compounds (aluminum, lead, and dieldrin).

Sediment Screening Results - A total of 34 contaminants were detected in sediment in the Northeast Open Area, and of these 76 percent were identified as sediment COPCs. The COPCs included 6 inorganic and 20 organic compounds. No screening criteria were available for 6 of the inorganic and organic compounds, so these were included on the COPC list.

9.10.3.3 Scientific Management Decision Point

The information indicates a potential for adverse ecological effects in all media, and a more thorough assessment is warranted. The COPCs identified in the screening process are to be carried forward to Step 3.

9.10.4 Step 3: Baseline Risk Assessment Problem Formulation

Step 3 refines the problem formulation developed in the screening-level assessment. In this step, the results of the screening-level assessment and additional site-specific information are used to determine the scope and goals of the baseline ERA.

9.10.4.1 Refinement of COPCs

In Steps 1 and 2, conservative assumptions were used. As a result, some of the COPCs were retained for Step 3, although they may pose only negligible risk. Therefore, in this first phase of Step 3, the assumptions used were further evaluated and other site-specific information was considered to refine the list of COPCs. In this refinement phase, the revised assumptions and site-specific considerations used were as follows:

- Arithmetic mean concentrations (for all samples) were considered along with maximum concentrations when a comparison to the benchmarks was conducted;
- Background concentrations included in Table 3-8 were compared to arithmetic mean and maximum values;
- FOD was considered;
- Elimination of common elements such as calcium, magnesium, potassium, and sodium; and
- Less conservative screening ecotoxicity values were considered in addition to the more conservative ecotoxicity screening values used in Step 2.

For soil, less conservative screening ecotoxicity values are termed "secondary benchmarks" in this report. The secondary benchmark selection process for soil focused on identifying the next highest benchmark value among the soil literature references used by EPA Region IV (1998). This was a stepwise process in which the first set of toxicological benchmarks considered was from two ORNL studies (Efroymson *et al.*, 1997). These studies established separate screening benchmarks for soil microorganisms, earthworms, and plants. A secondary screening value was chosen from these three data sets that was the next highest value above the primary EPA Region IV screening value. If no values were available, the selection process proceeded to the Netherlands values (MHSPE, 1994). In addition, if the selected value from ORNL was found to be greater than the highest Netherlands value, then the ORNL value was rejected and the process moved forward to the Netherlands values as a conservative measure.

The Netherlands values included optimum values and action values. When this set of data was considered, the next highest value above the primary EPA Region IV screening value was selected as a secondary benchmark. If a value was not available, the process proceeded to a final set of data as compiled by the USFWS (Beyer, 1990). The values in this data set represent Dutch background, moderate contamination, and cleanup values. As stated above, the next highest value above the primary EPA Region IV screening value was selected as a secondary benchmark.

For surface water COPC refinement, acute screening values, as identified by EPA Region IV (1998), were used as the less conservative refinement criteria for Step 3.

For sediment, EPA Region IV (1998) had used conservative Threshold Effects Levels (TELs) or Effects Range Low (ERL) values for the initial screening; therefore, the values chosen for this Step 3 refinement were the less conservative Probable Effects Levels (PELs) and Effects Range Medium (ERM). The lowest of these two literature values was used in Step 3.

In Step 3, the conservative ecological exposure pathways used in Step 2 were also re-evaluated based on actual site conditions. All of this information provides a WoE to determine which, if any, contaminants should be recommended for further evaluation in a baseline ERA.

The results of the Step 3 refinement of the COPC lists are summarized in Tables 9-19 through 9-21. These tables present the maximum and average EPCs, background concentrations, conservative/primary and less conservative/secondary screening criteria, the range of HQs, background comparisons, and FOD.

Surface Soil COPC Refinement Results - Based on the WoE presented in Table 9-19, two of the inorganic or organic COPCs (dieldrin and chromium [total]) indicated a potential for adverse effects to terrestrial organisms. This was based on an evaluation of the range of HQs, comparison to background, and FOD. Surface soil criteria for two contaminants were not available for comparison, so HQs could not be determined.

The maximum and average values of dieldrin were also found to significantly exceed the ecological criteria and background concentrations. Dieldrin was detected in 11 of 13 surface soil samples, and ranged in concentration from 0.0022 to 4.75 mg/kg. Background dieldrin was established at 0.086 mg/kg; however, only 6 of the samples exceeded the background concentration. These 6 samples were collected in open mowed grass areas, of which 4 were associated with the Former Pistol Range (Site 60) and 2 were located along a roadway in Area G. Dieldrin concentrations observed at Dunn Field appear to have resulted from historical pesticide applications in the area.

The maximum and average values of total chromium were found to significantly exceed the ecological criteria and background concentrations. Background chromium was established at 24.8 mg/kg. Chromium was detectable in all 14 surface soil samples, and ranged in concentration from 8.7 to 239 mg/kg. However, only 3 of the samples exceeded the background concentration, with values of 25, 71.2, and 239 mg/kg. These samples were collected in open mowed grass areas.

Surface Water COPC Refinement Results - Based on the WoE presented in Table 9-20, none of the inorganic or organic COPCs indicated a significant potential for adverse effects to aquatic organisms. This was based on an evaluation of the range of HQs, comparison to background, and FOD.

The Northeast Open Area includes no open surface water bodies or other site characteristics that would support aquatic communities. Surface water samples were collected at the discharge points of the onsite stormwater discharge system, which is typically dry except during rainfall events.

Therefore, based on the lack of surface water COPCs and lack of adequate surface water habitat in the Northeast Open Area, ecological impacts are expected to be negligible.

Sediment COPC Refinement Results - Based on the WoE presented in Table 9-21, three of the organic COPCs indicated a potential for adverse effects to aquatic benthic organisms. These included alpha-chlordane, DDT, and dieldrin. These are contaminants for which all HQs were at or above 1.0, and were also above background in all comparisons (except DDT, which had no background value). The remaining contaminants could be removed from further consideration as a result of some HQs being near or less than 1.0, or being less than background. Sediment criteria for a total of 6 contaminants were not available for comparison, so HQs could not be determined.

There is a low potential for ecological risk to benthic organisms based on the WoE presented. The HQs where the acute screening criterion was considered were below 10 for alpha-chlordane and DDT, although the HQ for dieldrin ranged from 27 to 35. The overriding factor is the lack of suitable aquatic habitat. Sediment samples were collected at the discharge points of the onsite stormwater discharge system, which is typically dry except during rainfall events.

Therefore, based on the lack of adequate surface water/sediment habitat in the Northeast Open Area, and the low HQs for the three sediment COPCs, ecological impacts are expected to be negligible

9.10.4.2 Scientific Management Decision Point

Dieldrin and chromium were found at levels in surface soil that significantly exceeded screening ecological criteria. An additional evaluation of the potential for effects on higher trophic level organisms was therefore conducted In this evaluation, the American robin was selected as a target receptor for the assessment of dieldrin and chromium in its diet. The methods and results are provided below.

The American robin (*Turdus migratorius*) was chosen to represent passerine birds at the site because it has been observed at the site and likely uses the area for foraging during portions of the year. Robins prey on ground-dwelling invertebrates and often search for fruit and foliage-dwelling insects in shrubs and low tree branches (Malmborg and Willson, 1988, in USEPA, 1993) Common invertebrates eaten include beetles, caterpillars, moths, grasshoppers, spiders, millipedes, and earthworms (Martin *et al*, 1951; and Wheelwright, 1986 in USEPA, 1993).

Calculation of Risk to the American Robin - Both USEPA (1995) and Sample *et al* (1996) are compendiums of toxicological information on numerous compounds, including dieldrin and chromium. The toxicological endpoints recommended in these documents are considered current (Sample 1999) and were used for predicting effects to the American robin

- The toxicity endpoint (i e., chronic NOAEL) identified from these literature sources was used as the toxicity reference value (TRV) that represents the amount or dose of dieldrin or chromium that might be ingested daily and result in no adverse ecological effects.

Table 9-22 presents the NOAEL chosen as well as the laboratory study endpoint, effects measured or observed in the toxicity test, the study reference, and the final TRVs for the American robin. For conservative purposes, the minimum body weight listed in Table 9-23 was used to calculate the TRV.

An estimate of the level of daily dieldrin exposure (in mg/kg of body weight per day) from the ingestion of food items and incidental ingestion of soil at the site (USEPA 1993) was then calculated. Information from the scientific literature on body weight, daily food ingestion rate, and dietary composition for the robin was used to develop exposure dose estimates (USEPA 1993), and is summarized in Table 9-23. A level of daily chemical exposure (in mg/kg of body weight per day) from the ingestion of food (prey items) and incidental ingestion of soil was calculated using the following equation as recommended in Sample (1996) and USEPA (1993):

$$Maximum\ Exposure\ Dose = \frac{(DFC)\times(C_{food})\times SUF}{BW}$$

where:

Maximum Exposure Dose = chemical ingested per day via prey and soil (mg chemical/kg body weight dry/day)
DFC = daily food consumption rate (kg food dry/day)
C_{food} = concentration in prey items plus soil (mg chemical/kg food dry)
SUF = site use factor (unitless)
BW = wildlife species body weight (kg)

Chemical concentrations in food items were estimated by multiplying the maximum invertebrate tissue concentration by the corresponding percent of the wildlife species diet as follows:

$$C_{food} = (C_s \times F_s) + (C_i \times F_i)$$

where:

C_{food} = concentration in prey items plus soil (mg chemical/kg food dry)
C_s = concentration in soil (mg chemical/kg soil dry)
C_i = concentration in invertebrate (earthworm) tissue (mg chemical/kg tissue dry)
F_s = fraction of the American robin diet that is soil (kg soil/kg food dry)
F_i = fraction of the American robin diet that is invertebrates (kg tissue/kg food dry)

and

$$F_s + F_i = 1.0$$

Concentrations in invertebrate (earthworm) tissue were estimated by multiplying the soil bioaccumulation factor for invertebrates for dieldrin or chromium by the concentration in soil as follows:

$$C_i = C_s \times BAF_i$$

Where:

C_i = concentration in invertebrate (earthworm) tissue (mg chemical/kg tissue dry) and
BAF_i = bioaccumulation factor for dieldrin or chromium from the literature

Exposure estimates were calculated using the following conservative assumptions:

- Site use factor (areal and temporal) is 100 percent (i.e , the receptor spends 100 percent of its time in the affected area);
- Chemical bioavailability is 100 percent;
- Minimum adult body weight;
- 100 percent of diet is exposed to the site; and
- Maximum soil concentrations.

Exposure parameters for the American robin are presented in Table 9-24. Tables 9-25 and -26 summarize the calculated maximum exposure doses.

Risk estimates (HQs) were developed by dividing the estimated daily exposure dose to dieldrin or chromium by the species-specific TRV. This ratio represents the estimated risk posed by dieldrin or chromium exposure at the site for the robin. This is expressed as:

$$HQ = \frac{\text{Maximum Exposure Dose}}{\text{Toxicity Reference Value}}$$

Tables 9-25 and -26 present the HQs for maximum and average exposure to dieldrin and chromium for the American robin.

Dieldrin Results - Based on the maximum surface soil concentration of 4.75 mg/kg and maximum exposure assumptions, the HQ was slightly above the target value of 1.0 (HQ = 2.7). This estimate indicates potential risks occur under conservative assumptions for species body weight and ingestion rate, EPC, and the percent of time spent foraging at the site (100 percent). However, based on average body weight and ingestion rate, an average EPC, and 100 percent use of the site, risk to American robins at the site is low (HQ = 0.2), well below the standard target HQ of less than or equal to one (USEPA 1998a). This evaluation is conservative, as it assumes that the American robin forages 100 percent of the time in the contaminated areas at either maximum or average concentration levels.

Chromium Results - Based on the maximum surface soil concentration of 239 mg/kg and maximum exposure assumptions, the chromium HQ was above the target value of 1.0 (HQ = 59.6). This estimate indicates potential risks occur under conservative exposure scenarios. However, based on average body weight and ingestion rate, an average EPC, and 100 percent use of the site, risk to American robins at the site is low (HQ = 7 0), but above the target HQ of one. Relative to this average exposure scenario, it should also be considered that when the background chromium soil concentration of 24 8 mg/kg is factored into the exposure model, the resulting HQ = 4.9, which is also above the target HQ of one.

Scientific Management Decision Point Summary - In summary, dieldrin and chromium were the only surface soil COPCs identified in the Northeast Open Area following the refinement step. Based on further refinement of the risk assumptions of dieldrin and chromium on the American robin as target receptor, along with the other site-specific characteristics and uncertainties, dieldrin and chromium will not be considered further as a COPCs at this site. The following bullets identify the key factors in this determination;

- Dieldrin was detected in 11 of 13 surface soil samples; however, only 6 of the samples exceeded the background concentration. These 6 samples were collected in open mowed grass areas, four of which were associated with the Former Pistol Range (Site 60) and two located along a roadway in Area G.
- HQs calculated for dieldrin exposure to the American robin target receptor were low, ranging from 2.7 under maximum exposure conditions to 0.2 under average exposure conditions.
- Chromium was detected in 14 of 14 surface soil samples; however, only 3 of the samples exceeded the background (24.8 mg/kg) concentration, with values of 25, 71.2, and 239 mg/kg. The average chromium concentration in site soil was 35.7 mg/kg, which was slightly above the background. All surface soil samples were collected in open mowed grass areas.
- The HQ calculated for chromium exposure to the American robin was 59.6 under maximum exposure conditions. However, under average exposure conditions the resulting chromium HQ was low, at 7.0.
- The robin exposure assumptions were conservative and designed to overestimate risk. It is unlikely that the robin would forage exclusively within the bounds of the Northeast Open Area, or that dieldrin and chromium would be uniformly distributed in surface soil, or that these chemicals would be 100 percent bioavailable in organic soil.
- Dietary components of the robin were conservatively estimated to support a worst case exposure to dieldrin; however, its actual diet is likely to differ (and is known to include more fruit and seeds at some times of the year) and the availability of preferred food items at the Northeast Open Area is expected to be low as a result of routine mowing activities.
- The Northeast Open Area is an entirely grassed section in which the landscape is routinely mowed or maintained, and this land maintenance is expected to continue into the future if the site is developed for recreational use. The onsite terrestrial habitat is of limited ecological value, and is generally supportive of maintained planted grasses, scattered hardwood trees, and some urbanized wildlife.

Based on this evaluation, no further assessment of ecological risk associated with contaminants at the Northeast Open Area is warranted.

Tables

Table 9-1

Constituents of Potential Concern in Northeast Open Area—Surface Soil

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC?	COPC/BASIS
SS	MG/KG	1,1,2,2-PCA	9	2	0.005	0.005	0.001	0.005	0.003		3	0.003	N/A	A
SS	MG/KG	ANTIMONY	16	2	14	18	5	24	15	7	3	5	Yes	A
SS	MG/KG	CHROMIUM, TOTAL	16	16	2	3	9	239	33	25	10800	38	Yes	A
SS	MG/KG	DIELDRIN	15	13	0.002	1	0.002	5	1	0.09	0.04	0.004	Yes	A
SS	MG/KG	LEAD	16	16	4	447	14	2100	175	30	400		Yes	A
SS	MG/KG	THALLIUM	16	9	2	3	0.2	0.6	0.5		0.6	0.7	N/A	A
SS	MG/KG	TRICHLOROETHENE (TCE)	9	2	0.005	0.005	0.004	0.7	0.4		58	0.06	N/A	A

Note Data evaluated includes field duplicates and normal samples (0-2 feet)

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

SS = Surface soil sample

COPC = Chemical of Potential Concern

MG/KG = milligrams per kilogram

Table 9-2

Constituents of Potential Concern in Northeast Open Area—Subsurface Soil

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Subsurface Soil (Leachability)	COPC?	COPC/ BASIS
SB	MG/KG	1,1,2 2-TETRACHLOROETHANE	20	1	0 005	6	0 01	0 01	0 01		0 003	Yes	A
SB	MG/KG	METHYLENE CHLORIDE	20	1	0 005	6	0 07	0 07	0 07		0 02	Yes	A
SB	MG/KG	Total Xylenes	20	1	0 005	6	1	1	1	0 002	0 2	Yes	A
SB	MG/KG	TRICHLOROETHENE (TCE)	20	5	0 005	6	0 0004	0 1	0 04		0 06	Yes	A
SB	MG/KG	TOTAL 1,2-DICHLOROETHENE	20	1	0,005	6	0 02	0,02	0,02			N/A	D

Note Data evaluated includes field duplicates and normal samples (2 feet and below)

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs
H	Chemical is a surface soil COPC

SB = Subsurface soil sample
MG/KG = milligrams per kilogram
COPC = Chemical of Potential Concern

Table 9-3

Constituents of Potential Concern in Northeast Open Area—Sediment

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Sediments	Regulatory Criteria for Leachability	COPC?	COPC/ BASIS
SE	MG/KG	DIELDRIN	2	2	0.01	0.03	0.08	0.2	0.1	0.01	0.04	0.004	Yes	A

Note

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

SE = Sediment sample

MG/KG = milligram per kilogram

COPC = Chemical of Potential Concern

Table 9-4

Constituents of Potential Concern in Northeast Open Area—Surface Water

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surfacewater	COPC?	COPC/ BASIS
WS	MG/L	DIELDRIN	2	1	0 00004	0 00004	0 00007	0 00007	0 00007		0 000001	Yes	A
WS	MG/L	PHENANTHRENE	2	1	0 01	0 01	0 0005	0 0005	0 0005		0 000003	Yes	A

Note

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

WS = Surface water sample
MG/L = milligrams per liter
COPC = Chemical of Potential Concern

TABLE 9-5
Summary of Exposure Pathways to be Quantified at Northeast Open Area
Rev 1 Memphis Depot Dunn Field RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion*
Current Land Use			
On-site Maintenance Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	Yes	Occasional maintenance work is assumed to involve a worker spending time in the contaminated soil
Future Land Use			
On-site Industrial Worker	Incidental ingestion, dermal contact, and inhalation from the surface soils and from groundwater, and volatilization from soil column	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
On-site Utility Worker	Incidental ingestion, dermal contact, and dust inhalation from the subsurface soils, and volatilization from soil column	Yes	A hypothetical future utility worker installing or maintaining underground utilities is assumed to be exposed to contaminated subsurface soil This should be evaluated as part of the surrogate site exposure unit, however no subsurface data exists there
Hypothetical On-site Recreational Receptors (Adult, Youth, Child)	Incidental ingestion, dermal contact, and dust inhalation from the surface soils, and incidental ingestion and dermal contact with sediments and surface waters	Yes	Occasional recreational adult is assumed to be playing in the contaminated soil, & wading in drainage ditches
Hypothetical On-site Residential	Incidental ingestion, dermal contact, and inhalation from the surface soils and from groundwater	No	Evaluated as part of surrogate site to represent worst case scenario
Hypothetical Off-site Residential	Incidental volatilization from onsite soil column	Yes	Evaluated for comparison purposes only

Note * - Section 7 1 provides approach and rationale for selection of exposure scenarios for each FU and the surrogate sites

Table 9-6

Exposure Point Concentrations for Northeast Open Area Surface Soil (0 - 2 ft bgs)

Rev 1 Memphis Depot Dunn Field RI

Units	Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Antimony	14	2	4	24	7	6	6
MG/KG	Chromium (total)	14	14	36	239	64	56	56
MG/KG	Lead	14	14	196	2100	—[a]	—[a]	196
MG/KG	Thallium	14	8	0 4	0 6	0 5	0 5	0 5
MG/KG	Dieldrin	13	11	0.5	5	1	278	1
MG/KG	1,1,2,2-	8	2	0.003	0 005	0.003	0 004	0.01
MG/KG	Trichloroethene	8	2	0.09	0 7	0 3	4	0.7

[a] UCL95 not calculated for lead Arithmetic mean is the appropriate concentration term for adult IEUBK lead models

MG/KG = milligrams per kilogram

UCL95 = Upper 95% confidence limit on mean

EPC = Exposue point concentrations

Table 9-7
Exposure Point Concentrations for Northeast Open Area Soil Column

Rev 1 Memphis Depot Dunn Field RI

Units	Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Antimony	14	2	4	24	7	6	6
MG/KG	Chromium (total)	14	14	36	239	64	56	56
MG/KG	Lead	14	14	196	2100	--[a]	--[a]	196
MG/KG	Thallium	14	8	0 4	0 6	0.5	0.5	0 5
MG/KG	Dieldrin	13	11	0 5	5	1	278	1
MG/KG	1,1,2,2-Tetrachloroethane	26	3	0.1	0 01	0 3	0.03	0 01
MG/KG	Total 1,2-Dichloroethene	26	2	0.1	0.2	0 3	0 06	0 06
MG/KG	Methylene chloride	26	1	0 007	0 07	0 01	0 008	0 008
MG/KG	Xylenes (total)	26	1	0 05	1	0.1	0 02	0 02
MG/KG	Trichloroethene	26	7	0 04	0 7	0 08	0 05	0 05

[a] UCL95 not calculated for lead Arithmetic mean is the appropriate concentration term for adult IEUBK lead models

MG/KG = milligrams per kilogram

UCL95 = Upper 95% confidence limit on mean

EPC = Exposure point concentration

Table 9-8
Exposure Point Concentrations for Northeast Open Area Sediment

Rev 1 Memphis Depot Dunn Field RI

Units	Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Dieldrin	2	2	0 1	0 2	0 3	2	0 2

MG/KG = milligrams per kilogram
UCL95 = Upper 95% confidence limit on mean
EPC = Exposure point concentration
Note EPC is referred to RME in Appendix Tables

Table 9-9

Exposure Point Concentrations for Northeast Open Area Surface Water

Rev. 1 Memphis Depot Dunn Field RI

Units	Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/L	Dieldrin	2	1	0 00004	0.00007	0 0002	0 2	0.00007
MG/L	Phenanthrene	2	1	0 003	0 0005	0 02	9 E+13	0 0005

MG/L = milligrams per liter

UCL95 = Upper 95% confidence limit on mean

EPC = Exposure Point Concentrations

TABLE 9-10
Toxicity Factors for All Media in Northeast Open Area
Rev 0 Memphis Depot Dunn Field RI

Name	Weight-of-Evidence Class	Oral SF kg-day/mg	Inhal SF kg-day/mg	C Oral RfD mg/kg-day	C Inhal RfD mg/kg-day
1,1,2,2-Tetrachloroethane	C	2 00E-01	2 03E-01	6.00E-02	
Antimony	D			4 00E-04	
Chromium (total)	A		4.20E+01	3 00E-03	2.86E-05
Dieldrin	B2	1 60E+01	1 60E+01	5.00E-05	
Lead	B2				
Methylene chloride	B2	7.50E-03	1.65E-03	6 00E-02	8.57E-01
Phenanthrene[1]	D			3.00E-02	
Thallium	D			8 00E-05	
Total 1,2-Dichloroethene	D			9.00E-03	
Trichloroethene	B2	1.10E-02	6 00E-03	6.00E-03	
Xylenes (total)	D			2 00E+00	

[1] Pyrene toxicity values used as a surrogate

SF = Slope Factor

kg-day/mg = kilogram-day per milligram

mg-day/mg = milligram-day per kilogram

Inhal = Inhalation

RfD = Reference Dose

Table 9-11

Summary of Risks and Hazards at Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Exposure Receptors	Carcinogenic Risks				Noncarcinogenic Hazard Index				COPCs
	Ingestion	Dermal	Inhalation	Total ELCR	Ingestion	Dermal	Inhalation	Total HI	
Maintenance Worker									
Surface Soil	3 E-07	2 E-07	4 E-08	6E-07	0 003	0 001	0 00006	0 004	N/A
Surface Water	3 E-09	3 E-08	N/A	3E-08	0 00001	0 0001	N/A	0 0001	N/A
Sediment	2 E-08	5 E-09	N/A	3E-08	0 00007	0 00002	N/A	0 00009	N/A
Total Risks & Hazards (combined from all pathways)				***6E-07***				***0 004***	N/A
Industrial Worker									
Surface Soil	3 E-06	1 E-06	2 E-07	5E-06	0 03	0 005	0 0003	0 04	dieldrin
Surface Water	1 E-08	1 E-07	N/A	1E-07	0 00005	0 0004	N/A	0 0005	N/A
Sediment	8 E-08	2 E-08	N/A	1E-07	0 0003	0 00008	N/A	0 0004	N/A
Soil Column	3 E-06	1 E-06	1 E-07	4E-06	0 03	0 005	0 0003	0 04	dieldrin
Soil Column - Ambient Air	N/A	N/A	1 E-07	1E-07	N/A	N/A	0 0001	0 0001	N/A
Total Risks/Hazards (combined for surface media)[1]				***5E-06***				***0 04***	*dieldrin*
Groundwater (Ave -Table15-7)	7 E-06	4 E-06	3 E-05	4E-05	0 1	0 011	0 001	0 11	
Total Risks & Hazards (combined for all media)[1]				***5E-05***				***0 04***	*As, dieldrin 1,1 2 2-PCA, 1,1-DCE, 1 2-DCA, chloroform, CCl4, PCE, TCE*
Soil Column - Indoor Air	N/A	N/A	1 E-05	1E-05	N/A	N/A	0 009	0 009	1,1,2 2-PCA
Utility Worker									
Soil Column	3 E-07	3 E-07	1 E-08	7E-07	0 003	0 002	0 00003	0 005	N/A
Soil Column - Ambient Air	N/A	N/A	5 E 10	5E 10	N/A	N/A	0 0000004	0 0000004	N/A
Total Risks & Hazards (combined from all pathways)				***7E 07***				***0 005***	*N/A*
Recreational Adult									
Surface Soil	1 E-06	7 E-08	7 E-09	1E-06	0 01	0 0003	0 000009	0 01	dieldrin
Surface Water	2 E-08	3 E-07	N/A	3E-07	0 00005	0 0008	N/A	0 0009	N/A
Sediment	2 E-07	2 E-08	N/A	2E-07	0 0005	0 00005	N/A	0 0006	N/A
Total Risks & Hazards (combined from all pathways)				***2E-06***				***0 01***	*dieldrin*
Recreational Child									
Surface Soil	2 E-06	1 E-07	5 E-09	2E-06	0 1	0 003	0 00003	0 1	dieldrin
Surface Water	1 E-08	9 E-08	N/A	1E-07	0 0002	0 001	N/A	0 001	N/A
Sediment	3 E-07	5 E-09	N/A	3E-07	0 005	0 00008	N/A	0 005	N/A
Total Risks & Hazards (combined from all pathways)				***2E-06***				***0 1***	*dieldrin*
Recreational Youth									
Surface Soil	7 E-07	2 E-07	4 E-09	9E-07	0 02	0 002	0 00001	0 02	N/A
Surface Water	8 E-09	1 E-07	N/A	1E-07	0 00007	0 001	N/A	0 001	N/A
Sediment	1 E-07	8 E-09	N/A	1E-07	0 0008	0 00007	N/A	0 0009	N/A
Total Risks & Hazards (combined from all pathways)				***1E-06***				***0 02***	*N/A*
Offsite Residential									
Soil Column - Ambient Air	N/A	N/A	3 E-08	3E-08	N/A	N/A	0 00002	0 00002	N/A
Total Risks & Hazards (combined from all pathways)				3E-08				0 00002	*N/A*

Note

1 = Industrial Worker Soil Column risks (4E-06) were not included in Total Risks & Hazards because they were less than Surface Soil risks (5E-06)

Since a worker is assumed to be exposed to ambient air during work, Indoor Air is also not combined with other media

COPCs are the chemicals contributing to risks at or above 1 in a million, and/or to HI at or above 1 0

Where

As	Arsenic
CCl4	Carbon tetrachloride
PAHs	Polyaromatic hydrocarbons
PCE	Tetrachloroethane
TCE	Trichloroethane
1 1-DCE	1 1-Dichloroethene
1 2-DCA	1,2-Dichloroethane
1 1,2 2-PCA	1,1 2 2-Tetrachloroethane

Table 9-12

Constituents of Potential Concern in Surrogate Site 6085—Surface Soil

Rev 1 Memphis Depot Dunn Fie'd RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC1?	COPC2?	COPC3?	COPC?	Basis?	COPC/BASIS	
SS	MG/KG	DIELDRIN	6	6	N/A	N/A	0 03	5	1	0 09	0 04	0 004	Yes	Yes	Yes	Yes	A	Yes	A
SS	MG/KG	LEAD	6	6	N/A	N/A	22	2100	382	30	400		Yes	Yes	N/A	Yes	A	Yes	A

Note Data evaluated includes field duplicates and normal samples (0-2 feet)

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

TABLE 9-13
Summary of Exposure Pathways to be Quantified at Surrogate Site 6085
Rev. 1 Memphis Depot Dunn Field RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion*
Current Land Use			
On-site Maintenance Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils.	No	Occasional maintenance work is assumed to involve a worker spending time in the contaminated soil
Future Land Use			
On-site Industrial Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
On-site Utility Worker	Incidental ingestion, dermal contact, and dust inhalation from soil column	No	A hypothetical future utility worker installing or maintaining underground utilities is assumed to be exposed to contaminated subsurface soil This would be evaluated if subsurface soil data was available
Hypothetical Future On-site Residential	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	Yes	Evaluated for comparison purposes only

Note * - Section 7 1 provides approach and rationale for selection of exposure scenarios for each FU and the surrogate sites

Table 9-14

Exposure Point Concentrations for Site 6085 Surface Soil

Rev 1 Memphis Depot Dunn Field RI

Units	Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Lead	6	6	382	2100	--[a]	--[a]	382
MG/KG	Dieldrin	6	6	1	5	3	861	3

[a] UCL95 not calculated for lead. Arithmetic mean is the appropriate concentration term for adult IEUBK lead models

MG/KG = milligrams per kilogram

UCL95 = Upper 95% confidence limit on mean

EPC = Exposure point concentration

Table 9-15

Summary of Risks and Hazards at Surrogate Site 6085

Rev 1 Memphis Depot Dunn Field RI

	Carcinogenic Risks				Noncarcinogenic Hazard Index				
Exposure Route/Receptors	Ingestion	Dermal	Inhalation	Total ELCR	Ingestion	Dermal	Inhalation	Total HI	COPCs
Industrial Worker									
Surface Soil	7 E-06	2 E-06	2 E-09	**9E-06**	0 02	0 008	N/A	0 03	dieldrin
Northeast Plume (Ave VOCs)*	2 E-03	6 E-07	2 E-03	**3 E-03**	5	0 007	1	**5**	As, dieldrin, 1,1,2,2-PCA, 1,1-DCE, chloroform, CCl4, PCE, TCE
Combined risks and hazards for all media				3E-03				**5**	
Residential Adult									
Surface Soil	6 E-05	1 E-06	9 E-10	**7E-05**	0 07	0 004	N/A	0 07	dieldrin
Northeast Plume (Ave VOCs)*	8 E-03	8 E-06	7 E-03	**1E-02**	13 0	0 1	1 8	**14 8**	As, dieldrin, heptachlor epoxide, 1,1,2,2-PCA, 1,1-DCE, 1,2-DCA, chloroform, CCl4, PCE, TCE
Combined risks and hazards for all media				1E-02				**15**	
Residential Child									
Surface Soil	NA	NA	NA	**NA**	0 6	0 04	N/A	0 7	dieldrin
Northeast Plume (Ave VOCs)*	NA	NA	NA	**NA**	30 2	0 11	4 09	**34**	As, dieldrin, 1,1,2,2-PCA, 1,1-DCE, 1,2-DCA, chloroform, CCl4, PCE, TCE
Combined risks and hazards for all media				NA				**35 1**	

Note= * Groundwater risks and HIs are from Table 15-7

COPCs are the chemicals contributing to risks at or above 1 in a million, and/or to HI at or above 1 0

Where

As	Arsenic
CCl4	Carbon tetrachloride
PAHs	Polyaromatic hydrocarbons
PCE	Tetrachloroethane
TCE	Trichloroethane
1,1-DCE	1,1-Dichloroethene
1,2-DCA	1,2-Dichloroethane
1,1,2,2-PCA	1,1,2,2-Tetrachloroethane

Table 9-15A
Remedial Action Objectives for the Northeast Open Area
Rev 1 Memphis Depot Dunn Field RI

Media	Land Use	Remedial Action Objectives (from RI)	General Response Actions
Surface Soil	Maintenance Worker	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action*
	Industrial Worker	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action*
	Recreational Adult	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action*
	Recreational Youth	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1.0, for ingestion, dermal and inhalation exposures combined	No Action*
	Recreational Child	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action*
	Residential Adult	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined Lead concentrations are elevated in localized areas	Removal of contaminated soils to residential levels
	Residential Child	Hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined. Lead concentrations are elevated in localized areas	Removal of contaminated soils to residential levels
Groundwater	Industrial worker	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration,remediate to drinking water standards
	Residential Adult	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration,remediate to drinking water standards
	Residential Child	HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration,remediate to drinking water standards
Indoor Air (Groundwater-to-Indoor Air)	Industrial worker	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Residential Adult	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Residential Child	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
Sediment & Surface Water	Maintenance Worker	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Industrial Worker	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Recreational Adult	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Recreational Youth	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action

*The maximum lead concentration detected at 2,100 mg/kg will be removed

TABLE 9-16

Step 2 Surface Soil Screening Level Risk Calculations for the Northeast Open Area

Rev 0 Memphis Depot Dunn Field RI

	Frequency of Detection		Range of Detected Values				
Parameter	Number Analyzed	Number Detected	Minimum (mg/kg)	Maximum (mg/kg)	Surface Soil Screening Value[1] (mg/kg)	Hazard Quotient (based on Max. detect)	Retained as a COPC?
Inorganics							
ALUMINUM	13	13	6550	18300	50	366	Yes
ANTIMONY	14	2	5 1	24 2	3 5	7	Yes
ARSENIC	14	14	4	14	10	1.4	Yes
BERYLLIUM	14	14	0 44	1 2	1 1	1 1	Yes
CADMIUM	14	2	2 1	4 8	1 6	3	Yes
CHROMIUM, TOTAL	14	14	8 7	239	0 4	598	Yes
COPPER	14	14	9 1	146	40	4	Yes
LEAD	14	14	14	2100	50	42	Yes
MERCURY	14	3	0 07	0 27	0 1	3	Yes
NICKEL	14	13	13 2	33 3	30	1 1	Yes
SELENIUM	14	1	0 6	0 6	0 81	0 7	No
SILVER	14	8	0 58	1 5	2	0 8	No
THALLIUM	14	8	0 44	0 63	1	0 6	No
ZINC	18	18	60 3	1780	50	36	Yes
Organics							
ALPHA-CHLORDANE	13	3	0 0025	0 0071	0 1	0 1	No
DIELDRIN	13	11	0 0022	4 75	0 0005	9500	Yes
ENDRIN	13	1	0 0055	0 0055	0 001	6	Yes
GAMMA-CHLORDANE	13	3	0 0012	0 0037	0 1	0 04	No
p,p'-DDD	13	6	0 0011	0 0543	0 0025	22	Yes
p,p'-DDE	13	10	0 0045	0 232	0 0025	93	Yes
p,p'-DDT	13	10	0 0072	0 296	0 0025	118	Yes
INDENO(1,2,3-c,d)PYRENE	7	1	0 0074	0 0074	0 1	0 1	No
PCB-1260 (AROCHLOR 1260)	13	5	0 0051	0 0421	0 02	2	Yes
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-	5	1	0 1	0 1	NA	--	Yes
1,1,2,2-TETRACHLOROETHANE	8	2	0 001	0 005	0 1	0 1	No
BENZENE	8	2	0 004	0 004	0 05	0 1	No
METHYL ETHYL KETONE (2-BUTANONE)	8	7	0 005	0 021	NA	--	Yes
TETRACHLOROETHYLENE(PCE)	8	3	0 002	0 006	0 01	0 6	No
TOTAL 1,2-DICHLOROETHENE	8	1	0 22	0 22	0 1	2	Yes
TRICHLOROETHYLENE (TCE)	8	2	0 004	0 7	0 001	700	Yes
VINYL CHLORIDE	8	1	0 008	0 008	0 01	0 8	No

[1] = Memorandum, Ecological Risk Assessment at Military Bases Process Consideration, Timing, of Activities, and Inclusion of Stakeholders EPA Region 4, December 22, 1998

NA = Not available in the literature reviewed

-- = An HQ could not be calculated due to the lack of available screening values

mg/kg = milligrams per kilogram

COPC = Chemical of Potential Concern

TABLE 9-17
Step 2 Surface Water Screening Level Risk Calculations for the Northeast Open Area

Rev. 0 Memphis Depot Dunn Field RI

	Frequency of Detection		Range of Detected Values				
Parameter	**Number Analyzed**	**Number Detected**	**Minimum (mg/L)**	**Maximum (mg/L)**	**Surface Water Screening Value[1] (mg/l)**	**Hazard Quotient (based on Max. detect)**	**Retained as a COPC?**
Inorganics							
ALUMINUM	2	2	0 957	1 04	0 087	**12**	**Yes**
ARSENIC	2	2	0 0022	0 0047	0 19	0 0	No
CHROMIUM, TOTAL	2	1	0 0027	0 0027	0 011	0 2	No
LEAD	2	1	0 0068	0 0068	0 00132	**5**	**Yes**
ZINC	2	2	0 026	0 0329	0 05891	0 6	No
Organics							
DIELDRIN	2	1	0 000065	0 000065	0.0000019	**34**	**Yes**
GAMMA-CHLORDANE	2	1	0 0000027	0 0000027	0 0000043	0 6	No
FLUORANTHENE	2	2	0 0002	0 00055	0 0398	0 01	No
PHENANTHRENE	2	1	0 00046	0 00046	0 017	0 03	No
PYRENE	2	1	0 00042	0 00042	0 017	0 02	No

1 = Memorandum, Ecological Risk Assessment at Military Bases Process Consideration, Timing, of Activities, and Inclusion of Stakeholders EPA Region 4, December 22, 1998

mg/L = milligrams per liter

COPC = Chemical of Potential Concern

TABLE 9-18

Step 2 Sediment Screening Level Risk Calculations for the Northeast Open Area

Rev 0 Memphis Depot Dunn Field RI

Parameter	Frequency of Detection		Range of Detected Values				
	Number Analyzed	Number Detected	Minimum (mg/kg)	Maximum (mg/kg)	Sediment Screening Value^1 (mg/kg)	Hazard Quotient (based on Max. detect)	Retained as a COPC?
Inorganics							
ALUMINUM	2	2	1170	5700	NA	--	Yes
ANTIMONY	2	1	7 3	7 3	12	0 6	No
ARSENIC	2	2	2 3	4 6	7 24	0 6	No
BERYLLIUM	2	1	0 23	0 23	NA	--	Yes
CADMIUM	2	1	0 88	0 88	1	0 9	No
CHROMIUM, TOTAL	2	2	4 9	11 1	52 3	0 2	No
COPPER	2	1	68	68	18 7	4	Yes
LEAD	2	2	76 5	82 3	30 2	3	Yes
NICKEL	2	2	2 7	14	15 9	0 9	No
SELENIUM	2	1	0 4	0 4	NA	--	Yes
ZINC	2	2	45 9	196	124	2	Yes
Organics							
ALPHA-CHLORDANE	2	2	0 0076	0 0309	0 0017	18	Yes
DDE	2	1	0 0053	0 0053	0 0033	2	Yes
DDT	2	2	0 0186	0 028	0 0033	8	Yes
DIELDRIN	2	2	0 0807	0 152	0 0033	46	Yes
GAMMA-CHLORDANE	2	2	0 0115	0 0337	0 0017	20	Yes
HEPTACHLOR EPOXIDE	2	2	0 0026	0 005	NA	--	Yes
ACENAPHTHENE	2	1	0 11	0 11	0 33	0 3	No
ANTHRACENE	2	1	0 3	0 3	0 33	0 9	No
BENZO(a)ANTHRACENE	2	2	0 23	0 75	0 33	2	Yes
BENZO(a)PYRENE	2	2	0 28	0 79	0 33	2	Yes
BENZO(b)FLUORANTHENE	2	2	0 17	0 85	0 33	3	Yes
BENZO(g,h,i)PERYLENE	2	2	0 32	0 55	0 33	2	Yes
BENZO(k)FLUORANTHENE	2	2	0 37	0 83	0 33	3	Yes
CHRYSENE	2	2	0 36	0 87	0 33	3	Yes
FLUORANTHENE	2	2	0 55	1 8	0 33	5	Yes
FLUORENE	2	1	0 1	0 1	0 33	0 3	No
INDENO(1,2,3-c,d)PYRENE	2	2	0 25	0 54	0 33	2	Yes
PHENANTHRENE	2	2	0 28	1 3	0 33	4	Yes
PYRENE	2	2	0 58	1 6	0 33	5	Yes
PCB-1260 (AROCHLOR 1260)	2	2	0 0116	0 0436	0 033	1 3	Yes
BENZYL BUTYL PHTHALATE	2	1	0 15	0 15	NA	--	Yes
bis(2-ETHYLHEXYL) PHTHALATE	2	1	1 6	1 6	0 182	9	Yes
CARBAZOLE	2	1	0 2	0 2	NA	--	Yes

^{1} = Memorandum, Ecological Risk Assessment at Military Bases Process Consideration, Timing, of Activities and Inclusion of Stakeholders EPA Region 4 December 22, 1998

NA = Not available in the literature reviewed

-- = An HQ could not be calculated due to the lack of available screening values

mg/kg = milligrams per kilogram

COPC = Chemical of Potential Concern

TABLE 9-19

Step 3 Refinement of Surface Soil Contaminants of Potential Concern for the Northeast Open Area

Rev 0 Memphis Depot Dunn Field RI

	COPC Concentrations (mg/kg)			Comparison Criteria (mg/kg)				Hazard Quotients				Background Comparisons		
COPCs	Maximum	Average*	Background	Primary Soil Screening Criterion	Basis	Secondary Soil Screening Criterion	Basis	Max. Compared to Primary	Avg. Compared to Primary	Max. Compared to Secondary	Avg. Compared to Secondary	Maximum Exceeds Background	Average Exceeds Background	Frequency of Detection (%)
Inorganics														
ALUMINUM	18300	11248	23810	50	2	600	3	366	225	31	19	No	No	100
ANTIMONY	24 2	4 5	7	3 5	8	5	2	7	1 3	5	0 9	Yes	No	14
ARSENIC	14	10 5	20	10	2	29	4	1 4	1 0	0 5	0 4	No	No	100
BERYLLIUM	1 2	0 7	1 1	1 1	8			1 1	0 6			Yes	No	100
CADMIUM	4 8	0 8	1 4	1 6	8	4	2	3	0 5	1 2	0 2	Yes	No	14
CHROMIUM, TOTAL	239	35 7	24 8	0 4	1	1	2	598	89	239	36	Yes	Yes	100
COPPER	146	37 8	33 5	40	8	50	2,6	4	0 9	3	0 8	Yes	Yes	100
LEAD	2100	196	30	50	2,6	500	1	42	4	4	0 4	Yes	Yes	100
MERCURY	0 27	0 05	0 4	0 1	1	0 3	2,4	3	0 5	0 9	0 2	No	No	21
NICKEL	33 3	17 76	30	30	2	90	3	1 1	0 6	0 4	0 2	Yes	No	93
ZINC	1780	249	126	50	2	100	3	36	5	18	2	Yes	Yes	100
Organics														
DIELDRIN	4 75	0 536	0 086	0 0005	4			9500	1072			Yes	Yes	85
ENDRIN	0 0055	0 0144	NA	0 001	4			5 5	14 4					8
p,p'-DDD	0 0543	0 0153	0 0067	0 0025	4	4	5	22	6	0 0	0 00	Yes	Yes	46
p,p'-DDE	0 232	0 062	0 16	0 0025	4	4	5	93	25	0 1	0 02	Yes	No	77
p,p'-DDT	0 296	0 072	0 074	0 0025	4	4	5	118	29	0 1	0 02	Yes	No	77
PCB-1260 (AROCHLOR 1260)	0 0421	0 0105	0 11	0 02	4	1	5	2	0 5	0 0	0 01	No	No	38
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-	0 1	0 42	NA											20
METHYL ETHYL KETONE (2-BUTANONE)	0 021	0 012	0 002									Yes	Yes	88
TOTAL 1,2-DICHLOROETHENE	0 22	0 03	NA	0 1	6	5	7	2	0 3	0 0	0 01			13
TRICHLOROETHYLENE (TCE)	0 7	0 09	NA	0 001	4	0 1	6	700	90	7	0 9			25

Notes

* Average of all sample data (includes non-detects)

1 Efroymson, R A et al 1997a Oak Ridge National Laboratory, toxicological banchmarks for earthworms

2 Efroymson, R A et al 1997b Oak Ridge National Laboratory, toxicological banchmarks for plants

3 Efroymson, R A et. al 1997a Oak Ridge National Laboratory, toxicological banchmarks for microorganisms

4 Ministry of Housing, Spatial Planning and Environment, 1994 optimum soil quality standards

5 Ministry of Housing Spatial Planning and Environment, 1994 action soil quality standards

6 Beyer, W N 1990 US Fish and Wildlife Service Dutch background

7 Beyer, W N 1990 US Fish and Wildlife Service Dutch moderate

8 Crommenttuijn, T et al , 1997 RIVM Report No 601501002

mg/kg = milligrams per kilogram

TABLE 9-20

Step 3 Refinement of Surface Water Contaminants of Potential Concern for the Northeast Open Area

Rev 0 Memphis Depot Dunn Field RI

	COPC Concentrations (mg/L)			Comparison Criteria[1] (mg/L)		Hazard Quotients				Background Comparisons		
COPCs	Maximum	Average[a]	Background	Chronic Screening Value	Acute Screening Value	Max Compared to Chronic	Avg. Compared to Chronic	Max Compared to Acute	Avg Compared to Acute	Maximum Exceeds Background	Average Exceeds Background	Frequency of Detection (%)
Inorganics												
ALUMINUM	1 04	1 00	5 077	0 087	0 75	12	11	1 4	1 3	No	No	100
LEAD	0 0068	0 0047	0 0186	0 00132	0 03378	5 2	4	0 2	0 1	No	No	50
Organics												
DIELDRIN	0 000065	0 000043		0 0000019	0 0025	34	23	0 026	0 017	NA	NA	50

Notes

[a] Average of all sample data (includes non-detects)

[1] EPA Region IV Supplemental Guidance to RAGS, Freshwater Surfacewater Screening Values for Hazardous Waste Sites

mg/l = milligrams per liter

COPC =Chemical of Potential Concern

TABLE 9-21

Step 3 Refinement of Sediment Contaminants of Potential Concern for the Northeast Open Area

Rev 0 Memphis Depot Dunn Field RI

	COPC Detected Concentrations (mg/kg)			Comparison Criteria (mg/kg)			Hazard Quotients				Background Comparisons		
COPCs	Maximum	Average [a]	Background	Chronic Screening Value [1]	Acute Screening Value	Basis	Max Compared to Chronic	Avg Compared to Chronic	Max Compared to Acute	Avg Compared to Acute	Maximum Exceeds Background	Average Exceeds Background	Frequency of Detection (%)
Inorganics													
ALUMINUM	5700	3435	10085								No	No	100
BERYLLIUM	0 23	0 15	1 3								No	No	50
CADMIUM	0 88	0 5775	28 9	1	4 21	3	1	1	0 2	0 1	No	No	50
COPPER	68	35 4	58	18 7	108	3	4	2	0 6	0 3	Yes	No	50
LEAD	82 3	79 4	35 2	30 2	112	3	3	3	0 7	0 7	Yes	Yes	100
SELENIUM	0 4	0 3	1 7								No	No	50
ZINC	196	121 0	797	124	271	3	2	1	0 7	0 4	No	No	100
Organics													
ALPHA-CHLORDANE	0 0309	0 019	0 0052	0 0017	0 00479	3	18	11	6 5	4 0	Yes	Yes	100
DDE	0 0053	0 0093	0 0072	0 0033	0 374	3	2	3	0 0	0 0	No	Yes	50
DDT	0 028	0 0233		0 0033	0 00477	3	8	7	5 9	4 9			100
DIELDRIN	0 152	0 116	0 011	0 0033	0 0043	3	46	35	35 3	27 1	Yes	Yes	100
GAMMA-CHLORDANE	0 0337	0 02	2	0 0017	0 00479	3	20	13	7 0	4 7	No	No	100
HEPTACHLOR EPOXIDE	0 005	0 0038	0 23								No	No	100
BENZO(a)ANTHRACENE	0 75	0 4900	2 9	0 33	0 693	3	2	1	1 1	0 7	No	No	100
BENZO(a)PYRENE	0 79	0 5350	2 5	0 33	0 763	3	2	2	1 0	0 7	No	No	100
BENZO(b)FLUORANTHENE	0 85	0 5100	2 216	0 33	0 763	5	3	2	1 1	0 7	No	No	100
BENZO(g,h,i)PERYLENE	0 55	0 4350	1 8	0 33	0 763	5	2	1	0 7	0 6	No	No	100
BENZO(k)FLUORANTHENE	0 83	0 6000	2 3	0 33	0 763	5	3	2	1 1	0 8	No	No	100
CHRYSENE	0 87	0 6150	3 2	0 33	0 846	3	3	2	1 0	0 7	No	No	100
FLUORANTHENE	1 8	1 1750	7 1	0 33	1 494	3	5	4	1 2	0 8	No	No	100
INDENO(1,2,3-c,d)PYRENE	0 54	0 4	1 7	0 33	0 763	5	2	1	0 7	0 5	No	No	100
PHENANTHRENE	1 3	0 79	6 9	0 33	0 544	3	4	2	2 4	1 5	No	No	100
PYRENE	1 6	1 09	2 882	0 33	1 398	3	5	3	1 1	0 8	No	No	100
PCB-1260 (AROCHLOR 1260)	0 0436	0 0276		0 033	0 18	2	1	1	0 2	0 2			100
BENZYL BUTYL PHTHALATE	0 15	0 2250											50
bis(2-ETHYLHEXYL) PHTHALATE	1 6	0 9500	0 48	0 182	2 647	3	9	5	0 6	0 4	Yes	Yes	50
CARBAZOLE	0 2	0 2500	1 1								No	No	50

a Average of all sample data (includes non-detects)

[1] EPA Region IV Supplemental Guidance to RAGS, Sediment Screening Values for Hazardous Waste Sites

[2] Long et. al 1995

[3] MacDonald 1994

[4] Long and Morgan 1991

[5] benzo(a)pyrene surrogate

mg/kg = milligrams per kilogram

COPC = Chemical of Potential Concern

Table 9-22
Toxicity Reference Value and Bioaccumulation Factor for American Robin
Rev 0 Memphis Depot Dunn Field RI

Chemical	Lab Species	Lab Species Body Weight (kg)	Lab Species Ingestion Rate (kg/kgbw-d)	Dose (mg/kgbw-d)	Endpoint	Effect Measured/ Observed	Reference	UF[b]	Normalized Dosage NOAEL (mg/kgbw-d)	Toxicity Reference Value[a] (mg/kgbw-d)	Invertebrate BAF (unitless)[c]
Chromium	black duck	1 25	0 1	1	chronic NOAEL	reproduction	Sample *et. al*., 1996	1	1	1 000	0.775
Dieldrin	barn owl	0 466	0 134	0 077	chronic NOAEL	eggshell thickness, number of eggs laid/ hatched, % broken, embryo mortality	Sample *et al* , 1996	1	0 077	0 077	0.047

NOAEL = No observed adverse effects level

UF = Uncertainty Factor

BAF = Bioaccumulation Factor

a) From Sample *et al* (1996), Toxicity Reference Value (mg/kgbw-d) =
all birds Normalized dosage NOAEL (mg/kgbw-d) * (Lab Species Body Weight (kg)/Indicator Species Body Weight)^0

b) A recommended uncertainty factor of 1 was used for chronic NOAELs, as recommended
by Wentsel, *et al* (1996). See text for discussion.

c) Invertebrate BAF = concentration in invertebrate tissue (mg/kg) /concentration in soil (mg/kg)
Assumes primary invertebrate in the American robin diet is the earthworm (USEPA 1994)

mg/kg bw-d = milligrams per kilograms of body weight per day

kg = kilogram

Table 9-23

Summary of Life History Information for American Robin

Rev 0 Memphis Depot Dunn Field RI

Functional Group	Body Weight (kg)[a]	Daily Food Consumption (kg wet/kgbw-d)[b]	Maximum Daily Food Consumption		Average Daily Food Consumption		Territory Size[f] (hectares)	Diet Composition (%)	
			(kg wet/d)[c]	(kg dry/d)[e]	(kg wet/d)[d]	(kg dry/d)[e]		Invertebrates	Soil
Terrestrial bird	0.064 - 0.103 mean = 0.077	1.22-1.96 mean = 1.52	0.125	0.020	0.117	0.019	0.12 - 0.84 mean = 0.42	90[g]	10[h]

a) based on adults of both sexes in Pennsylvania in Clench and Leberman (1978) in USEPA (1993)

b) based on both sexes of free living robins in Kansas in Hazelton *et al* (1984) in USEPA (1993)

c) Calculated by multiplying the maximum of the Daily Food Consumption range (kg wet/kgbw-d) by the minimum of the body weight range (kg)

d) Calculated by multiplying the mean Daily Food Consumption (kg wet/kgbw-d) by the mean body weight (kg)

e) Calculated by multiplying the Maximum (or Average) Daily Food Consumption (kg wet/d) by the fraction of solids in the food
For American Robin, it was assumed that the diet was primarily earthworms, which are approximately 84% water, or 16% solids (or 0.16)

f) For this assessment, forage range = size of the site (100%) and fraction of the year = 100% (365 d/y) Value for adults of both sexes in the spring on a Tennessee campus provided from Pitts (1984) in USEPA (1993) for qualitative comparison.

g) Estimate was approximated using professional judgement from very detailed dietary breakdowns in USEPA (1993)
Diets specific to the region were preferred. Diet of primarily invertebrates was conservatively chosen over plants because of low uptake of dieldrin in plants.

h) based on a the percent of soil in the diet of wild turkey in Beyer *et al* 1994

kg = kilogram
kg wet/kgbw-d = kilogram wet per kilogram of body weight per day
kg wet/d = kilogram wet per day
kg dry/d = kilogram dry per day

Table 9-24

American Robin Exposure Factors Used for Risk Calculations

Rev 0 Memphis Depot Dunn Field RI

Parameter	American robin
Minimum Body Weight (kg)	0.064
Maximum Daily Food Consumption (kg dry/d)	0.02
Average Body Weight (kg)	0.077
Average Daily Food Consumption (kg dry/d)	0.019
Site Use Factor (unitless)	1
Possible Site Use Factor[a]	0.5
Fraction invertebrates in diet	0.9
Fraction soil in diet	0.1

[a] The site use factor could be adjusted because it is expected that robin would spend approximately half the year elsewhere because they are migratory This factor could also be adjusted based on the size of the site

kg = kilogram

kg dry/d = kilogram dry per day

Table 9-25
Ecological Risk Calculations for Dieldrin
Rev 0 Memphis Depot Dunn Field RI

Indicator Species	Maximum Dieldrin Exposure Point Concentration (mg/kg)	Average Dieldrin Exposure Point Concentration (mg/kg)	Toxicity Reference Value (mg/kgbw-d)	Maximum Dieldrin Dose (mg/kgbw-d)[a, b]	Average Dieldrin Dose (mg/kgbw-d)[a, c]	Maximum Dieldrin Hazard Quotient[d]	Average Dieldrin Hazard Quotient[d]
American robin	4.75	0.536	0 077	0 211	0.019	**2.7**	0 2

[a] Maximum dose assumes invertebrate portion of their diet is earthworm tissue
[b] See text for derivation. Based on minimum body weight and maximum ingestion rate
c See text for derivation Based on an average body weight and ingestion rate
[d] Bold type face indicates the Hazard Quotient exceeds the target Hazard Quotient of less than or equal to one
mg/kg = milligrams per kilogram
mg/kgbw-d = milligrams per kilogram of body weight per day

Table 9-26

Ecological Risk Calculations for Chromium

Rev 0 Memphis Depot Dunn Field RI

Indicator Species	Maximum Chromium Exposure Point Concentration (mg/kg)	Average Chromium Exposure Point Concentration (mg/kg)	Toxicity Reference Value (mg/kgbw-d)	Maximum Chromium Dose (mg/kgbw-d)[a, b]	Average Chromium Dose (mg/kgbw-d)[a, c]	Maximum Chromium Hazard Quotient[d]	Average Chromium Hazard Quotient[d]
American robin	239	35 7	1 0	59.563	7.025	**59.6**	7.0

[a] Maximum dose assumes invertebrate portion of their diet is earthworm tissue

[b] See text for derivation Based on minimum body weight and maximum ingestion rate

c See text for derivation Based on an average body weight and ingestion rate

[d] Bold type face indicates the Hazard Quotient exceeds the target Hazard Quotient of less than or equal to one

mg/kg = milligrams per kilogram

mg/kgbw-d = milligrams per kilogram of body weight per day

Figures

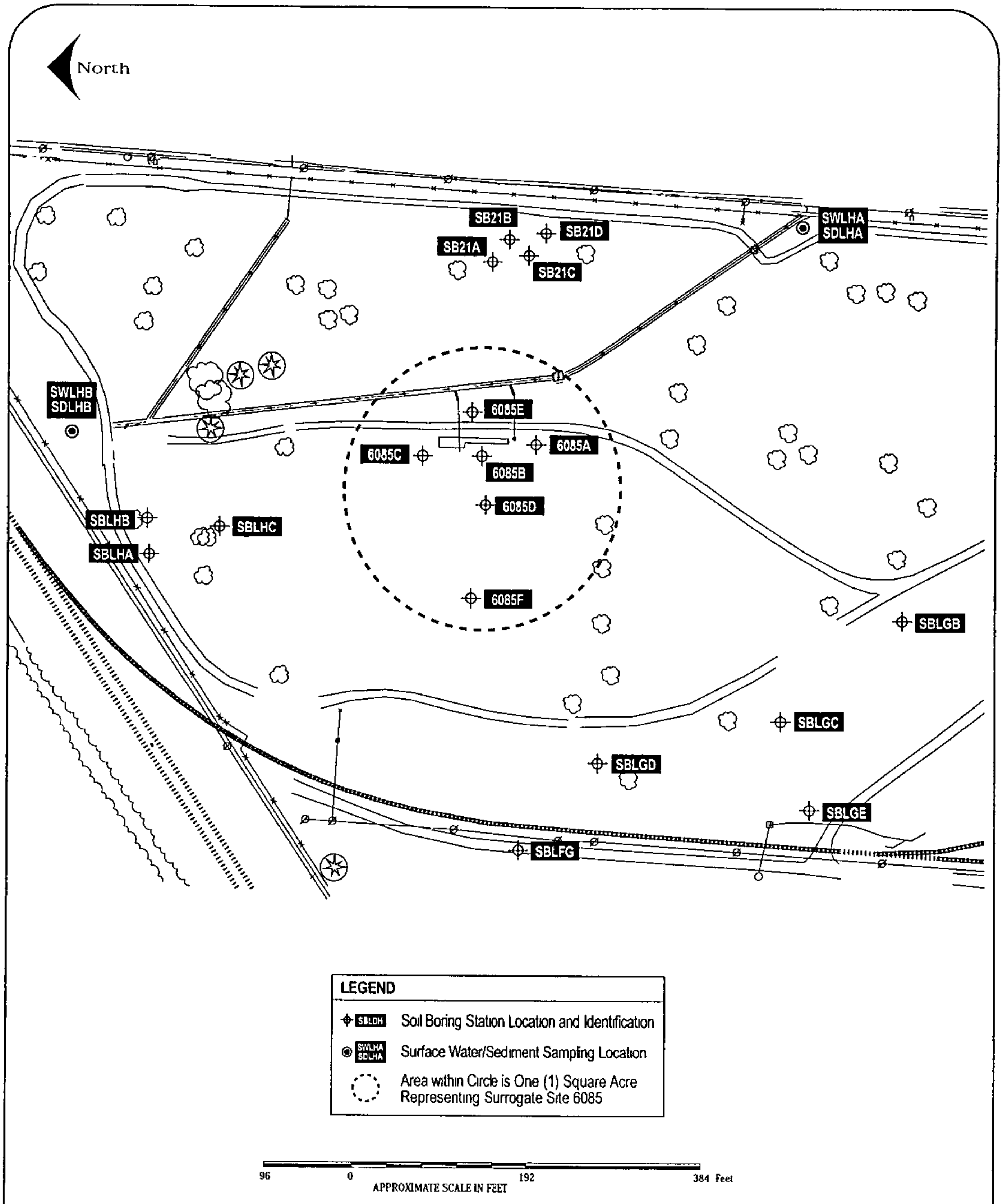
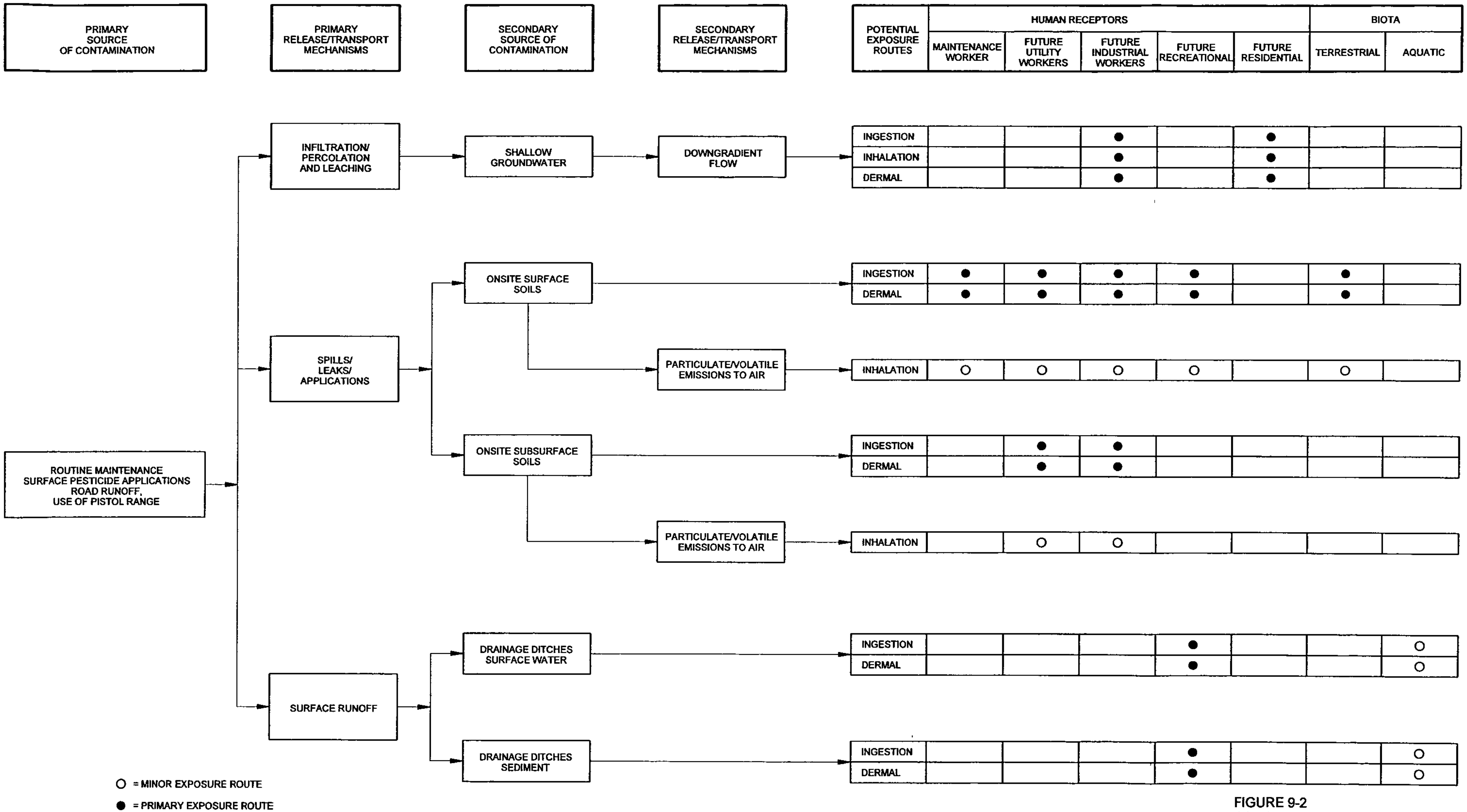


FIGURE 9-1
SURROGATE AREA
NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn124 FH8

CH2MHILL



POTENTIAL EXPOSURE ROUTES	HUMAN RECEPTORS: MAINTENANCE WORKER	FUTURE UTILITY WORKERS	FUTURE INDUSTRIAL WORKERS	FUTURE RECREATIONAL	FUTURE RESIDENTIAL	BIOTA: TERRESTRIAL	AQUATIC
INGESTION			●		●		
INHALATION			●		●		
DERMAL			●		●		
INGESTION	●	●	●	●		●	
DERMAL	●	●	●	●		●	
INHALATION	○	○	○	○		○	
INGESTION		●	●				
DERMAL		●	●				
INHALATION		○	○				
INGESTION				●			○
DERMAL				●			○
INGESTION				●			○
DERMAL				●			○

FIGURE 9-2
CONCEPTUAL SITE MODEL FOR
POTENTIAL HUMAN AND ECOLOGICAL
EXPOSURES - NORTHEAST OPEN AREA
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 18-OCT-2001 8071dfn01-9-2 dgn

Figure 5-3

Total Excess Lifetime Cancer Risks for Exposure to Soil, Sediment, Surfacewater and Groundwater in Northeast Open Area

Rev. 0 Memphis Depot Dunn Field RI

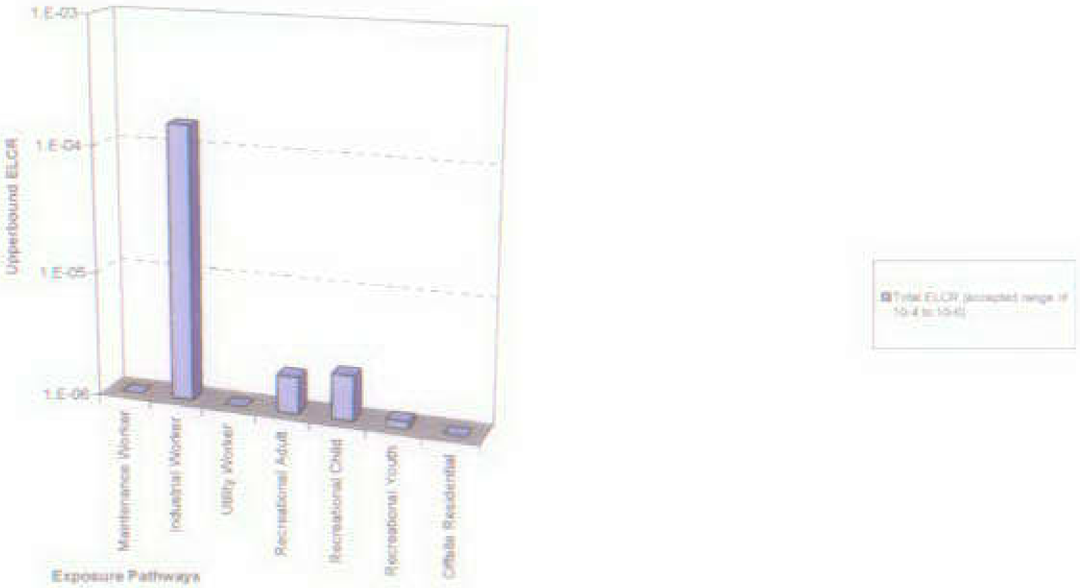
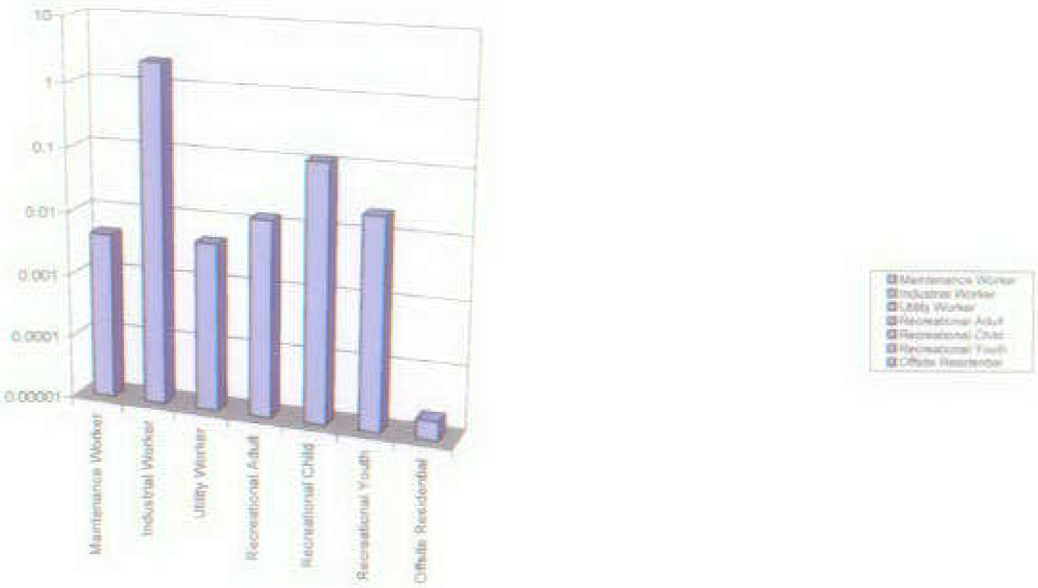
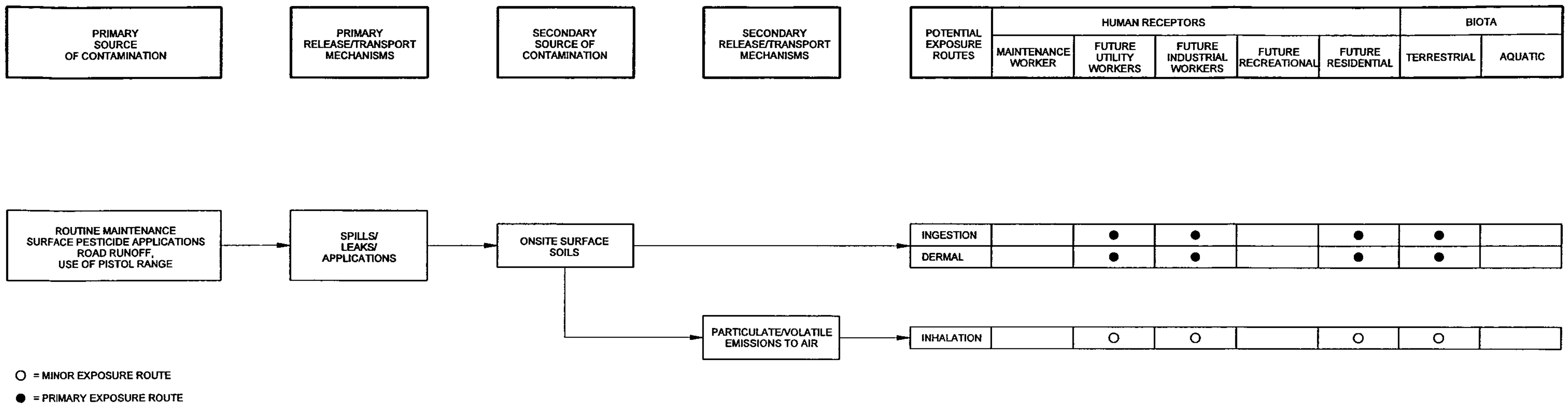


Figure 9-4

Total Hazard Indices for Exposure to Soil, Sediment, Surfacewater and Groundwater in Northeast Open Area

Rev. 0 Memphis Depot Dunn Field RI





POTENTIAL EXPOSURE ROUTES	HUMAN RECEPTORS					BIOTA	
	MAINTENANCE WORKER	FUTURE UTILITY WORKERS	FUTURE INDUSTRIAL WORKERS	FUTURE RECREATIONAL	FUTURE RESIDENTIAL	TERRESTRIAL	AQUATIC
INGESTION		●	●		●	●	
DERMAL		●	●		●	●	
INHALATION		○	○		○	○	

○ = MINOR EXPOSURE ROUTE

● = PRIMARY EXPOSURE ROUTE

FIGURE 9-5
CONCEPTUAL SITE MODEL FOR
POTENTIAL HUMAN AND ECOLOGICAL
EXPOSURES DUNN FIELD
SURROGATE SITE 6085
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 18-OCT-2001 8071dfn01-9-5 dgn

Figure 8-6

Total Excess Lifetime Cancer Risks for Exposure to Soil and Groundwater at Surrogate Site 6083

Rev. 0 Memphis Depot Dunn Field RI

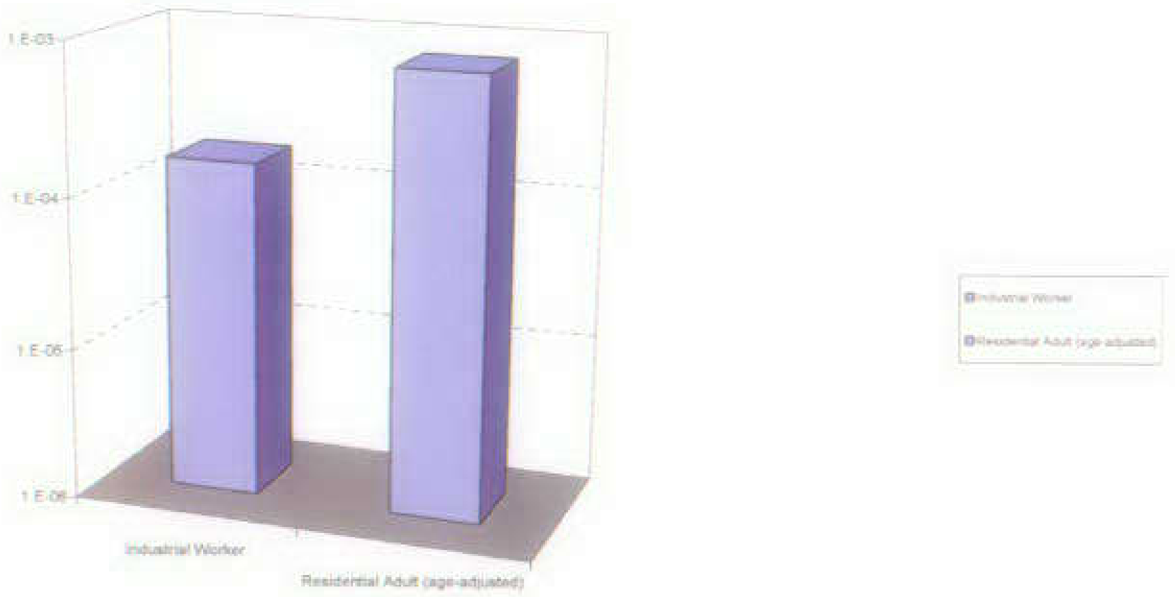
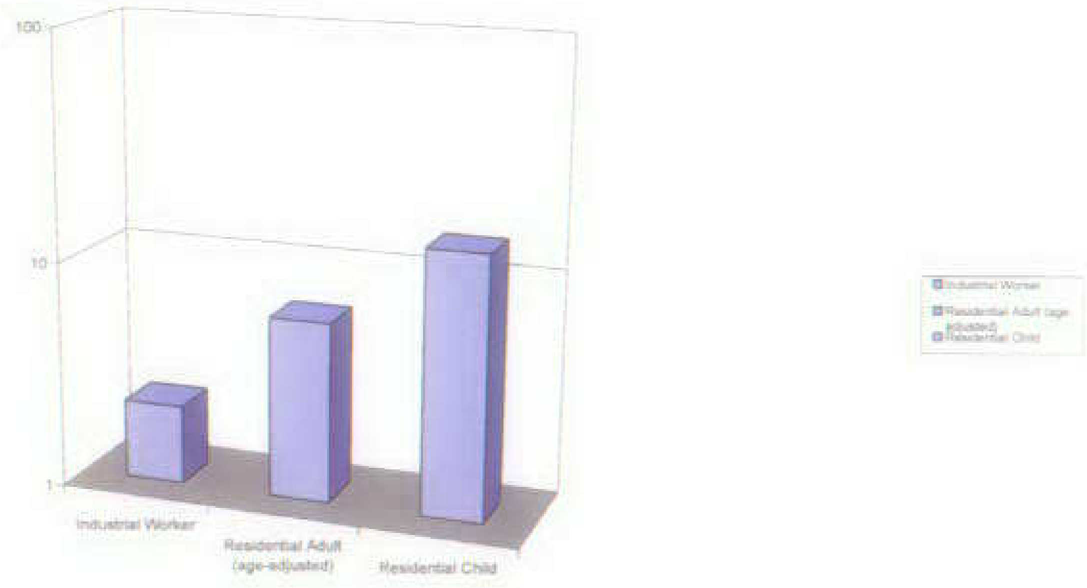


Figure 9-7

Total Hazard Indices for Exposure to Soil and Groundwater at Surrogate Site 6085

Rev. 0 Memphis Depot Dunn Field RI



TAB

Section 10

10.0 Nature and Extent of Contamination in Disposal Area of Dunn Field

This section addresses the nature and extent of contamination within the Disposal Area of Dunn Field (Figures 10-1 and 10-2). The subsections below describe how the Disposal Area was defined, the probable sources of contamination, and the nature and extent of contamination in the Disposal Area. The Disposal Area contains the following 25 Dunn Field historical sites as identified in previous RI activities and documents:

- Site 1 CWM (Mustard and Lewisite Training Site);
- Site 2 (Ammonia Hydroxide and Acetic Acid Burial);
- Site 3 (Mixed Chemical Burial Site);
- Site 4 and 4.1 (POL Burial Site);
- Site 5 (Methylbromide Burial Site A);
- Site 6 (Eye Ointment Burial Site);
- Site 7 (Nitric Acid Burial Site);
- Site 8 (Methyl Bromide Burial Site B);
- Site 9 CWM (Ashes and Metal Burial Site);
- Site 10 (Solid Waste Burial Site);
- Site 11 (Trichloroacetic Acid Burial Site);
- Site 12 and 12.1 (Sulfuric and Hydrochloric Acid Burial);
- Site 13 (Mixed Chemical Burial),
- Site 14 (Municipal Waste Burial Site B);
- Site 15 (Sodium Burial Site);
- Site 15.1 (Sodium Phosphate Burial);
- Site 15.2 (14 Burial Pits);
- Site 16 (Unknown Acid Burial Site);
- Site 16.1 (Acid Burial Site),
- Site 17 (Mixed Chemical Burial Site);
- Site 18 (Plane Crash Residue);
- Site 22 (Hardware Burial Site);
- Site 23 (Construction Debris and Food Burial Site);
- Site 24-A CWM (Bomb Casing Burial Site);
- Site 61 (Buried Drain Pipe);
- Site 63 (Fluorspar Storage);
- Site 64 (Bauxite Storage);
- Site 86 (Food Supplies).

To facilitate the RI, many of the above sites were combined into "Locations"(Figure 10-1) as described in Table 10-1, which was taken from the *Final Field Sampling Plan for OU-1 Addendum [I]* (CH2M HILL, March 1999). These locations were investigated as possible sources of contaminant releases to the environment The following subsection presents a discussion of the

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nature and extent of contamination within the Disposal Area based on an evaluation of the current and historical site data.

10.1 Disposal Area Background

10.1.1 Disposal Area Physical Description

The Disposal Area consists of the mowed area west of the railroad tracks. The topography is mostly level over the entire area, exhibiting surface relief features in the form of manmade depressions and drainage ditches. Ground elevations range from a high of approximately 305 feet above mean sea level (msl) measured at the southern end of the Disposal Area to a low of 280 feet msl in a culvert discharge area west of the concrete pad (see Figure 10-2).

The dominant manmade features within the Disposal Area are the power lines bisecting the area; an unused fill pile near Site 22; and the Asphalt Pad near Site 24-A. Two buried drain pipes originate east of the Disposal Area, draining the Northeast Open Area and the Stockpile Area. The flow in the culvert is generally in a westerly direction under the Disposal Area, discharging at the fence line into open ditches outside the northwestern corner and western boundary of the Disposal Area. The southern portion of the Disposal Area was used as a storage site for U.S. government strategic stockpiles of bauxite (Site 64) and fluorspar (Site 63). The bauxite and fluorspar piles have been removed. The groundwater extraction system is located on the west and north boundaries of the Disposal Area, and consists of 11 recovery wellheads, underground conveyance system, and control building.

10.1.2 Disposal Area Environmental History

The Disposal Area of Dunn Field is a known burial area at the Depot, and the majority of burial sites are located on the northern half of the Disposal Area. Installation records indicate that various types and quantities of wastes were buried in the Disposal Area, including 2 CWM burial sites. Based on the presence of possible CWM, intrusive activities in the known or suspected disposal sites were not conducted. The two CWM sites (Site 1 and Site 24-A) underwent removal actions in 2000/2001 (UXB, December 2001). Based on the available historical information and the information gathered in the field the following is known about each of the burial sites in the Disposal Area:

Site 2: This site is believed to be a small excavation into which 1 gallon of ammonia hydroxide and 1 gallon of acetic acid were buried in 1955. These materials are considered to have low toxicity and a local influence because of their small volume.

Site 3: This site is estimated to be approximately 30 feet long and 10 feet wide. It reportedly contains about 3,000 quarts of various chemicals, plus 5 cubic feet of orthotoludine dihydrochloride buried in 1955 As a result, toxicity potential is unknown based on the description of "various chemicals".

Site 4: This site is a trench containing approximately 13 drums of oil, grease, and paint thinner that were disposed of in the mid-1950's. These materials are considered to be both potentially toxic and highly mobile. Since the drums were placed 50 years ago, they may have corroded and may no longer be intact.

Site 4.1: This site is similar to Site 4, except that it contains approximately 32 drums of oil, grease, or thinners that were disposed of in the mid-1950's. These materials are considered to be both potentially toxic and highly mobile Since the drums were placed 50 years ago, they may have corroded and may no longer be intact.

Site 5: This site reportedly contains a single container of methyl bromide (bromomethane) approximately 3 cubic feet in volume from 1995. If the container is broken, local/limited contamination by this material may have resulted.

Site 6: This site contains approximately 40,000 units of eye ointment, estimated to be buried in boxes at a maximum depth of 6 feet in 1955. This material is non-hazardous and does not pose a known environmental hazard.

Site 7: This site is a trench containing approximately 1,700 quart bottles of nitric acid from 1954. Nitric acid is considered to have low toxicity, but could cause a low pH in the area, or mobilize metals, or both.

Site 8: This site is an excavation containing approximately 3,768 cans of methyl bromide (bromomethane) from 1954. The hazard is similar to that of Site 5, but the quantity is significantly greater and that makes this a higher priority site. The disposal excavation is estimated to be approximately 45 feet by 45 feet at the surface and the reported burial depth is 7 feet. (*It should noted, that no bromomethane was detected in the surface soil or subsurface soil on Dunn Field where tested during the RI [>250 samples]. Bromomethane was detected in 5 monitoring wells [MW-13, -69, -70, -76 & -77] in 2001 at low estimated concentrations ranging from 0.2J ug/L to 0.6J ug/L. No bromomethane was detected in the recovery wells. Bromomethane was not detected in groundwater samples prior to 2001 [a total of >500 groundwater samples]. There is no federal or state drinking water standard for bromomethane in groundwater.*)

Site 10: This a solid waste burial site approximately 100 feet long and 50 feet wide containing metal, cans, ash, broken glass, and other similar material last used in 1955. Information indicates the waste was located in a zone from 3.5 to 10 feet below the ground surface. Material descriptions suggest that the burial site contains little organic matter. The site is not expected to contain hazardous materials, but the actual contents of the buried material are unknown

Site 11: This site is an excavation containing 11 gallons of the herbicide trichlororacetic acid in 1,433 1-ounce bottles buried in 1965. This is a reportedly unstable chemical, with a transient influence on pH and with low toxicity.

Sites 12 & 12.1: These sites consist of 3 trenches containing a total of 30 pallets of sulfuric and hydrochloric acid buried in 1967. These below-grade materials are not expected to be extremely toxic, but could affect the pH in the local area and cause metals to become more mobile.

Site 13: This site contains approximately 32 cubic yards of mixed chemicals, acid and detergents, plus approximately 8,100 pounds of solids. The area is estimated at approximately 35 feet wide by 50 feet long, approximately 8 feet deep.

Site 14: This is a solid waste burial site reported to contain paper, food, and other similar sanitary landfill materials. The trench reportedly has horizontal dimensions of 40 feet by 80 feet and waste depths ranging from 6 to 10 feet Based on the known contents, this is a low priority site.

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Sites 15, 15.1 & 15.2: These sites comprise an area approximately 100 feet long and 20 feet wide containing 14 discrete trenches with sodium salt, sodium phosphate, chlorinated lime, acid wastes, and various medical supplies buried in 1968. The disposal area is estimated at approximately 8 feet deep. Sodium salts and lime materials are typically not considered to be hazardous materials; however, the contents are not clearly identified.

Sites 16 & 16.1: These sites are disposal areas containing unknown acid materials. Records indicate disposal of one pallet of an unknown acid Depending upon the quantity, this acid could adversely affect the local pH and groundwater.

Site 17: This site is a 20-foot by 30-foot disposal area containing an unknown quantity of herbicides, medical supplies, and cleaning compounds. The depth of the disposal trench is estimated at 8 feet.

Sites 18, 22, 23 & 86: These sites contain plane crash residue, hardware (nuts and bolts), and construction/food debris, and food supplies, respectively.

10.2 Summary of Environmental Investigations at Disposal Area

10.2.1 Historical Environmental Investigations

A geohydrologic study, performed by the USAEHA in 1982, identified Dunn Field as having the potential for groundwater contamination. Groundwater samples were analyzed, using EPA Method 624, for VOCs. The concentrations of all VOCs detected in the five wells sampled by the USAEHA ranged from 3 to 200 µg/L. Trichloroethene was detected in all five wells at levels ranging from 4 to 150 µg/L. Tetrachloroethene was also detected at concentrations ranging from 3 to 81 µg/L. Metals, pesticides/PCBs, and BNAs were also analyzed for, but were either not detected or were detected at levels below the applicable MCL.

In 1990, Law Environmental conducted an RI/FS that indicated contamination of the fluvial aquifer at Dunn Field. The RI/FS focused on Dunn Field, its activities, the environmental setting of the study area, the facility's environmental data collection, sample analysis, data evaluation, and a risk assessment.

Environmental Science and Engineering, Inc. (ESE) performed a groundwater monitoring study in 1993 to assess changes in groundwater quality since the completion of the RI/FS in 1990. The purpose was to evaluate contaminants in the groundwater and to evaluate contaminants onsite and in the vicinity of the Depot.

The USACE conducted an archive search regarding the possible use or disposal of chemical warfare materiel (CWM) on the site in 1995. The records obtained during this search indicated that only the Dunn Field area, especially the Disposal Area, was used to destroy or bury conventional ordnance or CWM. As a result of the archive search, Parsons under contract to the USACE, performed field activities associated with an EE/CA in 1998 specifically for locating the CWM sites in the Disposal and Stockpile Areas and assessing the potential for CWM constituent migration. During the study, Parsons collected surface soil samples at 4 locations (SS-1 through SS-4) in the Disposal Area, 2 background surface soil samples (one inside the Disposal Area boundary and the other outside the Disposal Area in the Northeast Open Area), 30 subsurface soil samples from 4 locations within the Disposal Area, and 4 groundwater samples from four monitoring wells that were installed during the EE/CA investigation. Other soil and groundwater samples collected during the EE/CA field effort were collected within the southwestern corner of the Stockpile Area. The EE/CA sample analysis results for the Disposal and Stockpile Areas have been included in this RI and are presented in this section and Section 12 and are discussed in appropriate subsections.

Based on analysis of all data collected during the EE/CA field effort, Parsons concluded in the *Engineering Evaluation/Cost Analysis for the Removal of Chemical Warfare Materiel, Former Defense Distribution Depot, Memphis, Tennessee.* (Parsons, June 1999), that there were several possible dump sites at Dunn Field, and that the potential for migration of CWM and CWM degradation products was very low. These wastes are toxic to human and ecological receptors, and it was recommended that the wastes be excavated and removed from the site.

Removal actions were executed in mid-2000 at Sites 1 and 24-A in the Disposal Area, and 24-B in the Stockpile Area to reduce or eliminate the potential CWM risk posed by these wastes, as described in Section 1.4. Excavated soils were visually inspected for glass ampoules and analyzed for selected constituents at a field laboratory. Based on this analysis, the soils were either stockpiled for use as backfill material or segregated for offsite disposal based on the analysis results. Confirmation samples were collected by CH2M HILL from the floor and walls of each excavation after completing the excavation to the targeted depth. All site removal activities were completed in March 2001.

In addition to environmental investigations and the CWM removal at the Disposal Area, an Interim Remedial Action (IRA) was initiated in 1998 to extract groundwater from the fluvial aquifer underlying the northwest side of Dunn Field and prevent further migration of groundwater contamination. The system, which consists of 11 recovery wells which discharges through an underground conveyance system to the City of Memphis sanitary sewer, is currently in operation and is continuing to remove groundwater and contaminants therein from the shallow aquifer. As of the end of 2000, approximately 69,657,128 gallons of groundwater had been extracted and discharged from the Dunn Field.

10.2.2 Summary of Findings from the Law Environmental RI

The results of the limited soil data collected during the 1990 RI indicated that certain areas of soil in Dunn Field were slightly contaminated with metals and pesticides. On the basis of fate and transport analysis, Law Environmental concluded that the metals were capable of migration, but that the pesticides were relatively immobile. It was concluded that these compounds were detected at locations near their original sources.

The extent of contamination from the chemicals detected was not defined by Law Environmental. Results from the Law Environmental RI and the ESE investigation were used to evaluate potential problem areas within Dunn Field and to provide part of the rationale for additional sampling. Additional sampling was conducted as part of this RI for areas in the Disposal Area where data gaps existed and where sampling and analyses were required to characterize the nature and extent of contamination from past activities at the site.

10.2.3 Current Remedial Investigations

The soil, sediment and surface associated with the 25 sites within the Disposal Area were investigated by CH2M HILL from February 1999 through April 1999, and then within an amendment to the workplan in 2000. Groundwater was investigated from 1996 to 2001 and is presented in Section 14 of this report. During the 1999 study, surface soil was sampled to assess the nature and horizontal extent of contamination at these sites, and subsurface soil was sampled to 30 feet bgs at most of these sites to assess the vertical extent of contamination. Surface water and sediment samples were collected at the terminus of two buried culverts that extend across the Disposal Area. A sampling and analysis summary for the Disposal Area is presented in Tables 10-2 and 10-2A. The analytes and analyte groups investigated within the Disposal Area for each site are presented in Table 10-3.

The 1999 sampling rationale was designed to allow the recommendations from the 1995 sampling plans and the 1999 FSP Addendum to be accomplished. In addition, the results of a passive soil gas screening survey, which was conducted in 1998 and focused on chlorinated solvents, were used to guide the RI sampling effort and analyte selection (see Sections 1 and 4). Therefore, the selection of sampling points and analytes for this RI was a culmination of both direct and indirect sources of information.

The first version of the draft final Dunn Field RI report was submitted on March 9, 2000; however, the document was recalled after elevated concentrations of TCE and 1,1,2,2-PCA were discovered in groundwater samples collected earlier from monitoring well MW-70. On March 17, 2000, members of the BCT concluded that the draft final RI report should be revised following additional RI activities due to: (1) the potential for DNAPL presence and (2) the potential need to re-evaluate source areas in Dunn Field. As a result of this decision, the RI FSP Addendum II was developed in July 2000 and implemented through the latter part of 2000 and into early 2001. This addendum included:

- Establishing the nature and horizontal and vertical extent of DNAPL and/or the resultant dissolved contaminant plume associated with MW-70 in saturated and unsaturated zones;
- Identifying DNAPL sources within the soil/disposal areas on Dunn Field, including, if DNAPL was found, assessing specific areas where DNAPL may have been released and the vertical and horizontal distribution within the unsaturated zone; and
- Evaluating DNAPL and dissolved phase transport in the vicinity of MW-70, including orientation of underlying clay confining and perched units, groundwater gradient and flow direction in areas of concern, and additional transport parameters

The additional RI field investigation activities commenced in October 2000 and were completed in December 2000.

10.3 Potential Sources of Contamination and Basis and Objectives for Sampling

The Disposal Area historically was used for disposal of various hazardous and non-hazardous materials. The history of Dunn Field operations includes disposal of construction debris, maintenance shop wastes, paints, acids, scrap metal, food stocks, clothing, CWM, and various other waste types. Table 10-1 lists the sites of concern within the Disposal Area, and the following sections provide a description of operations that have taken place at these sites, plus other areas of concern within the Disposal Area (Figure 10-2).

The following sections provide an overview of the sites consolidated within each location and the field sampling conducted in the Disposal Area Location- and site-specific objectives in the Disposal Area are presented in this section. Overall objectives for the investigation at Dunn Field are presented in Section 4.2. Sample locations for the Disposal Area are depicted in Figure 10-3. A summary of all analytical samples collected from all investigation areas can be found in Appendix B.

10.3.1 Location A - Asphalt Pad

Location A encompasses a portion of Site 23 (Construction Debris and Food Burial Site), Site 24-A (Bomb Casing Burial Site), Site 63 (Fluorspar Storage) and a portion of Site 64 (Bauxite Storage). These sites were combined based on a review of the available historical information, geophysical survey, and passive soil gas survey. The maximum depth of the burial sites, as indicated in historical records, is approximately 10 feet.

As identified in Figures 4-2 through 4-7, the PCE, 1,2-DCE, TCE, chloroform and carbon tetrachloride (CCl4) area of impact encompasses the southern half of Site 23, Site 24-A, Site 63 and the northern portion of Site 64. During the 1998 RI soil gas investigation, moderate to high soil gas concentrations associated with Site 24-A indicated that soil gas was collecting under the Asphalt Pad. The Asphalt Pad may have acted as a cap, limiting off-gassing to the atmosphere, thereby concentrating VOCs under the pad. Direct drilling into Site 24-A was avoided during the RI field sampling activities due to the possible presence of CWM. The presence of high to medium soil gas VOC concentrations associated with Site 24-A further indicated high VOC concentrations in the disposal areas and soils.

Specific sampling objectives at the Asphalt Pad were:

- Delineate the horizontal and vertical extent of VOCs in the surface and subsurface soils associated with the soil gas plumes at the Asphalt Pad;
- Identify other subsurface contaminants associated with the VOCs;
- Evaluate the extent of pesticides and metals in the surface soil; and
- Evaluate the potential for offsite transport of contaminants in surface water and sediment within the culvert draining the Location A area.

During and after the removal of CWM from Site 24-A in 2000, 3 soil samples were collected from the floor and sidewalls of the excavation pit to determine if excavation activities had effectively removed any associated contaminants. The sample analysis results from this sampling are summarized in Appendix K.

10.3.1.1 Field Investigation

Four 30-foot borings were drilled and sampled focusing on the PCE, TCE, CCl4, and 1,2-DCE soil gas plumes indicating areas of concern in Location A, near Site 23 Samples from the 0- to 1-foot and 8- to 10-foot interval from Boring SBLAA (closest to the Site 24-A disposal area) were analyzed for the TCL/TAL list of compounds to identify a broad range of potential contaminants. The sample from the 14- to 16-foot interval from Boring SBLAA was analyzed for TCL VOCs

Surface soil samples (0- to 1-foot interval) from Borings SBLAB, SBLAC and SBLAD were analyzed for metals, pesticides, PCBs and VOCs. Subsurface samples from the 8- to 10-foot interval from the referenced 3 borings were analyzed for TCL SVOCs and VOCs, and samples from the 14- to 16-foot interval were analyzed for TCL VOCs.

One surface water (SWLAA) and one sediment sample (SDLAA) were collected at the buried culvert outfall along the western fence line of the Disposal Area, southwest of Site 24-A. This outfall discharges storm water runoff from the Stockpile Area. Both samples were analyzed for metals, pesticides, PCBs, and TCL SVOCs.

10.3.2 Location B - Debris Site

Location B encompasses three sites: Site 22 (Hardware Burial Site), northern half of Site 23 and the northern end of Site 64. These sites were combined based on a review of the available historical information, geophysical survey, and passive soil gas survey. The maximum burial depths for Sites 22 and 23 as indicated in historical records is approximately 10 feet.

Figures 4-2 through 4-7 identify the PCE, TCE, CCl4, 1,2-DCE and chloroform soil gas plumes within Location B. Moderate to high soil gas concentrations associated with this area indicated high VOC concentrations in the disposal areas and surrounding soils.

Specific sampling objectives for Location B and Site 23 were.

- Delineate the horizontal and vertical extent of VOCs in the surface and subsurface soils associated with the soil gas plumes;
- Identify other contaminants associated with disposal operations in both surface and subsurface soil; and
- Evaluate the extent of metals and pesticides in surface soil.

10.3.2.1 Field Investigation

Five 30-foot borings were drilled and sampled within the PCE, TCE, CCl4, 1,2-DCE, and chloroform soil gas plumes (at Site 23). Surface samples from the 0- to 1-foot interval at all five borings were analyzed for TCL VOCs and metals. Four surface soil samples collected from Borings SBLBA, SBLBB, SBLBC, and SBLBD were analyzed for pesticides, PCBs, SVOCs and explosives. The surface soil sample from Boring SBLBE was analyzed for explosives. A total of 12 subsurface soil samples from the 5 borings were collected and analyzed for TCL VOCs. Samples were collected at 0- to 1-foot, 8- to 10-foot interval (near the bottom of the burial pit/trench), and below the disposal pit zone at the 14- to 16-feet interval. In addition, a sample was collected from 28 to 30 feet and held pending results from the 14- to 16-foot zone. The 14- to 16-foot samples were analyzed first with 24-hour laboratory turnaround; based on the results, 2 samples from the 28- to 30-foot interval were then analyzed for TCL VOCs (from Borings SBLBC and SBLBD). A sample from the 8- to 10-foot interval in Boring SBLBA was analyzed for herbicides and total metals, and a sample from the 8- to 10-foot interval in Boring SBLBE was analyzed for pesticides, PCBs and SVOCs. Samples from the 14- to 16-foot interval in Borings SBLBB, SBLBC, SBLBD and SBLBE were also analyzed for explosives.

10.3.3 Location C – South Burial Site

Location C encompasses Site 12 (Sulfuric and Hydrochloric Acid Burial Site) and 12.1 (Sulfuric and Hydrochloric Acid Burial Site), and Site 14 (Municipal Waste Burial Site B). These sites were combined based on a review of the available historical information, geophysical survey, and passive soil gas survey. The maximum burial depth, as indicated in historical records, is approximately 10 feet.

Figures 4-2 through 4-7 identify the PCE, 1,2-DCE, TCE, chloroform, and CCl4 soil gas plume within Location C. Moderate to high soil gas concentrations in this area indicated VOCs in the disposal areas and surrounding soils.

Specific sampling objectives for Location C were:

- Delineate the horizontal and vertical extent of VOCs in the surface and subsurface soils associated with the soil gas plumes;
- Identify other contaminants associated with disposal operations in both surface and subsurface soil; and
- Evaluate the extent of metals and pesticides in surface soil.

10.3.3.1 Field Investigation

During the 1999 investigation, six 30-foot borings were drilled within the PCE, TCE, CCl4, 1,2-DCE, and chloroform area of concern as defined by the soil gas plumes. A total of 6 surface soil samples were collected. Surface soil samples collected from Borings SBLCA, SBLCB, SBLCC and SBLCD were analyzed for metals, pesticides, PCBs, TCL SVOCs, TCL VOCs, and explosives. Samples from SBLCE and SBLCF were analyzed for metals, TCL SVOCs (sample from SBLCF only) and TCL VOCs. Subsurface samples from the 8- to 10-foot interval collected from Borings SBLCA and SBLCB were analyzed for herbicides, metals, and TCL VOCs.

Three samples from Borings SBLCA and SBLCF located within the Location C disposal area were analyzed for TCL/TAL to identify a broad range of potential contaminants. The TCL/TAL samples within the waste disposal areas were collected at 0 to 1 foot, the disposal pit zone (assumed to be 10 to 12 feet), and just below the disposal pit zone at 14 to 16 feet. In addition, a sample was collected from 28 to 30 feet and held pending results from the 14- to 16-foot zone. The 14- to 16-foot samples were analyzed first with 24-hour laboratory turnaround; based on the results, the 28- to 30-foot sample was analyzed for VOCs.

During the 2000 supplemental RI effort, 11 soil borings were installed adjacent to the previous location of Boring SBLCA and 4 at offsite locations in an attempt to delineate potential DNAPL source material from approximately 30 feet bgs to the underlying water table interface A total of 46 samples (including duplicates) were analyzed for VOCs. An additional 10 samples were analyzed for total organic carbon (TOC) content. The samples were collected from various depths in each boring. Table 10-4 presents the sample distribution information for the 2000 supplemental investigation.

10.3.4 Location D – North Burial Site

Location D encompasses Site 13 (Mixed Chemical Burial Site), Site 15 (Sodium Burial Sites), Site 15 1 (Sodium Phosphate Burial Site), Site 15.2 (14 Burial Pits: Sodium Phosphate, Sodium, Acid, Medical Supplies and Chlorinated Lime), Site 16 (Unknown Acid Burial Site), Site 16.1 (Acid), and Site 17 (Mixed Chemical Burial Site C). These sites were combined based on a review of the available historical information, geophysical survey, and passive soil gas survey. The maximum burial depth as indicated in historical records is approximately 10 feet.

Figures 4-2 through 4-7 identify the PCE, 1,2-DCE, TCE, CHCL3, and CCl4 soil gas area of potential concern within Location D. Moderate to high soil gas concentrations in this area indicated VOCs in the disposal areas and soils

Specific sampling objectives within the North Burial Site are the same as those for Location B – the Debris Site

10.3.4.1 Field Investigation

Eight 30-foot borings were drilled within the potential area of concern as defined by the soil gas contours. Surface soil samples from Borings SBLDA through SBLDH inside the disposal area were analyzed as follows: (1) All samples from the eight borings were analyzed for VOCs and metals; (2) surface soil samples from Borings SBLDA, B, C, and D were analyzed for pesticides/PCBs and SVOCs; (3) the surface soil sample from SBLDE was analyzed for explosives; and (4) the samples from SBLDG and SBLDH were also analyzed for SVOCs.

Subsurface soil samples from Borings SBLDA through SBLDH were analyzed according to the following: (1) the 8-10 ft bgs samples for SBLDA and SBLDB were analyzed for herbicides and metals; (2) the 14-16 ft bgs samples from SBLDE, SBLDF, SBLDG, and SBLDH were analyzed for explosives, pesticides/PCBs, and SVOCs; and all subsurface soil samples from these borings were analyzed for VOCs.

10.3.5 Location E – Site 10 Area

Location E encompasses Site 7 (Nitric Acid Burial Site), Site 8 (Methylbromide Burial Site B), and Site 10 (Solid Waste Burial Site). These sites were combined based on a review of the available historical information, geophysical survey, and passive soil gas survey. The maximum burial depth as indicated in historical records is approximately 10 feet.

Figures 4-2 through 4-7 identify the PCE, 1,2-DCE, TCE, and chloroform soil gas area of potential concern within Location E. Moderate to high soil gas concentrations indicated VOCs in the disposal areas and soils. Soil samples collected during the installation of the groundwater extraction system indicated the presence of PCE in the soil within the Site 10 Area.

Specific sampling objectives within the Site 10 Area are the same as those for Location B – the Debris Site.

10.3.5.1 Field Investigation

Eight 30-foot borings were drilled and samples collected within the potential area of concern as defined by the soil gas contours. Samples from Borings SBLEA, B, C, G, and H inside the disposal area were analyzed for TCL/TAL. Samples from all borings were analyzed for VOCs. All surface soil samples were analyzed for metals.

Subsurface soil samples from Borings SBLEA through SBLEH were analyzed according to the following: (1) the 8-10 ft bgs samples for SBLEA, SBLEB, SBLEG, and SBLEH were analyzed for herbicides and metals; (2) the 8 to 10 ft bgs zone sample from SBLEG was analyzed for explosives; (3) the 14-16 ft bgs samples from SBLED, SBLEE, SBLEG, and SBLEH were analyzed for TCL/TCL, except for the 8 to 10 ft sample from SBLEE that was not analyzed for metals; and all subsurface soil samples from these borings were analyzed for VOCs.

During the 2000 and 2001 supplemental RI sampling effort, one soil boring (SBLEE SB1) was installed adjacent to Boring SBLEE, in an attempt to delineate potential DNAPL source material from approximately 30 feet bgs to the top of the underlying water table. For Boring SBLEE SB1, a total of four samples (including duplicates) were analyzed for VOCs. An additional two samples were analyzed for TOC content. The samples were collected from various depths in the boring. Table 10-4 presents the sample distribution information for the samples collected from this boring.

10.3.6 Location F – POL Waste Sites

Location F encompasses Site 1-CWM (CAS Burial Pit), Site 2 (Ammonia Hydroxide Site), Site 3 (Mixed Chemical Burial Site), Site 4 (POL Burial Site), 4.1 Site (POL Burial Site), Site 5 (Methylbromide Burial Site A), Site 6 (Eye Ointment Burial Site), Site 9 (Ashes and Metal Burial Site), Site 11 (Trichloroacetic Acid Burial Site), Site 18 (Plane Crash Residue), and Site 86 (Food Supplies). These sites were combined, excluding Site 1-CWM, based on a review of the available historical information, the geophysical survey, and passive soil gas survey. The maximum burial depth as indicated in historical records is approximately 10 feet.

As shown in Figures 4-2 through 4-7, moderate to high PCE, 1,2-DCE, TCE, CCl4, and CHCL3 soil gas concentrations associated with this area indicated VOCs in the Disposal Area soils.

Specific sampling objectives within the Site 10 Area are the same as those for Location B – the Debris Site

10.3.6.1 Field Investigation

Seven borings were drilled within the potential area of concern as defined by the soil gas contours. Samples from Borings SBLFA, SBLFC, SBLFD, SBLFE, and SBLFG inside the disposal area were analyzed for TCL/TAL. Three surface soil samples were analyzed for pesticides. All surface soil samples were analyzed for metals.

Three samples from one boring located within the POL Waste Sites area were analyzed for TCL/TAL to identify a broad range of potential contaminants. The TCL/TAL samples within the disposal areas were collected at 0 to 1 foot, the disposal pit zone (assumed to be 10 to 12 feet), and just below the disposal pit zone at 14 to 16 feet. In addition, a sample was collected from 28 to 30 feet and held pending results from the 14- to 16-foot zone. The 14- to 16-foot samples were analyzed first with 24-hour laboratory turnaround; based on the results, the 28- to 30-foot sample was analyzed for VOCs.

10.3.7 Site 61 – Buried Drain Pipe

Site 61 is a buried pipe that drains surface runoff from the southwestern portion of the Northeast Open Area. It extends across the subsurface northern portion of the Disposal Area. To evaluate potential contamination in storm water, one 10-foot soil boring was hand-augered and sampled at the terminus of the drainpipe outside the northern portion of the Disposal Area. One surface water and one sediment sample were also collected outside the northwestern boundary of Dunn Field where the drainpipe empties into an open ditch All of these samples were analyzed for metals, pesticides/PCBs, and SVOCs.

10.4 Soil and Subsurface Soils Nature and Extent of Contamination

To characterize the nature and extent of contaminants within the Disposal Area, surface and subsurface soil samples were collected by CH2M HILL as part of the RI and by Parsons as part of the EE/CA in 1999 and analyzed for metals, VOCs, SVOCs, TOC, and the TCL/TAL parameters (organochlorine pesticides, herbicides, PCBs, and hexavalent chromium). For simplicity, the sample analysis results for these two investigations were combined. Table 10-5 presents the sampling results within the Disposal Area that exceeded background, listed by boring and sample interval. The nature and extent of the Disposal Area contaminant groups and individual contaminants that were detected above background are discussed below.

10.4.1 Metals Contamination

In the Disposal Area, 119 total surface and subsurface soil samples (including duplicates) were collected and analyzed for all the Priority Pollutant Metals - antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc–or a subset of the Priority Pollutant Metals depending on the data required from a given location. The FOD for these metals is included in Table 10-6. Figures 10-4 and 10-5 identify the locations within the Disposal Area where surface and subsurface samples were collected for metals analysis and highlight the metals with concentrations above background values.

The metals detected were divided into three categories based on the number of concentrations that exceeded background values and the relative importance of the metal as a potential contaminant. Each metal was classified as a primary metal of concern, a distributed metal, or a naturally occurring mineral as defined below:

- Primary metals of concern were detected above background values in a significant number of samples and may indicate a release from a source area in the Disposal Area;
- Distributed metals were detected above background values in a relatively small and insignificant number of samples; and
- Naturally occurring minerals were metals associated with the natural soil conditions that were detected above background values.

10.4.1.1 Primary Metals of Concern

Based on the definition above, chromium and lead were the primary metals of concern throughout the surface soils in the Disposal Area. Total chromium and lead were also classified as primary metals of concern in subsurface soils The primary metals of concern were detected at relatively low concentrations; therefore, no release from a discrete source within the Disposal Area is indicated by the sampling results.

Chromium. Total chromium in the surface soils of the Disposal Area was detected in 49 of 49 samples, of which 21 samples distributed across the Disposal Area (see Figure 10-4) exceeded the background value of 24 8 mg/kg. Chromium levels range from a low of 9.5 mg/kg to a maximum of 212 mg/kg at the Parsons SS-2 location, the same location as MW-60 in the northern part of the Disposal Area. The arithmetic mean of detected concentrations of total chromium is 30 mg/kg.

Surface soil chromium concentrations above background (Figure 10-4) are distributed across the Disposal Area. There is no cluster of elevated concentrations indicative of a specific release at one of the locations; however, the concentrations do appear where, based onsite records, disposal activities have taken place. As a result, the levels of chromium may be from general disposal operations or reworking of the surface soil with other soils or materials elevated in chromium content.

Subsurface chromium was detected in 69 of 69 samples submitted for laboratory analysis and exceeded the background value in 8 of these samples, with concentrations ranging from 26.8 to 76.4 mg/kg. The highest concentration reported was 74.6 mg/kg in the Parsons Sample SB-3 (current location of MW-59) at 9 to 11 feet bgs. A majority of the background exceedance values reported for total chromium were found in samples from subsurface soil borings located adjacent to former disposal pits found in the Disposal Area, as compared to samples from other subsurface borings located away from former disposal pits.

Lead. Lead was present in 50 of the 50 surface soil samples analyzed for lead and 28 of the 50 detections exceeded the background value of 30 mg/kg. The highest detection of lead was 1020 mg/kg in Location SS-2, the same sample point where total chromium was detected at its highest level in surface soils. Lead was detected in 69 of 69 subsurface soil samples and exceeded the background value in 13 of the 69 samples, with concentrations ranging from 27.3 mg/kg to 180 mg/kg (Figure 10-5). The highest detection was found in the 9- to 11-foot bgs sample from SB-3, the same sample point and depth where total chromium was detected at its highest level in subsurface soils.

Lead was detected at the following locations:

- In one surface soil sample (SS-7) at Location A, lead exceeded the background value with a concentration of 101 mg/kg. This sample was the background soil sample for the Parsons 1998 investigation.
- In five surface soil samples at Location B, lead exceeded the background value, with concentrations ranging from 52.2 mg/kg to 256 mg/kg.
- In Location C, lead exceeded the background value in one surface soil sample with a concentration of 192 mg/kg.
- In four surface soil samples at Location D (including one of the Parsons samples), lead exceeded the background value, with concentrations ranging from 62.3 mg/kg to 161 mg/kg. In one subsurface sample in Boring SBLDG, lead exceeded the background value at a concentration of 33.2 mg/kg
- In five surface soil samples at Location F, lead exceeded background with concentrations ranging from 64 mg/kg to 1,020 mg/kg. In one subsurface sample in Boring SBLFC, lead exceeded the background value at a concentration of 89 mg/kg.

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- In five surface soil samples at Location E, lead exceeded the background value, with concentrations ranging from 63.1 mg/kg to 789 mg/kg. In one subsurface sample in Boring SBLEE, lead exceeded the background value at a concentration of 72 mg/kg.
- In Site 61 surface soil, lead exceeded the background value, with a concentration of 107 mg/kg. In the subsurface, lead exceeded the background value in one sample with a concentration of 90.4 mg/kg.

As shown in Figure 10--4, elevated lead values (like those of chromium) are generally distributed throughout the Disposal Area. Exceptions are the two highest values, 789 and 1,020 mg/kg, from the northern portion of Dunn Field.

10.4.1.2 Distributed Metals

Based on the criteria in Section 10.4.1 above, antimony and thallium were classified as distributed metals in the Disposal Area surface soils and, antimony, selenium, and thallium were classified as distributed metals in subsurface soils. The isolated locations and minimal concentrations of these metals are shown in Figures 10-4 and 10-5. As a result, the concentrations of these constituents were not considered indicative of a release from a source area in the Disposal Area and these constituents were classified as distributed metals.

Antimony. Antimony was detected in 22 of 50 surface soil samples collected within the Disposal Area, but only three locations exceeded the background value of 7 mg/kg: surface soil samples collected from Location A (SBLAD) at a concentration of 25.3 mg/kg, from Location E (SBLEE) at 355 mg/kg, and from Location F (SS-2) at 12.9 mg/kg (see Figure 10-4). There is no background value for antimony in subsurface soils. Antimony was detected at an average concentration of 2.13 mg/kg in 30 of the 69 subsurface samples analyzed (see Figure 10-5).

Selenium. This metal was detected at an average concentration of 1.0 mg/kg (slightly above the background value of 0.6 mg/kg) in five surface soil samples, with a high detection of 1.4 mg/kg. Selenium was also detected in 9 out of 50 surface soil samples at an average concentration of 0.5 mg/kg (background value is 0.8 mg/kg). The highest reported surface soil concentration of selenium was 1.3 mg/kg.

Thallium. This metal, which has no background value, was detected in 20 of 50 samples collected in the Disposal Area (see Figure 10-4). The range of concentration was from 0.22 mg/kg to 0.68 mg/kg, with a median detection of 0.46 mg/kg. In the subsurface samples collected, thallium was detected in 8 of 24 samples and the range of concentration was from 0.31 mg/kg to 0.64 mg/kg. Thallium concentrations in the surface soils of the Northeastern Open Area are similar to the concentrations in the Disposal Area surface soils, indicating that thallium concentrations are not associated with waste management activities in the Disposal Area.

10.4.1.3 Naturally Occurring Metals

Several naturally occurring metals were detected in surface and subsurface soil concentrations at levels above the background value, as discussed below.

Aluminum. Aluminum was detected in 50 of 50 surface soil samples analyzed from the Disposal Area, and four samples (SBLBE, SBLEF, SS-2, and SS-4) exceeded the background value of 23,810 mg/kg (see Figure 10-4). The highest concentration of aluminum in surface soil samples was 31,100 mg/kg Aluminum was also detected in 69 of 69 subsurface soil samples analyzed and the highest detection was 32,200 mg/kg. The background subsurface soil concentration was 21,829 mg/kg. Bauxite stored onsite at Dunn Field is the most likely source of the slightly elevated aluminum values.

Arsenic. Arsenic was detected in 50 of 50 surface soil samples and 64 of 69 subsurface samples collected within the Disposal Area (see Figure 10-4 and 10-5). Arsenic was above the background value of 20 mg/kg in only two surface soil samples analyzed: SB61A contained 43.7 mg/kg and SS-2 contained 25.9 mg/kg. Arsenic was only detected once above the background value of 17 mg/kg in subsurface soil Sample SB61A from 3 to 5 feet bgs at a concentration of 35.6 mg/kg.

Copper. Copper was detected in 44 of 50 surface soil samples collected within the Disposal Area, and in 25 of 69 subsurface soil samples. As shown on Figure 10-4, copper exceeded the background value, at 16 locations in the surface soils. There was only one copper concentration greater than the background value in the subsurface soil Sample SB-2 from 3 to 5 feet. The highest detection of copper in surface soil samples was 796 mg/kg and the highest detection of copper in the subsurface was 89.9 mg/kg.

Zinc. Zinc was detected in 44 of 50 surface soil samples collected within the Disposal Area. Eleven of the 44 samples had zinc concentrations above the background value (126 mg/kg) ranging from 130 mg/kg to 935 mg/kg. In the Disposal Area subsurface soils, zinc was detected in 25 of 69 samples. Only one of the 25 samples had a zinc concentration above the background value (114 mg/kg); at Boring SBLFG from the 8- to 10-foot depth bgs, zinc was detected at a concentration of 2,560 mg/kg.

10.4.1.4 Summary of Metals Nature and Extent in Soils

Metals concentrations in surface and subsurface soil were compared to background and exceedences were plotted. Evaluation of the concentrations indicated that chromium and lead consistently exceed background concentrations in surface soil samples across the Disposal Area, probably resulting from waste management operations at the Disposal Area. Thallium concentrations are also elevated, but their concentrations are similar to those in the Northeast Open Area, indicating that thallium concentrations likely result from natural soil conditions (no background is available for thallium in soils). Arsenic exceeds background concentrations in two surface and one subsurface soil samples in the northern end of the Disposal Area. Other naturally occurring metals, aluminum, copper and zinc, exceeded background concentrations across the Disposal Area at reduced amounts.

With the exception of a cluster of elevated lead concentrations in Location E, there is no clear distribution of metals in the surface or subsurface soil indicative of a specific source of metal contamination within the Disposal Area Elevated metals likely result from general waste management and soil reworking across the Disposal Area.

10.4.2 Pesticide and PCB Contamination

The following 11 pesticides were detected in 28 pesticide surface soil samples within the Disposal Area· DDT, DDE, DDD, alpha-chlordane, gamma-chlordane, dieldrin, endosulfan sulfate, endrin ketone, heptachlor epoxide, methoxychlor, and endrin. Dieldrin was detected in 20 of 28 surface soil samples collected from the Disposal Area.

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The following 8 pesticides were detected in 21 pesticide subsurface soil samples within the Disposal Area: DDT, DDE, DDD, dieldrin, heptachlor, heptachlor epoxide, methoxychlor, and toxaphene. Dieldrin was detected in 6 of 21 subsurface soil samples collected from the Disposal Area

The distribution of pesticides in surface (Figure 10-6) and subsurface (Figure 10-7) soils is not associated with a specific waste disposal area. The pattern of concentration and location is consistent with that observed at the Main Installation, where pesticides were widely applied to surface soils. Pesticide detections in the 8- to 10-foot subsurface interval result from downward migration of the surface application and reworking of surface soil with subsurface soil during waste management operations at the Disposal Area.

10.4.3 SVOC Contamination

Surface soil samples were collected for SVOC (including PAH) analyses at 29 soil boring locations in the Disposal Area (Figure 10-8). A total of 22 SVOCs were detected in the surface soil samples. PAHs detected included: acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i) perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, 2-methylnapthalene, benzo(k)fluoranthene, fluorene, fluoranthene, naphthalene, phenanthrene, and pyrene. Other SVOCs detected in surface soil samples include· benzyl butyl phthalate, bis(2-ethylhexyl)phthalate, carbazole, dibenzofuran, diethyl phthalate, and di-n-butyl phthalate. Tables 10-5 and 10-6 present the concentrations at which these contaminants were detected.

Subsurface soil samples were collected for SVOC (including PAH) analyses (Figure 10-9). A total of 27 SVOCs were detected. PAHs that were detected included: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene), 2-methynapthalene, acenaphthene, acenaphthylene, anthracene, benzo(k)fluoranthene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, chrysene, and benzo(g,h,i) perylene. Other SVOCs detected in the subsurface soil samples include: 1,2,4-trichlorobenzene, 2,4,6-trichlorophenol, bis(2-ethylhexyl)phthalate, carbazole, di-n-butyl phthalate, dibenzofuran, diethyl phthalate, hexachlorobutadiene, pentachlorophenol, and phenol.

Many of the PAHs detected in subsurface soil samples do not have comparable background concentrations. This same situation is true for surface and subsurface SVOC soil samples. Many of the PAH constituents detected in surface soil samples do, however, have comparable background concentrations. Table 10-5 presents the analytical results for those PAHs in surface soil samples above background levels.

Surface and subsurface soil samples collected during the RI for the Main Installation revealed that PAHs are common throughout the Depot, generally associated with proximity to railroad tracks. Concentrations here are also likely associated with the tracks Sample stations SBLFA, SBLFB, SBLBA, and SBLBC are all downslope from the N-S trending railroad track that extends across Dunn Field. Samples from Boring SB61A, which revealed the presence of PAHs, is about 50 feet downslope from a commercial railroad track outside of the Dunn Field perimeter fence, and, were most likely impacted directly by outside operations.

10.4.4 VOCs in Surface Soil

Surface soil samples (0 to 1 foot bgs) were collected for VOC analyses at 45 soil boring locations in the Disposal Area (Figure 10-10). Figures 10-11A and 10-11B show the analytical results for samples collected in the surface and subsurface soil for the 1999 and 2000 investigations, respectively. Tables 10-5 and 10-6 present the analytical data for the surface soil samples.

Background values for most of the VOCs detected in the surface soil have not been established. Since VOCs in soil at many hazardous waste sites may act as groundwater contaminant sources, all constituents detected in the surface and subsurface soil were compared to generic groundwater protection criteria in a residential scenario, as established by EPA (March 2001). *Supplemental Guidance for Developing Soil Screening Guidance Levels for Superfund Sites.*(OSWER 9355.4-24. Peer Review Draft. As described in this document, groundwater screening levels "are back-calculated from an acceptable target soil leachate concentration using a dilution-attenuation factor (DAF)." For the comparison here, a DAF of 20 was used because the depth to groundwater beneath Dunn Field is greater than 70 feet bgs and natural contaminant reduction processes are expected to occur in the vadose zone. The residential scenario was also used because the criteria are assumed to be more stringent.

The results of the comparison can be found in Table 10-7. According to this table and information presented in Table 10-6:

- A surface soil sample at Location C (SBLCA) exceeded the screening value for TCE and 1,1,2,2-PCA at concentrations of 0.04 mg/kg and0.007 mg/kg, respectively;
- A surface soil sample at Location C (SBLCB) exceeded the screening value for TCE and vinyl chloride at concentrations of 0 61 mg/kg and 0 11 mg/kg, respectively;
- TCE was detected in one surface soil sample from Location C (SBLCD) at a concentration of 0 85 mg/kg; and
- TCE and 1,1,2,2-PCA were detected in one Location E surface soil sample (SBLEF) at concentrations of 0.067 mg/kg and 0.083 mg/kg, respectively.

Throughout the Disposal Area, TCE was the most prevalent VOC detected in surface soil. Maximum TCE concentrations (0.61 and 0.85 mg/kg) were detected at Location C, with the other concentrations ranging about an order of magnitude lower (0.002 to 0.077 mg/kg). VOC concentrations in surface soil are not bounded by surface soil sampling points in all areas; however, placement of borings in areas of maximum VOC soil gas concentrations and the continued presence of the Dunn Field perimeter fence restricting activities outside the current perimeter both indicate that maximum concentrations have been identified and that VOCs were not disposed of west of the Dunn Field perimeter

10.4.5 VOCs in Subsurface Soil

A total of 155 subsurface soil samples were analyzed for VOCs and 27 VOCs were detected. Figures 10-11A and 10-11B show the analytical results for samples collected in the surface and subsurface soil for the 1999 and 2000 investigations, respectively. Tables 10-5 and 10-6 present the analytical data for the subsurface soil samples.

Background values for most of the VOCs detected in subsurface soil samples have not been established. As discussed in the previous section, subsurface soil samples were compared to groundwater protection criteria. The results of that comparison can be found in Table 10-8 and are discussed in the following subsections.

Location A. VOCs exceeded screening values in only one (SBLAB) of the four Location A borings. 1,1,2,2-PCA, CCl4, chloroform, PCE, and TCE exceeded screening levels at all depths sampled (8 to 10 feet, 14 to 16 feet, and 28 to 30 feet). CCl4, PCE, and TCE exceeded screening levels at the 8- to 10-foot zone. 1,1,2,2-PCA, CCl4, chloroform, PCE, and TCE exceeded screening levels at 14 to 16 feet and 28 to 30 feet bgs. The deeper samples (28 to 30 feet) were collected at the bottom of the loess above the fluvial sands. The presence of VOCs at the base of the loess could be indicative of a possible pathway to groundwater. As discussed in Section 14, evaluation of concentration trends in groundwater extraction and monitoring wells near and downgradient of Location A indicate that a source of groundwater VOCs, particularly carbon tetrachloride and chloroform, is present in this area.

Location B. VOCs exceeded screening values in only two (SBLBC and SBLBD) of the five borings sampled in Location B. Both 1,1,2,2-PCA and vinyl chloride exceeded screening levels at a depth of 28 to 30 feet bgs. Only vinyl chloride exceeded the screening values at depths of 8- to 10-feet and 14 to 16 feet. The occurrence of both 1,1,2,2-PCA and vinyl chloride at the base of the loess could indicate a source of VOCs in groundwater, though vinyl chloride has not been detected in groundwater.

Location C. Nineteen borings and multiple samples were found to contain VOCs above groundwater protection criteria in the Location C area. The first 14 of the borings include the 1999 RI SBLCA boring and 13 borings from the 2000 supplemental RI. The other five borings included SBLCA, SBLCB, SBLCC, SBLCD, and SBLCF. The most common VOC constituents in samples from Location C included 1,1,2,2-PCA, TCE, and PCE, with concentrations ranging from a low of 0.007 mg/kg to 33 mg/kg. Least common constituents included vinyl chloride and 1,1,2-TCA. Samples that exceeded the criteria were collected from depths ranging from 8 feet to 83 feet bgs. Because of the depth to which VOCs were detected, a direct pathway to groundwater is indicated.

Location D. Chlorinated VOCs 1,1,2,2-PCA, TCE, and chloroform were detected at concentrations that exceed screening values in five of the eight borings sampled in Location D. VOCs at a depth of 8 to 10 feet bgs were detected in only one boring, while trichloroethelyne and chloroform were detected at the base of the loess, indicating a possible pathway to groundwater.

Location E. Chlorinated VOCs (1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCE, total 1,1-DCE, 1,2-DCA, methylene chloride, PCE, TCE, and vinyl chloride) were detected in only two of the six borings sampled in Location E. However, the highest concentrations of TCE (460 mg/kg), 1,1,2,2-PCA (160 mg/kg), and PCE (4.4 mg/kg) in soil at Dunn Field are found at Location E at the historically reported maximum depth for the disposal pits at Dunn Field. Samples that exceeded the criteria were collected from depths ranging from 5 feet to 67 feet bgs. Based on the samples collected, the concentrations of VOCs appear to decrease with depth but indicate a source and possible migration pathway to groundwater. Also, no bromomethane (methylene bromide) was detected in the surface soil or subsurface soil in Location E. As further discussed in Section 14, elevated concentrations of VOCs in groundwater are associated with this location.

Location F. Chlorinated VOCs (CCl4, chloroform, and methylene chloride) were detected in one (SBLFG) of the six borings sampled in Location F. The highest detection for CCl4 (6.8 mg/kg) was at 8 to 10 feet, the reported maximum depth of the Dunn Field disposal pits. Chloroform was also detected at a reported high concentration of 14 mg/kg in the 8- to 10-foot and 14- to 16-foot bgs depths. Also, no bromomethane (methylene bromide) was detected in the surface soil or subsurface soil in Location F

Site 61. No VOCs were detected in this soil boring

10.4.5.1 Summary of VOC Nature and Extent in Soils

VOCs in soils at Dunn Field as represented by the 1999 and 2000 sampling results (see Figures 10-10, -11A and -11B) correlate well with the extent of VOCs in the subsurface suggested by the passive soil gas survey results discussed in Section 4 (see Figures 4-2 through 4-6). The apparent clustering of the higher VOC detections correlates well with the historical information indicating that the disposal pits and trenches were relatively small and separate. In addition, the TCE, PCE, and carbon tetrachloride plume centroid depths reflect the Disposal Area source areas as defined by the soil analytical results. The Site 10 disposal pit (Solid Waste Burial Site) in Location E appears to be the largest single, potential chlorinated VOC source of contamination to groundwater. In addition, as evidenced by soil samples collected in Location C, VOCs have been transported from near the base of the disposal trenches (8 to 10 feet bgs) to depths (83 feet bgs) immediately above the water table.

The vertical extent of VOCs throughout the fluvial sands has not been fully characterized. However, as discussed in Section 14, groundwater contamination by VOCs occurs across the Disposal Area in concentrations that indicate dissolved-phase VOC transport within the fluvial sands to the fluvial aquifer. The relationship between VOC occurrences in soil and groundwater is further evaluated in Section 14.

10.5 Surface Water and Sediments

Two surface water and sediment samples were collected from within the Disposal Area. One sample was collected at the western fence line end near the Asphalt Pad and the other offsite at the outfall of the Site 61 culvert (see Figure 10-12).

The only COPCs identified in the surface water were aluminum, benzo(b)fluoranthene, beryllium, cadmium, chrysene, indeno(1,2,3-cd) pyrene, lead, and phenanthrene (see Figure 10-12). Sediment samples were collected for the same purpose and at the same time and location (see Figure 10-12) as the surface water samples Contaminant groups detected in the sediments included metals, pesticides, and PAHs. Based on comparison against background values and screening criteria, only the Site 61 sediments contained any COPCs: arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dieldrin, and indeno(1,2,3-cd) pyrene. No COPCs were detected in sediments associated with Location A (Asphalt Pad).

The SVOCs detected in surface water and sediments at Dunn Field are PAHs. PAHs have been observed throughout the Depot, generally associated with proximity to railroad tracks Both surface water and sediment sample locations drain areas associated with railroad tracks. The Site 61 culvert discharges into a ditch that parallels an active railroad track

10.6 Nature and Extent Conclusions

Conclusions regarding the nature and extent of contamination, expressed relative to the objectives of the RI established in Section 10.3, are as follows.

- Significant levels of the following chlorinated VOCs were detected in subsurface soils within the Disposal Area: 1,1,2,2-PCA, 1,2-DCA, 1,1-DCE, CCl4, chloroform, methylene chloride, PCE, TCE, and vinyl chloride.
- VOCs in soils correlate well with the extent of VOCs in the subsurface as defined by the passive soil gas survey.
- The apparent clustering of higher VOC concentrations both in soil gas and subsurface samples correlates well with historical information indicating that onsite disposal pits and trenches were relatively small and separate.
- Based on comparison of soil sample analytical results to contaminants in groundwater underlying Dunn Field (see Section 14.0), there appears to be a complete migration pathway from surface soil/disposal area to subsurface soil and then to groundwater for CVOCs.
- Chromium and lead consistently exceed background concentrations in surface and subsurface soil and likely result from waste management operations at the Disposal Area. Arsenic, aluminum, copper, and zinc also exceed background concentrations in soil. Metals in both surface and subsurface soil are widely distributed or sporadic and mostly do not correlate with specific locations or sites.
- Pesticides were detected in surface and subsurface (8- to 10-foot bgs) samples across the Disposal Area. The distribution of concentrations is indicative of broadcast application to the surface rather than disposal operations.
- Concentrations of metals, pesticides, and PAHs in ephemeral surface water flow exceeded background These chemicals also exceeded background in sediments in the northwest portion of the Disposal Area at Site 61. PAHs in sediment at Site 61 likely result from active offsite railroad tracks. Chemical concentrations in sediment from Location A–the Asphalt Pad–are almost all below background.

Tables

TABLE 10-1
Site Consolidation and Sampling Rationale within the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Consolidated Location ID	Historical Site Designation	Rationale for Consolidation and Sampling
Location A- Asphalt Pad	23, 24-A (CWM), 63	TCE, CCL4, 1,2-DCE, and PCE soil gas plume encompasses these sites Soil gas survey implies VOCs in the disposal pits and trenches
Location B- Debris Site	22, 23	TCE, CCL4, 1,2-DCE, and PCE soil gas plume encompasses these sites Soil gas survey implies VOCs in the disposal pits and trenches
Location C- South Burial Site	12, 12.1, 14	TCE, CCL4, 1,2-DCE, and PCE soil gas plume encompasses these sites. Soil gas survey implies VOCs in the disposal pits and trenches
Location D- North Burial Site	13, 15, 15.1, 15.2, 16, 16.1, 17	TCE, CCL4, 1,2-DCE, and PCE soil gas plume encompasses these sites. Soil gas survey implies VOCs in the disposal pits and trenches
Location E- Site 10 Area	7, 8, 10	TCE, CCL4, 1,2-DCE, and PCE soil gas plume encompasses these sites Soil gas survey implies VOCs in the disposal pits and trenches
Location F- POL Waste Sites	1 (CWM), 2, 3, 4, 4.1, 5, 6, 9, 11, 18, 86	TCE, CCL4, 1,2-DCE, and PCE soil gas plume encompasses these sites. Soil gas survey implies VOCs in the disposal pits and trenches
Site 61- Stormwater Culvert	61	Discharge area evaluated for the presence of contaminates associated with Dunn Field historical activities

Table 10-2
Sampling and Analysis Summary for 1999 Dunn Field RI

Rev. 1 Memphis Depot Dunn Field RI Report

							Analyses											
Site Consolidation Identification	Sites Consolidated	Sampling Objective	Number of Borings	Surface soil (0-1ft)	Sub-surface soil (>1-30 ft)	Sample Interval (ft)	VOC	PPM Metal	TAL	Herbicides	Pest/ PCB	SVOC	Aluminum	Thiodigycol	Dioxin	MS/ MSD	Field Duplicates	Comments
A-Asphalt Pad	23, 24-A (CWM), 63	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities	4	4	8 (4 held)	0.0-1.0, waste, 14-16, 28-30	12 (4 held)	4	1	1	5	5	2			1	2	
B-Debris Site	22, 23	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	5	5	15	0.0-1.0, waste, 14-16, 28-30	15 (5 held)	5	4	1	5	5				1	2	
C-South Burial Site	12, 12.1, 14	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	6	6	18	0.0-1.0, waste, 14-16, 28-30	24	6	2	2	6	7				1	3	
D-North Burial Site	13, 15, 15.1, 15.2, 16, 16.1, 17	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities	8	8	24	0.0-1.0, waste, 14-16, 28-30	32	8	4	4	8	10				3	2	

Table 10-2
Sampling and Analysis Summary for 1999 Dunn Field RI

Rev. 1 Memphis Depot Dunn Field RI Report

Site Consolidation Identification	Sites Consolidated	Sampling Objective	Number of Borings	Surface soil (0-1ft)	Sub-surface soil (>1-30 ft)	Sample Interval (ft)	Analyses											Comments
							VOC	PPM Metal	TAL	Herbicides	Pest/ PCB	SVOC	Aluminum	Thiodigycol	Dioxin	MS/ MSD	Field Duplicates	
E-Site 10 Area	7, 8, 10	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	8	8	24	0.0-1.0, waste, 14-16, 28-30	32	8	4	4	9	9				4	1	
F-POL Waste Sites	2, 3, 4, 4.1, 5, 6, 9, 11, 18, 86	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	7	7	21	0.0-1.0, waste, 14-16, 28-30	28	7	6	6	11	14		1		2	3	
G-Asphalt Burial Site and Tear Gas Canister Burn Area	Incinerator Site, 19, 20, 62, TEC	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	6	5	6(6held)	0.0-1.0, 3.0-5.0, 8.0-10	17	5			4					1	1	
H-Drainage Culvert Discharge Area	50	Evaluate presence of volatile organic compounds in surface soil - confirm horizontal and vertical extent. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	3	3	3	0.0-1.0, waste, 8.0-10	9	3			3	3					2	

Table 10-2
Sampling and Analysis Summary for 1999 Dunn Field RI

Rev 1 Memphis Depot Dunn Field RI Report

							Analyses													
Site Consolidation Identification	**Sites Consolidated**	**Sampling Objective**	**Number of Borings**	**Surface soil (0-1ft)**	**Sub-surface soil (>1-30 ft)**	**Sample Interval (ft)**	**VOC**	**PPM Metal**	**TAL**	**Herbicides**	**Pest/ PCB**	**SVOC**	**Aluminum**	**Thiodigycol**	**Dioxin**	**MS/ MSD**	**Field Duplicates**	**Comments**
Site 61-Buried Drain Pipe	61	Evaluate pesticide and metals contamination in surface soil - confirm horizontal and vertical extent. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	1	1	2	0.0-1.0, 3.0-5.0, 8.0-10	3	3			3	3		3	3			
Surface Water							1	2			2	2		1	1			
Sediment							1	2			2	2		1	1			

ft = feet; VOC = volatile organic compounds; PPM = Priority Pollutant Metals; TAL = Target Analyte List; PCB = polychlorinated biphenyls; SVOC = semi-volatile organic compounds; MS/MSD = matrix spike/matrix spike duplicate

Table 10-2A
Sampling and Analysis Summary for 2000/2001 DNAPL Investigation
Rev. 1 Memphis Depot Dunn Field RI Report

							Analyses												
Site Consolidation Identification	Sites Consolidated	Sampling Objective	Number of Borings	Surface soil (0-1ft)	Sub-surface soil (>1-85 ft)	Sample Interval (ft)	VOC	TOC	TAL	Herbicides	Pest/ PCB	SVOC	Aluminum	Thiodigycol	Dioxin	Zinc	MS/MSD	Field Duplicates	Comments
C-South Burial Site	12, 12.1, 14	Evaluate presence of volatile organic compounds in surface soil – confirm horizontal and vertical extent. Evaluate the nature of the materials contained in the disposal area. Data will support human health and ecological risk assessment of exposure to surface soil during construction activities.	16	0		various	45	21									1	5	
Groundwater		Evaluate presence of volatile organic, semivolatile organic, metals, and pesticides in surface water. Data will support human health and ecological risk assessment of exposure.					32										6	4	

ft = feet; VOC = volatile organic compounds; PPM = Priority Pollutant Metals; TAL = Target Analyte List; PCB = polychlorinated biphenyls, SVOC = semi-volatile organic compounds, MS/MSD = matrix spike/matrix spike duplicate

TABLE 10-3
Analyte Groups for the Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Matrix	Station Identification	Sample Identification	Date Collected	Metals, Total	OC Pesticides	Polychlorinated biphenyls	Semivolatiles	Thiodiglycol	Volatiles	1,4-Oxathiane & 1,4-Dithiane
SB	SB21A	DJA174	03/30/1999	X			X			
SB	SB21B	DJA177	03/30/1999	X			X			
SB	SB21C	DJA180	03/30/1999	X			X			
SB	SB21D	DJA183	04/01/1999	X			X			
SB	SBLGA	DJA143	03/29/1999						X	
SB	SBLGA	DJA144	03/29/1999						X	
SB	SBLGB	DJA146	03/29/1999						X	
SB	SBLGB	DJA147	03/29/1999						X	
SB	SBLGC	DJA149	03/29/1999						X	
SB	SBLGC	DJA150	03/29/1999						X	
SB	SBLGC	DJA238FD	03/29/1999						X	
SB	SBLGD	DJA152	03/29/1999						X	
SB	SBLGD	DJA153	03/29/1999						X	
SB	SBLGE	DJA155	03/29/1999						X	
SB	SBLGE	DJA156	03/29/1999						X	
SB	SBLGF	DJA158	04/01/1999						X	
SB	SBLGF	DJA159	04/01/1999						X	
SB	SBLHA	DJA161	03/30/1999						X	
SB	SBLHA	DJA162	03/30/1999						X	
SB	SBLHB	DJA164	03/30/1999						X	
SB	SBLHB	DJA165	03/30/1999						X	
SB	SBLHC	DJA167	03/30/1999						X	
SB	SBLHC	DJA168	03/30/1999						X	
SB	SBLHC	DJA284FD	03/30/1999						X	
SE	SDLHA	DJA169	03/15/1999	X	X	X	X			
SE	SDLHB	DJA171	03/15/1999	X	X	X	X			
SS	SB21A	DJA173	03/30/1999	X			X			
SS	SB21B	DJA176	03/30/1999	X			X			
SS	SB21C	DJA179	03/30/1999	X			X			
SS	SB21D	DJA182	04/01/1999	X			X			
SS	SBLGA	DJA142	03/29/1999	X	X	X			X	
SS	SBLGB	DJA145	03/29/1999	X	X	X			X	
SS	SBLGC	DJA148	03/29/1999	X	X	X			X	
SS	SBLGD	DJA151	03/29/1999	X	X	X			X	
SS	SBLGE	DJA154	03/29/1999	X					X	
SS	SBLHA	DJA160	03/30/1999	X	X	X	X		X	
SS	SBLHA	DJA239FD	03/30/1999	X	X	X	X		X	
SS	SBLHB	DJA163	03/30/1999	X	X	X	X		X	
SS	SBLHC	DJA166	03/30/1999	X	X	X	X		X	
SS	SS-8	DDMT-081098-SS8	08/10/1998	X				X		X

TABLE 10-3

Analyte Groups for the Northeast Open Area

Rev 1 Memphis Depot Dunn Field RI

Matrix	Station Identification	Sample Identification	Date Collected	Metals, Total	OC Pesticides	Polychlorinated biphenyls	Semivolatiles	Thiodiglycol	Volatiles	1,4-Oxathiane & 1,4-Dithiane
SS	SS6085A	DJA185	04/01/1999	X	X	X				
SS	SS6085B	DJA186	04/01/1999	X	X	X				
SS	SS6085C	DJA187	04/01/1999	X	X	X				
SS	SS6085D	DJA188	04/01/1999	X	X	X				
SS	SS6085E	DJA189	04/01/1999	X	X	X				
SS	SS6085F	DJA190	04/01/1999	X	X	X				
SS	SS6085F	DJA288FD	04/01/1999	X	X	X				
WS	SWLHA	DJA170	03/13/1999	X	X	X	X			
WS	SWLHB	DJA172	03/13/1999	X	X	X	X			

SB = Subsurface soil sample

SS = Surface soil sample

WS = Surface water sample

Table 10-4
Sample Distribution for 2000 DNAPL Investigation
Rev 1 Memphis Depot Dunn Field RI

Boring ID and Dates of Collection	Volatile Organics (EnCore Sample Device)				Sieve Analysis	Total Organic Carbon	Equipment Rinse
	Columbia Labs	Duplicate	ETC Labs	Duplicate			
Distribution	2 per 10	1 per 10		1 per 10			
SBLCA-SB-1 10/12/2000			33 feet 64 feet 74 feet		20 feet 41 feet 53 feet		X
SBLCA-SB-2 10/16/2000	44S feet[1]		44 feet 68 feet 73 feet	444 feet	11 feet 46 feet 74 feet	12 feet 47 feet 73 feet 90 feet	
SBLCA-SB-3 10/17/2000 10/18/2000			44 feet 53 feet 67 feet		13 feet 37 feet	12 5 feet 36 feet 87 feet	
SBLCA-SB-4 10/18/2000 10/19/2000	75S feet	755S feet	42 feet 52 feet 75 feet		19 feet	18 5 feet	X
SBLCA-SB-5 10/24/2000			44 feet 54 feet 77 feet		18 feet 42 feet 60 5 feet	17 5 42 5 feet 61 feet 88 feet	
SBLCA-SB-8 10/25/2000	47S feet		47 feet 52 feet 72 feet	522 feet	32 feet	31 5 feet	
SBLCA-SB-9 10/30/2000 10/31/2000	56S feet		22 feet 42 feet 56 feet 77 feet		42 feet	42 5 feet 87 feet	X
SBLCA-SB-10 11/01/2000			12 5 feet 37 5 feet 57 5 feet 72 5 feet	12 55 feet			
SBLCA-SB-11 11/07/2000	27 5S feet		27 5 feet 37 5 feet 81 feet	811 feet			
SBLCA-SB-12 11/13/2000	74S feet		46 5 feet 74 feet			80 5 feet	
SBLCA-SB-13 11/14/2000			77 feet				X
SBLCA-SB-14 11/21/2000			83 feet				
SBLCA-SB-15 11/28/2000	80S feet		80 feet				X
SBLEE-SB-1 10/26/2000 10/27/2000	34S feet		5 feet* 34 feet 67 feet		19 feet 41 feet 54 feet 64 feet	18 5 feet 41 5 feet 54 5 feet 64 5 feet 74 feet	
Total	8	1	37	4	18	21	5

* 4 oz jar of asphalt medium

Sample ID SBLCA-SB-1 and add number of feet below ground surface as found in columns Example SBLCA-SB-1-33

[1] "S" in sample number stands for split sample

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are:

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Dioxins								
Sediments								
SD61A	DJA194	0 0 to 1 0	OCTACHLORODIBENZO-p-DIOXIN	0 001204	=	MG/KG	0 00858	
Surface Soils								
SS61A	DJA191	0 0 to 1 0	OCTACHLORODIBENZO-p-DIOXIN	0 00013	J	MG/KG	0 00972	
Surface Water								
SW61A	DJA195	Not Applicable	OCTACHLORODIBENZO-p-DIOXIN	0 0000012	J	MG/L	0 0000012	
General Chemistry								
Subsurface Soils								
SBLCA	SBLCA-SB-12-80 5	80 5 to 80 5	TOTAL ORGANIC CARBON	30600	=	MG/KG		
SBLCA	SBLCA-SB-3-12 5	12 5 to 12 5	TOTAL ORGANIC CARBON	1200	=	MG/KG		
SBLCA	SBLCA-SB-3-36	36 0 to 36 0	TOTAL ORGANIC CARBON	500	=	MG/KG		
SBLCA	SBLCA-SB-4-18 5	18 5 to 18 5	TOTAL ORGANIC CARBON	2100	=	MG/KG		
SBLCA	SBLCA-SB2-12	12 0 to 12 0	TOTAL ORGANIC CARBON	3000	=	MG/KG		
SBLCA	SBLCA-SB2-47	47 0 to 47 0	TOTAL ORGANIC CARBON	1500	=	MG/KG		
SBLCA	SBLCA-SB2-73CAS	73 0 to 73 0	TOTAL ORGANIC CARBON	900	=	MG/KG		
SBLCA	SBLCA SB2 90	90 0 to 90 0	TOTAL ORGANIC CARBON	900	=	MG/KG		
SBLCA	SBLCA-SB3-87	87 0 to 87 0	TOTAL ORGANIC CARBON	3600	=	MG/KG		
SBLCA	SBLCASB542 5	42 5 to 42 5	TOTAL ORGANIC CARBON	600	=	MG/KG		
SBLEE	SBLEESB118 5	18 5 to 18 5	TOTAL ORGANIC CARBON	5300	=	MG/KG		
SBLEE	SBLEESB164 5	64 5 to 64 5	TOTAL ORGANIC CARBON	2700	=	MG/KG		
Metals								
Subsurface Soils								
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	ALUMINUM	9930	=	MG/KG	21829	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	ARSENIC	7	=	MG/KG	17	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	BARIUM	85	=	MG/KG	300	
SB-1	DDMT-080598-SB1-11-13-06	11 0 to 13 0	CALCIUM	2430	=	MG/KG	2432	
SB-1	DDMT-080598-SB1-11-13-06	11 0 to 13 0	CHROMIUM TOTAL	15 9	=	MG/KG	26 4	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	COBALT	6 2	=	MG/KG	20 4	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	IRON	19100	=	MG/KG	38480	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	LEAD	8 9	=	MG/KG	23 9	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	MAGNESIUM	2720	=	MG/KG	4900	
SB-1	DDMT-080598-SB1-11-13-06	11 0 to 13 0	MANGANESE	541	=	MG/KG	1540	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	NICKEL	18 8	=	MG/KG	36 6	
SB-1	DDMT-080598-SB1-11-13-06	11 0 to 13 0	POTASSIUM	1040	=	MG/KG	1800	
SB-1	DDMT-080598-SB1-11-13'-06	11 0 to 13 0	SODIUM	297	=	MG/KG		
SB-1	DDMT-080598-SB1 11-13-06	11 0 to 13 0	VANADIUM	28 7	=	MG/KG	51 3	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	ALUMINUM	13300	=	MG/KG	21829	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	ARSENIC	6 1	=	MG/KG	17	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	BARIUM	98 4	=	MG/KG	300	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	CALCIUM	2410	=	MG/KG	2432	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	CHROMIUM TOTAL	17 5	=	MG/KG	26 4	
SB-1	DDMT-080598-SB1-13-15-07	13 0 to 15 0	COBALT	7 9	=	MG/KG	20 4	
SB-1	DDMT-080598-SB1 13-15'-07	13 0 to 15 0	IRON	18100	=	MG/KG	38480	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	LEAD	9	=	MG/KG	23 9	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	MAGNESIUM	2910	=	MG/KG	4900	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	MANGANESE	656	=	MG/KG	1540	
SB-1	DDMT-080598-SB1-13-15-07	13 0 to 15 0	MERCURY	0 03	=	MG/KG	0 2	
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	NICKEL	19 4	=	MG/KG	36 6	
SB-1	DDMT-080598-SB1-13-15-07	13 0 to 15 0	POTASSIUM	1090	=	MG/KG	1800	
SB-1	DDMT-080598-SB1-13-15-07	13 0 to 15 0	SODIUM	340	=	MG/KG		
SB-1	DDMT-080598-SB1 13-15-07	13 0 to 15 0	VANADIUM	35 8	=	MG/KG	51 3	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	ALUMINUM	10000	=	MG/KG	21829	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	ARSENIC	4 9	=	MG/KG	17	
SB-1	DDMT-080598 SB1-15-17'-08	13 0 to 15 0	BARIUM	84 8	=	MG/KG	300	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	CALCIUM	2220	=	MG/KG	2432	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	CHROMIUM TOTAL	14 6	=	MG/KG	26 4	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	COBALT	7 1	=	MG/KG	20 4	
SB-1	DDMT-080598-SB1 15-17'-08	13 0 to 15 0	IRON	16200	=	MG/KG	38480	
SB 1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	LEAD	8 2	=	MG/KG	23 9	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	MAGNESIUM	2540	=	MG/KG	4900	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	MANGANESE	569	=	MG/KG	1540	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	NICKEL	17 2	=	MG/KG	36 6	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	POTASSIUM	776	=	MG/KG	1800	
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	SODIUM	304	=	MG/KG		
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	VANADIUM	27 7	=	MG/KG	51 3	
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	ALUMINUM	32200	=	MG/KG	21829	X
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	ARSENIC	15 1	=	MG/KG	17	
SB-1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	BARIUM	174	=	MG/KG	300	
SB-1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	BERYLLIUM	0 84	=	MG/KG	1 2	
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	CALCIUM	4700	=	MG/KG	2432	X
SB 1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	CHROMIUM TOTAL	28 5	=	MG/KG	26 4	X
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	COBALT	13	=	MG/KG	20 4	
SB 1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	IRON	31900	=	MG/KG	38480	
SB-1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	LEAD	27 3	J	MG/KG	23 9	X
SB-1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	MAGNESIUM	3950	=	MG/KG	4900	
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	MANGANESE	1090	=	MG/KG	1540	
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	MERCURY	0 11	=	MG/KG	0 2	
SB 1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	NICKEL	22 5	=	MG/KG	36 6	
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	POTASSIUM	3190	=	MG/KG	1800	X
SB 1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	SODIUM	200	=	MG/KG		
SB-1	DDMT-080598-SB1-3-5-02	3 0 to 5 0	VANADIUM	64 6	=	MG/KG	51 3	X
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	ALUMINUM	17000	=	MG/KG	21829	
SB-1	DDMT-080598-SB1-7-9-04	7 0 to 9 0	ARSENIC	10 7	=	MG/KG	17	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	BARIUM	121	=	MG/KG	300	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	CALCIUM	1250	=	MG/KG	2432	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB-1	DDMT-080598-SB1 7-9'-04	7 0 to 9 0	CHROMIUM TOTAL	18 3	=	MG/KG	26 4	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	COBALT	6 8	=	MG/KG	20 4	
SB-1	DDMT-080598-SB1-7 9'-04	7 0 to 9 0	IRON	24900	=	MG/KG	38480	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	LEAD	11 7	J	MG/KG	23 9	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	MAGNESIUM	3250	=	MG/KG	4900	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	MANGANESE	488	=	MG/KG	1540	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	NICKEL	20 1	=	MG/KG	36 6	
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	POTASSIUM	1930	=	MG/KG	1800	X
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	SODIUM	243	=	MG/KG		
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	VANADIUM	39 5	=	MG/KG	51 3	
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	ALUMINUM	15700	=	MG/KG	21829	
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	ARSENIC	9 5	=	MG/KG	17	
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	BARIUM	109	=	MG/KG	300	
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	CALCIUM	2460	=	MG/KG	2432	X
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	CHROMIUM, TOTAL	18 9	=	MG/KG	26 4	
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	COBALT	7	=	MG/KG	20 4	
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	IRON	23300	=	MG/KG	38480	
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	LEAD	10 6	J	MG/KG	23 9	
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	MAGNESIUM	3050	=	MG/KG	4900	
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	MANGANESE	585	=	MG/KG	1540	
SB-1	DDMT-080598-SB1 9-11'-05	9 0 to 11 0	NICKEL	19 9	=	MG/KG	36 6	
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	POTASSIUM	2150	=	MG/KG	1800	X
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	SODIUM	258	=	MG/KG		
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	VANADIUM	40	=	MG/KG	51.3	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	ALUMINUM	1240	=	MG/KG	21829	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	BARIUM	4 9	=	MG/KG	300	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	CHROMIUM TOTAL	4 2	=	MG/KG	26 4	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	IRON	2450	=	MG/KG	38480	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	LEAD	2 6	J	MG/KG	23 9	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	MANGANESE	22 2	J	MG/KG	1540	
SB-1	DDMT-082598-SB1-44-45 5'-08	44 0 to 45 5	VANADIUM	3 4	=	MG/KG	51 3	
SB-2	DDMT-080698-SB2-11-13 -06	11 0 to 13 0	ALUMINUM	25200	=	MG/KG	21829	X
SB-2	DDMT-080698-SB2-11-13 -06	11 0 to 13 0	ARSENIC	8 8	=	MG/KG	17	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	BARIUM	120	=	MG/KG	300	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	CALCIUM	1210	=	MG/KG	2432	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	CHROMIUM, TOTAL	23 9	=	MG/KG	26 4	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	COBALT	8 5	=	MG/KG	20 4	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	IRON	20900	=	MG/KG	38480	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	LEAD	13 2	J	MG/KG	23 9	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	MAGNESIUM	2490	=	MG/KG	4900	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	MANGANESE	238	=	MG/KG	1540	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	MERCURY	0 04	J	MG/KG	0 2	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	NICKEL	19 3	=	MG/KG	36 6	
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	POTASSIUM	2210	J	MG/KG	1800	X
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	VANADIUM	45 7	=	MG/KG	51 3	
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	ALUMINUM	26200	=	MG/KG	21829	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	ARSENIC	10 3	=	MG/KG	17	
SB-2	DDMT-080698-SB2-13-15 -07	13 0 to 15 0	BARIUM	145	=	MG/KG	300	
SB-2	DDMT-080698-SB2-13-15 -07	13 0 to 15 0	CALCIUM	2600	=	MG/KG	2432	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	CHROMIUM TOTAL	36 5	=	MG/KG	26 4	X
SB-2	DDMT-080698-SB2-13-15 -07	13 0 to 15 0	COBALT	8 1	=	MG/KG	20 4	
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	IRON	24700	=	MG/KG	38480	
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	LEAD	46 2	J	MG/KG	23 9	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	MAGNESIUM	2950	=	MG/KG	4900	
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	MANGANESE	402	=	MG/KG	1540	
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	MERCURY	0 04	J	MG/KG	0 2	
SB-2	DDMT-080698-SB2-13-15 -07	13 0 to 15 0	NICKEL	20 2	=	MG/KG	36 6	
SB-2	DDMT-080698-SB2-13-15 -07	13 0 to 15 0	POTASSIUM	2550	=	MG/KG	1800	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	VANADIUM	49 2	=	MG/KG	51 3	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	ALUMINUM	19400	J	MG/KG	21829	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	ANTIMONY	1 3	J	MG/KG		
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	ARSENIC	9 1	=	MG/KG	17	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	BARIUM	108	=	MG/KG	300	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	CALCIUM	1280	=	MG/KG	2432	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	CHROMIUM TOTAL	20 1	=	MG/KG	26 4	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	COBALT	9 2	=	MG/KG	20 4	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	IRON	20700	=	MG/KG	38480	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	LEAD	12 5	=	MG/KG	23 9	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	MAGNESIUM	2260	=	MG/KG	4900	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	MANGANESE	252	=	MG/KG	1540	
SB-2	DDMT-080698-SB2 15-17'-08	11 0 to 13 0	NICKEL	18 7	=	MG/KG	36 6	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	POTASSIUM	1470	J	MG/KG	1800	
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	VANADIUM	38	=	MG/KG	51 3	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	ALUMINUM	15400	=	MG/KG	21829	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	ANTIMONY	1 2	J	MG/KG		
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	ARSENIC	14 3	=	MG/KG	17	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	BARIUM	207	=	MG/KG	300	
SB-2	DDMT-080698-SB2-3-5 -02	3 0 to 5 0	CALCIUM	2400	=	MG/KG	2432	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	CHROMIUM TOTAL	24 4	=	MG/KG	26 4	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	COBALT	12 8	=	MG/KG	20 4	
SB-2	DDMT-080698-SB2-3-5 -02	3 0 to 5 0	COPPER	89 9	=	MG/KG	32 7	X
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	IRON	32400	=	MG/KG	38480	
SB-2	DDMT-080698-SB2-3-5 -02	3 0 to 5 0	LEAD	21 3	=	MG/KG	23 9	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	MAGNESIUM	2800	=	MG/KG	4900	
SB-2	DDMT-080698-SB2-3-5 -02	3 0 to 5 0	MANGANESE	974	=	MG/KG	1540	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5.0	MERCURY	0 04	=	MG/KG	0 2	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Arez
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB 2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	NICKEL	27	=	MG/KG	36 6	
SB-2	DDMT-080698-SB2-3-5-02	3 0 to 5 0	POTASSIUM	1250	=	MG/KG	1800	
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	SELENIUM	1 4	=	MG/KG	0 6	X
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	VANADIUM	33 4	=	MG/KG	51 3	
SB-2	DDMT-080698-SB2 5-7'-03	5 0 to 7 0	ALUMINUM	17900	=	MG/KG	21829	
SB-2	DDMT-080698-SB2 5-7'-03	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-2	DDMT-080698-SB2 5-7'-03	5 0 to 7 0	ARSENIC	12 2	=	MG/KG	17	
SB-2	DDMT-080698-SB2 5-7'-03	5 0 to 7 0	BARIUM	173	=	MG/KG	300	
SB-2	DDMT-080698-SB2 5-7'-03	5 0 to 7.0	CALCIUM	2680	=	MG/KG	2432	X
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	CHROMIUM, TOTAL	19 5	=	MG/KG	26 4	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	COBALT	6 5	=	MG/KG	20 4	
SB 2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	IRON	24800	=	MG/KG	38480	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	LEAD	21 6	=	MG/KG	23 9	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	MAGNESIUM	2950	=	MG/KG	4900	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	MANGANESE	570	=	MG/KG	1540	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	MERCURY	0 05	=	MG/KG	0 2	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	NICKEL	20 1	=	MG/KG	36 6	
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	POTASSIUM	1500	=	MG/KG	1800	
SB 2	DDMT-080698-SB2 5-7'-03	5 0 to 7 0	VANADIUM	37 8	=	MG/KG	51 3	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	ALUMINUM	18700	=	MG/KG	21829	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	ANTIMONY	1 2	J	MG/KG		
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	ARSENIC	11 7	=	MG/KG	17	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	BARIUM	131	=	MG/KG	300	
SB-2	DDMT-080698-SB2 7-9'-04	7 0 to 9 0	CALCIUM	2530	=	MG/KG	2432	X
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	CHROMIUM, TOTAL	23 1	=	MG/KG	26 4	
SB-2	DDMT-080698-SB2 7-9'-04	7 0 to 9 0	COBALT	8	=	MG/KG	20 4	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	IRON	24400	=	MG/KG	38480	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	LEAD	34 2	=	MG/KG	23 9	X
SB-2	DDMT-080698-SB2-7 9'-04	7 0 to 9 0	MAGNESIUM	2830	=	MG/KG	4900	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	MANGANESE	528	=	MG/KG	1540	
SB-2	DDMT-080698-SB2 7-9'-04	7 0 to 9 0	MERCURY	0 04	=	MG/KG	0 2	
SB-2	DDMT-080698-SB2 7-9'-04	7 0 to 9 0	NICKEL	19 8	=	MG/KG	36 6	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	POTASSIUM	1450	=	MG/KG	1800	
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	VANADIUM	38 3	=	MG/KG	51 3	
SB-2	DDMT-082498-SB2-64-65 5'-08	64 0 to 65 5	ALUMINUM	721	=	MG/KG	21829	
SB-2	DDMT-082498-SB2-64-65 5'-08	64 0 to 65 5	CHROMIUM TOTAL	1 6	J	MG/KG	26 4	
SB-2	DDMT-082498-SB2-64-65 5'-08	64 0 to 65 5	IRON	2090	J	MG/KG	38480	
SB-2	DDMT-082498-SB2-64-65 5'-08	64 0 to 65 5	LEAD	0 65	J	MG/KG	23 9	
SB-2	DDMT-082498-SB2-64-65 5'-08	64 0 to 65 5	MANGANESE	2 5	J	MG/KG	1540	
SB-2	DDMT-082498-SB2-64-65 5'-08	64 0 to 65 5	VANADIUM	2	=	MG/KG	51 3	
SB-2	DDMT-082498-SB2-64-65 5-08	64 0 to 65 5	ZINC	2 2	J	MG/KG	114	
SB-3	DDMT-080698-SB3-1-3 -01	1 0 to 3 0	ALUMINUM	19700	J	MG/KG	21829	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	ARSENIC	11 8	=	MG/KG	17	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	BARIUM	209	=	MG/KG	300	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	BERYLLIUM	0 78	=	MG/KG	1 2	
SB-3	DDMT-080698-SB3-1 3'-01	1 0 to 3 0	CALCIUM	3440	=	MG/KG	2432	X
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	CHROMIUM, TOTAL	53 9	=	MG/KG	26.4	X
SB-3	DDMT-080698-SB3-1-3 -01	1 0 to 3 0	COBALT	9 9	=	MG/KG	20 4	
SB 3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	IRON	27100	=	MG/KG	38480	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	LEAD	85 6	=	MG/KG	23 9	X
SB-3	DDMT-080698-SB3-1-3 -01	1 0 to 3 0	MAGNESIUM	3190	=	MG/KG	4900	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	MANGANESE	849	=	MG/KG	1540	
SB-3	DDMT-080698-SB3-1-3 -01	1 0 to 3 0	MERCURY	0 04	=	MG/KG	0 2	
SB-3	DDMT-080698-SB3-1-3 -01	1 0 to 3 0	NICKEL	22 4	=	MG/KG	36 6	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	POTASSIUM	1730	=	MG/KG	1800	
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	SODIUM	137	=	MG/KG		
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	VANADIUM	42 5	=	MG/KG	51 3	
SB-3	DDMT-080798-SB3-11 13'-06	11 0 to 13 0	ALUMINUM	22500	=	MG/KG	21829	X
SB-3	DDMT-080798-SB3-11 13'-06	11 0 to 13 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-11-13 -06	11 0 to 13 0	ARSENIC	11 8	=	MG/KG	17	
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	BARIUM	104	=	MG/KG	300	
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	CALCIUM	1290	=	MG/KG	2432	
SB-3	DDMT-080798-SB3-11-13 -06	11 0 to 13 0	CHROMIUM TOTAL	23 4	=	MG/KG	26 4	
SB-3	DDMT-080798-SB3-11 13'-06	11 0 to 13 0	COBALT	5 9	=	MG/KG	20 4	
SB 3	DDMT-080798 SB3-11-13'-06	11 0 to 13 0	IRON	27000	=	MG/KG	38480	
SB 3	DDMT-080798-SB3-11-13 -06	11 0 to 13 0	LEAD	12 4	J	MG/KG	23 9	
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	MAGNESIUM	3110	=	MG/KG	4900	
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	MANGANESE	311	=	MG/KG	1540	
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	MERCURY	0 06	J	MG/KG	0 2	
SB 3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	NICKEL	18 5	=	MG/KG	36 6	
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	POTASSIUM	2230	=	MG/KG	1800	X
SB-3	DDMT-080798-SB3-11-13 -06	11 0 to 13 0	VANADIUM	45 7	=	MG/KG	51 3	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	ALUMINUM	14100	=	MG/KG	21829	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	ANTIMONY	1 2	J	MG/KG		
SB 3	DDMT-080798-SB3-13-15 -07	13 0 to 15 0	ARSENIC	9 6	=	MG/KG	17	
SB 3	DDMT-080798-SB3-13-15 -07	13 0 to 15 0	BARIUM	135	=	MG/KG	300	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	CALCIUM	2360	=	MG/KG	2432	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	CHROMIUM, TOTAL	18 9	=	MG/KG	26 4	
SB-3	DDMT-080798-SB3-13-15 -07	13 0 to 15 0	COBALT	6 8	=	MG/KG	20 4	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	IRON	23200	=	MG/KG	38480	
SB 3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	LEAD	9 9	J	MG/KG	23 9	
SB-3	DDMT-080798-SB3-13-15 -07	13 0 to 15 0	MAGNESIUM	2920	=	MG/KG	4900	
SB-3	DDMT-080798-SB3-13-15 -07	13 0 to 15 0	MANGANESE	539	=	MG/KG	1540	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	MERCURY	0 04	J	MG/KG	0 2	
SB-3	DDMT-080798-SB3-13-15 -07	13 0 to 15 0	NICKEL	19 9	=	MG/KG	36 6	
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	POTASSIUM	1820	=	MG/KG	1800	X

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB-3	DDMT-080798-SB3-13-15-07	13 0 to 15 0	SODIUM	152	=	MG/KG		
SB-3	DDMT-080798-SB3-13-15-07	13 0 to 15 0	VANADIUM	37 1	=	MG/KG	51 3	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	ALUMINUM	14900	=	MG/KG	21829	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	ANTIMONY	1.2	J	MG/KG		
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	ARSENIC	8 1	=	MG/KG	17	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	BARIUM	161	=	MG/KG	300	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	CALCIUM	1140	=	MG/KG	2432	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	CHROMIUM TOTAL	74 6	J	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	COBALT	6 8	J	MG/KG	20 4	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	IRON	19300	=	MG/KG	38480	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	LEAD	180	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	MAGNESIUM	1760	=	MG/KG	4900	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	MANGANESE	367	J	MG/KG	1540	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	MERCURY	0 04	J	MG/KG	0 2	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	NICKEL	13 6	=	MG/KG	36 6	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	POTASSIUM	1400	=	MG/KG	1800	
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	VANADIUM	28 6	=	MG/KG	51 3	
SB-3	DDMT-080798-SB3-3-5-02	3 0 to 5.0	ALUMINUM	24900	=	MG/KG	21829	X
SB-3	DDMT-080798-SB3-3-5'-02	3.0 to 5 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	ARSENIC	11 1	=	MG/KG	17	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	BARIUM	179	=	MG/KG	300	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5.0	CALCIUM	2490	=	MG/KG	2432	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	CHROMIUM, TOTAL	26 8	=	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	COBALT	9 4	=	MG/KG	20 4	
SB-3	DDMT-080798-SB3-3-5-02	3 0 to 5 0	IRON	24900	=	MG/KG	38480	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	LEAD	34 9	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	MAGNESIUM	3150	=	MG/KG	4900	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	MANGANESE	789	=	MG/KG	1540	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	MERCURY	0 12	J	MG/KG	0 2	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	NICKEL	20 6	=	MG/KG	36 6	
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	POTASSIUM	2410	=	MG/KG	1800	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	SODIUM	139	=	MG/KG		
SB-3	DDMT-080798-SB3-3-5-02	3 0 to 5 0	VANADIUM	49 9	=	MG/KG	51 3	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	ALUMINUM	15400	=	MG/KG	21829	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	ANTIMONY	1 1	J	MG/KG		
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	ARSENIC	7 5	=	MG/KG	17	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	BARIUM	175	=	MG/KG	300	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	BERYLLIUM	0 84	=	MG/KG	1 2	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	CALCIUM	3560	=	MG/KG	2432	X
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	CHROMIUM TOTAL	59 6	=	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	COBALT	6	=	MG/KG	20 4	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	IRON	23400	=	MG/KG	38480	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	LEAD	160	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	MAGNESIUM	1700	=	MG/KG	4900	
SB-3	DDMT-080798-SB3-7-9-04	7 0 to 9 0	MANGANESE	452	=	MG/KG	1540	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	MERCURY	0 04	J	MG/KG	0 2	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	NICKEL	15 9	=	MG/KG	36 6	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	POTASSIUM	1630	=	MG/KG	1800	
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	SODIUM	160	=	MG/KG		
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	VANADIUM	32 3	=	MG/KG	51 3	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	ALUMINUM	19800	=	MG/KG	21829	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	ARSENIC	8 1	=	MG/KG	17	
SB-3	DDMT-080798-SB3-9-11-05	9 0 to 11 0	BARIUM	163	=	MG/KG	300	
SB-3	DDMT-080798-SB3-9-11-05	9 0 to 11 0	CALCIUM	1500	=	MG/KG	2432	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	CHROMIUM, TOTAL	32 8	J	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	COBALT	10 1	J	MG/KG	20 4	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	IRON	21300	=	MG/KG	38480	
SB-3	DDMT-080798-SB3-9-11-05	9 0 to 11 0	LEAD	45 5	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	MAGNESIUM	2350	=	MG/KG	4900	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	MANGANESE	850	J	MG/KG	1540	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	MERCURY	0 04	J	MG/KG	0 2	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	NICKEL	15 9	=	MG/KG	36 6	
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	POTASSIUM	1970	=	MG/KG	1800	X
SB-3	DDMT-080798-SB3-9-11-05	9 0 to 11 0	VANADIUM	39 5	=	MG/KG	51.3	
SB-3	DDMT-082198-SB3-69-70 5-08	69 0 to 70 5	ALUMINUM	925	=	MG/KG	21829	
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	BARIUM	2 8	=	MG/KG	300	
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	CHROMIUM TOTAL	6	J	MG/KG	26 4	
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	IRON	4660	J	MG/KG	38480	
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	LEAD	0 89	J	MG/KG	23 9	
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	MANGANESE	14 9	=	MG/KG	1540	
SB-3	DDMT-082198-SB3-69-70 5-08	69 0 to 70 5	NICKEL	1 4	=	MG/KG	36 6	
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	SELENIUM	1.2	J	MG/KG	0 6	X
SB-3	DDMT-082198-SB3-69-70 5'-08	69 0 to 70 5	VANADIUM	4 4	=	MG/KG	51 3	
SB-4	DDMT-081198-SB4-11-13-06	11 0 to 13 0	ALUMINUM	11000	J	MG/KG	21829	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	ARSENIC	7	=	MG/KG	17	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	BARIUM	91 3	=	MG/KG	300	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	CALCIUM	2640	J	MG/KG	2432	X
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	CHROMIUM TOTAL	14 7	=	MG/KG	26 4	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	COBALT	8 2	=	MG/KG	20 4	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	IRON	19500	=	MG/KG	38480	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13.0	LEAD	9 6	=	MG/KG	23 9	
SB-4	DDMT-081198-SB4-11-13-06	11 0 to 13 0	MAGNESIUM	2860	=	MG/KG	4900	
SB-4	DDMT-081198 SB4-11-13-06	11 0 to 13 0	MANGANESE	719	J	MG/KG	1540	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	NICKEL	21 5	=	MG/KG	36 6	
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	POTASSIUM	1250	=	MG/KG	1800	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB-4	DDMT-081198-SB4-11-13 -06	11 0 to 13 0	SODIUM	142	=	MG/KG		
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	VANADIUM	31 9	=	MG/KG	51 3	
SB-4	DDMT-081198-SB4-13-15 -07	13 0 to 15 0	ALUMINUM	10400	J	MG/KG	21829	
SB-4	DDMT-081198-SB4-13-15 -07	13 0 to 15 0	ARSENIC	5	J	MG/KG	17	
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	BARIUM	82 9	=	MG/KG	300	
SB-4	DDMT-081198-SB4-13-15 -07	13 0 to 15 0	CALCIUM	2760	J	MG/KG	2432	X
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	CHROMIUM TOTAL	14 2	=	MG/KG	26 4	
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	COBALT	6 8	=	MG/KG	20 4	
SB-4	DDMT-081198-SB4-13-15 -07	13 0 to 15 0	IRON	16300	=	MG/KG	38480	
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	LEAD	8 1	=	MG/KG	23 9	
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	MAGNESIUM	2730	=	MG/KG	4900	
SB-4	DDMT-081198-SB4-13-15 -07	13 0 to 15 0	MANGANESE	563	J	MG/KG	1540	
SB-4	DDMT-081198-SB4-13-15 -07	13 0 to 15 0	NICKEL	18 4	=	MG/KG	36 6	
SB-4	DDMT-081198 SB4 13-15'-07	13 0 to 15 0	POTASSIUM	1050	=	MG/KG	1800	
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	VANADIUM	28	=	MG/KG	51 3	
SB-4	DDMT-081198 SB4-15-17'-08	7 0 to 9 0	ALUMINUM	11700	J	MG/KG	21829	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	ARSENIC	9 4	=	MG/KG	17	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	BARIUM	184	J	MG/KG	300	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	CALCIUM	1420	J	MG/KG	2432	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	CHROMIUM, TOTAL	16 7	=	MG/KG	26 4	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	COBALT	8 2	=	MG/KG	20 4	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	IRON	20400	=	MG/KG	38480	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	LEAD	11 3	=	MG/KG	23 9	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	MAGNESIUM	2720	=	MG/KG	4900	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	MANGANESE	517	J	MG/KG	1540	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	NICKEL	21	=	MG/KG	36 6	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	POTASSIUM	1190	=	MG/KG	1800	
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	SODIUM	136	=	MG/KG		
SB-4	DDMT-081198-SB4 15-17'-08	7 0 to 9 0	VANADIUM	29 2	=	MG/KG	51 3	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	ALUMINUM	23000	J	MG/KG	21829	X
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	ARSENIC	13 7	=	MG/KG	17	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	BARIUM	119	=	MG/KG	300	
SB-4	DDMT-081198-SB4 3-5-02	3 0 to 5 0	BERYLLIUM	0 89	=	MG/KG	1 2	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	CALCIUM	1520	=	MG/KG	2432	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	CHROMIUM TOTAL	22.3	=	MG/KG	28 4	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	COBALT	7 5	=	MG/KG	20 4	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	IRON	28900	=	MG/KG	38480	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	LEAD	16 3	=	MG/KG	23 9	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	MAGNESIUM	3230	=	MG/KG	4900	
SB-4	DDMT-081198-SB4-3-5 -02	3 0 to 5 0	MANGANESE	545	=	MG/KG	1540	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	MERCURY	0 09	=	MG/KG	0 2	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	NICKEL	20 8	=	MG/KG	36 6	
SB-4	DDMT-081198-SB4-3-5'-02	3 0 to 5 0	POTASSIUM	1860	=	MG/KG	1800	X
SB-4	DDMT-081198-SB4-3-5 -02	3 0 to 5 0	VANADIUM	47 9	=	MG/KG	51 3	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	ALUMINUM	15800	J	MG/KG	21829	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	ARSENIC	11 5	=	MG/KG	17	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	BARIUM	312	=	MG/KG	300	X
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	BERYLLIUM	0 76	=	MG/KG	1 2	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	CALCIUM	1610	=	MG/KG	2432	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	CHROMIUM TOTAL	18 3	=	MG/KG	26 4	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	COBALT	8 1	=	MG/KG	20 4	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	IRON	25000	=	MG/KG	38480	
SB-4	DDMT-081198-SB4 5-7'-03	5 0 to 7 0	LEAD	12 9	=	MG/KG	23 9	
SB-4	DDMT-081198-SB4 5-7'-03	5 0 to 7 0	MAGNESIUM	3200	=	MG/KG	4900	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	MANGANESE	521	=	MG/KG	1540	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	MERCURY	0 06	=	MG/KG	0 2	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	NICKEL	22 7	=	MG/KG	36 6	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	POTASSIUM	1460	=	MG/KG	1800	
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	SODIUM	160	=	MG/KG		
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	VANADIUM	36 3	=	MG/KG	51 3	
SB-4	DDMT-081198-SB4-7-9'-04	7 0 to 9 0	ALUMINUM	13700	J	MG/KG	21829	
SB-4	DDMT-081198-SB4 7-9'-04	7 0 to 9 0	ARSENIC	9 5	J	MG/KG	17	
SB-4	DDMT-081198-SB4 7-9'-04	7 0 to 9 0	BARIUM	150	J	MG/KG	300	
SB-4	DDMT-081198 SB4 7-9'-04	7 0 to 9 0	CALCIUM	1870	J	MG/KG	2432	
SB-4	DDMT-081198-SB4-7 9'-04	7 0 to 9 0	CHROMIUM TOTAL	17 2	=	MG/KG	26 4	
SB-4	DDMT-081198-SB4-7-9 -04	7 0 to 9 0	COBALT	8 7	=	MG/KG	20 4	
SB-4	DDMT-081198-SB4-7 9 -04	7 0 to 9 0	IRON	23000	=	MG/KG	38480	
SB-4	DDMT-081198-SB4-7-9 -04	7 0 to 9 0	LEAD	12 4	=	MG/KG	23 9	
SB-4	DDMT-081198-SB4-7-9 -04	7 0 to 9 0	MAGNESIUM	3140	=	MG/KG	4900	
SB-4	DDMT-081198-SB4-7-9'-04	7 0 to 9 0	MANGANESE	602	J	MG/KG	1540	
SB-4	DDMT-081198-SB4-7-9'-04	7 0 to 9 0	NICKEL	21 9	=	MG/KG	36 6	
SB-4	DDMT-081198-SB4-7-9'-04	7 0 to 9 0	POTASSIUM	1390	=	MG/KG	1800	
SB-4	DDMT-081198-SB4-7-9'-04	7 0 to 9 0	VANADIUM	33 5	=	MG/KG	51 3	
SB-4	DDMT-081898-SB4-59-61'-08	59 0 to 61 0	ALUMINUM	2260	=	MG/KG	21829	
SB-4	DDMT-081898-SB4-59-61'-08	59 0 to 61 0	BARIUM	6 8	=	MG/KG	300	
SB-4	DDMT-081898-SB4-59-61'-08	59 0 to 61 0	CHROMIUM, TOTAL	6 2	J	MG/KG	26 4	
SB-4	DDMT-081898-SB4-59-61 -08	59 0 to 61 0	IRON	6260	J	MG/KG	38480	
SB-4	DDMT-081898-SB4-59-61'-08	59 0 to 61 0	LEAD	1 9	J	MG/KG	23 9	
SB-4	DDMT-081898-SB4 59-61'-08	59 0 to 61 0	MAGNESIUM	116	=	MG/KG	4900	
SB-4	DDMT-081898-SB4-59-61'-08	59 0 to 61 0	MANGANESE	17 1	J	MG/KG	1540	
SB-4	DDMT-081898-SB4 59-61'-08	59 0 to 61 0	NICKEL	2 1	=	MG/KG	36 6	
SB-4	DDMT-081898-SB4 59-61 -08	59 0 to 61 0	POTASSIUM	119	=	MG/KG	1800	
SB-4	DDMT-081898-SB4-59-61'-08	59 0 to 61 0	VANADIUM	8 4	=	MG/KG	51 3	
SB61A	DJA192	3 0 to 5 0	ALUMINUM	9100	=	MG/KG	21829	
SB61A	DJA192	3 0 to 5 0	ARSENIC	35 6	=	MG/KG	17	X
SB61A	DJA192	3 0 to 5 0	BERYLLIUM	0 79	J	MG/KG	1 2	

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TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB61A	DJA192	3.0 to 5.0	CHROMIUM, TOTAL	13.6	=	MG/KG	26.4	
SB61A	DJA192	3.0 to 5.0	COPPER	28.7	=	MG/KG	32.7	
SB61A	DJA192	3.0 to 5.0	LEAD	90.4	=	MG/KG	23.9	X
SB61A	DJA192	3.0 to 5.0	MERCURY	0.11	J	MG/KG	0.2	
SB61A	DJA192	3.0 to 5.0	NICKEL	15.8	=	MG/KG	36.6	
SB61A	DJA192	3.0 to 5.0	SILVER	1.2	J	MG/KG	1	X
SB61A	DJA192	3.0 to 5.0	ZINC	86.4	=	MG/KG	114	
SB61A	DJA193	8.0 to 10.0	ALUMINUM	9710	=	MG/KG	21829	
SB61A	DJA193	8.0 to 10.0	ARSENIC	11.2	=	MG/KG	17	
SB61A	DJA193	8.0 to 10.0	BERYLLIUM	0.57	J	MG/KG	1.2	
SB61A	DJA193	8.0 to 10.0	CHROMIUM, TOTAL	13.9	=	MG/KG	26.4	
SB61A	DJA193	8.0 to 10.0	COPPER	24.4	=	MG/KG	32.7	
SB61A	DJA193	8.0 to 10.0	LEAD	22.1	=	MG/KG	23.9	
SB61A	DJA193	8.0 to 10.0	NICKEL	14.7	=	MG/KG	36.6	
SB61A	DJA193	8.0 to 10.0	SILVER	0.93	J	MG/KG	1	
SB61A	DJA193	8.0 to 10.0	ZINC	66.6	=	MG/KG	114	
SBLAA	DJA002	8.0 to 10.0	ALUMINUM	7560	=	MG/KG	21829	
SBLAA	DJA002	8.0 to 10.0	ANTIMONY	5.9	J	MG/KG		
SBLAA	DJA002	8.0 to 10.0	ARSENIC	7.8	=	MG/KG	17	
SBLAA	DJA002	8.0 to 10.0	BARIUM	77.2	=	MG/KG	300	
SBLAA	DJA002	8.0 to 10.0	BERYLLIUM	0.44	J	MG/KG	1.2	
SBLAA	DJA002	8.0 to 10.0	CALCIUM	2140	=	MG/KG	2432	
SBLAA	DJA002	8.0 to 10.0	CHROMIUM, TOTAL	13.1	=	MG/KG	26.4	
SBLAA	DJA002	8.0 to 10.0	COBALT	7.5	J	MG/KG	20.4	
SBLAA	DJA002	8.0 to 10.0	COPPER	17.7	=	MG/KG	32.7	
SBLAA	DJA002	8.0 to 10.0	IRON	20500	=	MG/KG	38480	
SBLAA	DJA002	8.0 to 10.0	LEAD	8.9	=	MG/KG	23.9	
SBLAA	DJA002	8.0 to 10.0	MAGNESIUM	2560	=	MG/KG	4900	
SBLAA	DJA002	8.0 to 10.0	MANGANESE	628	=	MG/KG	1540	
SBLAA	DJA002	8.0 to 10.0	NICKEL	20.3	=	MG/KG	36.6	
SBLAA	DJA002	8.0 to 10.0	SODIUM	96	J	MG/KG		
SBLAA	DJA002	8.0 to 10.0	VANADIUM	23.8	=	MG/KG	51.3	
SBLAA	DJA002	8.0 to 10.0	ZINC	47.9	=	MG/KG	114	
SBLBA	DJA055	8.0 to 10.0	ALUMINUM	7070	=	MG/KG	21829	
SBLBA	DJA055	8.0 to 10.0	ARSENIC	7.9	=	MG/KG	17	
SBLBA	DJA055	8.0 to 10.0	BARIUM	112	=	MG/KG	300	
SBLBA	DJA055	8.0 to 10.0	BERYLLIUM	0.45	J	MG/KG	1.2	
SBLBA	DJA055	8.0 to 10.0	CALCIUM	1720	=	MG/KG	2432	
SBLBA	DJA055	8.0 to 10.0	CHROMIUM, TOTAL	9.8	=	MG/KG	26.4	
SBLBA	DJA055	8.0 to 10.0	COBALT	6.8	J	MG/KG	20.4	
SBLBA	DJA055	8.0 to 10.0	COPPER	15.6	=	MG/KG	32.7	
SBLBA	DJA055	8.0 to 10.0	IRON	18000	=	MG/KG	38480	
SBLBA	DJA055	8.0 to 10.0	LEAD	11	=	MG/KG	23.9	
SBLBA	DJA055	8.0 to 10.0	MAGNESIUM	2330	=	MG/KG	4900	
SBLBA	DJA055	8.0 to 10.0	MANGANESE	491	J	MG/KG	1540	
SBLBA	DJA055	8.0 to 10.0	NICKEL	20.8	=	MG/KG	36.6	
SBLBA	DJA055	8.0 to 10.0	POTASSIUM	495	J	MG/KG	1800	
SBLBA	DJA055	8.0 to 10.0	SODIUM	77	J	MG/KG		
SBLBA	DJA055	8.0 to 10.0	VANADIUM	20.6	=	MG/KG	51.3	
SBLBA	DJA055	8.0 to 10.0	ZINC	53.5	=	MG/KG	114	
SBLCA	DJA075	8.0 to 10.0	ALUMINUM	6700	=	MG/KG	21829	
SBLCA	DJA075	8.0 to 10.0	ARSENIC	4.6	J	MG/KG	17	
SBLCA	DJA075	8.0 to 10.0	BARIUM	75.9	=	MG/KG	300	
SBLCA	DJA075	8.0 to 10.0	CALCIUM	2110	=	MG/KG	2432	
SBLCA	DJA075	8.0 to 10.0	CHROMIUM, TOTAL	10.4	=	MG/KG	26.4	
SBLCA	DJA075	8.0 to 10.0	COBALT	5.8	J	MG/KG	20.4	
SBLCA	DJA075	8.0 to 10.0	COPPER	13.3	=	MG/KG	32.7	
SBLCA	DJA075	8.0 to 10.0	IRON	13900	=	MG/KG	38480	
SBLCA	DJA075	8.0 to 10.0	LEAD	7.4	=	MG/KG	23.9	
SBLCA	DJA075	8.0 to 10.0	MAGNESIUM	2420	=	MG/KG	4900	
SBLCA	DJA075	8.0 to 10.0	MANGANESE	492	=	MG/KG	1540	
SBLCA	DJA075	8.0 to 10.0	NICKEL	13.4	=	MG/KG	36.6	
SBLCA	DJA075	8.0 to 10.0	SODIUM	627	J	MG/KG		
SBLCA	DJA075	8.0 to 10.0	VANADIUM	19	=	MG/KG	51.3	
SBLCA	DJA075	8.0 to 10.0	ZINC	33.1	=	MG/KG	114	
SBLCB	DJA079	8.0 to 10.0	ALUMINUM	8750	=	MG/KG	21829	
SBLCB	DJA079	8.0 to 10.0	ARSENIC	4.3	J	MG/KG	17	
SBLCB	DJA079	8.0 to 10.0	BARIUM	80.6	=	MG/KG	300	
SBLCB	DJA079	8.0 to 10.0	CALCIUM	2050	=	MG/KG	2432	
SBLCB	DJA079	8.0 to 10.0	CHROMIUM, TOTAL	14.5	=	MG/KG	26.4	
SBLCB	DJA079	8.0 to 10.0	COBALT	6.5	J	MG/KG	20.4	
SBLCB	DJA079	8.0 to 10.0	COPPER	13	=	MG/KG	32.7	
SBLCB	DJA079	8.0 to 10.0	IRON	15100	=	MG/KG	38480	
SBLCB	DJA079	8.0 to 10.0	LEAD	7.1	=	MG/KG	23.9	
SBLCB	DJA079	8.0 to 10.0	MAGNESIUM	2450	=	MG/KG	4900	
SBLCB	DJA079	8.0 to 10.0	MANGANESE	458	=	MG/KG	1540	
SBLCB	DJA079	8.0 to 10.0	NICKEL	15.1	=	MG/KG	36.6	
SBLCB	DJA079	8.0 to 10.0	SODIUM	328	J	MG/KG		
SBLCB	DJA079	8.0 to 10.0	VANADIUM	24	=	MG/KG	51.3	
SBLCB	DJA079	8.0 to 10.0	ZINC	37.1	=	MG/KG	114	
SBLCB	DJA234FD	8.0 to 10.0	ALUMINUM	7880	=	MG/KG	21829	
SBLCB	DJA234FD	8.0 to 10.0	ARSENIC	4	J	MG/KG	17	
SBLCB	DJA234FD	8.0 to 10.0	BARIUM	77	=	MG/KG	300	
SBLCB	DJA234FD	8.0 to 10.0	CALCIUM	1850	=	MG/KG	2432	
SBLCB	DJA234FD	8.0 to 10.0	CHROMIUM, TOTAL	12.3	=	MG/KG	26.4	
SBLCB	DJA234FD	8.0 to 10.0	COBALT	6.2	J	MG/KG	20.4	

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCB	DJA234FD	8 0 to 10 0	COPPER	11 8	=	MG/KG	32 7	
SBLCB	DJA234FD	8 0 to 10 0	IRON	14200	=	MG/KG	38480	
SBLCB	DJA234FD	8 0 to 10 0	LEAD	7 2	=	MG/KG	23 9	
SBLCB	DJA234FD	8 0 to 10 0	MAGNESIUM	2220	=	MG/KG	4900	
SBLCB	DJA234FD	8 0 to 10 0	MANGANESE	495	=	MG/KG	1540	
SBLCB	DJA234FD	8 0 to 10 0	NICKEL	13 7	=	MG/KG	36 6	
SBLCB	DJA234FD	8 0 to 10 0	SODIUM	307	J	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	VANADIUM	23 3	=	MG/KG	51 3	
SBLCB	DJA234FD	8 0 to 10 0	ZINC	34 1	=	MG/KG	114	
SBLCF	DJA220	8 0 to 10 0	ALUMINUM	6520	=	MG/KG	21829	
SBLCF	DJA220	8 0 to 10 0	ARSENIC	5 1	=	MG/KG	17	
SBLCF	DJA220	8 0 to 10 0	BARIUM	65 8	=	MG/KG	300	
SBLCF	DJA220	8 0 to 10 0	BERYLLIUM	0 43	J	MG/KG	1 2	
SBLCF	DJA220	8 0 to 10 0	CALCIUM	2100	=	MG/KG	2432	
SBLCF	DJA220	8 0 to 10 0	CHROMIUM TOTAL	9 6	=	MG/KG	26 4	
SBLCF	DJA220	8 0 to 10 0	COBALT	6	J	MG/KG	20 4	
SBLCF	DJA220	8 0 to 10 0	COPPER	13 9	J	MG/KG	32.7	
SBLCF	DJA220	8 0 to 10 0	IRON	15300	=	MG/KG	38480	
SBLCF	DJA220	8 0 to 10 0	LEAD	7 2	=	MG/KG	23 9	
SBLCF	DJA220	8 0 to 10 0	MAGNESIUM	2150	=	MG/KG	4900	
SBLCF	DJA220	8 0 to 10 0	MANGANESE	585	=	MG/KG	1540	
SBLCF	DJA220	8 0 to 10 0	NICKEL	18 6	=	MG/KG	36 6	
SBLCF	DJA220	8 0 to 10 0	POTASSIUM	400	J	MG/KG	1800	
SBLCF	DJA220	8 0 to 10 0	SODIUM	152	J	MG/KG		
SBLCF	DJA220	8 0 to 10 0	VANADIUM	19 7	=	MG/KG	51 3	
SBLCF	DJA220	8 0 to 10 0	ZINC	36 2	J	MG/KG	114	
SBLDA	DJA095	8 0 to 10 0	ALUMINUM	18600	=	MG/KG	21829	
SBLDA	DJA095	8 0 to 10 0	ARSENIC	11 9	J	MG/KG	17	
SBLDA	DJA095	8 0 to 10 0	BARIUM	94 4	=	MG/KG	300	
SBLDA	DJA095	8 0 to 10 0	CALCIUM	892	J	MG/KG	2432	
SBLDA	DJA095	8 0 to 10 0	CHROMIUM, TOTAL	19 3	=	MG/KG	26 4	
SBLDA	DJA095	8 0 to 10 0	COBALT	7 7	J	MG/KG	20 4	
SBLDA	DJA095	8 0 to 10 0	COPPER	19 3	=	MG/KG	32 7	
SBLDA	DJA095	8 0 to 10 0	IRON	24700	=	MG/KG	38480	
SBLDA	DJA095	8 0 to 10 0	LEAD	13 6	=	MG/KG	23 9	
SBLDA	DJA095	8 0 to 10 0	MAGNESIUM	2630	=	MG/KG	4900	
SBLDA	DJA095	8 0 to 10 0	MANGANESE	193	=	MG/KG	1540	
SBLDA	DJA095	8 0 to 10 0	MERCURY	0 09	J	MG/KG	0 2	
SBLDA	DJA095	8 0 to 10 0	NICKEL	15 9	=	MG/KG	36 6	
SBLDA	DJA095	8 0 to 10 0	SODIUM	95 3	J	MG/KG		
SBLDA	DJA095	8 0 to 10 0	THALLIUM	0 32	J	MG/KG		
SBLDA	DJA095	8 0 to 10 0	VANADIUM	36 9	=	MG/KG	51 3	
SBLDA	DJA095	8 0 to 10 0	ZINC	54 4	=	MG/KG	114	
SBLDB	DJA099	8 0 to 10 0	ALUMINUM	8430	=	MG/KG	21829	
SBLDB	DJA099	8 0 to 10 0	ANTIMONY	5 6	J	MG/KG		
SBLDB	DJA099	8 0 to 10 0	ARSENIC	8 9	=	MG/KG	17	
SBLDB	DJA099	8 0 to 10 0	BARIUM	265	=	MG/KG	300	
SBLDB	DJA099	8 0 to 10 0	BERYLLIUM	0 53	J	MG/KG	1 2	
SBLDB	DJA099	8 0 to 10 0	CALCIUM	2540	=	MG/KG	2432	X
SBLDB	DJA099	8 0 to 10 0	CHROMIUM, TOTAL	14	=	MG/KG	26 4	
SBLDB	DJA099	8 0 to 10 0	COBALT	8 3	J	MG/KG	20 4	
SBLDB	DJA099	8 0 to 10 0	COPPER	17	=	MG/KG	32 7	
SBLDB	DJA099	8 0 to 10 0	IRON	19900	=	MG/KG	38480	
SBLDB	DJA099	8 0 to 10 0	LEAD	11 4	=	MG/KG	23 9	
SBLDB	DJA099	8 0 to 10 0	MAGNESIUM	2480	=	MG/KG	4900	
SBLDB	DJA099	8 0 to 10 0	MANGANESE	751	=	MG/KG	1540	
SBLDB	DJA099	8 0 to 10 0	NICKEL	29 4	=	MG/KG	36 6	
SBLDB	DJA099	8 0 to 10 0	POTASSIUM	570	J	MG/KG	1800	
SBLDB	DJA099	8 0 to 10 0	SODIUM	82 3	J	MG/KG		
SBLDB	DJA099	8 0 to 10 0	THALLIUM	0 64	J	MG/KG		
SBLDB	DJA099	8 0 to 10 0	VANADIUM	22	=	MG/KG	51 3	
SBLDB	DJA099	8 0 to 10 0	ZINC	55 1	=	MG/KG	114	
SBLDG	DJA212	8 0 to 10 0	ALUMINUM	6920	=	MG/KG	21829	
SBLDG	DJA212	8 0 to 10 0	ARSENIC	8	=	MG/KG	17	
SBLDG	DJA212	8 0 to 10 0	BARIUM	114	=	MG/KG	300	
SBLDG	DJA212	8 0 to 10 0	BERYLLIUM	0 57	J	MG/KG	1 2	
SBLDG	DJA212	8 0 to 10 0	CALCIUM	1420	=	MG/KG	2432	
SBLDG	DJA212	8 0 to 10 0	CHROMIUM TOTAL	14 9	=	MG/KG	26 4	
SBLDG	DJA212	8 0 to 10 0	COBALT	6 6	J	MG/KG	20 4	
SBLDG	DJA212	8 0 to 10 0	COPPER	17 2	J	MG/KG	32 7	
SBLDG	DJA212	8 0 to 10 0	IRON	20100	=	MG/KG	38480	
SBLDG	DJA212	8 0 to 10 0	LEAD	33 2	=	MG/KG	23 9	X
SBLDG	DJA212	8 0 to 10 0	MAGNESIUM	2040	=	MG/KG	4900	
SBLDG	DJA212	8 0 to 10 0	MANGANESE	248	=	MG/KG	1540	
SBLDG	DJA212	8 0 to 10 0	NICKEL	17 1	=	MG/KG	36 6	
SBLDG	DJA212	8 0 to 10 0	POTASSIUM	490	J	MG/KG	1800	
SBLDG	DJA212	8 0 to 10 0	SILVER	0 76	J	MG/KG	1	
SBLDG	DJA212	8 0 to 10 0	SODIUM	66 4	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	VANADIUM	23 7	=	MG/KG	51 3	
SBLDG	DJA212	8 0 to 10 0	ZINC	54 5	J	MG/KG	114	
SBLDH	DJA216	8 0 to 10 0	ALUMINUM	6520	=	MG/KG	21829	
SBLDH	DJA216	8 0 to 10 0	ARSENIC	6 8	=	MG/KG	17	
SBLDH	DJA216	8 0 to 10 0	BARIUM	69 6	=	MG/KG	300	
SBLDH	DJA216	8 0 to 10 0	BERYLLIUM	0 49	J	MG/KG	1 2	
SBLDH	DJA216	8 0 to 10 0	CALCIUM	2380	=	MG/KG	2432	
SBLDH	DJA216	8 0 to 10 0	CHROMIUM, TOTAL	10 7	=	MG/KG	26 4	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLDH	DJA216	8 0 to 10 0	COBALT	6 2	J	MG/KG	20 4	
SBLDH	DJA216	8 0 to 10 0	COPPER	14 2	J	MG/KG	32.7	
SBLDH	DJA216	8 0 to 10 0	IRON	15500	=	MG/KG	38480	
SBLDH	DJA216	8 0 to 10 0	LEAD	9 1	=	MG/KG	23 9	
SBLDH	DJA216	8 0 to 10 0	MAGNESIUM	2360	=	MG/KG	4900	
SBLDH	DJA216	8 0 to 10 0	MANGANESE	591	=	MG/KG	1540	
SBLDH	DJA216	8 0 to 10 0	NICKEL	18 4	=	MG/KG	36 6	
SBLDH	DJA216	8 0 to 10 0	POTASSIUM	439	J	MG/KG	1800	
SBLDH	DJA216	8 0 to 10 0	SODIUM	131	J	MG/KG		
SBLDH	DJA216	8 0 to 10 0	VANADIUM	20 1	=	MG/KG	51.3	
SBLDH	DJA216	8 0 to 10 0	ZINC	44 6	J	MG/KG	114	
SBLEA	DJA119	8.0 to 10 0	ALUMINUM	9090	=	MG/KG	21829	
SBLEA	DJA119	8 0 to 10 0	ARSENIC	8 9	J	MG/KG	17	
SBLEA	DJA119	8 0 to 10 0	BARIUM	138	=	MG/KG	300	
SBLEA	DJA119	8 0 to 10 0	CALCIUM	2360	=	MG/KG	2432	
SBLEA	DJA119	8 0 to 10 0	CHROMIUM, TOTAL	13 5	=	MG/KG	26 4	
SBLEA	DJA119	8 0 to 10 0	COBALT	7 7	J	MG/KG	20 4	
SBLEA	DJA119	8.0 to 10 0	COPPER	16 3	=	MG/KG	32.7	
SBLEA	DJA119	8 0 to 10 0	IRON	20700	=	MG/KG	38480	
SBLEA	DJA119	8 0 to 10 0	LEAD	10 3	=	MG/KG	23 9	
SBLEA	DJA119	8 0 to 10 0	MAGNESIUM	2690	=	MG/KG	4900	
SBLEA	DJA119	8 0 to 10.0	MANGANESE	590	=	MG/KG	1540	
SBLEA	DJA119	8 0 to 10 0	NICKEL	19 7	=	MG/KG	36 6	
SBLEA	DJA119	8 0 to 10 0	POTASSIUM	1330	=	MG/KG	1800	
SBLEA	DJA119	8 0 to 10 0	SODIUM	64 7	J	MG/KG		
SBLEA	DJA119	8 0 to 10 0	THALLIUM	0 31	J	MG/KG		
SBLEA	DJA119	8 0 to 10 0	VANADIUM	26 9	=	MG/KG	51 3	
SBLEA	DJA119	8.0 to 10 0	ZINC	54 9	=	MG/KG	114	
SBLEB	DJA123	8 0 to 10 0	ALUMINUM	16000	=	MG/KG	21829	
SBLEB	DJA123	8 0 to 10 0	ARSENIC	12 1	J	MG/KG	17	
SBLEB	DJA123	8 0 to 10 0	BARIUM	92 9	=	MG/KG	300	
SBLEB	DJA123	8 0 to 10 0	CALCIUM	1170	J	MG/KG	2432	
SBLEB	DJA123	8 0 to 10 0	CHROMIUM, TOTAL	17	=	MG/KG	26 4	
SBLEB	DJA123	8 0 to 10 0	COBALT	4 9	J	MG/KG	20 4	
SBLEB	DJA123	8 0 to 10 0	COPPER	21 4	=	MG/KG	32 7	
SBLEB	DJA123	8.0 to 10 0	IRON	24900	=	MG/KG	38480	
SBLEB	DJA123	8 0 to 10 0	LEAD	15 1	=	MG/KG	23 9	
SBLEB	DJA123	8 0 to 10 0	MAGNESIUM	2390	=	MG/KG	4900	
SBLEB	DJA123	8 0 to 10 0	MANGANESE	418	=	MG/KG	1540	
SBLEB	DJA123	8 0 to 10 0	NICKEL	18 3	=	MG/KG	36 6	
SBLEB	DJA123	8 0 to 10 0	THALLIUM	0 32	J	MG/KG		
SBLEB	DJA123	8 0 to 10 0	VANADIUM	32 9	=	MG/KG	51 3	
SBLEB	DJA123	8 0 to 10 0	ZINC	61 7	=	MG/KG	114	
SBLED	DJA131	8 0 to 10 0	ALUMINUM	6680	=	MG/KG	21829	
SBLED	DJA131	8 0 to 10 0	ANTIMONY	5 7	J	MG/KG		
SBLED	DJA131	8 0 to 10 0	ARSENIC	7 4	=	MG/KG	17	
SBLED	DJA131	8 0 to 10 0	BARIUM	75 8	=	MG/KG	300	
SBLED	DJA131	8 0 to 10 0	BERYLLIUM	0 46	J	MG/KG	1 2	
SBLED	DJA131	8 0 to 10 0	CALCIUM	2160	=	MG/KG	2432	
SBLED	DJA131	8 0 to 10 0	CHROMIUM TOTAL	9 8	=	MG/KG	26 4	
SBLED	DJA131	8 0 to 10 0	COBALT	4 8	J	MG/KG	20 4	
SBLED	DJA131	8 0 to 10 0	COPPER	16 5	=	MG/KG	32.7	
SBLED	DJA131	8 0 to 10 0	IRON	16800	=	MG/KG	38480	
SBLED	DJA131	8 0 to 10 0	LEAD	9 2	=	MG/KG	23.9	
SBLED	DJA131	8 0 to 10 0	MAGNESIUM	2120	=	MG/KG	4900	
SBLED	DJA131	8 0 to 10 0	MANGANESE	808	=	MG/KG	1540	
SBLED	DJA131	8 0 to 10 0	NICKEL	18 6	=	MG/KG	36 6	
SBLED	DJA131	8 0 to 10 0	POTASSIUM	311	J	MG/KG	1800	
SBLED	DJA131	8 0 to 10 0	SODIUM	37 5	J	MG/KG		
SBLED	DJA131	8 0 to 10 0	THALLIUM	0 45	J	MG/KG		
SBLED	DJA131	8 0 to 10 0	VANADIUM	19 3	=	MG/KG	51 3	
SBLED	DJA131	8 0 to 10 0	ZINC	42 3	=	MG/KG	114	
SBLEG	DJA200	8 0 to 10 0	ALUMINUM	12000	=	MG/KG	21829	
SBLEG	DJA200	8 0 to 10 0	ARSENIC	6	=	MG/KG	17	
SBLEG	DJA200	8 0 to 10 0	BARIUM	139	=	MG/KG	300	
SBLEG	DJA200	8 0 to 10 0	BERYLLIUM	0 69	J	MG/KG	1.2	
SBLEG	DJA200	8 0 to 10 0	CALCIUM	1720	=	MG/KG	2432	
SBLEG	DJA200	8 0 to 10 0	CHROMIUM TOTAL	15 1	=	MG/KG	26 4	
SBLEG	DJA200	8 0 to 10 0	COBALT	8 7	J	MG/KG	20 4	
SBLEG	DJA200	8 0 to 10 0	COPPER	17 9	=	MG/KG	32 7	
SBLEG	DJA200	8 0 to 10 0	IRON	18700	=	MG/KG	38480	
SBLEG	DJA200	8 0 to 10 0	LEAD	17 9	=	MG/KG	23 9	
SBLEG	DJA200	8 0 to 10 0	MAGNESIUM	2390	=	MG/KG	4900	
SBLEG	DJA200	8 0 to 10 0	MANGANESE	315	=	MG/KG	1540	
SBLEG	DJA200	8 0 to 10 0	NICKEL	20 9	=	MG/KG	36 6	
SBLEG	DJA200	8 0 to 10 0	POTASSIUM	1150	J	MG/KG	1800	
SBLEG	DJA200	8 0 to 10 0	SILVER	0 57	J	MG/KG	1	
SBLEG	DJA200	8 0 to 10 0	SODIUM	92 5	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	THALLIUM	0 37	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	VANADIUM	29 7	J	MG/KG	51 3	
SBLEG	DJA200	8.0 to 10 0	ZINC	66 3	=	MG/KG	114	
SBLEH	DJA208	8 0 to 10 0	ALUMINUM	6860	=	MG/KG	21829	
SBLEH	DJA208	8.0 to 10 0	ARSENIC	9 2	=	MG/KG	17	
SBLEH	DJA208	8 0 to 10 0	BARIUM	150	=	MG/KG	300	
SBLEH	DJA208	8 0 to 10 0	BERYLLIUM	0 51	J	MG/KG	1 2	
SBLEH	DJA208	8 0 to 10 0	CALCIUM	2670	=	MG/KG	2432	X

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) In the Disposal Are:
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLEH	DJA208	8 0 to 10 0	CHROMIUM TOTAL	24 6	=	MG/KG	26 4	
SBLEH	DJA208	8 0 to 10 0	COBALT	8 2	J	MG/KG	20 4	
SBLEH	DJA208	8 0 to 10 0	COPPER	21 4	J	MG/KG	32.7	
SBLEH	DJA208	8 0 to 10 0	IRON	17600	=	MG/KG	38480	
SBLEH	DJA208	8 0 to 10 0	LEAD	72.5	=	MG/KG	23 9	X
SBLEH	DJA208	8 0 to 10 0	MAGNESIUM	1850	=	MG/KG	4900	
SBLEH	DJA208	8 0 to 10 0	MANGANESE	568	=	MG/KG	1540	
SBLEH	DJA208	8 0 to 10 0	MERCURY	0 15	=	MG/KG	0 2	
SBLEH	DJA208	8 0 to 10 0	NICKEL	13 5	=	MG/KG	36 6	
SBLEH	DJA208	8 0 to 10 0	POTASSIUM	546	J	MG/KG	1800	
SBLEH	DJA208	8 0 to 10 0	SODIUM	71 8	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	VANADIUM	21 3	=	MG/KG	51.3	
SBLEH	DJA208	8 0 to 10 0	ZINC	84 3	J	MG/KG	114	
SBLFA (1)	DJA020	8 0 to 10 0	ALUMINUM	9960	=	MG/KG	21829	
SBLFA (1)	DJA020	8 0 to 10 0	ARSENIC	3 7	=	MG/KG	17	
SBLFA (1)	DJA020	8 0 to 10 0	BARIUM	84 1	=	MG/KG	300	
SBLFA (1)	DJA020	8 0 to 10 0	BERYLLIUM	0 45	J	MG/KG	1 2	
SBLFA (1)	DJA020	8 0 to 10 0	CALCIUM	3640	=	MG/KG	2432	X
SBLFA (1)	DJA020	8 0 to 10 0	CHROMIUM, TOTAL	14 2	=	MG/KG	26 4	
SBLFA (1)	DJA020	8 0 to 10 0	COBALT	5 7	J	MG/KG	20 4	
SBLFA (1)	DJA020	8 0 to 10 0	COPPER	13 9	=	MG/KG	32 7	
SBLFA (1)	DJA020	8 0 to 10 0	IRON	16400	=	MG/KG	38480	
SBLFA (1)	DJA020	8 0 to 10 0	LEAD	7 5	=	MG/KG	23 9	
SBLFA (1)	DJA020	8 0 to 10 0	MAGNESIUM	2950	=	MG/KG	4900	
SBLFA (1)	DJA020	8 0 to 10 0	MANGANESE	487	=	MG/KG	1540	
SBLFA (1)	DJA020	8 0 to 10 0	NICKEL	16 6	=	MG/KG	36 6	
SBLFA (1)	DJA020	8 0 to 10 0	SELENIUM	0 59	J	MG/KG	0 6	
SBLFA (1)	DJA020	8 0 to 10 0	SODIUM	108	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	VANADIUM	27 3	=	MG/KG	51 3	
SBLFA (1)	DJA020	8 0 to 10 0	ZINC	39 9	=	MG/KG	114	
SBLFB (1)	DJA024	8 0 to 10 0	ALUMINUM	8850	=	MG/KG	21829	
SBLFB (1)	DJA024	8 0 to 10 0	ARSENIC	2.2	J	MG/KG	17	
SBLFB (1)	DJA024	8 0 to 10 0	BERYLLIUM	0 53	J	MG/KG	1 2	
SBLFB (1)	DJA024	8 0 to 10 0	CHROMIUM TOTAL	15 4	=	MG/KG	26 4	
SBLFB (1)	DJA024	8 0 to 10 0	COPPER	8 6	=	MG/KG	32 7	
SBLFB (1)	DJA024	8 0 to 10 0	LEAD	10 2	=	MG/KG	23 9	
SBLFB (1)	DJA024	8 0 to 10 0	NICKEL	13 9	=	MG/KG	36 6	
SBLFB (1)	DJA024	8 0 to 10 0	ZINC	24 3	=	MG/KG	114	
SBLFC (1)	DJA028	8 0 to 10 0	ALUMINUM	11500	=	MG/KG	21829	
SBLFC (1)	DJA028	8 0 to 10 0	ANTIMONY	5 7	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	ARSENIC	11 3	=	MG/KG	17	
SBLFC (1)	DJA028	8 0 to 10 0	BARIUM	154	=	MG/KG	300	
SBLFC (1)	DJA028	8 0 to 10 0	BERYLLIUM	0 54	J	MG/KG	1 2	
SBLFC (1)	DJA028	8 0 to 10 0	CALCIUM	2270	=	MG/KG	2432	
SBLFC (1)	DJA028	8 0 to 10 0	CHROMIUM, TOTAL	30	=	MG/KG	26 4	X
SBLFC (1)	DJA028	8 0 to 10 0	COBALT	7 4	J	MG/KG	20 4	
SBLFC (1)	DJA028	8 0 to 10 0	COPPER	26 8	=	MG/KG	32 7	
SBLFC (1)	DJA028	8 0 to 10 0	IRON	21400	=	MG/KG	38480	
SBLFC (1)	DJA028	8 0 to 10 0	LEAD	89	=	MG/KG	23 9	X
SBLFC (1)	DJA028	8 0 to 10 0	MAGNESIUM	2290	=	MG/KG	4900	
SBLFC (1)	DJA028	8 0 to 10 0	MANGANESE	557	=	MG/KG	1540	
SBLFC (1)	DJA028	8 0 to 10 0	NICKEL	19 4	=	MG/KG	36 6	
SBLFC (1)	DJA028	8 0 to 10 0	POTASSIUM	1100	J	MG/KG	1800	
SBLFC (1)	DJA028	8 0 to 10 0	SELENIUM	0 77	J	MG/KG	0 6	X
SBLFC (1)	DJA028	8 0 to 10 0	SODIUM	62 4	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	VANADIUM	25 8	=	MG/KG	51 3	
SBLFC (1)	DJA028	8 0 to 10 0	ZINC	101	=	MG/KG	114	
SBLFD (1)	DJA032	8 0 to 10 0	ALUMINUM	10300	=	MG/KG	21829	
SBLFD (1)	DJA032	8.0 to 10 0	ANTIMONY	5 8	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	ARSENIC	9 7	=	MG/KG	17	
SBLFD (1)	DJA032	8 0 to 10 0	BARIUM	80 7	=	MG/KG	300	
SBLFD (1)	DJA032	8 0 to 10 0	BERYLLIUM	0 47	J	MG/KG	1 2	
SBLFD (1)	DJA032	8 0 to 10 0	CALCIUM	682	J	MG/KG	2432	
SBLFD (1)	DJA032	8 0 to 10 0	CHROMIUM, TOTAL	13 6	=	MG/KG	26 4	
SBLFD (1)	DJA032	8 0 to 10 0	COBALT	6 6	J	MG/KG	20 4	
SBLFD (1)	DJA032	8 0 to 10 0	COPPER	17 2	=	MG/KG	32 7	
SBLFD (1)	DJA032	8 0 to 10 0	IRON	20700	=	MG/KG	38480	
SBLFD (1)	DJA032	8 0 to 10 0	LEAD	11 3	=	MG/KG	23 9	
SBLFD (1)	DJA032	8 0 to 10 0	MAGNESIUM	2420	=	MG/KG	4900	
SBLFD (1)	DJA032	8 0 to 10 0	MANGANESE	440	=	MG/KG	1540	
SBLFD (1)	DJA032	8 0 to 10 0	NICKEL	20 5	=	MG/KG	36 6	
SBLFD (1)	DJA032	8.0 to 10 0	SODIUM	56 5	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	VANADIUM	24 2	=	MG/KG	51 3	
SBLFD (1)	DJA032	8 0 to 10 0	ZINC	53 5	=	MG/KG	114	
SBLFE (1)	DJA036	8 0 to 10 0	ALUMINUM	7780	=	MG/KG	21829	
SBLFE (1)	DJA036	8 0 to 10 0	ANTIMONY	5 7	J	MG/KG		
SBLFE (1)	DJA036	8 0 to 10 0	ARSENIC	7 4	=	MG/KG	17	
SBLFE (1)	DJA036	8 0 to 10 0	BARIUM	92 1	=	MG/KG	300	
SBLFE (1)	DJA036	8 0 to 10 0	BERYLLIUM	0 43	J	MG/KG	1 2	
SBLFE (1)	DJA036	8 0 to 10 0	CALCIUM	2400	=	MG/KG	2432	
SBLFE (1)	DJA036	8 0 to 10 0	CHROMIUM, TOTAL	10 7	=	MG/KG	26 4	
SBLFE (1)	DJA036	8 0 to 10 0	COBALT	7 3	J	MG/KG	20 4	
SBLFE (1)	DJA036	8 0 to 10 0	COPPER	16 1	=	MG/KG	32 7	
SBLFE (1)	DJA036	8 0 to 10 0	IRON	19000	=	MG/KG	38480	
SBLFE (1)	DJA036	8 0 to 10 0	LEAD	11 2	=	MG/KG	23 9	
SBLFE (1)	DJA036	8 0 to 10 0	MAGNESIUM	2530	=	MG/KG	4900	

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TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are«

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFE (1)	DJA036	8 0 to 10 0	MANGANESE	567	=	MG/KG	1540	
SBLFE (1)	DJA036	8 0 to 10 0	NICKEL	19 4	=	MG/KG	36 6	
SBLFE (1)	DJA036	8 0 to 10 0	SODIUM	63 5	J	MG/KG		
SBLFE (1)	DJA036	8 0 to 10 0	THALLIUM	0 51	J	MG/KG		
SBLFE (1)	DJA036	8 0 to 10 0	VANADIUM	21	=	MG/KG	51 3	
SBLFE (1)	DJA036	8 0 to 10 0	ZINC	49 6	=	MG/KG	114	
SBLFF (1)	DJA040	8 0 to 10 0	ALUMINUM	6660	=	MG/KG	21829	
SBLFF (1)	DJA040	8 0 to 10 0	ARSENIC	5 1	J	MG/KG	17	
SBLFF (1)	DJA040	8 0 to 10 0	BARIUM	68 9	=	MG/KG	300	
SBLFF (1)	DJA040	8 0 to 10 0	CALCIUM	1750	=	MG/KG	2432	
SBLFF (1)	DJA040	8 0 to 10 0	CHROMIUM TOTAL	11 3	=	MG/KG	26 4	
SBLFF (1)	DJA040	8 0 to 10 0	COBALT	6 2	J	MG/KG	20 4	
SBLFF (1)	DJA040	8.0 to 10 0	COPPER	13 1	=	MG/KG	32 7	
SBLFF (1)	DJA040	8 0 to 10 0	IRON	14300	=	MG/KG	38480	
SBLFF (1)	DJA040	8 0 to 10 0	LEAD	7 4	=	MG/KG	23 9	
SBLFF (1)	DJA040	8 0 to 10 0	MAGNESIUM	2690	=	MG/KG	4900	
SBLFF (1)	DJA040	8 0 to 10 0	MANGANESE	495	=	MG/KG	1540	
SBLFF (1)	DJA040	8 0 to 10 0	NICKEL	14 1	=	MG/KG	36 6	
SBLFF (1)	DJA040	8 0 to 10 0	SODIUM	59 7	J	MG/KG		
SBLFF (1)	DJA040	8 0 to 10 0	VANADIUM	20.3	=	MG/KG	51 3	
SBLFF (1)	DJA040	8 0 to 10 0	ZINC	32 7	=	MG/KG	114	
SBLFG	DJA204	8 0 to 10 0	ALUMINUM	9080	=	MG/KG	21829	
SBLFG	DJA204	8 0 to 10 0	ARSENIC	4 4	=	MG/KG	17	
SBLFG	DJA204	8 0 to 10 0	BARIUM	68	=	MG/KG	300	
SBLFG	DJA204	8 0 to 10 0	BERYLLIUM	0 54	J	MG/KG	1 2	
SBLFG	DJA204	8 0 to 10 0	CALCIUM	1590	=	MG/KG	2432	
SBLFG	DJA204	8 0 to 10 0	CHROMIUM TOTAL	13 9	=	MG/KG	26 4	
SBLFG	DJA204	8.0 to 10 0	COBALT	6	J	MG/KG	20 4	
SBLFG	DJA204	8 0 to 10 0	COPPER	15	=	MG/KG	32 7	
SBLFG	DJA204	8 0 to 10 0	IRON	16000	=	MG/KG	38480	
SBLFG	DJA204	8 0 to 10 0	LEAD	9 3	=	MG/KG	23 9	
SBLFG	DJA204	8 0 to 10 0	MAGNESIUM	2240	=	MG/KG	4900	
SBLFG	DJA204	8 0 to 10 0	MANGANESE	421	=	MG/KG	1540	
SBLFG	DJA204	8 0 to 10 0	NICKEL	16 3	=	MG/KG	36 6	
SBLFG	DJA204	8 0 to 10 0	SODIUM	119	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	THALLIUM	0 31	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	VANADIUM	27 2	J	MG/KG	51 3	
SBLFG	DJA204	8 0 to 10 0	ZINC	2650	=	MG/KG	114	X
Sediments								
SD61A	DJA194	0 0 to 1 0	ALUMINUM	6980	=	MG/KG	10085	
SD61A	DJA194	0 0 to 1 0	ARSENIC	14 1	=	MG/KG	12	X
SD61A	DJA194	0 0 to 1 0	BERYLLIUM	0 43	J	MG/KG	1 3	
SD61A	DJA194	0 0 to 1 0	CHROMIUM, TOTAL	11 3	=	MG/KG	20	
SD61A	DJA194	0 0 to 1 0	COPPER	23 4	=	MG/KG	58	
SD61A	DJA194	0 0 to 1 0	LEAD	34 7	=	MG/KG	35 2	
SD61A	DJA194	0 0 to 1 0	MERCURY	0 31	=	MG/KG	4	
SD61A	DJA194	0 0 to 1 0	NICKEL	17 2	=	MG/KG	30 5	
SD61A	DJA194	0 0 to 1 0	THALLIUM	0 39	J	MG/KG	1 1	
SD61A	DJA194	0 0 to 1 0	ZINC	88 4	=	MG/KG	797	
SDLAA	DJA017	0 0 to 1 0	ALUMINUM	10000	=	MG/KG	10085	
SDLAA	DJA017	0 0 to 1 0	ARSENIC	4 8	=	MG/KG	12	
SDLAA	DJA017	0 0 to 1.0	CHROMIUM TOTAL	15 1	=	MG/KG	20	
SDLAA	DJA017	0 0 to 1 0	COPPER	12 6	=	MG/KG	58	
SDLAA	DJA017	0 0 to 1 0	LEAD	15 9	=	MG/KG	35.2	
SDLAA	DJA017	0 0 to 1 0	NICKEL	14 4	=	MG/KG	30 5	
SDLAA	DJA017	0 0 to 1 0	THALLIUM	0 46	J	MG/KG	1 1	
SDLAA	DJA017	0 0 to 1 0	ZINC	50 5	=	MG/KG	797	
Surface Soils								
SB61A	DJA191	0 0 to 1 0	ALUMINUM	8390	=	MG/KG	23810	
SB61A	DJA191	0 0 to 1 0	ARSENIC	43 7	=	MG/KG	20	X
SB61A	DJA191	0 0 to 1 0	BERYLLIUM	1 3	J	MG/KG	1 1	X
SB61A	DJA191	0 0 to 1 0	CHROMIUM TOTAL	13 8	=	MG/KG	24 8	
SB61A	DJA191	0 0 to 1 0	COPPER	46 2	=	MG/KG	33 5	X
SB61A	DJA191	0 0 to 1 0	LEAD	107	=	MG/KG	30	X
SB61A	DJA191	0 0 to 1 0	MERCURY	0 4	J	MG/KG	0 4	
SB61A	DJA191	0 0 to 1 0	NICKEL	15 6	=	MG/KG	30	
SB61A	DJA191	0 0 to 1 0	SELENIUM	0 59	J	MG/KG	0 6	
SB61A	DJA191	0 0 to 1 0	SILVER	0 73	J	MG/KG	2	
SB61A	DJA191	0 0 to 1 0	ZINC	146	=	MG/KG	126	X
SBLAA	DJA001	0 0 to 1 0	ALUMINUM	9340	=	MG/KG	23810	
SBLAA	DJA001	0 0 to 1 0	ANTIMONY	5 6	J	MG/KG	7	
SBLAA	DJA001	0 0 to 1 0	ARSENIC	10 3	=	MG/KG	20	
SBLAA	DJA001	0 0 to 1 0	BERYLLIUM	0 48	J	MG/KG	1 1	
SBLAA	DJA001	0 0 to 1 0	CHROMIUM TOTAL	10 6	=	MG/KG	24 8	
SBLAA	DJA001	0 0 to 1 0	COPPER	18 5	=	MG/KG	33 5	
SBLAA	DJA001	0 0 to 1 0	LEAD	12 9	=	MG/KG	30	
SBLAA	DJA001	0 0 to 1 0	MERCURY	0 77	=	MG/KG	0 4	X
SBLAA	DJA001	0 0 to 1 0	NICKEL	16 3	=	MG/KG	30	
SBLAA	DJA001	0 0 to 1 0	ZINC	59 7	=	MG/KG	126	
SBLAB	DJA005	0 0 to 1 0	ALUMINUM	10800	=	MG/KG	23810	
SBLAB	DJA005	0 0 to 1 0	ANTIMONY	5 2	J	MG/KG	7	
SBLAB	DJA005	0 0 to 1 0	ARSENIC	4 6	=	MG/KG	20	
SBLAB	DJA005	0 0 to 1 0	BERYLLIUM	0 49	J	MG/KG	1 1	
SBLAB	DJA005	0 0 to 1 0	CADMIUM	1 1	=	MG/KG	1 4	
SBLAB	DJA005	0 0 to 1 0	CHROMIUM TOTAL	13 3	=	MG/KG	24 8	
SBLAB	DJA005	0 0 to 1 0	COBALT	7 4	J	MG/KG	18 3	

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Arez

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLAB	DJA005	0 0 to 1 0	COPPER	11 2	=	MG/KG	33 5	
SBLAB	DJA005	0 0 to 1 0	LEAD	13 4	=	MG/KG	30	
SBLAB	DJA005	0 0 to 1 0	MERCURY	0 11	=	MG/KG	0 4	
SBLAB	DJA005	0 0 to 1 0	NICKEL	9 9	=	MG/KG	30	
SBLAB	DJA005	0 0 to 1 0	ZINC	221	=	MG/KG	126	X
SBLAC	DJA009	0 0 to 1 0	ALUMINUM	17100	=	MG/KG	23810	
SBLAC	DJA009	0 0 to 1 0	ANTIMONY	5 6	J	MG/KG	7	
SBLAC	DJA009	0 0 to 1 0	ARSENIC	9 6	=	MG/KG	20	
SBLAC	DJA009	0 0 to 1 0	BARIUM	115	=	MG/KG	234	
SBLAC	DJA009	0 0 to 1 0	BERYLLIUM	0 63	J	MG/KG	1 1	
SBLAC	DJA009	0 0 to 1 0	CALCIUM	986	J	MG/KG	5840	
SBLAC	DJA009	0 0 to 1 0	CHROMIUM TOTAL	16 1	=	MG/KG	24 8	
SBLAC	DJA009	0 0 to 1 0	COBALT	10 3	J	MG/KG	18 3	
SBLAC	DJA009	0 0 to 1 0	COPPER	18 1	=	MG/KG	33 5	
SBLAC	DJA009	0 0 to 1 0	IRON	25600	=	MG/KG	37040	
SBLAC	DJA009	0 0 to 1 0	LEAD	11 9	=	MG/KG	30	
SBLAC	DJA009	0 0 to 1 0	MAGNESIUM	2960	=	MG/KG	4600	
SBLAC	DJA009	0 0 to 1 0	MANGANESE	866	=	MG/KG	1304	
SBLAC	DJA009	0 0 to 1 0	NICKEL	19 3	=	MG/KG	30	
SBLAC	DJA009	0 0 to 1 0	POTASSIUM	1320	=	MG/KG	1620	
SBLAC	DJA009	0 0 to 1 0	SODIUM	58 2	J	MG/KG		
SBLAC	DJA009	0 0 to 1 0	THALLIUM	0 22	J	MG/KG		
SBLAC	DJA009	0 0 to 1 0	VANADIUM	33 6	=	MG/KG	48 4	
SBLAC	DJA009	0 0 to 1 0	ZINC	67 9	=	MG/KG	126	
SBLAD	DJA013	0 0 to 1 0	ALUMINUM	8100	=	MG/KG	23810	
SBLAD	DJA013	0 0 to 1 0	ANTIMONY	25 3	J	MG/KG	7	X
SBLAD	DJA013	0 0 to 1 0	ARSENIC	19 3	=	MG/KG	20	
SBLAD	DJA013	0 0 to 1 0	BERYLLIUM	0 39	J	MG/KG	1 1	
SBLAD	DJA013	0 0 to 1 0	CADMIUM	1 2	=	MG/KG	1 4	
SBLAD	DJA013	0 0 to 1 0	CHROMIUM, TOTAL	20 1	=	MG/KG	24 8	
SBLAD	DJA013	0 0 to 1 0	COPPER	6 8	=	MG/KG	33 5	
SBLAD	DJA013	0 0 to 1 0	LEAD	29 2	=	MG/KG	30	
SBLAD	DJA013	0 0 to 1 0	MERCURY	1 3	=	MG/KG	0 4	X
SBLAD	DJA013	0 0 to 1 0	ZINC	114	=	MG/KG	126	
SBLBA	DJA054	0 0 to 1 0	ALUMINUM	14200	=	MG/KG	23810	
SBLBA	DJA054	0 0 to 1 0	ARSENIC	5 9	=	MG/KG	20	
SBLBA	DJA054	0 0 to 1 0	BERYLLIUM	0 4	J	MG/KG	1 1	
SBLBA	DJA054	0 0 to 1 0	CHROMIUM, TOTAL	19 4	=	MG/KG	24.8	
SBLBA	DJA054	0 0 to 1 0	COPPER	14 6	=	MG/KG	33 5	
SBLBA	DJA054	0 0 to 1 0	LEAD	122	=	MG/KG	30	X
SBLBA	DJA054	0 0 to 1 0	NICKEL	12 2	=	MG/KG	30	
SBLBA	DJA054	0 0 to 1 0	ZINC	53 6	=	MG/KG	126	
SBLBB	DJA058	0 0 to 1 0	ALUMINUM	11100	=	MG/KG	23810	
SBLBB	DJA058	0 0 to 1 0	ARSENIC	8 9	=	MG/KG	20	
SBLBB	DJA058	0 0 to 1 0	BERYLLIUM	0 45	J	MG/KG	1 1	
SBLBB	DJA058	0 0 to 1 0	CHROMIUM TOTAL	30 4	=	MG/KG	24 8	X
SBLBB	DJA058	0 0 to 1 0	COPPER	29	=	MG/KG	33 5	
SBLBB	DJA058	0 0 to 1 0	LEAD	52 2	=	MG/KG	30	X
SBLBB	DJA058	0 0 to 1 0	NICKEL	14 8	=	MG/KG	30	
SBLBB	DJA058	0 0 to 1 0	ZINC	116	=	MG/KG	126	
SBLBC	DJA062	0 0 to 1 0	ALUMINUM	11600	=	MG/KG	23810	
SBLBC	DJA062	0 0 to 1 0	ANTIMONY	5	J	MG/KG	7	
SBLBC	DJA062	0 0 to 1.0	ARSENIC	6 7	=	MG/KG	20	
SBLBC	DJA062	0 0 to 1 0	BERYLLIUM	0 43	J	MG/KG	1 1	
SBLBC	DJA062	0 0 to 1 0	CADMIUM	0 78	J	MG/KG	1 4	
SBLBC	DJA062	0 0 to 1 0	CHROMIUM TOTAL	40	=	MG/KG	24 8	X
SBLBC	DJA062	0 0 to 1 0	COPPER	48 1	=	MG/KG	33 5	X
SBLBC	DJA062	0 0 to 1 0	LEAD	59 1	=	MG/KG	30	X
SBLBC	DJA062	0 0 to 1 0	NICKEL	17 5	=	MG/KG	30	
SBLBC	DJA062	0 0 to 1 0	SILVER	0 68	J	MG/KG	2	
SBLBC	DJA062	0 0 to 1 0	ZINC	141	=	MG/KG	126	X
SBLBD	DJA066	0 0 to 1 0	ALUMINUM	6470	=	MG/KG	23810	
SBLBD	DJA066	0 0 to 1 0	ARSENIC	13 9	=	MG/KG	20	
SBLBD	DJA066	0 0 to 1 0	BERYLLIUM	0 49	J	MG/KG	1 1	
SBLBD	DJA066	0 0 to 1 0	CHROMIUM, TOTAL	9 9	=	MG/KG	24 8	
SBLBD	DJA066	0 0 to 1 0	COPPER	13 9	=	MG/KG	33 5	
SBLBD	DJA066	0 0 to 1 0	LEAD	54 3	=	MG/KG	30	X
SBLBD	DJA066	0 0 to 1 0	NICKEL	13 3	=	MG/KG	30	
SBLBD	DJA066	0 0 to 1 0	ZINC	49 4	=	MG/KG	126	
SBLBE	DJA070	0 0 to 1 0	ALUMINUM	6070	=	MG/KG	23810	
SBLBE	DJA070	0 0 to 1 0	ARSENIC	14 2	=	MG/KG	20	
SBLBE	DJA070	0 0 to 1 0	BERYLLIUM	0 29	J	MG/KG	1 1	
SBLBE	DJA070	0 0 to 1 0	CHROMIUM TOTAL	33 3	=	MG/KG	24 8	X
SBLBE	DJA070	0 0 to 1 0	COPPER	80 6	=	MG/KG	33 5	X
SBLBE	DJA070	0 0 to 1 0	LEAD	256	=	MG/KG	30	X
SBLBE	DJA070	0 0 to 1 0	NICKEL	26 8	=	MG/KG	30	
SBLBE	DJA070	0 0 to 1 0	ZINC	935	=	MG/KG	126	X
SBLBE	DJA237FD	0 0 to 1 0	ALUMINUM	26700	=	MG/KG	23810	X
SBLBE	DJA237FD	0 0 to 1 0	ARSENIC	1 9	J	MG/KG	20	
SBLBE	DJA237FD	0 0 to 1 0	BERYLLIUM	0 21	J	MG/KG	1 1	
SBLBE	DJA237FD	0 0 to 1 0	CHROMIUM, TOTAL	45 7	=	MG/KG	24 8	X
SBLBE	DJA237FD	0 0 to 1 0	COPPER	11 5	=	MG/KG	33 5	
SBLBE	DJA237FD	0 0 to 1 0	LEAD	23 1	=	MG/KG	30	
SBLBE	DJA237FD	0 0 to 1 0	MERCURY	0 13	=	MG/KG	0 4	
SBLBE	DJA237FD	0 0 to 1 0	NICKEL	3	J	MG/KG	30	
SBLBE	DJA237FD	0 0 to 1 0	ZINC	41 1	=	MG/KG	126	

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TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCA	DJA074	0 0 to 1 0	ALUMINUM	10200	=	MG/KG	23810	
SBLCA	DJA074	0 0 to 1 0	ARSENIC	11 2	J	MG/KG	20	
SBLCA	DJA074	0 0 to 1 0	CHROMIUM, TOTAL	12 1	=	MG/KG	24 8	
SBLCA	DJA074	0 0 to 1 0	COPPER	17 4	=	MG/KG	33 5	
SBLCA	DJA074	0 0 to 1 0	LEAD	14 3	=	MG/KG	30	
SBLCA	DJA074	0 0 to 1 0	NICKEL	16 7	=	MG/KG	30	
SBLCA	DJA074	0 0 to 1 0	THALLIUM	0 33	J	MG/KG		
SBLCA	DJA074	0 0 to 1 0	ZINC	59 6	=	MG/KG	126	
SBLCB	DJA078	0 0 to 1 0	ALUMINUM	11100	=	MG/KG	23810	
SBLCB	DJA078	0 0 to 1 0	ARSENIC	9 5	J	MG/KG	20	
SBLCB	DJA078	0 0 to 1 0	CHROMIUM, TOTAL	12 8	=	MG/KG	24 8	
SBLCB	DJA078	0 0 to 1 0	COPPER	20 5	=	MG/KG	33 5	
SBLCB	DJA078	0 0 to 1 0	LEAD	7 4	=	MG/KG	30	
SBLCB	DJA078	0 0 to 1 0	NICKEL	20 9	=	MG/KG	30	
SBLCB	DJA078	0 0 to 1 0	THALLIUM	0 3	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	ZINC	74	=	MG/KG	126	
SBLCC	DJA082	0 0 to 1 0	ALUMINUM	6570	=	MG/KG	23810	
SBLCC	DJA082	0 0 to 1 0	ANTIMONY	4 7	J	MG/KG	7	
SBLCC	DJA082	0 0 to 1 0	ARSENIC	7 1	=	MG/KG	20	
SBLCC	DJA082	0 0 to 1 0	BERYLLIUM	0 4	J	MG/KG	1 1	
SBLCC	DJA082	0 0 to 1 0	CHROMIUM, TOTAL	9 5	=	MG/KG	24.8	
SBLCC	DJA082	0 0 to 1 0	COPPER	13 9	=	MG/KG	33 5	
SBLCC	DJA082	0 0 to 1 0	LEAD	10 7	=	MG/KG	30	
SBLCC	DJA082	0 0 to 1 0	NICKEL	15 7	=	MG/KG	30	
SBLCC	DJA082	0 0 to 1 0	ZINC	48	=	MG/KG	126	
SBLCD	DJA086	0 0 to 1 0	ALUMINUM	7900	=	MG/KG	23810	
SBLCD	DJA086	0 0 to 1 0	ARSENIC	6 9	=	MG/KG	20	
SBLCD	DJA086	0 0 to 1 0	BERYLLIUM	0 36	J	MG/KG	1 1	
SBLCD	DJA086	0 0 to 1 0	CHROMIUM TOTAL	20	=	MG/KG	24.8	
SBLCD	DJA086	0 0 to 1 0	COPPER	55.2	=	MG/KG	33 5	X
SBLCD	DJA086	0 0 to 1 0	LEAD	22.2	=	MG/KG	30	
SBLCD	DJA086	0 0 to 1 0	MERCURY	0 07	J	MG/KG	0 4	
SBLCD	DJA086	0 0 to 1 0	NICKEL	13 9	=	MG/KG	30	
SBLCD	DJA086	0 0 to 1.0	SILVER	0 65	J	MG/KG	2	
SBLCD	DJA086	0 0 to 1 0	ZINC	66 7	=	MG/KG	126	
SBLCE	DJA090	0 0 to 1 0	ALUMINUM	7690	=	MG/KG	23810	
SBLCE	DJA090	0 0 to 1 0	ARSENIC	6 9	=	MG/KG	20	
SBLCE	DJA090	0 0 to 1 0	BERYLLIUM	0 48	J	MG/KG	1 1	
SBLCE	DJA090	0 0 to 1 0	CHROMIUM, TOTAL	50 3	=	MG/KG	24 8	X
SBLCE	DJA090	0 0 to 1 0	COPPER	21 1	=	MG/KG	33 5	
SBLCE	DJA090	0 0 to 1 0	LEAD	192	=	MG/KG	30	X
SBLCE	DJA090	0 0 to 1 0	NICKEL	11.8	=	MG/KG	30	
SBLCE	DJA090	0 0 to 1 0	ZINC	121	=	MG/KG	126	
SBLCE	DJA235FD	0 0 to 1 0	ALUMINUM	7820	=	MG/KG	23810	
SBLCE	DJA235FD	0 0 to 1 0	ARSENIC	7 9	=	MG/KG	20	
SBLCE	DJA235FD	0 0 to 1 0	BERYLLIUM	0 47	J	MG/KG	1 1	
SBLCE	DJA235FD	0 0 to 1 0	CHROMIUM TOTAL	40 9	=	MG/KG	24 8	X
SBLCE	DJA235FD	0 0 to 1 0	COPPER	42	=	MG/KG	33 5	X
SBLCE	DJA235FD	0 0 to 1 0	LEAD	131	=	MG/KG	30	X
SBLCE	DJA235FD	0 0 to 1 0	NICKEL	15 8	=	MG/KG	30	
SBLCE	DJA235FD	0 0 to 1 0	SILVER	0 79	J	MG/KG	2	
SBLCE	DJA235FD	0 0 to 1 0	ZINC	88 9	=	MG/KG	126	
SBLCF	DJA219	0 0 to 1 0	ALUMINUM	9770	=	MG/KG	23810	
SBLCF	DJA219	0 0 to 1 0	ARSENIC	12 5	=	MG/KG	20	
SBLCF	DJA219	0 0 to 1 0	BERYLLIUM	0 6	J	MG/KG	1 1	
SBLCF	DJA219	0 0 to 1 0	CHROMIUM, TOTAL	10 4	=	MG/KG	24 8	
SBLCF	DJA219	0 0 to 1.0	COPPER	21.2	J	MG/KG	33 5	
SBLCF	DJA219	0 0 to 1 0	LEAD	13 5	=	MG/KG	30	
SBLCF	DJA219	0 0 to 1 0	NICKEL	20 2	=	MG/KG	30	
SBLCF	DJA219	0 0 to 1 0	SILVER	0 69	J	MG/KG	2	
SBLCF	DJA219	0 0 to 1 0	ZINC	66 4	J	MG/KG	126	
SBLDA	DJA094	0 0 to 1 0	ALUMINUM	22300	=	MG/KG	23810	
SBLDA	DJA094	0 0 to 1 0	ANTIMONY	6 3	J	MG/KG	7	
SBLDA	DJA094	0 0 to 1 0	ARSENIC	7 6	J	MG/KG	20	
SBLDA	DJA094	0 0 to 1 0	CHROMIUM TOTAL	53 6	=	MG/KG	24.8	X
SBLDA	DJA094	0 0 to 1 0	COPPER	71 5	=	MG/KG	33 5	X
SBLDA	DJA094	0 0 to 1 0	LEAD	161	=	MG/KG	30	X
SBLDA	DJA094	0 0 to 1 0	NICKEL	18	=	MG/KG	30	
SBLDA	DJA094	0 0 to 1 0	ZINC	130	=	MG/KG	126	X
SBLDB	DJA098	0 0 to 1 0	ALUMINUM	9430	=	MG/KG	23810	
SBLDB	DJA098	0 0 to 1 0	ANTIMONY	5 2	J	MG/KG	7	
SBLDB	DJA098	0 0 to 1 0	ARSENIC	8 9	=	MG/KG	20	
SBLDB	DJA098	0 0 to 1.0	BERYLLIUM	0 65	J	MG/KG	1 1	
SBLDB	DJA098	0 0 to 1 0	CHROMIUM TOTAL	36 9	=	MG/KG	24 8	X
SBLDB	DJA098	0 0 to 1 0	COPPER	43 9	=	MG/KG	33 5	X
SBLDB	DJA098	0 0 to 1 0	LEAD	72 4	=	MG/KG	30	X
SBLDB	DJA098	0 0 to 1 0	NICKEL	18 3	=	MG/KG	30	
SBLDB	DJA098	0 0 to 1 0	SELENIUM	0 39	J	MG/KG	0 8	
SBLDB	DJA098	0 0 to 1 0	SILVER	0 9	J	MG/KG	2	
SBLDB	DJA098	0 0 to 1 0	THALLIUM	0 62	J	MG/KG		
SBLDB	DJA098	0 0 to 1.0	ZINC	90 1	=	MG/KG	126	
SBLDC	DJA102	0 0 to 1 0	ALUMINUM	11800	=	MG/KG	23810	
SBLDC	DJA102	0 0 to 1 0	ANTIMONY	5 2	J	MG/KG	7	
SBLDC	DJA102	0 0 to 1 0	ARSENIC	9 6	=	MG/KG	20	
SBLDC	DJA102	0 0 to 1 0	BERYLLIUM	0 58	J	MG/KG	1 1	
SBLDC	DJA102	0 0 to 1 0	CHROMIUM TOTAL	20 7	=	MG/KG	24 8	

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLDC	DJA102	0.0 to 1.0	COPPER	29	=	MG/KG	33.5	
SBLDC	DJA102	0.0 to 1.0	LEAD	35.5	=	MG/KG	30	X
SBLDC	DJA102	0.0 to 1.0	NICKEL	19.3	=	MG/KG	30	
SBLDC	DJA102	0.0 to 1.0	THALLIUM	0.6	J	MG/KG		
SBLDC	DJA102	0.0 to 1.0	ZINC	76.5	=	MG/KG	126	
SBLDD	DJA106	0.0 to 1.0	ALUMINUM	12400	=	MG/KG	23810	
SBLDD	DJA106	0.0 to 1.0	ANTIMONY	5.4	J	MG/KG	7	
SBLDD	DJA106	0.0 to 1.0	ARSENIC	11.3	=	MG/KG	20	
SBLDD	DJA106	0.0 to 1.0	BERYLLIUM	0.55	J	MG/KG	1.1	
SBLDD	DJA106	0.0 to 1.0	CHROMIUM, TOTAL	14.6	=	MG/KG	24.8	
SBLDD	DJA106	0.0 to 1.0	COPPER	21.9	=	MG/KG	33.5	
SBLDD	DJA106	0.0 to 1.0	LEAD	17.4	=	MG/KG	30	
SBLDD	DJA106	0.0 to 1.0	MERCURY	0.06	J	MG/KG	0.4	
SBLDD	DJA106	0.0 to 1.0	NICKEL	17.1	=	MG/KG	30	
SBLDD	DJA106	0.0 to 1.0	SELENIUM	0.33	J	MG/KG	0.8	
SBLDD	DJA106	0.0 to 1.0	THALLIUM	0.6	J	MG/KG		
SBLDD	DJA106	0.0 to 1.0	ZINC	73.7	=	MG/KG	126	
SBLDE	DJA110	0.0 to 1.0	ALUMINUM	9030	=	MG/KG	23810	
SBLDE	DJA110	0.0 to 1.0	ARSENIC	9	J	MG/KG	20	
SBLDE	DJA110	0.0 to 1.0	CHROMIUM TOTAL	15.4	=	MG/KG	24.8	
SBLDE	DJA110	0.0 to 1.0	COPPER	29.8	=	MG/KG	33.5	
SBLDE	DJA110	0.0 to 1.0	LEAD	29.9	=	MG/KG	30	
SBLDE	DJA110	0.0 to 1.0	NICKEL	15.1	=	MG/KG	30	
SBLDE	DJA110	0.0 to 1.0	ZINC	64.7	=	MG/KG	126	
SBLDF	DJA114	0.0 to 1.0	ALUMINUM	12700	=	MG/KG	23810	
SBLDF	DJA114	0.0 to 1.0	ARSENIC	11.5	J	MG/KG	20	
SBLDF	DJA114	0.0 to 1.0	CHROMIUM, TOTAL	12.8	=	MG/KG	24.8	
SBLDF	DJA114	0.0 to 1.0	COPPER	19.9	=	MG/KG	33.5	
SBLDF	DJA114	0.0 to 1.0	LEAD	13.8	=	MG/KG	30	
SBLDF	DJA114	0.0 to 1.0	MERCURY	0.03	J	MG/KG	0.4	
SBLDF	DJA114	0.0 to 1.0	NICKEL	18.5	=	MG/KG	30	
SBLDF	DJA114	0.0 to 1.0	ZINC	75	=	MG/KG	126	
SBLDG	DJA211	0.0 to 1.0	ALUMINUM	8820	=	MG/KG	23810	
SBLDG	DJA211	0.0 to 1.0	ARSENIC	14	=	MG/KG	20	
SBLDG	DJA211	0.0 to 1.0	BERYLLIUM	0.47	J	MG/KG	1.1	
SBLDG	DJA211	0.0 to 1.0	CHROMIUM TOTAL	19.9	=	MG/KG	24.8	
SBLDG	DJA211	0.0 to 1.0	COPPER	40.8	J	MG/KG	33.5	X
SBLDG	DJA211	0.0 to 1.0	LEAD	61.6	=	MG/KG	30	X
SBLDG	DJA211	0.0 to 1.0	NICKEL	16.4	=	MG/KG	30	
SBLDG	DJA211	0.0 to 1.0	SILVER	0.81	J	MG/KG	2	
SBLDG	DJA211	0.0 to 1.0	ZINC	136	J	MG/KG	126	X
SBLDG	DJA286FD	0.0 to 1.0	ALUMINUM	12000	=	MG/KG	23810	
SBLDG	DJA286FD	0.0 to 1.0	ARSENIC	10.2	=	MG/KG	20	
SBLDG	DJA286FD	0.0 to 1.0	BERYLLIUM	0.6	J	MG/KG	1.1	
SBLDG	DJA286FD	0.0 to 1.0	CHROMIUM, TOTAL	26.3	=	MG/KG	24.8	X
SBLDG	DJA286FD	0.0 to 1.0	COPPER	73.3	J	MG/KG	33.5	X
SBLDG	DJA286FD	0.0 to 1.0	LEAD	62.3	=	MG/KG	30	X
SBLDG	DJA286FD	0.0 to 1.0	NICKEL	20.9	=	MG/KG	30	
SBLDG	DJA286FD	0.0 to 1.0	SILVER	1.4	J	MG/KG	2	
SBLDG	DJA286FD	0.0 to 1.0	ZINC	90.7	J	MG/KG	126	
SBLDH	DJA215	0.0 to 1.0	ALUMINUM	13300	=	MG/KG	23810	
SBLDH	DJA215	0.0 to 1.0	ARSENIC	9.1	=	MG/KG	20	
SBLDH	DJA215	0.0 to 1.0	BERYLLIUM	0.6	J	MG/KG	1.1	
SBLDH	DJA215	0.0 to 1.0	CHROMIUM TOTAL	13.4	=	MG/KG	24.8	
SBLDH	DJA215	0.0 to 1.0	COPPER	15.3	J	MG/KG	33.5	
SBLDH	DJA215	0.0 to 1.0	LEAD	15.3	=	MG/KG	30	
SBLDH	DJA215	0.0 to 1.0	NICKEL	16	=	MG/KG	30	
SBLDH	DJA215	0.0 to 1.0	SILVER	0.77	J	MG/KG	2	
SBLDH	DJA215	0.0 to 1.0	ZINC	54.5	J	MG/KG	126	
SBLEA	DJA118	0.0 to 1.0	ALUMINUM	19000	=	MG/KG	23810	
SBLEA	DJA118	0.0 to 1.0	ARSENIC	12	J	MG/KG	20	
SBLEA	DJA118	0.0 to 1.0	CHROMIUM, TOTAL	109	=	MG/KG	24.8	X
SBLEA	DJA118	0.0 to 1.0	COPPER	171	=	MG/KG	33.5	X
SBLEA	DJA118	0.0 to 1.0	LEAD	487	=	MG/KG	30	X
SBLEA	DJA118	0.0 to 1.0	NICKEL	21.9	=	MG/KG	30	
SBLEA	DJA118	0.0 to 1.0	SILVER	1.2	J	MG/KG	2	
SBLEA	DJA118	0.0 to 1.0	THALLIUM	0.33	J	MG/KG		
SBLEA	DJA118	0.0 to 1.0	ZINC	306	=	MG/KG	126	X
SBLEB	DJA122	0.0 to 1.0	ALUMINUM	21100	=	MG/KG	23810	
SBLEB	DJA122	0.0 to 1.0	ANTIMONY	6.3	J	MG/KG	7	
SBLEB	DJA122	0.0 to 1.0	ARSENIC	8.7	J	MG/KG	20	
SBLEB	DJA122	0.0 to 1.0	CHROMIUM TOTAL	33	=	MG/KG	24.8	X
SBLEB	DJA122	0.0 to 1.0	COPPER	72.5	=	MG/KG	33.5	X
SBLEB	DJA122	0.0 to 1.0	LEAD	142	=	MG/KG	30	X
SBLEB	DJA122	0.0 to 1.0	MERCURY	0.12	=	MG/KG	0.4	
SBLEB	DJA122	0.0 to 1.0	NICKEL	17.4	=	MG/KG	30	
SBLEB	DJA122	0.0 to 1.0	THALLIUM	0.47	J	MG/KG		
SBLEB	DJA122	0.0 to 1.0	ZINC	139	=	MG/KG	126	X
SBLEB	DJA229FD	0.0 to 1.0	ALUMINUM	14700	=	MG/KG	23810	
SBLEB	DJA229FD	0.0 to 1.0	ARSENIC	9.9	J	MG/KG	20	
SBLEB	DJA229FD	0.0 to 1.0	CHROMIUM, TOTAL	17.8	=	MG/KG	24.8	
SBLEB	DJA229FD	0.0 to 1.0	COPPER	30.6	=	MG/KG	33.5	
SBLEB	DJA229FD	0.0 to 1.0	LEAD	41	=	MG/KG	30	X
SBLEB	DJA229FD	0.0 to 1.0	NICKEL	15.8	=	MG/KG	30	
SBLEB	DJA229FD	0.0 to 1.0	THALLIUM	0.36	J	MG/KG		
SBLEB	DJA229FD	0.0 to 1.0	ZINC	80.2	=	MG/KG	126	

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TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLEC	DJA126	0 0 to 1 0	ALUMINUM	22000	=	MG/KG	23810	
SBLEC	DJA126	0 0 to 1 0	ANTIMONY	5 5	J	MG/KG	7	
SBLEC	DJA126	0 0 to 1 0	ARSENIC	12 2	=	MG/KG	20	
SBLEC	DJA126	0 0 to 1 0	BERYLLIUM	0 7	J	MG/KG	1 1	
SBLEC	DJA126	0 0 to 1.0	CADMIUM	0 64	J	MG/KG	1 4	
SBLEC	DJA126	0 0 to 1 0	CHROMIUM TOTAL	27 1	=	MG/KG	24 8	X
SBLEC	DJA126	0 0 to 1 0	COPPER	31 7	=	MG/KG	33 5	
SBLEC	DJA126	0 0 to 1 0	LEAD	39 1	=	MG/KG	30	X
SBLEC	DJA126	0 0 to 1 0	NICKEL	21 6	=	MG/KG	30	
SBLEC	DJA126	0 0 to 1 0	SILVER	0 66	J	MG/KG	2	
SBLEC	DJA126	0 0 to 1 0	THALLIUM	0 6	J	MG/KG		
SBLEC	DJA126	0 0 to 1 0	ZINC	88 1	=	MG/KG	126	
SBLED	DJA130	0 0 to 1 0	ALUMINUM	11600	=	MG/KG	23810	
SBLED	DJA130	0 0 to 1 0	ANTIMONY	5 5	J	MG/KG	7	
SBLED	DJA130	0 0 to 1 0	ARSENIC	9 9	=	MG/KG	20	
SBLED	DJA130	0 0 to 1 0	BERYLLIUM	0 53	J	MG/KG	1 1	
SBLED	DJA130	0 0 to 1 0	CHROMIUM TOTAL	12.9	=	MG/KG	24 8	
SBLED	DJA130	0 0 to 1 0	COPPER	17 1	=	MG/KG	33 5	
SBLED	DJA130	0 0 to 1 0	LEAD	17	=	MG/KG	30	
SBLED	DJA130	0 0 to 1.0	NICKEL	18	=	MG/KG	30	
SBLED	DJA130	0 0 to 1.0	SELENIUM	0 24	J	MG/KG	0 8	
SBLED	DJA130	0 0 to 1 0	THALLIUM	0 61	J	MG/KG		
SBLED	DJA130	0 0 to 1 0	ZINC	58 8	=	MG/KG	126	
SBLEE	DJA134	0 0 to 1.0	ALUMINUM	11600	=	MG/KG	23810	
SBLEE	DJA134	0 0 to 1 0	ANTIMONY	355	J	MG/KG	7	X
SBLEE	DJA134	0 0 to 1 0	ARSENIC	9 6	=	MG/KG	20	
SBLEE	DJA134	0 0 to 1 0	BERYLLIUM	0 46	J	MG/KG	1 1	
SBLEE	DJA134	0 0 to 1 0	CHROMIUM, TOTAL	23 6	=	MG/KG	24 8	
SBLEE	DJA134	0 0 to 1 0	COPPER	70 1	=	MG/KG	33 5	X
SBLEE	DJA134	0 0 to 1 0	LEAD	211	=	MG/KG	30	X
SBLEE	DJA134	0 0 to 1 0	NICKEL	18 7	=	MG/KG	30	
SBLEE	DJA134	0 0 to 1.0	SELENIUM	0 36	J	MG/KG	0 8	
SBLEE	DJA134	0 0 to 1 0	SILVER	1 5	J	MG/KG	2	
SBLEE	DJA134	0 0 to 1 0	THALLIUM	0 62	J	MG/KG		
SBLEE	DJA134	0 0 to 1 0	ZINC	97 8	=	MG/KG	126	
SBLEF	DJA138	0 0 to 1 0	ALUMINUM	25100	=	MG/KG	23810	X
SBLEF	DJA138	0 0 to 1 0	ANTIMONY	5 6	J	MG/KG	7	
SBLEF	DJA138	0 0 to 1 0	ARSENIC	12 3	=	MG/KG	20	
SBLEF	DJA138	0 0 to 1 0	BERYLLIUM	0 74	J	MG/KG	1 1	
SBLEF	DJA138	0 0 to 1 0	CHROMIUM, TOTAL	38 1	=	MG/KG	24 8	X
SBLEF	DJA138	0 0 to 1 0	COPPER	37 2	=	MG/KG	33 5	X
SBLEF	DJA138	0 0 to 1 0	LEAD	789	=	MG/KG	30	X
SBLEF	DJA138	0 0 to 1 0	MERCURY	0 05	J	MG/KG	0 4	
SBLEF	DJA138	0 0 to 1.0	NICKEL	21 8	=	MG/KG	30	
SBLEF	DJA138	0 0 to 1 0	SELENIUM	0 51	J	MG/KG	0 8	
SBLEF	DJA138	0 0 to 1 0	THALLIUM	0 68	J	MG/KG		
SBLEF	DJA138	0 0 to 1 0	ZINC	144	=	MG/KG	126	X
SBLEG	DJA199	0 0 to 1 0	ALUMINUM	10800	=	MG/KG	23810	
SBLEG	DJA199	0 0 to 1 0	ARSENIC	9 3	=	MG/KG	20	
SBLEG	DJA199	0 0 to 1 0	BERYLLIUM	0 59	J	MG/KG	1 1	
SBLEG	DJA199	0 0 to 1 0	CHROMIUM TOTAL	13 4	=	MG/KG	24 6	
SBLEG	DJA199	0 0 to 1 0	COPPER	20 9	=	MG/KG	33 5	
SBLEG	DJA199	0 0 to 1 0	LEAD	16 3	=	MG/KG	30	
SBLEG	DJA199	0 0 to 1 0	NICKEL	22.4	=	MG/KG	30	
SBLEG	DJA199	0 0 to 1 0	THALLIUM	0 43	J	MG/KG		
SBLEG	DJA199	0 0 to 1 0	ZINC	65 9	=	MG/KG	126	
SBLEH	DJA207	0 0 to 1 0	ALUMINUM	15900	=	MG/KG	23810	
SBLEH	DJA207	0 0 to 1 0	ARSENIC	8 9	=	MG/KG	20	
SBLEH	DJA207	0 0 to 1 0	BERYLLIUM	0 53	J	MG/KG	1 1	
SBLEH	DJA207	0 0 to 1 0	CHROMIUM, TOTAL	18 4	=	MG/KG	24 8	
SBLEH	DJA207	0 0 to 1 0	COPPER	20 7	J	MG/KG	33 5	
SBLEH	DJA207	0 0 to 1 0	LEAD	63 1	=	MG/KG	30	X
SBLEH	DJA207	0 0 to 1 0	MERCURY	0 07	J	MG/KG	0 4	
SBLEH	DJA207	0 0 to 1 0	NICKEL	16 7	=	MG/KG	30	
SBLEH	DJA207	0 0 to 1 0	SILVER	0 69	J	MG/KG	2	
SBLEH	DJA207	0 0 to 1 0	ZINC	64 8	J	MG/KG	126	
SBLFB (1)	DJA023	0 0 to 1 0	ALUMINUM	6590	=	MG/KG	23810	
SBLFB (1)	DJA023	0 0 to 1 0	ARSENIC	6 4	=	MG/KG	20	
SBLFB (1)	DJA023	0 0 to 1 0	BERYLLIUM	0 45	J	MG/KG	1 1	
SBLFB (1)	DJA023	0 0 to 1 0	CHROMIUM TOTAL	14 1	=	MG/KG	24 8	
SBLFB (1)	DJA023	0 0 to 1 0	COPPER	19 8	=	MG/KG	33 5	
SBLFB (1)	DJA023	0 0 to 1 0	LEAD	10	=	MG/KG	30	
SBLFB (1)	DJA023	0 0 to 1 0	NICKEL	17 7	=	MG/KG	30	
SBLFB (1)	DJA023	0 0 to 1.0	ZINC	44 2	=	MG/KG	126	
SBLFC (1)	DJA027	0 0 to 1 0	ALUMINUM	13300	=	MG/KG	23810	
SBLFC (1)	DJA027	0 0 to 1 0	ANTIMONY	5 5	J	MG/KG	7	
SBLFC (1)	DJA027	0 0 to 1 0	ARSENIC	8 2	=	MG/KG	20	
SBLFC (1)	DJA027	0 0 to 1 0	BERYLLIUM	0 55	J	MG/KG	1 1	
SBLFC (1)	DJA027	0 0 to 1 0	CHROMIUM TOTAL	36 4	=	MG/KG	24 8	X
SBLFC (1)	DJA027	0 0 to 1 0	COPPER	22 8	=	MG/KG	33 5	
SBLFC (1)	DJA027	0 0 to 1 0	LEAD	112	=	MG/KG	30	X
SBLFC (1)	DJA027	0 0 to 1 0	NICKEL	17	=	MG/KG	30	
SBLFC (1)	DJA027	0 0 to 1 0	SELENIUM	0 56	J	MG/KG	0 8	
SBLFC (1)	DJA027	0 0 to 1 0	THALLIUM	0 29	J	MG/KG		
SBLFC (1)	DJA027	0 0 to 1 0	ZINC	101	=	MG/KG	126	
SBLFD (1)	DJA031	0 0 to 1 0	ALUMINUM	18100	=	MG/KG	23810	

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Arer

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFD (1)	DJA031	0 0 to 1 0	ANTIMONY	5 5	J	MG/KG	7	
SBLFD (1)	DJA031	0 0 to 1 0	ARSENIC	9 9	=	MG/KG	20	
SBLFD (1)	DJA031	0 0 to 1 0	BERYLLIUM	0 67	J	MG/KG	1 1	
SBLFD (1)	DJA031	0 0 to 1 0	CHROMIUM TOTAL	43	=	MG/KG	24 8	X
SBLFD (1)	DJA031	0 0 to 1 0	COPPER	126	=	MG/KG	33 5	X
SBLFD (1)	DJA031	0 0 to 1 0	LEAD	179	=	MG/KG	30	X
SBLFD (1)	DJA031	0 0 to 1 0	NICKEL	20 2	=	MG/KG	30	
SBLFD (1)	DJA031	0 0 to 1 0	SELENIUM	0 51	J	MG/KG	0 8	
SBLFD (1)	DJA031	0 0 to 1 0	THALLIUM	0 29	J	MG/KG		
SBLFD (1)	DJA031	0 0 to 1 0	ZINC	169	=	MG/KG	126	X
SBLFE (1)	DJA035	0 0 to 1 0	ALUMINUM	12500	=	MG/KG	23810	
SBLFE (1)	DJA035	0 0 to 1 0	ANTIMONY	5 5	J	MG/KG	7	
SBLFE (1)	DJA035	0 0 to 1 0	ARSENIC	9 5	=	MG/KG	20	
SBLFE (1)	DJA035	0 0 to 1 0	BERYLLIUM	0 55	J	MG/KG	1 1	
SBLFE (1)	DJA035	0 0 to 1 0	CHROMIUM, TOTAL	16 2	=	MG/KG	24 8	
SBLFE (1)	DJA035	0 0 to 1 0	COPPER	48 9	=	MG/KG	33 5	X
SBLFE (1)	DJA035	0 0 to 1 0	LEAD	64	=	MG/KG	30	X
SBLFE (1)	DJA035	0 0 to 1 0	NICKEL	17 2	=	MG/KG	30	
SBLFE (1)	DJA035	0 0 to 1 0	THALLIUM	0 56	J	MG/KG		
SBLFE (1)	DJA035	0 0 to 1 0	ZINC	104	=	MG/KG	126	
SBLFF (1)	DJA039	0 0 to 1 0	ALUMINUM	10300	=	MG/KG	23810	
SBLFF (1)	DJA039	0 0 to 1 0	ARSENIC	10 3	J	MG/KG	20	
SBLFF (1)	DJA039	0 0 to 1 0	CHROMIUM TOTAL	14 4	=	MG/KG	24 8	
SBLFF (1)	DJA039	0 0 to 1 0	COPPER	23 9	=	MG/KG	33 5	
SBLFF (1)	DJA039	0 0 to 1 0	LEAD	23 5	=	MG/KG	30	
SBLFF (1)	DJA039	0 0 to 1 0	NICKEL	20 1	=	MG/KG	30	
SBLFF (1)	DJA039	0 0 to 1 0	THALLIUM	0 36	J	MG/KG		
SBLFF (1)	DJA039	0 0 to 1 0	ZINC	72 4	=	MG/KG	126	
SBLFF (1)	DJA049FD	0 0 to 1 0	ALUMINUM	11000	=	MG/KG	23810	
SBLFF (1)	DJA049FD	0 0 to 1 0	ARSENIC	10 7	J	MG/KG	20	
SBLFF (1)	DJA049FD	0 0 to 1 0	COBALT	9 1	J	MG/KG	18 3	
SBLFF (1)	DJA049FD	0 0 to 1 0	COPPER	18 8	=	MG/KG	33 5	
SBLFF (1)	DJA049FD	0 0 to 1 0	LEAD	15 7	=	MG/KG	30	
SBLFF (1)	DJA049FD	0 0 to 1 0	NICKEL	17 6	=	MG/KG	30	
SBLFF (1)	DJA049FD	0 0 to 1 0	THALLIUM	0 38	J	MG/KG		
SBLFF (1)	DJA049FD	0 0 to 1 0	ZINC	68 2	=	MG/KG	126	
SBLFG	DJA203	0 0 to 1 0	ALUMINUM	14800	=	MG/KG	23810	
SBLFG	DJA203	0 0 to 1 0	ARSENIC	11 2	=	MG/KG	20	
SBLFG	DJA203	0 0 to 1 0	BERYLLIUM	0 78	J	MG/KG	1 1	
SBLFG	DJA203	0 0 to 1 0	CHROMIUM, TOTAL	20 4	=	MG/KG	24 8	
SBLFG	DJA203	0 0 to 1 0	COPPER	29 7	=	MG/KG	33 5	
SBLFG	DJA203	0 0 to 1 0	LEAD	23 1	=	MG/KG	30	
SBLFG	DJA203	0 0 to 1 0	NICKEL	27 2	=	MG/KG	30	
SBLFG	DJA203	0 0 to 1 0	THALLIUM	0 5	J	MG/KG		
SBLFG	DJA203	0 0 to 1 0	ZINC	84 2	=	MG/KG	126	
SS-1	DDMT-080598-SS1	0 0 to 1 0	ALUMINUM	19400	=	mg/Kg	23810	
SS-1	DDMT-080598-SS1	0 0 to 1 0	ANTIMONY	1 5	=	mg/Kg	7	
SS-1	DDMT-080598-SS1	0 0 to 1 0	ARSENIC	12	=	mg/Kg	20	
SS 1	DDMT-080598-SS1	0 0 to 1 0	BARIUM	158	=	mg/Kg	234	
SS-1	DDMT-080598-SS1	0 0 to 1 0	CALCIUM	6710	=	mg/Kg	5840	X
SS-1	DDMT-080598 SS1	0 0 to 1 0	CHROMIUM, TOTAL	25 3	=	mg/Kg	24 8	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	COBALT	6 9	=	mg/Kg	18 3	
SS-1	DDMT-080598-SS1	0 0 to 1 0	IRON	22000	=	mg/Kg	37040	
SS-1	DDMT-080598-SS1	0 0 to 1 0	LEAD	73 8	J	mg/Kg	30	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	MAGNESIUM	2600	=	mg/Kg	4600	
SS-1	DDMT-080598-SS1	0 0 to 1 0	MANGANESE	540	=	mg/Kg	1304	
SS-1	DDMT-080598-SS1	0 0 to 1 0	MERCURY	0 04	=	mg/Kg	0 4	
SS-1	DDMT-080598-SS1	0 0 to 1 0	NICKEL	17 7	=	mg/Kg	30	
SS-1	DDMT-080598-SS1	0 0 to 1 0	POTASSIUM	2390	=	mg/Kg	1820	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	SODIUM	126	=	mg/Kg		
SS-1	DDMT-080598-SS1	0 0 to 1 0	VANADIUM	41 1	=	mg/Kg	48 4	
SS-2	DDMT-080698-SS2	0 0 to 1 0	ALUMINUM	23900	=	mg/Kg	23810	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	ANTIMONY	12 9	J	mg/Kg	7	X
SS 2	DDMT-080698-SS2	0 0 to 1 0	ARSENIC	25 9	=	mg/Kg	20	X
SS 2	DDMT-080698-SS2	0 0 to 1 0	BARIUM	423	=	mg/Kg	234	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	BERYLLIUM	1	=	mg/Kg	1 1	
SS-2	DDMT-080698-SS2	0 0 to 1 0	CADMIUM	0 94	=	mg/Kg	1 4	
SS-2	DDMT-080698-SS2	0 0 to 1 0	CALCIUM	17700	=	mg/Kg	5840	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	CHROMIUM, TOTAL	212	=	mg/Kg	24 8	X
SS 2	DDMT-080698-SS2	0 0 to 1 0	COBALT	10 8	=	mg/Kg	18 3	
SS-2	DDMT-080698-SS2	0 0 to 1 0	COPPER	796	=	mg/Kg	33 5	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	IRON	51000	=	mg/Kg	37040	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	LEAD	1020	=	mg/Kg	30	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	MAGNESIUM	2980	=	mg/Kg	4600	
SS-2	DDMT-080698-SS2	0 0 to 1 0	MANGANESE	723	=	mg/Kg	1304	
SS-2	DDMT-080698-SS2	0 0 to 1 0	MERCURY	0 08	=	mg/Kg	0 4	
SS 2	DDMT-080698-SS2	0 0 to 1 0	NICKEL	37 1	=	mg/Kg	30	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	POTASSIUM	3000	=	mg/Kg	1820	X
SS 2	DDMT-080698-SS2	0 0 to 1 0	SELENIUM	1 3	=	mg/Kg	0 8	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	SILVER	8 4	=	mg/Kg	2	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	SODIUM	391	=	mg/Kg		
SS 2	DDMT-080698-SS2	0 0 to 1 0	VANADIUM	46 4	=	mg/Kg	48 4	
SS-2	DDMT-080698-SS2	0 0 to 1 0	ZINC	662	=	mg/Kg	126	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	ALUMINUM	23300	=	mg/Kg	23810	
SS 3	DDMT-080698-SS3	0 0 to 1 0	ANTIMONY	2 1	J	mg/Kg	7	
SS 3	DDMT-080698-SS3	0 0 to 1 0	ARSENIC	13 7	=	mg/Kg	20	

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TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area

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Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SS-3	DDMT-080698-SS3	0 0 to 1 0	BARIUM	215	=	mg/Kg	234	
SS-3	DDMT-080698-SS3	0 0 to 1 0	CALCIUM	3680	=	mg/Kg	5840	
SS-3	DDMT-080698-SS3	0 0 to 1 0	CHROMIUM TOTAL	37 5	=	mg/Kg	24.8	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	COBALT	8	=	mg/Kg	18.3	
SS-3	DDMT-080698-SS3	0 0 to 1 0	IRON	24100	=	mg/Kg	37040	
SS-3	DDMT-080698-SS3	0 0 to 1 0	LEAD	128	J	mg/Kg	30	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	MAGNESIUM	2740	=	mg/Kg	4600	
SS-3	DDMT-080698-SS3	0 0 to 1 0	MANGANESE	640	=	mg/Kg	1304	
SS-3	DDMT-080698-SS3	0 0 to 1 0	MERCURY	0 05	J	mg/Kg	0 4	
SS-3	DDMT-080698-SS3	0 0 to 1 0	NICKEL	20 1	=	mg/Kg	30	
SS-3	DDMT-080698-SS3	0 0 to 1 0	POTASSIUM	2580	=	mg/Kg	1820	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	VANADIUM	44 9	=	mg/Kg	48 4	
SS-4	DDMT-081098-SS4	0 0 to 1 0	ALUMINUM	31100	J	mg/Kg	23810	X
SS-4	DDMT-081098-SS4	0 0 to 1 0	ARSENIC	12 2	=	mg/Kg	20	
SS-4	DDMT-081098-SS4	0 0 to 1 0	BARIUM	112	=	mg/Kg	234	
SS-4	DDMT-081098-SS4	0 0 to 1 0	CALCIUM	1990	=	mg/Kg	5840	
SS-4	DDMT-081098-SS4	0 0 to 1 0	CHROMIUM TOTAL	31 6	=	mg/Kg	24 8	X
SS-4	DDMT-081098-SS4	0 0 to 1 0	COBALT	7 5	=	mg/Kg	18 3	
SS-4	DDMT-081098-SS4	0 0 to 1 0	IRON	23400	=	mg/Kg	37040	
SS-4	DDMT-081098-SS4	0 0 to 1 0	LEAD	21 4	=	mg/Kg	30	
SS-4	DDMT-081098-SS4	0 0 to 1 0	MAGNESIUM	2240	=	mg/Kg	4600	
SS-4	DDMT-081098-SS4	0 0 to 1 0	MANGANESE	481	=	mg/Kg	1304	
SS-4	DDMT-081098-SS4	0 0 to 1 0	MERCURY	0 06	=	mg/Kg	0 4	
SS-4	DDMT-081098-SS4	0 0 to 1 0	NICKEL	16 8	=	mg/Kg	30	
SS-4	DDMT-081098-SS4	0 0 to 1 0	POTASSIUM	1540	=	mg/Kg	1820	
SS-4	DDMT-081098-SS4	0 0 to 1 0	VANADIUM	53 8	=	mg/Kg	48 4	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	ALUMINUM	19900	J	mg/Kg	23810	
SS-7	DDMT-081098-SS7	0 0 to 1 0	ANTIMONY	4 3	=	mg/Kg	7	
SS-7	DDMT-081098-SS7	0 0 to 1 0	ARSENIC	13 5	=	mg/Kg	20	
SS-7	DDMT-081098-SS7	0 0 to 1 0	BARIUM	158	=	mg/Kg	234	
SS-7	DDMT-081098-SS7	0 0 to 1 0	CALCIUM	61200	=	mg/Kg	5840	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	CHROMIUM TOTAL	53 7	=	mg/Kg	24.8	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	COBALT	3 2	=	mg/Kg	18 3	
SS-7	DDMT-081098-SS7	0 0 to 1 0	IRON	13200	=	mg/Kg	37040	
SS-7	DDMT-081098-SS7	0 0 to 1 0	LEAD	101	=	mg/Kg	30	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	MAGNESIUM	2450	=	mg/Kg	4600	
SS-7	DDMT-081098-SS7	0 0 to 1 0	MANGANESE	211	=	mg/Kg	1304	
SS-7	DDMT-081098-SS7	0 0 to 1 0	MERCURY	0 18	=	mg/Kg	0 4	
SS-7	DDMT-081098-SS7	0 0 to 1 0	NICKEL	11 1	=	mg/Kg	30	
SS-7	DDMT-081098-SS7	0 0 to 1 0	POTASSIUM	2540	=	mg/Kg	1820	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	SODIUM	400	=	mg/Kg		
SS-7	DDMT-081098-SS7	0 0 to 1 0	VANADIUM	31 8	=	mg/Kg	48 4	
Surface Water								
SW61A	DJA195	Not Applicable	ALUMINUM	17 8	=	MG/L	5 077	X
SW61A	DJA195	Not Applicable	ARSENIC	0 0103	=	MG/L	0 018	
SW61A	DJA195	Not Applicable	BERYLLIUM	0 0011	J	MG/L		
SW61A	DJA195	Not Applicable	CHROMIUM TOTAL	0 0203	=	MG/L	0 0361	
SW61A	DJA195	Not Applicable	COPPER	0 0401	=	MG/L	0 0746	
SW61A	DJA195	Not Applicable	LEAD	0 0256	=	MG/L	0 0186	X
SW61A	DJA195	Not Applicable	NICKEL	0 0396	J	MG/L	0 228	
SW61A	DJA195	Not Applicable	ZINC	0 131	=	MG/L	0.2873	
SWLAA	DJA018	Not Applicable	ALUMINUM	11 7	=	MG/L	5 077	X
SWLAA	DJA018	Not Applicable	ARSENIC	0 0066	J	MG/L	0 018	
SWLAA	DJA018	Not Applicable	BERYLLIUM	0 0007	J	MG/L		
SWLAA	DJA018	Not Applicable	CADMIUM	0 0036	J	MG/L		
SWLAA	DJA018	Not Applicable	CHROMIUM, TOTAL	0 0172	=	MG/L	0 0361	
SWLAA	DJA018	Not Applicable	LEAD	0 0336	=	MG/L	0 0186	X
SWLAA	DJA018	Not Applicable	NICKEL	0 0192	J	MG/L	0 228	
SWLAA	DJA018	Not Applicable	ZINC	0 0879	=	MG/L	0.2873	
OC Pesticides								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	DIELDRIN	0 009	J	MG/KG	0 37	
SB61A	DJA192	3 0 to 5 0	TOXAPHENE	0 167	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 002	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0038	=	MG/KG	0 0015	X
SB61A	DJA193	8 0 to 10 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 0049	J	MG/KG	0 0072	
SB61A	DJA193	8 0 to 10 0	DIELDRIN	0 016	=	MG/KG	0 37	
SBLCE	DJA091	8 0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0016	J	MG/KG		
SBLCF	DJA220	8 0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 00065	J	MG/KG	0 0015	
SBLCF	DJA220	8 0 to 10 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2 TRICHL	0 00067	J	MG/KG	0 0072	
SBLDF	DJA115	8 0 to 10 0	DIELDRIN	0 00075	J	MG/KG	0 37	
SBLDG	DJA212	8 0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0074	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 00092	J	MG/KG	0 0015	
SBLDG	DJA212	8 0 to 10 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 0012	J	MG/KG	0 0072	
SBLDH	DJA216	8 0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 00021	J	MG/KG	0 0015	
SBLDH	DJA216	8 0 to 10 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2 TRICHL	0 00058	J	MG/KG	0 0072	
SBLDH	DJA216	8 0 to 10 0	DIELDRIN	0 0012	J	MG/KG	0 37	
SBLEE	DJA135	8 0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0456	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 004	=	MG/KG	0 0015	X
SBLEE	DJA135	8 0 to 10 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2 TRICHL	0 00068	J	MG/KG	0 0072	
SBLEG	DJA200	8 0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0041	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 001	J	MG/KG	0 0015	
SBLEG	DJA200	8 0 to 10 0	HEPTACHLOR	0 00011	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0786	=	MG/KG		
SBLEH	DJA208	8 0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0086	J	MG/KG	0 0015	X
SBLEH	DJA208	8 0 to 10 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 0042	J	MG/KG	0 0072	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Arez
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFA (1)	DJA020	8 0 to 10 0	HEPTACHLOR EPOXIDE	0 0326	J	MG/KG	0 0021	X
SBLFA (1)	DJA020	8 0 to 10 0	METHOXYCHLOR	0 0502	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0305	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0221	=	MG/KG	0 0015	X
SBLFC (1)	DJA028	8 0 to 10 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2 TRICHL	0 0164	J	MG/KG	0 0072	X
SBLFC (1)	DJA028	8 0 to 10 0	DIELDRIN	0 0005	J	MG/KG	0 37	
SBLFD (1)	DJA032	8 0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2 DICHLOR	0 00078	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0019	J	MG/KG	0 0015	X
SBLFD (1)	DJA032	8 0 to 10 0	DDT (1 1 bis(CHLOROPHENYL)-2,2 2-TRICHL	0 0034	J	MG/KG	0 0072	
SBLFD (1)	DJA032	8 0 to 10 0	DIELDRIN	0 0047	=	MG/KG	0 37	
Sediments								
SD61A	DJA194	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0062	J	MG/KG	0 0061	X
SD61A	DJA194	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0392	=	MG/KG	0 0072	X
SD61A	DJA194	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 0282	J	MG/KG		
SD61A	DJA194	0 0 to 1 0	DIELDRIN	0 0617	=	MG/KG	0 011	X
SD61A	DJA194	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 0356	J	MG/KG	0 23	
SD61A	DJA194	0 0 to 1 0	METHOXYCHLOR	0 0682	J	MG/KG		
SDLAA	DJA017	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 002	J	MG/KG	0 0072	
SDLAA	DJA017	0 0 to 1 0	GAMMA-CHLORDANE	0 0017	J	MG/KG	2	
SDLAA	DJA017	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 0146	J	MG/KG	0 23	
Surface Soils								
SB61A	DJA191	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 007	J	MG/KG	0 16	
SB61A	DJA191	0 0 to 1 0	DIELDRIN	0 0242	J	MG/KG	0 086	
SBLAA	DJA001	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2 TRICHL	0 00029	J	MG/KG	0 074	
SBLAB	DJA005	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 00029	J	MG/KG	0 0067	
SBLAB	DJA005	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 00057	J	MG/KG	0 16	
SBLAB	DJA005	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 0041	J	MG/KG	0 074	
SBLAD	DJA013	0 0 to 1 0	ALPHA-CHLORDANE	0 00038	J	MG/KG	0 029	
SBLAD	DJA013	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0018	J	MG/KG	0 0067	
SBLAD	DJA013	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0026	=	MG/KG	0 16	
SBLAD	DJA013	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2 TRICHL	0 0076	J	MG/KG	0 074	
SBLAD	DJA013	0 0 to 1 0	DIELDRIN	0 0027	J	MG/KG	0 086	
SBLAD	DJA013	0 0 to 1 0	GAMMA-CHLORDANE	0 00038	J	MG/KG	0 026	
SBLAD	DJA013	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 0034	J	MG/KG	0 0045	
SBLAD	DJA013	0 0 to 1 0	METHOXYCHLOR	0 0042	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0378	=	MG/KG	0 16	
SBLBA	DJA054	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 0085	J	MG/KG	0 074	
SBLBD	DJA066	0 0 to 1 0	ALPHA-CHLORDANE	0 0015	J	MG/KG	0 029	
SBLBD	DJA066	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0018	J	MG/KG	0 0067	
SBLBD	DJA066	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2 DICHLOR	0 0019	J	MG/KG	0 16	
SBLBD	DJA066	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2 TRICHL	0 0048	J	MG/KG	0 074	
SBLBD	DJA066	0 0 to 1 0	DIELDRIN	0 177	=	MG/KG	0 086	X
SBLBD	DJA066	0 0 to 1 0	GAMMA-CHLORDANE	0 0013	J	MG/KG	0 026	
SBLCA	DJA074	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0655	J	MG/KG	0 0067	X
SBLCA	DJA074	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 212	=	MG/KG	0 16	X
SBLCA	DJA074	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 234	J	MG/KG	0 074	X
SBLCA	DJA074	0 0 to 1 0	DIELDRIN	0 964	=	MG/KG	0 086	X
SBLCA	DJA074	0 0 to 1 0	ENDRIN	0 0036	J	MG/KG		
SBLCA	DJA074	0 0 to 1 0	ENDRIN KETONE	0 003	=	MG/KG		
SBLCB	DJA078	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0013	J	MG/KG	0 0067	
SBLCB	DJA078	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0022	J	MG/KG	0 16	
SBLCB	DJA078	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2 TRICHL	0 0045	J	MG/KG	0 074	
SBLCB	DJA078	0 0 to 1 0	DIELDRIN	0 0042	=	MG/KG	0 086	
SBLCC	DJA082	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0839	J	MG/KG	0 0067	X
SBLCC	DJA082	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 294	=	MG/KG	0 16	X
SBLCC	DJA082	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHL	1 46	J	MG/KG	0 074	X
SBLCC	DJA082	0 0 to 1 0	DIELDRIN	0 174	=	MG/KG	0 086	X
SBLCD	DJA086	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0012	J	MG/KG	0 0067	
SBLCD	DJA086	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0184	=	MG/KG	0 16	
SBLCD	DJA086	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2 TRICHL	0 0223	J	MG/KG	0 074	
SBLCD	DJA086	0 0 to 1 0	DIELDRIN	0 0398	=	MG/KG	0 086	
SBLCD	DJA086	0 0 to 1 0	GAMMA-CHLORDANE	0 0003	J	MG/KG	0 026	
SBLDA	DJA094	0 0 to 1 0	ALPHA CHLORDANE	0 0016	J	MG/KG	0 029	
SBLDA	DJA094	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0363	J	MG/KG	0 0067	X
SBLDA	DJA094	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 236	=	MG/KG	0 16	X
SBLDA	DJA094	0 0 to 1 0	DDT (1 1 bis(CHLOROPHENYL)-2,2 2-TRICHL	0 408	J	MG/KG	0 074	X
SBLDA	DJA094	0 0 to 1 0	DIELDRIN	0 068	=	MG/KG	0 086	
SBLDA	DJA094	0 0 to 1 0	ENDOSULFAN SULFATE	0 0259	J	MG/KG		
SBLDA	DJA094	0 0 to 1 0	GAMMA CHLORDANE	0 0018	J	MG/KG	0 026	
SBLDB	DJA098	0 0 to 1 0	ALPHA CHLORDANE	0 00047	J	MG/KG	0 029	
SBLDB	DJA098	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0274	J	MG/KG	0 0067	X
SBLDB	DJA098	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0248	J	MG/KG	0 16	
SBLDB	DJA098	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 246	J	MG/KG	0 074	X
SBLDB	DJA098	0 0 to 1 0	DIELDRIN	0 0026	=	MG/KG	0 086	
SBLDB	DJA098	0 0 to 1 0	ENDOSULFAN SULFATE	0 0084	J	MG/KG		
SBLDC	DJA102	0 0 to 1 0	DDD (1 1 bis(CHLOROPHENYL)-2 2-DICHLOR	0 001	J	MG/KG	0 0067	
SBLDC	DJA102	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0037	=	MG/KG	0 16	
SBLDC	DJA102	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2 TRICHL	0 0175	J	MG/KG	0 074	
SBLDC	DJA102	0 0 to 1 0	ENDOSULFAN SULFATE	0 0043	J	MG/KG		
SBLDD	DJA106	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0104	J	MG/KG	0 0067	X
SBLDD	DJA106	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0769	=	MG/KG	0 16	
SBLDD	DJA106	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 132	J	MG/KG	0 074	X
SBLDD	DJA106	0 0 to 1 0	DIELDRIN	0 0681	=	MG/KG	0 086	
SBLEA	DJA118	0 0 to 1 0	ALPHA-CHLORDANE	0 0036	J	MG/KG	0 029	
SBLEA	DJA118	0 0 to 1 0	DDD (1 1 bis(CHLOROPHENYL)-2 2-DICHLOR	0 0435	J	MG/KG	0 0067	X
SBLEA	DJA118	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 155	=	MG/KG	0 16	

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TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLEA	DJA118	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 179	J	MG/KG	0 074	X
SBLEA	DJA118	0 0 to 1 0	DIELDRIN	0 0731	=	MG/KG	0 086	
SBLEA	DJA118	0 0 to 1 0	ENDOSULFAN SULFATE	0 0799	=	MG/KG		
SBLEA	DJA118	0 0 to 1 0	GAMMA-CHLORDANE	0 0042	J	MG/KG	0 026	
SBLEB	DJA122	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0091	=	MG/KG	0 0067	X
SBLEB	DJA122	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0273	=	MG/KG	0 16	
SBLEB	DJA122	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2,2 TRICHL	0 0551	J	MG/KG	0 074	
SBLEB	DJA122	0 0 to 1 0	DIELDRIN	0 0834	=	MG/KG	0 086	
SBLEB	DJA229FD	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0226	J	MG/KG	0 0067	X
SBLEB	DJA229FD	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0516	=	MG/KG	0 16	
SBLEB	DJA229FD	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 0971	J	MG/KG	0 074	X
SBLEB	DJA229FD	0 0 to 1 0	DIELDRIN	0 0111	=	MG/KG	0 086	
SBLEC	DJA126	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0045	J	MG/KG	0 0067	
SBLEC	DJA126	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 014	=	MG/KG	0 16	
SBLEC	DJA126	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2 TRICHL	0 024	J	MG/KG	0 074	
SBLEC	DJA126	0 0 to 1 0	DIELDRIN	0 041	=	MG/KG	0 086	
SBLEG	DJA199	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 00024	J	MG/KG	0 0067	
SBLEG	DJA199	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 0021	J	MG/KG	0 074	
SBLEG	DJA199	0 0 to 1 0	DIELDRIN	0 0006	J	MG/KG	0 086	
SBLEH	DJA207	0 0 to 1 0	ALPHA-CHLORDANE	0 0058	J	MG/KG	0 029	
SBLEH	DJA207	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 126	J	MG/KG	0 0067	X
SBLEH	DJA207	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 6	=	MG/KG	0 16	X
SBLEH	DJA207	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2-TRICHL	1 04	J	MG/KG	0 074	X
SBLEH	DJA207	0 0 to 1 0	DIELDRIN	0 0335	J	MG/KG	0 086	
SBLEH	DJA207	0 0 to 1 0	GAMMA-CHLORDANE	0 0041	J	MG/KG	0 026	
SBLFA (1)	DJA019	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0094	J	MG/KG	0 0067	X
SBLFA (1)	DJA019	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0736	=	MG/KG	0 16	
SBLFA (1)	DJA019	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2-TRICHL	0 0978	J	MG/KG	0 074	X
SBLFA (1)	DJA019	0 0 to 1 0	DIELDRIN	0 094	=	MG/KG	0 086	X
SBLFA (1)	DJA019	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 029	J	MG/KG	0 0045	X
SBLFA (1)	DJA019	0 0 to 1 0	METHOXYCHLOR	0 0543	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	ALPHA-CHLORDANE	0 0042	J	MG/KG	0 029	
SBLFA (1)	DJA046FD	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0248	J	MG/KG	0 0067	X
SBLFA (1)	DJA046FD	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0995	=	MG/KG	0 16	
SBLFA (1)	DJA046FD	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 173	J	MG/KG	0 074	X
SBLFA (1)	DJA046FD	0 0 to 1 0	DIELDRIN	0 209	=	MG/KG	0 086	X
SBLFA (1)	DJA046FD	0 0 to 1 0	ENDOSULFAN SULFATE	0 0911	=	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	GAMMA-CHLORDANE	0 0028	J	MG/KG	0 026	
SBLFB (1)	DJA023	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 0053	J	MG/KG	0 16	
SBLFB (1)	DJA023	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2 TRICHL	0 0115	J	MG/KG	0 074	
SBLFC (1)	DJA027	0 0 to 1 0	ALPHA-CHLORDANE	0 00025	J	MG/KG	0 029	
SBLFC (1)	DJA027	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 0095	J	MG/KG	0 0067	X
SBLFC (1)	DJA027	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2 DICHLOR	0 146	=	MG/KG	0 16	
SBLFC (1)	DJA027	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 329	J	MG/KG	0 074	X
SBLFC (1)	DJA027	0 0 to 1 0	DIELDRIN	0 0149	=	MG/KG	0 086	
SBLFC (1)	DJA027	0 0 to 1 0	ENDOSULFAN SULFATE	0 0052	J	MG/KG		
SBLFG	DJA203	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2 2-DICHLOR	0 00066	J	MG/KG	0 0067	
SBLFG	DJA203	0 0 to 1 0	DDE (1 1 bis(CHLOROPHENYL)-2 2-DICHLOR	0 0065	=	MG/KG	0 16	
SBLFG	DJA203	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2,2 TRICHL	0 132	=	MG/KG	0 074	X
SBLFG	DJA203	0 0 to 1 0	DIELDRIN	0 00054	J	MG/KG	0 086	
Organics								
Subsurface Soils								
SB-1	DDMT-080598 SB1-3-5 -02	3 0 to 5 0	1 4-Dithiane	0 0016	J	MG/KG		
SB-1	DDMT-080598-SB1-3-5 -02	3 0 to 5 0	1 4-Oxathiane	0 001	J	MG/KG		
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	1 4-Dithiane	0 0019	J	MG/KG		
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	1 4-Oxathiane	0 0011	J	MG/KG		
SB-1	DDMT-080598 SB1 9-11'-05	9 0 to 11 0	1,4-Dithiane	0 0019	J	MG/KG		
SB-1	DDMT-080598-SB1-9-11-05	9 0 to 11 0	1 4-Oxathiane	0 0011	J	MG/KG		
Surface Soils								
SS-1	DDMT-080598-SS1	0 0 to 1 0	1 4-Dithiane	0 0017	J	MG/KG		
SS-1	DDMT-080598-SS1	0 0 to 1 0	1 4-Oxathiane	0 001	J	MG/KG		
Polyaromatic Hydrocarbons								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	2-METHYLNAPHTHALENE	0 12	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	ACENAPHTHYLENE	0 079	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	ANTHRACENE	0 11	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(a)ANTHRACENE	0 74	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(a)PYRENE	0 97	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(b)FLUORANTHENE	1 2	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(g h i)PERYLENE	0 57	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(k)FLUORANTHENE	0 95	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	CHRYSENE	0 91	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	DIBENZ(a h)ANTHRACENE	0 2	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	FLUORANTHENE	1 2	=	MG/KG	0 045	X
SB61A	DJA192	3 0 to 5 0	INDENO(1 2 3-c d)PYRENE	0 69	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	NAPHTHALENE	0 082	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	PHENANTHRENE	0 56	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	PYRENE	1 6	=	MG/KG	0 042	X
SB61A	DJA193	8 0 to 10 0	BENZO(a)ANTHRACENE	0 095	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(a)PYRENE	0 13	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 15	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(g h i)PERYLENE	0 14	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 13	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	CHRYSENE	0 11	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	DIBENZ(a h)ANTHRACENE	0 1	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	FLUORANTHENE	0 15	J	MG/KG	0 045	X

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB61A	DJA193	8 0 to 10 0	INDENO(1 2 3-c d)PYRENE	0 15	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	PYRENE	0 16	J	MG/KG	0 042	X
SBLAA	DJA002	8 0 to 10 0	ANTHRACENE	0 0083	J	MG/KG		
SBLAA	DJA002	8 0 to 10 0	BENZO(a)ANTHRACENE	0 0061	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	BENZO(a)ANTHRACENE	0 0041	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	BENZO(a)PYRENE	0 0042	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	ANTHRACENE	0 0045	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	BENZO(a)PYRENE	0 0034	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12 0	BENZO(a)ANTHRACENE	0 0051	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(a)ANTHRACENE	0 18	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(a)PYRENE	0 24	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 21	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(g h i)PERYLENE	0 18	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 22	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	CHRYSENE	0 21	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	DIBENZ(a h)ANTHRACENE	0 041	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	FLUORANTHENE	0 23	J	MG/KG	0 045	X
SBLEE	DJA135	8 0 to 10 0	INDENO(1 2 3-c d)PYRENE	0 17	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	PHENANTHRENE	0 11	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	PYRENE	0 2	J	MG/KG	0 042	X
SBLEH	DJA208	8 0 to 10 0	BENZO(a)ANTHRACENE	0 12	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(a)PYRENE	0 13	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 14	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(g,h i)PERYLENE	0 12	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 14	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	CHRYSENE	0 15	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	DIBENZ(a h)ANTHRACENE	0 07	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	FLUORANTHENE	0 28	J	MG/KG	0 045	X
SBLEH	DJA208	8 0 to 10 0	INDENO(1,2,3-c d)PYRENE	0 13	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	NAPHTHALENE	0 069	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	PHENANTHRENE	0 18	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	PYRENE	0 29	J	MG/KG	0 042	X
SBLFA (1)	DJA020	8 0 to 10 0	ACENAPHTHENE	0 055	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	ANTHRACENE	0 1	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(a)ANTHRACENE	0 3	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(a)PYRENE	0 3	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 3	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(g h i)PERYLENE	0 22	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 32	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	CHRYSENE	0 33	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	DIBENZ(a h)ANTHRACENE	0 053	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	FLUORANTHENE	0 84	=	MG/KG	0 045	X
SBLFA (1)	DJA020	8 0 to 10 0	FLUORENE	0 042	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	INDENO(1 2,3-c d)PYRENE	0 22	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	PHENANTHRENE	0 52	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	PYRENE	0 56	=	MG/KG	0 042	X
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(a)ANTHRACENE	0 019	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(a)PYRENE	0 017	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 02	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(g h i)PERYLENE	0 017	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 02	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	CHRYSENE	0 024	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	FLUORANTHENE	0 052	J	MG/KG	0 045	X
SBLFB (1)	DJA024	8 0 to 10 0	INDENO(1 2 3-c d)PYRENE	0 014	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	PHENANTHRENE	0 041	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	PYRENE	0 038	J	MG/KG	0 042	
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(a)ANTHRACENE	0 1	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(a)PYRENE	0 11	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 12	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(g h i)PERYLENE	0 091	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 11	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	CHRYSENE	0 12	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	FLUORANTHENE	0 26	J	MG/KG	0 045	X
SBLFC (1)	DJA028	8 0 to 10 0	INDENO(1 2 3-c d)PYRENE	0 09	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	PHENANTHRENE	0 13	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	PYRENE	0 2	J	MG/KG	0 042	X
SBLFD (1)	DJA032	8 0 to 10 0	FLUORANTHENE	0 15	J	MG/KG	0 045	X
SBLFD (1)	DJA032	8 0 to 10 0	PHENANTHRENE	0 1	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	PYRENE	0 11	J	MG/KG	0 042	X
Sediments								
SD61A	DJA194	0 0 to 1 0	2 METHYLNAPHTHALENE	0 16	J	MG/KG		
SD61A	DJA194	0 0 to 1 0	ACENAPHTHENE	0 94	=	MG/KG	0 77	X
SD61A	DJA194	0 0 to 1 0	ACENAPHTHYLENE	0 24	J	MG/KG		
SD61A	DJA194	0 0 to 1 0	ANTHRACENE	1 6	=	MG/KG	1 6	
SD61A	DJA194	0 0 to 1 0	BENZO(a)ANTHRACENE	5 4	=	MG/KG	2 9	X
SD61A	DJA194	0 0 to 1 0	BENZO(a)PYRENE	5 9	=	MG/KG	2 5	X
SD61A	DJA194	0 0 to 1 0	BENZO(b)FLUORANTHENE	7 4	=	MG/KG	2 21605	X
SD61A	DJA194	0 0 to 1 0	BENZO(g h i)PERYLENE	4 6	=	MG/KG	1 8	X
SD61A	DJA194	0 0 to 1 0	BENZO(k)FLUORANTHENE	5	=	MG/KG	2 3	X
SD61A	DJA194	0 0 to 1 0	CHRYSENE	5 8	=	MG/KG	3 2	X
SD61A	DJA194	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	1 8	=	MG/KG	0 7	X
SD61A	DJA194	0 0 to 1 0	FLUORANTHENE	9 7	=	MG/KG	7 1	X
SD61A	DJA194	0 0 to 1 0	FLUORENE	0 73	=	MG/KG	0 87	
SD61A	DJA194	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	5 1	=	MG/KG	1 7	X
SD61A	DJA194	0 0 to 1 0	NAPHTHALENE	0 19	J	MG/KG	0 13	X
SD61A	DJA194	0 0 to 1 0	PHENANTHRENE	7 3	=	MG/KG	6 9	X

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TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SD61A	DJA194	0 0 to 1 0	PYRENE	7 9	=	MG/KG	2 882	X
SDLAA	DJA017	0 0 to 1 0	ACENAPHTHENE	0 13	J	MG/KG	0 77	
SDLAA	DJA017	0 0 to 1 0	ACENAPHTHYLENE	0 16	J	MG/KG		
SDLAA	DJA017	0 0 to 1 0	ANTHRACENE	0 36	=	MG/KG	1 6	
SDLAA	DJA017	0 0 to 1 0	BENZO(a)ANTHRACENE	1 4	=	MG/KG	2 9	
SDLAA	DJA017	0 0 to 1 0	BENZO(a)PYRENE	1 6	=	MG/KG	2 5	
SDLAA	DJA017	0 0 to 1 0	BENZO(b)FLUORANTHENE	1 6	=	MG/KG	2 21605	
SDLAA	DJA017	0 0 to 1 0	BENZO(g h i)PERYLENE	0 025	J	MG/KG	1 8	
SDLAA	DJA017	0 0 to 1 0	BENZO(k)FLUORANTHENE	1 6	=	MG/KG	2 3	
SDLAA	DJA017	0 0 to 1 0	CHRYSENE	1 6	=	MG/KG	3 2	
SDLAA	DJA017	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 3	=	MG/KG	0 7	
SDLAA	DJA017	0 0 to 1 0	FLUORANTHENE	3 7	=	MG/KG	7 1	
SDLAA	DJA017	0 0 to 1 0	FLUORENE	0 2	J	MG/KG	0 87	
SDLAA	DJA017	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	1 3	=	MG/KG	1 7	
SDLAA	DJA017	0 0 to 1 0	NAPHTHALENE	0 062	J	MG/KG	0 13	
SDLAA	DJA017	0 0 to 1 0	PHENANTHRENE	2 4	=	MG/KG	6 9	
SDLAA	DJA017	0 0 to 1 0	PYRENE	2 5	=	MG/KG	2 882	
Surface Soils								
SB61A	DJA191	0 0 to 1 0	2-METHYLNAPHTHALENE	0 34	=	MG/KG		
SB61A	DJA191	0 0 to 1 0	ACENAPHTHENE	0 38	=	MG/KG		
SB61A	DJA191	0 0 to 1 0	ANTHRACENE	0 9	=	MG/KG	0 096	X
SB61A	DJA191	0 0 to 1 0	BENZO(a)ANTHRACENE	5 8	=	MG/KG	0 71	X
SB61A	DJA191	0 0 to 1 0	BENZO(a)PYRENE	6 7	=	MG/KG	0 96	X
SB61A	DJA191	0 0 to 1 0	BENZO(b)FLUORANTHENE	8 2	=	MG/KG	0 9	X
SB61A	DJA191	0 0 to 1.0	BENZO(g,h,i)PERYLENE	3 8	=	MG/KG	0 82	X
SB61A	DJA191	0 0 to 1 0	BENZO(k)FLUORANTHENE	6 3	=	MG/KG	0 78	X
SB61A	DJA191	0 0 to 1 0	CHRYSENE	6 3	=	MG/KG	0 94	X
SB61A	DJA191	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	1 6	=	MG/KG	0 26	X
SB61A	DJA191	0 0 to 1 0	FLUORANTHENE	8 5	=	MG/KG	1 6	X
SB61A	DJA191	0 0 to 1 0	FLUORENE	0 32	=	MG/KG		
SB61A	DJA191	0 0 to 1 0	INDENO(1 2 3-c,d)PYRENE	4 6	=	MG/KG	0 7	X
SB61A	DJA191	0 0 to 1 0	NAPHTHALENE	0 25	J	MG/KG		
SB61A	DJA191	0 0 to 1 0	PHENANTHRENE	4 3	=	MG/KG	0 61	X
SB61A	DJA191	0 0 to 1 0	PYRENE	12	=	MG/KG	1 5	X
SBLAA	DJA001	0 0 to 1 0	ANTHRACENE	0 0084	J	MG/KG	0 096	
SBLAA	DJA001	0 0 to 1 0	BENZO(a)ANTHRACENE	0 0093	J	MG/KG	0 71	
SBLAA	DJA001	0 0 to 1 0	PHENANTHRENE	0 011	J	MG/KG	0 61	
SBLBA	DJA054	0 0 to 1 0	ACENAPHTHENE	0 18	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	ANTHRACENE	0 31	=	MG/KG	0 096	X
SBLBA	DJA054	0 0 to 1 0	BENZO(a)ANTHRACENE	1 1	=	MG/KG	0 71	X
SBLBA	DJA054	0 0 to 1 0	BENZO(a)PYRENE	1	=	MG/KG	0 96	X
SBLBA	DJA054	0 0 to 1 0	BENZO(b)FLUORANTHENE	1 2	=	MG/KG	0 9	X
SBLBA	DJA054	0 0 to 1 0	BENZO(g h i)PERYLENE	0 46	=	MG/KG	0 82	
SBLBA	DJA054	0 0 to 1 0	BENZO(k)FLUORANTHENE	1 1	=	MG/KG	0 78	X
SBLBA	DJA054	0 0 to 1 0	CHRYSENE	1 2	=	MG/KG	0 94	X
SBLBA	DJA054	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 13	J	MG/KG	0 26	
SBLBA	DJA054	0 0 to 1 0	FLUORANTHENE	2 4	=	MG/KG	1 6	X
SBLBA	DJA054	0 0 to 1 0	FLUORENE	0 14	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	INDENO(1 2,3-c d)PYRENE	0 55	=	MG/KG	0 7	
SBLBA	DJA054	0 0 to 1 0	PHENANTHRENE	1 8	=	MG/KG	0 61	X
SBLBA	DJA054	0 0 to 1 0	PYRENE	2.4	=	MG/KG	1 5	X
SBLBB	DJA058	0 0 to 1 0	BENZO(a)ANTHRACENE	0 06	J	MG/KG	0 71	
SBLBB	DJA058	0 0 to 1 0	BENZO(a)PYRENE	0 066	J	MG/KG	0 96	
SBLBB	DJA058	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 074	J	MG/KG	0 9	
SBLBB	DJA058	0 0 to 1 0	BENZO(g h i)PERYLENE	0 062	J	MG/KG	0 82	
SBLBB	DJA058	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 069	J	MG/KG	0 78	
SBLBB	DJA058	0 0 to 1 0	CHRYSENE	0 068	J	MG/KG	0 94	
SBLBB	DJA058	0 0 to 1 0	FLUORANTHENE	0 12	J	MG/KG	1 6	
SBLBB	DJA058	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 038	J	MG/KG	0 7	
SBLBB	DJA058	0 0 to 1 0	PYRENE	0 12	J	MG/KG	1 5	
SBLBC	DJA062	0 0 to 1 0	ACENAPHTHENE	0 2	J	MG/KG		
SBLBC	DJA062	0 0 to 1 0	ANTHRACENE	0 32	J	MG/KG	0 096	X
SBLBC	DJA062	0 0 to 1 0	BENZO(a)ANTHRACENE	0 86	J	MG/KG	0 71	X
SBLBC	DJA062	0 0 to 1 0	BENZO(a)PYRENE	0 99	J	MG/KG	0 96	X
SBLBC	DJA062	0 0 to 1 0	BENZO(b)FLUORANTHENE	1 1	J	MG/KG	0 9	X
SBLBC	DJA062	0 0 to 1 0	BENZO(g h i)PERYLENE	0 74	J	MG/KG	0 82	
SBLBC	DJA062	0 0 to 1 0	BENZO(k)FLUORANTHENE	1	J	MG/KG	0 78	X
SBLBC	DJA062	0 0 to 1 0	CHRYSENE	0 95	J	MG/KG	0 94	X
SBLBC	DJA062	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 12	J	MG/KG	0 26	
SBLBC	DJA062	0 0 to 1 0	FLUORANTHENE	2 1	J	MG/KG	1 6	X
SBLBC	DJA062	0 0 to 1 0	FLUORENE	0 13	J	MG/KG		
SBLBC	DJA062	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 55	J	MG/KG	0 7	
SBLBC	DJA062	0 0 to 1 0	PHENANTHRENE	1 6	J	MG/KG	0 61	X
SBLBC	DJA062	0 0 to 1 0	PYRENE	3	J	MG/KG	1 5	X
SBLBD	DJA066	0 0 to 1 0	BENZO(a)ANTHRACENE	0 14	J	MG/KG	0 71	
SBLBD	DJA066	0 0 to 1 0	BENZO(a)PYRENE	0 17	J	MG/KG	0 96	
SBLBD	DJA066	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 18	J	MG/KG	0 9	
SBLBD	DJA066	0 0 to 1 0	BENZO(g h i)PERYLENE	0 12	J	MG/KG	0 82	
SBLBD	DJA066	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 18	J	MG/KG	0 78	
SBLBD	DJA066	0 0 to 1 0	CHRYSENE	0 18	J	MG/KG	0 94	
SBLBD	DJA066	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 032	J	MG/KG	0 26	
SBLBD	DJA066	0 0 to 1 0	FLUORANTHENE	0 32	=	MG/KG	1 6	
SBLBD	DJA066	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 14	J	MG/KG	0 7	
SBLBD	DJA066	0 0 to 1 0	PHENANTHRENE	0 16	J	MG/KG	0 61	
SBLBD	DJA066	0 0 to 1 0	PYRENE	0 31	=	MG/KG	1 5	
SBLCA	DJA074	0 0 to 1 0	BENZO(a)ANTHRACENE	0 18	J	MG/KG	0 71	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCA	DJA074	0 0 to 1 0	BENZO(a)PYRENE	0 23	J	MG/KG	0 96	
SBLCA	DJA074	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 24	J	MG/KG	0 9	
SBLCA	DJA074	0 0 to 1 0	BENZO(g h i)PERYLENE	0 15	J	MG/KG	0 82	
SBLCA	DJA074	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 2	J	MG/KG	0 78	
SBLCA	DJA074	0 0 to 1 0	CHRYSENE	0 26	J	MG/KG	0 94	
SBLCA	DJA074	0 0 to 1 0	FLUORANTHENE	0 48	=	MG/KG	1 6	
SBLCA	DJA074	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 18	J	MG/KG	0 7	
SBLCA	DJA074	0 0 to 1 0	PHENANTHRENE	0 18	J	MG/KG	0 61	
SBLCA	DJA074	0 0 to 1 0	PYRENE	0 49	=	MG/KG	1 5	
SBLCD	DJA086	0 0 to 1 0	BENZO(a)ANTHRACENE	0 25	J	MG/KG	0 71	
SBLCD	DJA086	0 0 to 1 0	BENZO(a)PYRENE	0 23	J	MG/KG	0 96	
SBLCD	DJA086	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 28	J	MG/KG	0 9	
SBLCD	DJA086	0 0 to 1 0	BENZO(g h i)PERYLENE	0 16	J	MG/KG	0 82	
SBLCD	DJA086	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 23	J	MG/KG	0 78	
SBLCD	DJA086	0 0 to 1 0	CHRYSENE	0 3	=	MG/KG	0 94	
SBLCD	DJA086	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 046	J	MG/KG	0 26	
SBLCD	DJA086	0 0 to 1 0	FLUORANTHENE	0 52	=	MG/KG	1 6	
SBLCD	DJA086	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 2	J	MG/KG	0 7	
SBLCD	DJA086	0 0 to 1 0	PHENANTHRENE	0 28	J	MG/KG	0 61	
SBLCD	DJA086	0 0 to 1 0	PYRENE	0 57	=	MG/KG	1 5	
SBLDA	DJA094	0 0 to 1 0	BENZO(a)ANTHRACENE	0 13	J	MG/KG	0 71	
SBLDA	DJA094	0 0 to 1 0	BENZO(a)PYRENE	0 15	J	MG/KG	0 96	
SBLDA	DJA094	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 17	J	MG/KG	0 9	
SBLDA	DJA094	0 0 to 1 0	BENZO(g h,i)PERYLENE	0 14	J	MG/KG	0 82	
SBLDA	DJA094	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 17	J	MG/KG	0 78	
SBLDA	DJA094	0 0 to 1 0	CHRYSENE	0 16	J	MG/KG	0 94	
SBLDA	DJA094	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 038	J	MG/KG	0 26	
SBLDA	DJA094	0 0 to 1 0	FLUORANTHENE	0 3	=	MG/KG	1 6	
SBLDA	DJA094	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 13	J	MG/KG	0 7	
SBLDA	DJA094	0 0 to 1 0	PHENANTHRENE	0 13	J	MG/KG	0 61	
SBLDA	DJA094	0 0 to 1 0	PYRENE	0 24	J	MG/KG	1 5	
SBLDB	DJA098	0 0 to 1 0	FLUORANTHENE	0 098	J	MG/KG	1 6	
SBLDB	DJA098	0 0 to 1 0	PYRENE	0 072	J	MG/KG	1 5	
SBLDG	DJA211	0 0 to 1 0	BENZO(a)ANTHRACENE	0 17	J	MG/KG	0 71	
SBLDG	DJA211	0 0 to 1 0	BENZO(a)PYRENE	0 19	J	MG/KG	0 96	
SBLDG	DJA211	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 24	J	MG/KG	0 9	
SBLDG	DJA211	0 0 to 1 0	BENZO(g h i)PERYLENE	0 15	J	MG/KG	0 82	
SBLDG	DJA211	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 21	J	MG/KG	0 78	
SBLDG	DJA211	0 0 to 1 0	CHRYSENE	0 21	J	MG/KG	0 94	
SBLDG	DJA211	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 077	J	MG/KG	0 26	
SBLDG	DJA211	0 0 to 1 0	FLUORANTHENE	0 38	=	MG/KG	1 6	
SBLDG	DJA211	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 17	J	MG/KG	0 7	
SBLDG	DJA211	0 0 to 1 0	PHENANTHRENE	0 19	J	MG/KG	0 61	
SBLDG	DJA211	0 0 to 1 0	PYRENE	0 4	=	MG/KG	1 5	
SBLDG	DJA286FD	0 0 to 1 0	BENZO(a)ANTHRACENE	0 26	J	MG/KG	0 71	
SBLDG	DJA286FD	0 0 to 1 0	BENZO(a)PYRENE	0 37	=	MG/KG	0 96	
SBLDG	DJA286FD	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 39	=	MG/KG	0 9	
SBLDG	DJA286FD	0 0 to 1 0	BENZO(g h i)PERYLENE	0 51	=	MG/KG	0 82	
SBLDG	DJA286FD	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 38	=	MG/KG	0 78	
SBLDG	DJA286FD	0 0 to 1 0	CHRYSENE	0 33	=	MG/KG	0 94	
SBLDG	DJA286FD	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 12	J	MG/KG	0 26	
SBLDG	DJA286FD	0 0 to 1 0	FLUORANTHENE	0 61	=	MG/KG	1 6	
SBLDG	DJA286FD	0 0 to 1 0	INDENO(1 2,3-c d)PYRENE	0 32	=	MG/KG	0 7	
SBLDG	DJA286FD	0 0 to 1 0	PHENANTHRENE	0 3	=	MG/KG	0 61	
SBLDG	DJA286FD	0 0 to 1 0	PYRENE	0 72	=	MG/KG	1 5	
SBLDH	DJA215	0 0 to 1 0	BENZO(a)PYRENE	0 057	J	MG/KG	0 96	
SBLDH	DJA215	0 0 to 1 0	BENZO(g h i)PERYLENE	0 046	J	MG/KG	0 82	
SBLDH	DJA215	0 0 to 1 0	CHRYSENE	0 07	J	MG/KG	0 94	
SBLDH	DJA215	0 0 to 1 0	FLUORANTHENE	0 13	J	MG/KG	1 6	
SBLDH	DJA215	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 05	J	MG/KG	0 7	
SBLDH	DJA215	0 0 to 1 0	PYRENE	0 12	J	MG/KG	1 5	
SBLEA	DJA118	0 0 to 1 0	BENZO(a)ANTHRACENE	0 16	J	MG/KG	0 71	
SBLEA	DJA118	0 0 to 1 0	BENZO(a)PYRENE	0 23	J	MG/KG	0 96	
SBLEA	DJA118	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 23	J	MG/KG	0 9	
SBLEA	DJA118	0 0 to 1 0	BENZO(g h i)PERYLENE	0 25	J	MG/KG	0 82	
SBLEA	DJA118	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 23	J	MG/KG	0 78	
SBLEA	DJA118	0 0 to 1 0	CHRYSENE	0 19	J	MG/KG	0 94	
SBLEA	DJA118	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 066	J	MG/KG	0 26	
SBLEA	DJA118	0 0 to 1 0	FLUORANTHENE	0 3	=	MG/KG	1 6	
SBLEA	DJA118	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 23	J	MG/KG	0 7	
SBLCA	DJA118	0 0 to 1 0	PHENANTHRENE	0 11	J	MG/KG	0 61	
SBLEA	DJA118	0 0 to 1 0	PYRENE	0 24	J	MG/KG	1 5	
SBLEB	DJA122	0 0 to 1 0	ACENAPHTHENE	0 026	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	ANTHRACENE	0 05	J	MG/KG	0 096	
SBLEB	DJA122	0 0 to 1 0	BENZO(a)ANTHRACENE	0 28	J	MG/KG	0 71	
SBLEB	DJA122	0 0 to 1 0	BENZO(a)PYRENE	0 26	J	MG/KG	0 96	
SBLEB	DJA122	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 37	=	MG/KG	0 9	
SBLEB	DJA122	0 0 to 1 0	BENZO(g h i)PERYLENE	0 23	J	MG/KG	0 82	
SBLEB	DJA122	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 36	=	MG/KG	0 78	
SBLEB	DJA122	0 0 to 1 0	CHRYSENE	0 33	=	MG/KG	0 94	
SBLEB	DJA122	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 067	J	MG/KG	0 26	
SBLEB	DJA122	0 0 to 1 0	FLUORANTHENE	0 61	=	MG/KG	1 6	
SBLEB	DJA122	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	0 26	J	MG/KG	0 7	
SBLEB	DJA122	0 0 to 1 0	PHENANTHRENE	0 28	J	MG/KG	0 61	
SBLEB	DJA122	0 0 to 1 0	PYRENE	0 51	=	MG/KG	1 5	
SBLEB	DJA229FD	0 0 to 1 0	ACENAPHTHENE	0 074	J	MG/KG		

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Arez

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLEB	DJA229FD	0 0 to 1 0	ANTHRACENE	0 12	J	MG/KG	0 096	X
SBLEB	DJA229FD	0 0 to 1 0	BENZO(a)ANTHRACENE	0 32	=	MG/KG	0 71	
SBLEB	DJA229FD	0 0 to 1 0	BENZO(a)PYRENE	0 28	J	MG/KG	0 96	
SBLEB	DJA229FD	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 32	=	MG/KG	0 9	
SBLEB	DJA229FD	0 0 to 1.0	BENZO(g h i)PERYLENE	0 18	J	MG/KG	0 82	
SBLEB	DJA229FD	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 33	=	MG/KG	0 78	
SBLEB	DJA229FD	0 0 to 1 0	CHRYSENE	0 33	=	MG/KG	0 94	
SBLEB	DJA229FD	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 06	J	MG/KG	0 26	
SBLEB	DJA229FD	0 0 to 1 0	FLUORANTHENE	0 83	=	MG/KG	1 6	
SBLEB	DJA229FD	0 0 to 1 0	FLUORENE	0 07	J	MG/KG		
SBLEB	DJA229FD	0 0 to 1 0	INDENO(1 2 3-c,d)PYRENE	0 2	J	MG/KG	0 7	
SBLEB	DJA229FD	0 0 to 1 0	PHENANTHRENE	0 55	=	MG/KG	0 61	
SBLEB	DJA229FD	0 0 to 1 0	PYRENE	0 56	=	MG/KG	1 5	
SBLEH	DJA207	0 0 to 1 0	BENZO(a)ANTHRACENE	0 17	J	MG/KG	0 71	
SBLEH	DJA207	0 0 to 1 0	BENZO(a)PYRENE	0 22	J	MG/KG	0 96	
SBLEH	DJA207	0 0 to 1.0	BENZO(b)FLUORANTHENE	0 22	J	MG/KG	0 9	
SBLEH	DJA207	0 0 to 1.0	BENZO(g h,i)PERYLENE	0 2	J	MG/KG	0 82	
SBLEH	DJA207	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 24	J	MG/KG	0 78	
SBLEH	DJA207	0 0 to 1 0	CHRYSENE	0 22	J	MG/KG	0 94	
SBLEH	DJA207	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 059	J	MG/KG	0 26	
SBLEH	DJA207	0 0 to 1 0	FLUORANTHENE	0 42	=	MG/KG	1 6	
SBLEH	DJA207	0 0 to 1 0	INDENO(1 2 3-c,d)PYRENE	0 22	J	MG/KG	0 7	
SBLEH	DJA207	0 0 to 1 0	PHENANTHRENE	0 24	J	MG/KG	0 61	
SBLEH	DJA207	0 0 to 1 0	PYRENE	0 39	=	MG/KG	1 5	
SBLFA (1)	DJA019	0 0 to 1 0	ACENAPHTHENE	0 014	J	MG/KG		
SBLFA (1)	DJA019	0 0 to 1 0	ANTHRACENE	0 029	J	MG/KG	0 096	
SBLFA (1)	DJA019	0 0 to 1 0	BENZO(a)ANTHRACENE	0 093	J	MG/KG	0 71	
SBLFA (1)	DJA019	0 0 to 1 0	BENZO(a)PYRENE	0 087	J	MG/KG	0 96	
SBLFA (1)	DJA019	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 092	J	MG/KG	0 9	
SBLFA (1)	DJA019	0 0 to 1 0	BENZO(g h i)PERYLENE	0 073	J	MG/KG	0 82	
SBLFA (1)	DJA019	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 094	J	MG/KG	0 78	
SBLFA (1)	DJA019	0 0 to 1 0	CHRYSENE	0 1	J	MG/KG	0 94	
SBLFA (1)	DJA019	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 02	J	MG/KG	0 26	
SBLFA (1)	DJA019	0 0 to 1 0	FLUORANTHENE	0 24	J	MG/KG	1 6	
SBLFA (1)	DJA019	0 0 to 1 0	FLUORENE	0 01	J	MG/KG		
SBLFA (1)	DJA019	0 0 to 1 0	INDENO(1 2 3-c,d)PYRENE	0 068	J	MG/KG	0 7	
SBLFA (1)	DJA019	0 0 to 1 0	PHENANTHRENE	0 14	J	MG/KG	0 61	
SBLFA (1)	DJA019	0 0 to 1 0	PYRENE	0 17	J	MG/KG	1 5	
SBLFA (1)	DJA046FD	0 0 to 1 0	ACENAPHTHENE	0 18	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	ANTHRACENE	0 29	J	MG/KG	0 096	X
SBLFA (1)	DJA046FD	0 0 to 1 0	BENZO(a)ANTHRACENE	0 76	=	MG/KG	0 71	X
SBLFA (1)	DJA046FD	0 0 to 1 0	BENZO(a)PYRENE	0 77	=	MG/KG	0 96	
SBLFA (1)	DJA046FD	0 0 to 1 0	BENZO(b)FLUORANTHENE	0 75	=	MG/KG	0 9	
SBLFA (1)	DJA046FD	0 0 to 1 0	BENZO(g h i)PERYLENE	0 54	=	MG/KG	0 82	
SBLFA (1)	DJA046FD	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 83	=	MG/KG	0 78	X
SBLFA (1)	DJA046FD	0 0 to 1 0	CHRYSENE	0 82	=	MG/KG	0 94	
SBLFA (1)	DJA046FD	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 14	J	MG/KG	0 26	
SBLFA (1)	DJA046FD	0 0 to 1 0	FLUORANTHENE	2	=	MG/KG	1 6	X
SBLFA (1)	DJA046FD	0 0 to 1 0	FLUORENE	0 13	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	INDENO(1 2 3-c,d)PYRENE	0 55	=	MG/KG	0 7	
SBLFA (1)	DJA046FD	0 0 to 1 0	NAPHTHALENE	0 041	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	PHENANTHRENE	1 4	=	MG/KG	0 61	X
SBLFA (1)	DJA046FD	0 0 to 1 0	PYRENE	1 4	=	MG/KG	1 5	
SBLFB (1)	DJA023	0 0 to 1 0	2-METHYLNAPHTHALENE	0 11	J	MG/KG		
SBLFB (1)	DJA023	0 0 to 1 0	ACENAPHTHENE	1 3	=	MG/KG		
SBLFB (1)	DJA023	0 0 to 1 0	ANTHRACENE	1 8	=	MG/KG	0 096	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(a)ANTHRACENE	4 7	=	MG/KG	0 71	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(a)PYRENE	4 9	=	MG/KG	0 96	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(b)FLUORANTHENE	5 8	=	MG/KG	0 9	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(g h i)PERYLENE	3 7	=	MG/KG	0 82	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(k)FLUORANTHENE	3 6	=	MG/KG	0 78	X
SBLFB (1)	DJA023	0 0 to 1 0	CHRYSENE	5 1	=	MG/KG	0 94	X
SBLFB (1)	DJA023	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	1 4	=	MG/KG	0 26	X
SBLFB (1)	DJA023	0 0 to 1 0	FLUORANTHENE	17	=	MG/KG	1 6	X
SBLFB (1)	DJA023	0 0 to 1 0	FLUORENE	0 86	=	MG/KG		
SBLFB (1)	DJA023	0 0 to 1 0	INDENO(1 2 3-c d)PYRENE	4 1	=	MG/KG	0 7	X
SBLFB (1)	DJA023	0 0 to 1 0	NAPHTHALENE	0 26	J	MG/KG		
SBLFB (1)	DJA023	0 0 to 1 0	PHENANTHRENE	13	=	MG/KG	0 61	X
SBLFB (1)	DJA023	0 0 to 1 0	PYRENE	7 2	=	MG/KG	1 5	X
SBLFC (1)	DJA027	0 0 to 1 0	BENZO(a)ANTHRACENE	0 072	J	MG/KG	0 71	
SBLFC (1)	DJA027	0 0 to 1 0	BENZO(a)PYRENE	0 067	J	MG/KG	0 96	
SBLFC (1)	DJA027	0 0 to 1 0	BENZO(g h i)PERYLENE	0 052	J	MG/KG	0 82	
SBLFC (1)	DJA027	0 0 to 1 0	BENZO(k)FLUORANTHENE	0 071	J	MG/KG	0 78	
SBLFC (1)	DJA027	0 0 to 1 0	CHRYSENE	0 076	J	MG/KG	0 94	
SBLFC (1)	DJA027	0 0 to 1 0	FLUORANTHENE	0 18	J	MG/KG	1 6	
SBLFC (1)	DJA027	0 0 to 1.0	INDENO(1 2,3-c d)PYRENE	0 055	J	MG/KG	0 7	
SBLFC (1)	DJA027	0 0 to 1 0	PHENANTHRENE	0 11	J	MG/KG	0 61	
SBLFC (1)	DJA027	0 0 to 1 0	PYRENE	0 13	J	MG/KG	1 5	
SBLFG	DJA203	0 0 to 1 0	BENZO(g h i)PERYLENE	0 035	J	MG/KG	0 82	
Surface Water								
SW61A	DJA195	Not Applicable	BENZO(b)FLUORANTHENE	0 00035	J	MG/L		
SW61A	DJA195	Not Applicable	CHRYSENE	0 00046	J	MG/L		
SW61A	DJA195	Not Applicable	FLUORANTHENE	0 00068	J	MG/L		
SW61A	DJA195	Not Applicable	INDENO(1 2 3-c d)PYRENE	0 00027	J	MG/L		
SW61A	DJA195	Not Applicable	PHENANTHRENE	0 0003	J	MG/L		
SW61A	DJA195	Not Applicable	PYRENE	0 0004	J	MG/L		

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
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Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SWLAA	DJA018	Not Applicable	BENZO(b)FLUORANTHENE	0 00028	J	MG/L		
SWLAA	DJA018	Not Applicable	CHRYSENE	0 00032	J	MG/L		
SWLAA	DJA018	Not Applicable	FLUORANTHENE	0 00066	J	MG/L		
SWLAA	DJA018	Not Applicable	PHENANTHRENE	0 00034	J	MG/L		
SWLAA	DJA018	Not Applicable	PYRENE	0 00052	J	MG/L		
Polychlorinated Biphenyls								
Subsurface Soils								
SBLEE	DJA135	8 0 to 10 0	PCB-1260 (AROCHLOR 1260)	0 0201	=	MG/KG		
SBLEH	DJA208	8 0 to 10 0	PCB 1260 (AROCHLOR 1260)	0 008	J	MG/KG		
Sediments								
SD61A	DJA194	0 0 to 1 0	PCB 1260 (AROCHLOR 1260)	0 0553	=	MG/KG		
Surface Soils								
SB61A	DJA191	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0138	J	MG/KG	0 11	
SBLBA	DJA054	0 0 to 1 0	PCB 1260 (AROCHLOR 1260)	0 0045	J	MG/KG	0 11	
SBLCC	DJA082	0 0 to 1 0	PCB-1254 (AROCHLOR 1254)	0 0121	J	MG/KG		
SBLCC	DJA082	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 12	=	MG/KG	0 11	X
SBLFA (1)	DJA019	0 0 to 1 0	PCB 1260 (AROCHLOR 1260)	0 0364	=	MG/KG	0 11	
SBLFA (1)	DJA046FD	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0446	=	MG/KG	0 11	
Semivolatile Organics								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	CARBAZOLE	0 096	J	MG/KG		
SBLAA	DJA002	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 021	J	MG/KG		
SBLAA	DJA002	8 0 to 10 0	DI-n-BUTYL PHTHALATE	0 012	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	bis(2 ETHYLHEXYL) PHTHALATE	0 022	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 035	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12 0	bis(2-ETHYLHEXYL) PHTHALATE	0 035	J	MG/KG		
SBLAD	DJA014	8 0 to 10 0	PHENOL	0 022	J	MG/KG	19	
SBLCA	SBLCA SB-1 33	33 0 to 35 0	HEXACHLOROBUTADIENE	0 00309	=	MG/KG		
SBLDG	DJA212	8 0 to 10 0	DIETHYL PHTHALATE	0 16	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	CARBAZOLE	0 097	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	DIBENZOFURAN	0 023	J	MG/KG	0 72	
SBLFA (1)	DJA020	8 0 to 10 0	DIETHYL PHTHALATE	0 0087	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	DI-n BUTYL PHTHALATE	0 035	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	bis(2 ETHYLHEXYL) PHTHALATE	0 16	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	1 2,4-TRICHLOROBENZENE	0 094	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	2 4 6-TRICHLOROPHENOL	0 27	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	PENTACHLOROPHENOL	0 22	J	MG/KG		
Sediments								
SD61A	DJA194	0 0 to 1 0	CARBAZOLE	1 6	=	MG/KG	1 1	X
SD61A	DJA194	0 0 to 1 0	DIBENZOFURAN	0 38	=	MG/KG	0 38	
SDLAA	DJA017	0 0 to 1 0	CARBAZOLE	0 37	=	MG/KG	1 1	
SDLAA	DJA017	0 0 to 1 0	DIBENZOFURAN	0 11	J	MG/KG	0 38	
Surface Soils								
SB61A	DJA191	0 0 to 1 0	bis(2 ETHYLHEXYL) PHTHALATE	0 1	J	MG/KG		
SB61A	DJA191	0 0 to 1 0	CARBAZOLE	0 92	=	MG/KG	0 067	X
SB61A	DJA191	0 0 to 1 0	DIBENZOFURAN	0 3	=	MG/KG	0 647	
SBLAA	DJA001	0 0 to 1 0	bis(2 ETHYLHEXYL) PHTHALATE	0 016	J	MG/KG		
SBLAA	DJA001	0 0 to 1 0	DI n BUTYL PHTHALATE	0 01	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	bis(2 ETHYLHEXYL) PHTHALATE	0 12	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	CARBAZOLE	0 36	=	MG/KG	0 067	X
SBLBB	DJA058	0 0 to 1 0	BENZYL BUTYL PHTHALATE	0 0034	J	MG/KG	0 645	
SBLBC	DJA062	0 0 to 1 0	CARBAZOLE	0 35	J	MG/KG	0 067	X
SBLCD	DJA086	0 0 to 1 0	bis(2 ETHYLHEXYL) PHTHALATE	0 12	J	MG/KG		
SBLCD	DJA086	0 0 to 1 0	CARBAZOLE	0 049	J	MG/KG	0 067	
SBLDH	DJA215	0 0 to 1 0	DIETHYL PHTHALATE	0 15	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 17	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	CARBAZOLE	0 05	J	MG/KG	0 067	
SBLEB	DJA122	0 0 to 1 0	DI n BUTYL PHTHALATE	0 018	J	MG/KG		
SBLEB	DJA229FD	0 0 to 1 0	CARBAZOLE	0 11	J	MG/KG	0 067	X
SBLEB	DJA229FD	0 0 to 1 0	DIETHYL PHTHALATE	0 0044	J	MG/KG		
SBLEH	DJA207	0 0 to 1 0	bis(2 ETHYLHEXYL) PHTHALATE	0 13	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	CARBAZOLE	0 27	J	MG/KG	0 067	X
SBLFA (1)	DJA046FD	0 0 to 1 0	DIBENZOFURAN	0 077	J	MG/KG	0 647	
SBLFB (1)	DJA023	0 0 to 1 0	CARBAZOLE	2	=	MG/KG	0 067	X
SBLFB (1)	DJA023	0 0 to 1 0	DIBENZOFURAN	0 52	=	MG/KG	0 647	
Surface Water								
SW61A	DJA195	Not Applicable	DI n-BUTYL PHTHALATE	0 00042	J	MG/L		
SW61A	DJA195	Not Applicable	DIETHYL PHTHALATE	0 00046	J	MG/L		
SWLAA	DJA018	Not Applicable	2 NITROPHENOL	0 00035	J	MG/L		
Volatile Organics								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	METHYL ETHYL KETONE (2-BUTANONE)	0 007	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	METHYLENE CHLORIDE	0 004	J	MG/KG		
SBLAA	DJA003	14 0 to 16 0	CARBON TETRACHLORIDE	0 003	J	MG/KG		
SBLAA	DJA003	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	CARBON TETRACHLORIDE	0 13	=	MG/KG		
SBLAB	DJA006	8 0 to 10 0	CHLOROFORM	0 56	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	METHYLENE CHLORIDE	0 001	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 041	=	MG/KG		
SBLAB	DJA006	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 004	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 1	=	MG/KG		
SBLAB	DJA007	14 0 to 16 0	CARBON TETRACHLORIDE	0 57	J	MG/KG		
SBLAB	DJA007	14 0 to 16 0	CHLOROFORM	2 4	=	MG/KG		
SBLAB	DJA007	14 0 to 16 0	METHYLENE CHLORIDE	0 004	J	MG/KG		
SBLAB	DJA007	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 14	J	MG/KG		

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Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLAB	DJA007	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 033	=	MG/KG		
SBLAB	DJA007	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	1 1,2 2 TETRACHLOROETHANE	0 009	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	CARBON TETRACHLORIDE	0 35	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	CHLOROFORM	1 7	=	MG/KG		
SBLAB	DJA008	28 0 to 30 0	METHYLENE CHLORIDE	0 0007	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 089	=	MG/KG		
SBLAB	DJA008	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 022	=	MG/KG		
SBLAB	DJA008	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 33	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	CARBON TETRACHLORIDE	0 003	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	CHLOROFORM	0 002	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	METHYLENE CHLORIDE	0 0008	J	MG/KG		
SBLAC	DJA011	14 0 to 16 0	CARBON TETRACHLORIDE	0 01	J	MG/KG		
SBLAC	DJA011	14 0 to 16 0	CHLOROFORM	0 003	J	MG/KG		
SBLAC	DJA011	14 0 to 16 0	METHYLENE CHLORIDE	0 003	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12 0	CARBON TETRACHLORIDE	0 004	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12 0	CHLOROFORM	0 002	J	MG/KG		
SBLAD	DJA015	14 0 to 16 0	CARBON TETRACHLORIDE	0 001	J	MG/KG		
SBLAD	DJA015	14 0 to 16 0	CHLOROFORM	0 0008	J	MG/KG		
SBLBA	DJA056	14 0 to 16 0	METHYLENE CHLORIDE	0 0008	J	MG/KG		
SBLBB	DJA060	14 0 to 16 0	BENZENE	0 001	J	MG/KG		
SBLBB	DJA060	14 0 to 16 0	METHYLENE CHLORIDE	0 0009	J	MG/KG		
SBLBB	DJA060	14 0 to 16 0	TOLUENE	0 001	J	MG/KG		
SBLBC	DJA063	8 0 to 10 0	TOTAL 1 2 DICHLOROETHENE	0 027	=	MG/KG		
SBLBC	DJA063	8 0 to 10 0	VINYL CHLORIDE	0 018	=	MG/KG		
SBLBC	DJA064	14 0 to 16 0	CHLOROFORM	0 001	J	MG/KG		
SBLBC	DJA064	14 0 to 16 0	STYRENE	0 0003	J	MG/KG		
SBLBC	DJA064	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 24	J	MG/KG		
SBLBC	DJA064	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 023	=	MG/KG		
SBLBC	DJA064	14 0 to 16 0	VINYL CHLORIDE	0 066	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	1 1 2 2-TETRACHLOROETHANE	0 055	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	1 1 2 TRICHLOROETHANE	0 001	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	BENZENE	0 0003	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	CARBON TETRACHLORIDE	0 003	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	CHLOROFORM	0 008	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	METHYLENE CHLORIDE	0 0009	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	STYRENE	0 0004	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	TOTAL 1 2 DICHLOROETHENE	0 088	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 031	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	VINYL CHLORIDE	0 011	=	MG/KG		
SBLBD	DJA067	8 0 to 10 0	CARBON DISULFIDE	0 004	J	MG/KG	0 002	X
SBLBD	DJA068	14 0 to 16 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	CHLOROFORM	0 004	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	METHYLENE CHLORIDE	0 0005	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	STYRENE	0 0003	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 001	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	TRICHLORDETHYLENE (TCE)	0 017	=	MG/KG		
SBLBD	DJA069	28 0 to 30 0	1 1 2,2 TETRACHLOROETHANE	0 005	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	CHLOROFORM	0 006	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 001	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 017	=	MG/KG		
SBLBE	DJA071	8 0 to 10 0	METHYLENE CHLORIDE	0 002	J	MG/KG		
SBLBE	DJA071	8 0 to 10 0	VINYL CHLORIDE	0 006	=	MG/KG		
SBLBE	DJA072	14 0 to 16 0	METHYLENE CHLORIDE	0 0006	J	MG/KG		
SBLBE	DJA072	14 0 to 16 0	STYRENE	0 0002	J	MG/KG		
SBLBE	DJA072	14 0 to 16 0	TOTAL 1 2 DICHLOROETHENE	0 001	J	MG/KG		
SBLCA	DJA075	8 0 to 10 0	1 1 2,2-TETRACHLOROETHANE	0 24	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	2-HEXANONE	0 035	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	ACETONE	0 36	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	CHLOROFORM	0 002	J	MG/KG		
SBLCA	DJA075	8 0 to 10 0	METHYL ETHYL KETONE (2 BUTANONE)	0 13	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	1 9	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 083	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	6 8	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	VINYL CHLORIDE	0 005	J	MG/KG		
SBLCA	DJA076	14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	8 6	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	1,1 2 TRICHLOROETHANE	0 003	J	MG/KG		
SBLCA	DJA076	14 0 to 16 0	1 1-DICHLOROETHENE	0 0004	J	MG/KG		
SBLCA	DJA076	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	1 9	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 072	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	9 5	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	VINYL CHLORIDE	0 007	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	1 1 2 2-TETRACHLOROETHANE	33	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	1 1 2-TRICHLOROETHANE	0 027	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	1 1-DICHLOROETHENE	0 002	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	CHLOROFORM	0 007	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 31	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 55	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	18	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	VINYL CHLORIDE	0 047	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	1,1,2 2-TETRACHLOROETHANE	0 0157	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	ACETONE	0 933	=	MG/KG		

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Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCA	SBLCA-SB-1 33	33 0 to 33 0	cis-1 2-DICHLOROETHYLENE	0 00534	=	MG/KG		
SBLCA	SBLCA-SB-1 33	33 0 to 33 0	TETRACHLOROETHYLENE(PCE)	0 00572	=	MG/KG		
SBLCA	SBLCA SB-1 33	33 0 to 33 0	trans-1 2-DICHLOROETHENE	0 00189	J	MG/KG		
SBLCA	SBLCA-SB-1 33	33 0 to 33 0	TRICHLOROETHYLENE (TCE)	0 132	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	1 1 2,2 TETRACHLOROETHANE	0 0121	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	1,1,2-TRICHLOROETHANE	0 0026	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	cis-1 2-DICHLOROETHYLENE	0 0155	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	trans-1,2 DICHLOROETHENE	0 00246	=	MG/KG		
SBLCA	SBLCA SB-1-64	64 0 to 64 0	TRICHLOROETHYLENE (TCE)	0 0746	=	MG/KG		
SBLCA	SBLCA-SB-1 74	74 0 to 74 0	1 1 2 2-TETRACHLOROETHANE	0 0083	=	MG/KG		
SBLCA	SBLCA SB-1-74	74 0 to 74 0	TRICHLOROETHYLENE (TCE)	0 00978	=	MG/KG		
SBLCA	SBLCA-SB-10-12 5	12 5 to 12 5	cis-1 2-DICHLOROETHYLENE	0 00596	=	MG/KG		
SBLCA	SBLCA SB 10-12 55	12 5 to 12 5	cis-1 2-DICHLOROETHYLENE	0 00691	=	MG/KG		
SBLCA	SBLCA-SB-10-37 5	37 5 to 37 5	cis-1 2-DICHLOROETHYLENE	0 00566	=	MG/KG		
SBLCA	SBLCA-SB-10-37 5	37 5 to 37 5	TRICHLOROETHYLENE (TCE)	0 0584	=	MG/KG		
SBLCA	SBLCA-SB-10 57 5	57 5 to 57 5	1,1 2,2 TETRACHLOROETHANE	0 265	=	MG/KG		
SBLCA	SBLCA-SB-10 57 5	57 5 to 57 5	cis-1 2-DICHLOROETHYLENE	0 00533	=	MG/KG		
SBLCA	SBLCA SB-10-57 5	57 5 to 57 5	TRICHLOROETHYLENE (TCE)	0 0447	=	MG/KG		
SBLCA	SBLCA SB 10 72 5	72 5 to 72 5	1 1 2,2-TETRACHLOROETHANE	0 0999	=	MG/KG		
SBLCA	SBLCA-SB 10-72 5	72 5 to 72 5	TRICHLOROETHYLENE (TCE)	0 0083	=	MG/KG		
SBLCA	SBLCA SB-11-27 5	27 5 to 27 5	TRICHLOROETHYLENE (TCE)	0 00935	=	MG/KG		
SBLCA	SBLCA SB-11-27 55	27 5 to 27 5	METHYLENE CHLORIDE	0 001	J	MG/KG		
SBLCA	SBLCA SB 11 27 55	27 5 to 27 5	TRICHLOROETHYLENE (TCE)	0 009	=	MG/KG		
SBLCA	SBLCA-SB-11-37 5	37 5 to 37 5	cis-1 2-DICHLOROETHYLENE	0 00226	=	MG/KG		
SBLCA	SBLCA-SB-11-37 5	37 5 to 37 5	TRICHLOROETHYLENE (TCE)	0 059	=	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	1,1,2,2 TETRACHLOROETHANE	5 98	=	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	1,1,2 TRICHLOROETHANE	0 00121	J	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	cis-1 2 DICHLOROETHYLENE	0 0122	=	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	trans-1 2-DICHLOROETHENE	0 0016	J	MG/KG		
SBLCA	SBLCA SB-11-81	81 0 to 81 0	TRICHLOROETHYLENE (TCE)	0 0888	=	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	1 1 2 2-TETRACHLOROETHANE	2 22	=	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	cis-1,2-DICHLOROETHYLENE	0 00639	=	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	trans-1 2-DICHLOROETHENE	0 00069	J	MG/KG		
SBLCA	SBLCA SB-11-811	81 0 to 81 0	TRICHLOROETHYLENE (TCE)	0 0485	=	MG/KG		
SBLCA	SBLCA-SB-12-46 5	46 5 to 46 5	1 1 2 2-TETRACHLOROETHANE	0 131	=	MG/KG		
SBLCA	SBLCA-SB 12-46 5	46 5 to 46 5	cis-1 2-DICHLOROETHYLENE	0 0104	=	MG/KG		
SBLCA	SBLCA-SB 12-46 5	46 5 to 46 5	TRICHLOROETHYLENE (TCE)	0 055	=	MG/KG		
SBLCA	SBLCA-SB-12-74	74 0 to 74 0	1 1 2 2-TETRACHLOROETHANE	0 203	=	MG/KG		
SBLCA	SBLCA-SB-12 74	74 0 to 74 0	cis-1 2 DICHLOROETHYLENE	0 00408	=	MG/KG		
SBLCA	SBLCA-SB-12-74	74 0 to 74 0	trans-1 2-DICHLOROETHENE	0 0009	J	MG/KG		
SBLCA	SBLCA SB-12 74	74 0 to 74 0	TRICHLOROETHYLENE (TCE)	0 043	=	MG/KG		
SBLCA	SBLCA SB-12-74 5	74 0 to 74 0	1 1 2 2 TETRACHLOROETHANE	0 033	J	MG/KG		
SBLCA	SBLCA-SB 12 74 5	74 0 to 74 0	cis 1 2-DICHLOROETHYLENE	0 002	J	MG/KG		
SBLCA	SBLCA SB-12 74 5	74 0 to 74 0	TRICHLOROETHYLENE (TCE)	0 036	=	MG/KG		
SBLCA	SBLCA SB-13 77	77 0 to 77 0	1 1 2 2-TETRACHLOROETHANE	0 385	=	MG/KG		
SBLCA	SBLCA-SB-13-77	77 0 to 77 0	cis-1,2 DICHLOROETHYLENE	0 00425	=	MG/KG		
SBLCA	SBLCA-SB-13 77	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 0379	=	MG/KG		
SBLCA	SBLCA SB-14-83	83 0 to 83 0	1 1 2,2 TETRACHLOROETHANE	0 00842	=	MG/KG		
SBLCA	SBLCA-SB-15-80	80 0 to 80 0	1,1,2,2 TETRACHLOROETHANE	0 204	=	MG/KG		
SBLCA	SBLCA-SB 15-80	80 0 to 80 0	TRICHLOROETHYLENE (TCE)	0 0118	=	MG/KG		
SBLCA	SBLCA SB-15-80 5	80 0 to 80 0	1,1,2 2 TETRACHLOROETHANE	0 21	J	MG/KG		
SBLCA	SBLCA-SB-15-80 5	80 0 to 80 0	cis 1 2-DICHLOROETHYLENE	0 0007	J	MG/KG		
SBLCA	SBLCA-SB-15-80 5	80 0 to 80 0	TRICHLOROETHYLENE (TCE)	0 011	=	MG/KG		
SBLCA	SBLCA SB-2-44	44 0 to 44 0	1 1 2 2-TETRACHLOROETHANE	22 6	=	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	1,1 2 TRICHLOROETHANE	0 00157	J	MG/KG		
SBLCA	SBLCA SB 2-44	44 0 to 44 0	cis-1 2-DICHLOROETHYLENE	0 0402	=	MG/KG		
SBLCA	SBLCA-SB 2-44	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 00352	=	MG/KG		
SBLCA	SBLCA SB 2-44	44 0 to 44 0	trans-1 2 DICHLOROETHENE	0 0138	=	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 176	=	MG/KG		
SBLCA	SBLCA SB 2-444	44 0 to 44 0	1 1 2 2 TETRACHLOROETHANE	13 9	=	MG/KG		
SBLCA	SBLCA SB-2-444	44 0 to 44 0	1 1 2-TRICHLOROETHANE	0 00261	=	MG/KG		
SBLCA	SBLCA SB-2-444	44 0 to 44 0	cis 1 2 DICHLOROETHYLENE	0 0616	=	MG/KG		
SBLCA	SBLCA SB 2-444	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 00636	=	MG/KG		
SBLCA	SBLCA-SB-2-444	44 0 to 44 0	trans 1 2 DICHLOROETHENE	0 0184	=	MG/KG		
SBLCA	SBLCA-SB-2-444	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 309	=	MG/KG		
SBLCA	SBLCA SB-2-68	68 0 to 68 0	1 1 2 2 TETRACHLOROETHANE	15 1	=	MG/KG		
SBLCA	SBLCA SB 2-68	68 0 to 68 0	cis-1,2-DICHLOROETHYLENE	0 00371	=	MG/KG		
SBLCA	SBLCA SB-2 68	68 0 to 68 0	TRICHLOROETHYLENE (TCE)	0 0412	=	MG/KG		
SBLCA	SBLCA-SB-2 73	73 0 to 73 0	1,1,2,2-TETRACHLOROETHANE	13 6	=	MG/KG		
SBLCA	SBLCA SB-2 73	73 0 to 73 0	1 1 2-TRICHLOROETHANE	0 00256	=	MG/KG		
SBLCA	SBLCA-SB-2 73	73 0 to 73 0	cis-1 2-DICHLOROETHYLENE	0 0111	=	MG/KG		
SBLCA	SBLCA-SB 2 73	73 0 to 73 0	TETRACHLOROETHYLENE(PCE)	0 00145	J	MG/KG		
SBLCA	SBLCA-SB 2 73	73 0 to 73 0	trans-1 2 DICHLOROETHENE	0 0022	=	MG/KG		
SBLCA	SBLCA SB-2 73	73 0 to 73 0	TRICHLOROETHYLENE (TCE)	0 145	=	MG/KG		
SBLCA	SBLCA SB-3-44	44 0 to 44 0	1 1 2 2 TETRACHLOROETHANE	0 0173	=	MG/KG		
SBLCA	SBLCA SB-3-44	44 0 to 44 0	cis-1 2-DICHLOROETHYLENE	0 0073	=	MG/KG		
SBLCA	SBLCA-SB-3-44	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 00112	J	MG/KG		
SBLCA	SBLCA-SB-3-44	44 0 to 44 0	trans 1 2 DICHLOROETHENE	0 00142	J	MG/KG		
SBLCA	SBLCA-SB 3-44	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 0747	=	MG/KG		
SBLCA	SBLCA-SB 3 53	53 0 to 53 0	1 1 2 2-TETRACHLOROETHANE	0 0869	=	MG/KG		
SBLCA	SBLCA-SB-3 53	53 0 to 53 0	cis 1 2 DICHLOROETHYLENE	0 00285	=	MG/KG		
SBLCA	SBLCA SB-3 53	53 0 to 53 0	TETRACHLOROETHYLENE(PCE)	0 00122	J	MG/KG		
SBLCA	SBLCA SB-3 53	53 0 to 53 0	TRICHLOROETHYLENE (TCE)	0 0536	=	MG/KG		
SBLCA	SBLCA SB-3-67	67 0 to 67 0	1 1 2 2-TETRACHLOROETHANE	1 07	=	MG/KG		
SBLCA	SBLCA SB-3 67	67 0 to 67 0	cis 1 2 DICHLOROETHYLENE	0 00477	=	MG/KG		
SBLCA	SBLCA-SB-3 67	67 0 to 67 0	TETRACHLOROETHYLENE(PCE)	0 00096	J	MG/KG		

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
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Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	trans 1 2-DICHLOROETHENE	0 00096	J	MG/KG		
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	TRICHLOROETHYLENE (TCE)	0 0633	=	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42 0	cis-1,2 DICHLOROETHYLENE	0 00756	=	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42 0	TETRACHLOROETHYLENE(PCE)	0 00121	J	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42 0	trans-1 2-DICHLOROETHENE	0 00288	=	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42 0	TRICHLOROETHYLENE (TCE)	0 089	=	MG/KG		
SBLCA	SBLCA-SB-4-52	52 0 to 52 0	1 1 2 2-TETRACHLOROETHANE	0 0223	=	MG/KG		
SBLCA	SBLCA-SB-4-52	52 0 to 52 0	cis-1 2-DICHLOROETHYLENE	0 00492	=	MG/KG		
SBLCA	SBLCA-SB-4 52	52 0 to 52 0	TRICHLOROETHYLENE (TCE)	0 055	=	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	1 1 2 2 TETRACHLOROETHANE	2 03	=	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	1 1 2-TRICHLOROETHANE	0 00177	J	MG/KG		
SBLCA	SBLCA SB-4-75	75 0 to 75 0	cis-1,2-DICHLOROETHYLENE	0 0169	=	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	TETRACHLOROETHYLENE(PCE)	0 00147	J	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	trans-1 2-DICHLOROETHENE	0.00198	J	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	TRICHLOROETHYLENE (TCE)	0 164	=	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	1 1 2 2-TETRACHLOROETHANE	0 96	=	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	1,1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	cis-1 2-DICHLOROETHYLENE	0 006	=	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	trans-1,2-DICHLOROETHENE	0 0007	J	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	TRICHLOROETHYLENE (TCE)	0 068	=	MG/KG		
SBLCA	SBLCA-SB-5-44	44 0 to 44 0	1 1 2 2-TETRACHLOROETHANE	0 914	=	MG/KG		
SBLCA	SBLCA-SB-5-44	44 0 to 44 0	cis-1 2-DICHLOROETHYLENE	0 00499	=	MG/KG		
SBLCA	SBLCA-SB-5-44	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 0609	=	MG/KG		
SBLCA	SBLCA-SB-6-54	54 0 to 54 0	1 1 2,2-TETRACHLOROETHANE	3 42	=	MG/KG		
SBLCA	SBLCA-SB-5-54	54 0 to 54 0	cis-1 2-DICHLOROETHYLENE	0 0228	=	MG/KG		
SBLCA	SBLCA-SB-5-54	54 0 to 54 0	trans 1,2-DICHLOROETHENE	0 00604	=	MG/KG		
SBLCA	SBLCA SB-5-54	54 0 to 54 0	TRICHLOROETHYLENE (TCE)	0 0992	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	1,1 2 2-TETRACHLOROETHANE	0 159	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	cis-1 2 DICHLOROETHYLENE	0 0105	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	TETRACHLOROETHYLENE(PCE)	0 00194	J	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	trans-1 2-DICHLOROETHENE	0 00352	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 179	=	MG/KG		
SBLCA	SBLCA-SB-8-47	47 0 to 47 0	TRICHLOROETHYLENE (TCE)	0 00568	=	MG/KG		
SBLCA	SBLCA-SB-8-52	52 0 to 52 0	1 1 2 2-TETRACHLOROETHANE	0 021	=	MG/KG		
SBLCA	SBLCA SB-8-52	52 0 to 52 0	cis-1 2-DICHLOROETHYLENE	0 011	=	MG/KG		
SBLCA	SBLCA SB-8-52	52 0 to 52 0	TETRACHLOROETHYLENE(PCE)	0 00171	J	MG/KG		
SBLCA	SBLCA-SB-8-52	52 0 to 52 0	trans-1 2-DICHLOROETHENE	0 00323	=	MG/KG		
SBLCA	SBLCA SB-8-52	52 0 to 52 0	TRICHLOROETHYLENE (TCE)	0 161	=	MG/KG		
SBLCA	SBLCA-SB-8 522	52 0 to 52 0	1 1 2 2 TETRACHLOROETHANE	0 0145	=	MG/KG		
SBLCA	SBLCA-SB-8 522	52 0 to 52 0	cis-1 2-DICHLOROETHYLENE	0.00656	=	MG/KG		
SBLCA	SBLCA-SB-8 522	52 0 to 52 0	trans-1,2-DICHLOROETHENE	0 00182	J	MG/KG		
SBLCA	SBLCA-SB-8-522	52 0 to 52 0	TRICHLOROETHYLENE (TCE)	0 0941	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	1 1 2 2-TETRACHLOROETHANE	0 399	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72.0	1 1 2-TRICHLOROETHANE	0 0102	=	MG/KG		
SBLCA	SBLCA-SB-8 72	72 0 to 72 0	CHLOROFORM	0 00531	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	cis-1 2-DICHLOROETHYLENE	0 132	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	TETRACHLOROETHYLENE(PCE)	0 0657	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	trans 1 2-DICHLOROETHENE	0 0444	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	TRICHLOROETHYLENE (TCE)	0 322	=	MG/KG		
SBLCA	SBLCA SB-9-22	22 0 to 22 0	cis-1 2-DICHLOROETHYLENE	0 00204	=	MG/KG		
SBLCA	SBLCA-SB-9-42	42 0 to 42.0	cis-1 2 DICHLOROETHYLENE	0 00095	J	MG/KG		
SBLCA	SBLCA-SB-9-42	42 0 to 42 0	TRICHLOROETHYLENE (TCE)	0 0208	=	MG/KG		
SBLCA	SBLCA-SB-9-56	56 0 to 56 0	TRICHLOROETHYLENE (TCE)	0 0115	=	MG/KG		
SBLCA	SBLCA SB-9 56 5	56 0 to 56 0	1 1 2 2 TETRACHLOROETHANE	0 082	=	MG/KG		
SBLCA	SBLCA-SB-9-56 5	56 0 to 56 0	cis-1 2-DICHLOROETHYLENE	0 008	=	MG/KG		
SBLCA	SBLCA-SB-9-56 5	56 0 to 56 0	TRICHLOROETHYLENE (TCE)	0 074	=	MG/KG		
SBLCA	SBLCA SB-9 77	77 0 to 77 0	1 1 2 2-TETRACHLOROETHANE	0 124	=	MG/KG		
SBLCA	SBLCA-SB-9-77	77 0 to 77 0	cis-1 2-DICHLOROETHYLENE	0 00391	=	MG/KG		
SBLCA	SBLCA-SB-9-77	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 0652	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	1 1 2 2-TETRACHLOROETHANE	6 7	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	1 1 2-TRICHLOROETHANE	0 002	J	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	CHLOROFORM	0 0008	J	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 009	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	TOTAL 1 2-DICHLOROETHENE	0 056	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	1 1 2,2 TETRACHLOROETHANE	1 8	=	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	1 1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	cis-1 2-DICHLOROETHYLENE	0 012	=	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLCA	SBLCA SB4755	75 0 to 75 0	trans-1 2-DICHLOROETHENE	0 001	J	MG/KG		
SBLCA	SBLCA-SB8475	47 0 to 47 0	1 1,2,2 TETRACHLOROETHANE	0 003	J	MG/KG		
SBLCA	SBLCA-SB8475	47 0 to 47 0	cis-1 2-DICHLOROETHYLENE	0 002	J	MG/KG		
SBLCA	SBLCA-SB8475	47 0 to 47 0	TRICHLOROETHYLENE (TCE)	0 027	=	MG/KG		
SBLCB	DJA079	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 015	=	MG/KG		
SBLCB	DJA079	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 021	=	MG/KG		
SBLCB	DJA079	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 68	=	MG/KG		
SBLCB	DJA080	14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLCB	DJA080	14 0 to 16 0	CHLOROFORM	0 0009	J	MG/KG		
SBLCB	DJA080	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 017	=	MG/KG		
SBLCB	DJA080	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 044	=	MG/KG		
SBLCB	DJA080	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 96	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	1 1 2 2-TETRACHLOROETHANE	0 027	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	1 1 2-TRICHLOROETHANE	0 002	J	MG/KG		
SBLCB	DJA081	28 0 to 30 0	CHLOROFORM	0 002	J	MG/KG		
SBLCB	DJA081	28 0 to 30 0	METHYL ISOBUTYL KETONE (4-METHYL-2 PE	0 004	J	MG/KG		
SBLCB	DJA081	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 013	=	MG/KG		

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCB	DJA081	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 084	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	1 3	=	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 011	=	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 014	=	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 47	=	MG/KG		
SBLCC	DJA083	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLCC	DJA084	14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	0 007	J	MG/KG		
SBLCC	DJA084	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 006	J	MG/KG		
SBLCD	DJA087	8 0 to 10 0	1,1 2 2-TETRACHLOROETHANE	1 6	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	1 1 2 TRICHLOROETHANE	0 034	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	BENZENE	0 003	J	MG/KG		
SBLCD	DJA087	8 0 to 10 0	CHLOROFORM	0 007	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	ETHYLBENZENE	0 004	J	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 007	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TOLUENE	0 008	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 11	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	1 9	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	XYLENES TOTAL	0 006	=	MG/KG	0 002	X
SBLCD	DJA088	14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	2 5	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1 1 2 TRICHLOROETHANE	0 075	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,1-DICHLOROETHENE	0 001	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,2-DICHLOROETHANE	0 001	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,2-DICHLOROPROPANE	0 0004	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	BENZENE	0 001	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	CHLOROFORM	0 03	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 025	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	TOTAL 1 2 DICHLOROETHENE	0 33	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	4 9	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 91	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1,1,2-TRICHLOROETHANE	0 1	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1 2 DICHLOROETHANE	0 003	J	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1 2 DICHLOROPROPANE	0 0003	J	MG/KG		
SBLCD	DJA089	28 0 to 30 0	CHLOROFORM	0 032	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 007	J	MG/KG		
SBLCD	DJA089	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 16	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	3 9	=	MG/KG		
SBLCE	DJA092	14 0 to 16 0	METHYLENE CHLORIDE	0 0006	J	MG/KG		
SBLCE	DJA092	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 0008	J	MG/KG		
SBLCF	DJA220	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 007	J	MG/KG		
SBLCF	DJA220	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 006	=	MG/KG		
SBLCF	DJA221	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 025	=	MG/KG		
SBLCF	DJA222	28 0 to 30 0	CHLOROFORM	0 002	J	MG/KG		
SBLCF	DJA222	28 0 to 30 0	METHYLENE CHLORIDE	0 002	J	MG/KG		
SBLCF	DJA222	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 006	=	MG/KG		
SBLCF	DJA222	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 027	=	MG/KG		
SBLCF	DJA222	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	1 1	=	MG/KG		
SBLCF	DJA287FD	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG		
SBLCF	DJA287FD	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 025	=	MG/KG		
SBLDA	DJA095	8 0 to 10 0	CHLOROBENZENE	0 007	J	MG/KG		
SBLDA	DJA095	8 0 to 10 0	TOLUENE	0 0006	J	MG/KG		
SBLDA	DJA095	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 12	=	MG/KG		
SBLDA	DJA096	14 0 to 16 0	CHLOROBENZENE	0 002	J	MG/KG		
SBLDA	DJA096	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 04	=	MG/KG		
SBLDA	DJA097	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 004	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	CHLOROBENZENE	0 002	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	METHYLENE CHLORIDE	0 0006	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 005	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	TOTAL 1,2 DICHLOROETHENE	0 028	=	MG/KG		
SBLDA	DJA097	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLDB	DJA099	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	CARBON DISULFIDE	0 003	J	MG/KG	0 002	X
SBLDB	DJA100	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 012	=	MG/KG		
SBLDB	DJA100	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 007	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	XYLENES, TOTAL	0 0006	J	MG/KG	0 002	
SBLDC	DJA103	8 0 to 10 0	CHLOROFORM	0 001	J	MG/KG		
SBLDC	DJA103	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 0009	J	MG/KG		
SBLDC	DJA103	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 12	=	MG/KG		
SBLDC	DJA103	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 073	=	MG/KG		
SBLDC	DJA104	14 0 to 16 0	1 1 2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLDC	DJA104	14 0 to 16 0	CHLOROFORM	0 004	J	MG/KG		
SBLDC	DJA104	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLDC	DJA104	14 0 to 16 0	TOTAL 1 2 DICHLOROETHENE	0 65	=	MG/KG		
SBLDC	DJA104	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	1 1 2 TRICHLOROETHANE	0 0003	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	CHLOROFORM	0 003	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	TOTAL 1 2 DICHLOROETHENE	0 68	=	MG/KG		
SBLDC	DJA105	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 59	=	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	1,1 2-TRICHLOROETHANE	0 0003	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	1,1 DICHLOROETHENE	0 0004	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	CHLOROFORM	0 004	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 008	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	TOTAL 1 2 DICHLOROETHENE	0 6	=	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 55	=	MG/KG		

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLDD	DJA107	8 0 to 10 0	CHLOROFORM	0 098	=	MG/KG		
SBLDD	DJA107	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 012	=	MG/KG		
SBLDD	DJA108	14 0 to 16 0	CHLOROFORM	0 72	=	MG/KG		
SBLDD	DJA108	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLDD	DJA108	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 002	J	MG/KG		
SBLDD	DJA108	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLDD	DJA109	28 0 to 30 0	CHLOROFORM	0 85	=	MG/KG		
SBLDD	DJA109	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 0007	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	CHLOROFORM	0 002	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 003	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 003	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 009	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	CHLOROFORM	0 002	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	METHYL ETHYL KETONE (2 BUTANONE)	0 005	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 008	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 021	=	MG/KG		
SBLDE	DJA113	28 0 to 30 0	CHLOROFORM	0 003	J	MG/KG		
SBLDE	DJA113	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLDE	DJA113	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 025	=	MG/KG		
SBLDE	DJA113	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 043	=	MG/KG		
SBLDF	DJA115	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG		
SBLDF	DJA115	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 0005	J	MG/KG		
SBLDF	DJA116	14 0 to 16 0	METHYL ETHYL KETONE (2 BUTANONE)	0 004	J	MG/KG		
SBLDF	DJA116	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0006	J	MG/KG		
SBLDF	DJA117	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLDF	DJA117	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 003	J	MG/KG		
SBLDF	DJA117	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 093	=	MG/KG		
SBLDF	DJA233FD	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLDF	DJA233FD	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLDF	DJA233FD	14 0 to 16 0	TOLUENE	0 0004	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	1,1-DICHLOROETHENE	0 004	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	17	=	MG/KG		
SBLDG	DJA212	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 003	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	VINYL CHLORIDE	0 006	=	MG/KG		
SBLDG	DJA213	14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLDG	DJA213	14 0 to 16 0	1 1 2 TRICHLOROETHANE	0 001	J	MG/KG		
SBLDG	DJA213	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 003	J	MG/KG		
SBLDG	DJA213	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	1 5	=	MG/KG		
SBLDG	DJA213	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 11	=	MG/KG		
SBLDG	DJA214	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 071	=	MG/KG		
SBLEA	DJA119	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 005	J	MG/KG		
SBLEA	DJA120	14 0 to 16 0	STYRENE	0 0006	J	MG/KG		
SBLEA	DJA120	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0006	J	MG/KG		
SBLEA	DJA120	14 0 to 16 0	TOLUENE	0 0007	J	MG/KG		
SBLEB	DJA123	8 0 to 10 0	STYRENE	0 0007	J	MG/KG		
SBLEB	DJA123	8 0 to 10 0	TOLUENE	0 0007	J	MG/KG		
SBLEB	DJA124	14 0 to 16 0	STYRENE	0 0004	J	MG/KG		
SBLEC	DJA127	8 0 to 10 0	METHYL ETHYL KETONE (2 BUTANONE)	0 004	J	MG/KG		
SBLEC	DJA127	8 0 to 10 0	STYRENE	0 0003	J	MG/KG		
SBLEC	DJA128	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1 1 2,2-TETRACHLOROETHANE	160	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1 1 2-TRICHLOROETHANE	2	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1 1-DICHLOROETHENE	0 04	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1 2-DICHLOROETHANE	0 028	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BROMODICHLOROMETHANE	0 003	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	CARBON DISULFIDE	0 001	J	MG/KG	0 002	
SBLEE	DJA135	8 0 to 10 0	CHLOROBENZENE	0 004	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	ETHYLBENZENE	0 0005	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	METHYL ISOBUTYL KETONE (4-METHYL 2-PE	0 001	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	METHYLENE CHLORIDE	0 031	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	4 4	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TOLUENE	0 008	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	120	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	460	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	VINYL CHLORIDE	2	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	XYLENES TOTAL	0 02	=	MG/KG	0 002	X
SBLEE	DJA136	14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	46	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1 1 2-TRICHLOROETHANE	2 2	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1 1-DICHLOROETHENE	0 06	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1 2-DICHLOROETHANE	0 046	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1 2-DICHLOROPROPANE	0 005	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	CARBON DISULFIDE	0 003	J	MG/KG	0 002	X
SBLEE	DJA136	14 0 to 16 0	CHLOROBENZENE	0 0004	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	CHLOROFORM	0 049	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 002	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	METHYLENE CHLORIDE	0 039	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 056	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TOLUENE	0 006	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TOTAL 1 2 DICHLOROETHENE	190	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	210	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	VINYL CHLORIDE	7	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	XYLENES TOTAL	0 001	J	MG/KG	0 002	

TABLE 10-5
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Arer
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLEE	DJA137	28 0 to 30 0	1 1 2 2 TETRACHLOROETHANE	0 009	J	MG/KG		
SBLEE	DJA137	28 0 to 30 0	1 1-DICHLOROETHENE	0 0007	J	MG/KG		
SBLEE	DJA137	28 0 to 30 0	STYRENE	0 0003	J	MG/KG		
SBLEE	DJA137	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 19	=	MG/KG		
SBLEE	DJA137	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 027	=	MG/KG		
SBLEE	DJA137	28 0 to 30 0	VINYL CHLORIDE	0 3	J	MG/KG		
SBLEE	SBLEE-SB 1-34	34 0 to 34 0	ACETONE	0 0793	=	MG/KG		
SBLEE	SBLEE-SB-1-5	5 0 to 5 0	ACETONE	0 0651	=	MG/KG		
SBLEE	SBLEE SB 1-5	5 0 to 5 0	cis-1 2 DICHLOROETHYLENE	0 00375	=	MG/KG		
SBLEE	SBLEE-SB 1-5	5 0 to 5 0	trans 1 2-DICHLOROETHENE	0 00256	=	MG/KG		
SBLEE	SBLEE SB-1-5	5 0 to 5 0	VINYL CHLORIDE	0 0552	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	1 1 2,2-TETRACHLOROETHANE	0 153	=	MG/KG		
SBLEE	SBLEE SB-1-67	67 0 to 67 0	1,1,2-TRICHLOROETHANE	0 00228	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	cis-1,2-DICHLOROETHYLENE	0 0192	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	trans-1,2-DICHLOROETHENE	0 00259	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	TRICHLOROETHYLENE (TCE)	0 0111	=	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	1,2-DICHLOROETHANE	0 001	J	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	cis-1,2-DICHLOROETHYLENE	0 009	=	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	trans-1,2-DICHLOROETHENE	0 004	J	MG/KG		
SBLEE	SBLEE SB1345	34 0 to 34 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLEE	SBLEE SB1345	34 0 to 34 0	VINYL CHLORIDE	0 074	=	MG/KG		
SBLEF	DJA139	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SBLEF	DJA140	14 0 to 16 0	1,1,2,2-TETRACHLOROETHANE	0 032	=	MG/KG		
SBLEF	DJA140	14 0 to 16 0	1 1 2 TRICHLOROETHANE	0 001	J	MG/KG		
SBLEF	DJA140	14 0 to 16 0	CARBON DISULFIDE	0 002	J	MG/KG	0 002	
SBLEF	DJA140	14 0 to 16 0	TOTAL 1 2 DICHLOROETHENE	0 083	=	MG/KG		
SBLEF	DJA140	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 033	=	MG/KG		
SBLEF	DJA140	14 0 to 16 0	VINYL CHLORIDE	0 002	J	MG/KG		
SBLEF	DJA141	28 0 to 30 0	1,1 2 2-TETRACHLOROETHANE	0 004	J	MG/KG		
SBLEF	DJA141	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 0006	J	MG/KG		
SBLEF	DJA141	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 004	J	MG/KG		
SBLEF	DJA231FD	8 0 to 10 0	CARBON DISULFIDE	0 001	J	MG/KG	0 002	
SBLEF	DJA231FD	8 0 to 10 0	STYRENE	0 0003	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	METHYL ETHYL KETONE (2 BUTANONE)	0 004	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	TOTAL 1 2 DICHLOROETHENE	0 002	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	VINYL CHLORIDE	0 008	=	MG/KG		
SBLEG	DJA201	14 0 to 16 0	METHYL ETHYL KETONE (2 BUTANONE)	0 004	J	MG/KG		
SBLEG	DJA285FD	14 0 to 16 0	METHYL ETHYL KETONE (2 BUTANONE)	0 011	J	MG/KG		
SBLEH	DJA209	14 0 to 16 0	CARBON DISULFIDE	0 004	J	MG/KG	0 002	X
SBLFC (1)	DJA028	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	CHLOROFORM	0 003	J	MG/KG		
SBLFD (1)	DJA033	14 0 to 16 0	CHLOROFORM	0 009	J	MG/KG		
SBLFD (1)	DJA033	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLFD (1)	DJA033	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 0007	J	MG/KG		
SBLFE (1)	DJA036	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 031	=	MG/KG		
SBLFE (1)	DJA037	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 018	=	MG/KG		
SBLFE (1)	DJA038	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLFF (1)	DJA040	8 0 to 10 0	TOLUENE	0 0008	J	MG/KG		
SBLFF (1)	DJA041	14 0 to 16 0	CARBON TETRACHLORIDE	0 001	J	MG/KG		
SBLFF (1)	DJA041	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 0006	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	BROMODICHLOROMETHANE	0 011	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	CARBON TETRACHLORIDE	6 8	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	CHLOROETHANE	0 003	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	CHLOROFORM	14	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	METHYLENE CHLORIDE	0 036	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 005	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 025	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	BROMODICHLOROMETHANE	0 006	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	CARBON TETRACHLORIDE	0 36	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	CHLOROFORM	14	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	METHYLENE CHLORIDE	0 012	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLFG	DJA205	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 006	=	MG/KG		
SBLFG	DJA206	28 0 to 30 0	BROMODICHLOROMETHANE	0 001	J	MG/KG		
SBLFG	DJA206	28 0 to 30 0	CARBON TETRACHLORIDE	0 016	=	MG/KG		
SBLFG	DJA206	28 0 to 30 0	CHLOROFORM	0 34	=	MG/KG		
Surface Soils								
SB61A	DJA191	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 007	J	MG/KG	0 002	X
SBLAB	DJA005	0 0 to 1 0	ACETONE	0 44	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	CARBON TETRACHLORIDE	0 039	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	CHLOROFORM	0 089	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 042	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 0009	J	MG/KG		
SBLAB	DJA005	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 04	=	MG/KG		
SBLAC	DJA009	0 0 to 1 0	CHLOROFORM	0 001	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	BENZENE	0 028	=	MG/KG		
SBLBB	DJA058	0 0 to 1 0	CARBON DISULFIDE	0 015	=	MG/KG	0 002	X
SBLBB	DJA058	0 0 to 1 0	CHLOROFORM	0 002	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	ETHYLBENZENE	0 006	=	MG/KG		
SBLBB	DJA058	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 016	J	MG/KG	0 002	X
SBLBB	DJA058	0 0 to 1 0	TOLUENE	0 026	=	MG/KG	0 002	X
SBLBB	DJA058	0 0 to 1 0	TOTAL 1 2 DICHLOROETHENE	0 002	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 004	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	XYLENES TOTAL	0 011	=	MG/KG	0 009	X
SBLBC	DJA062	0 0 to 1 0	BENZENE	0 002	J	MG/KG		
SBLBC	DJA062	0 0 to 1 0	TOLUENE	0 002	J	MG/KG	0 002	

TABLE 10-5

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLBD	DJA066	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 022	=	MG/KG	0 002	X
SBLBE	DJA070	0 0 to 1 0	BENZENE	0 002	J	MG/KG		
SBLBE	DJA070	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG	0 002	X
SBLBE	DJA237FD	0 0 to 1 0	BENZENE	0 003	J	MG/KG		
SBLBE	DJA237FD	0 0 to 1 0	CHLOROFORM	0 002	J	MG/KG		
SBLBE	DJA237FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG	0 002	X
SBLBE	DJA237FD	0 0 to 1 0	TOLUENE	0 003	J	MG/KG	0 002	X
SBLBE	DJA237FD	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLCA	DJA074	0 0 to 1 0	ACETONE	0 2	=	MG/KG		
SBLCA	DJA074	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 019	=	MG/KG		
SBLCA	DJA074	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 077	=	MG/KG		
SBLCB	DJA078	0 0 to 1 0	1 1 2 2-TETRACHLOROETHANE	0 007	=	MG/KG		
SBLCB	DJA078	0 0 to 1 0	1,1,2-TRICHLOROETHANE	0 002	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	1,2-DICHLOROPROPANE	0 002	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 015	J	MG/KG	0 002	X
SBLCB	DJA078	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 87	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 61	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	VINYL CHLORIDE	0 11	=	MG/KG		
SBLCC	DJA082	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 018	J	MG/KG	0 002	X
SBLCD	DJA086	0 0 to 1 0	1,1-DICHLOROETHENE	0 002	J	MG/KG		
SBLCD	DJA086	0 0 to 1 0	CHLOROFORM	0 007	=	MG/KG		
SBLCD	DJA086	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SBLCD	DJA086	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLCD	DJA086	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 14	=	MG/KG		
SBLCD	DJA086	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 85	=	MG/KG		
SBLCE	DJA090	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 014	J	MG/KG	0 002	X
SBLCE	DJA235FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 019	J	MG/KG	0 002	X
SBLCF	DJA219	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 023	=	MG/KG	0 002	X
SBLDA	DJA094	0 0 to 1 0	STYRENE	0 0006	J	MG/KG		
SBLDB	DJA098	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 019	=	MG/KG	0 002	X
SBLDC	DJA102	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 039	=	MG/KG	0 002	X
SBLDC	DJA102	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0009	J	MG/KG		
SBLDC	DJA102	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 051	=	MG/KG		
SBLDC	DJA102	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 054	=	MG/KG		
SBLDD	DJA106	0 0 to 1 0	CHLOROFORM	0 003	J	MG/KG		
SBLDD	DJA106	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 012	=	MG/KG	0 002	X
SBLDE	DJA110	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 012	=	MG/KG	0 002	X
SBLDE	DJA110	0 0 to 1 0	METHYLENE CHLORIDE	0 0007	J	MG/KG		
SBLDE	DJA110	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0009	J	MG/KG		
SBLDE	DJA110	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLDF	DJA114	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 017	=	MG/KG	0 002	X
SBLDG	DJA211	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 017	J	MG/KG	0 002	X
SBLDG	DJA286FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 022	=	MG/KG	0 002	X
SBLDH	DJA215	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SBLEA	DJA118	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG	0 002	X
SBLEB	DJA122	0 0 to 1 0	STYRENE	0 0008	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	TOLUENE	0 0008	J	MG/KG	0 002	
SBLEC	DJA126	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 008	J	MG/KG	0 002	X
SBLEC	DJA126	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0003	J	MG/KG		
SBLED	DJA130	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG	0 002	
SBLED	DJA130	0 0 to 1 0	STYRENE	0 0003	J	MG/KG		
SBLEE	DJA134	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 008	J	MG/KG	0 002	X
SBLEE	DJA134	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLEE	DJA134	0 0 to 1 0	TOTAL 1,2-DICHLOROETHENE	0 05	=	MG/KG		
SBLEE	DJA134	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 028	=	MG/KG		
SBLEF	DJA138	0 0 to 1 0	1,1 2,2-TETRACHLOROETHANE	0 083	=	MG/KG		
SBLEF	DJA138	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 015	=	MG/KG	0 002	X
SBLEF	DJA138	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLEF	DJA138	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 024	=	MG/KG		
SBLEF	DJA138	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 067	=	MG/KG		
SBLEG	DJA199	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 011	J	MG/KG	0 002	X
SBLEH	DJA207	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 017	J	MG/KG	0 002	X
SBLFA (1)	DJA046FD	0 0 to 1 0	STYRENE	0 0002	J	MG/KG		
SBLFE (1)	DJA035	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 049	=	MG/KG		
SBLFE (1)	DJA035	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 0009	J	MG/KG		
SBLFG	DJA203	0 0 to 1 0	CARBON TETRACHLORIDE	0 001	J	MG/KG		
SBLFG	DJA203	0 0 to 1 0	CHLOROFORM	0 008	=	MG/KG		
SBLFG	DJA203	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 019	J	MG/KG	0 002	X

TABLE 10-6

Frequency of Detection for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
Dioxins							
Sediments							
MG/KG	OCTACHLORODIBENZO-p-DIOXIN	1	1	0 001204	0 001204	0 001204	0 00856
Surface Soils							
MG/KG	OCTACHLORODIBENZO-p-DIOXIN	1	1	0 00013	0 00013	0 00013	0 00972
Surface Water							
MG/L	OCTACHLORODIBENZO-p-DIOXIN	1	1	0 0000012	0 0000012	0 0000012	0 0000012
General Chemistry							
Subsurface Soils							
MG/KG	TOTAL ORGANIC CARBON	21	12	500	30600	4408	
Metals							
Subsurface Soils							
MG/KG	ALUMINUM	53	53	721	32200	12519	21829
MG/KG	ANTIMONY	53	16	1 1	5 9	2 9	
MG/KG	ARSENIC	53	49	2 2	35 6	9 13	17
MG/KG	BARIUM	50	49	2 8	312	119	300
MG/KG	BERYLLIUM	53	22	0 43	0 89	0 59	1 2
MG/KG	CALCIUM	50	46	682	4700	2117	2432
MG/KG	CHROMIUM, TOTAL	53	53	1 6	74 6	19 2	26 4
MG/KG	COBALT	50	46	4 8	13	7 49	20 4
MG/KG	COPPER	53	25	8 6	89 9	20	32 7
MG/KG	IRON	50	50	2090	32400	19597	38480
MG/KG	LEAD	53	53	0 65	180	25 3	23 9
MG/KG	MAGNESIUM	50	47	116	3950	2576	4900
MG/KG	MANGANESE	50	50	2 5	1090	503	1540
MG/KG	MERCURY	52	19	0 03	0 15	0 065	0 2
MG/KG	NICKEL	53	51	1 4	29 4	18 1	36 6
MG/KG	POTASSIUM	50	36	119	3190	1360	1800
MG/KG	SELENIUM	53	4	0 59	1 4	0 99	0 6
MG/KG	SILVER	53	4	0 57	1 2	0 87	1
MG/KG	SODIUM	50	33	37 5	627	163	
MG/KG	THALLIUM	53	8	0 31	0 64	0 4	
MG/KG	VANADIUM	50	50	2	64 6	29 8	51 3
MG/KG	ZINC	53	25	2 2	2650	155	114
Sediments							
MG/KG	ALUMINUM	2	2	6980	10000	8490	10085
MG/KG	ARSENIC	2	2	4 8	14 1	9 45	12
MG/KG	BERYLLIUM	2	1	0 43	0 43	0 43	1 3
MG/KG	CHROMIUM, TOTAL	2	2	11 3	15 1	13 2	20
MG/KG	COPPER	2	2	12 6	23 4	18	58
MG/KG	MERCURY	2	1	0 31	0 31	0 31	4
MG/KG	NICKEL	2	2	14 4	17 2	15 8	30 5
MG/KG	LEAD	2	2	15 9	34 7	25 3	35 2
MG/KG	THALLIUM	2	2	0 39	0 46	0 425	1 1
MG/KG	ZINC	2	2	50 5	88 4	69 45	797
Surface Soils							
MG/KG	SILVER	48	14	0 65	8 4	1 42	2
MG/KG	ALUMINUM	48	48	6070	31100	13764	23810
MG/KG	ARSENIC	48	48	1 9	43 7	11	20
MG/KG	BARIUM	6	6	112	423	197	234
MG/KG	BERYLLIUM	48	34	0 21	1 3	0 56	1 1
MG/KG	CALCIUM	6	6	986	61200	15378	5840
MG/KG	CADMIUM	48	5	0 64	1 2	0 93	1 4
MG/KG	COBALT	8	8	3 2	10 8	7 9	18 3
MG/KG	CHROMIUM, TOTAL	47	47	9 5	212	30 2	24 8
MG/KG	COPPER	48	44	6 8	796	54 4	33 5
MG/KG	IRON	6	6	13200	51000	26550	37040
MG/KG	MERCURY	48	16	0 03	1 3	0 22	0 4
MG/KG	POTASSIUM	6	6	1320	3000	2228	1820
MG/KG	MAGNESIUM	6	6	2240	2980	2662	4600
MG/KG	MANGANESE	6	6	211	866	577	1304
MG/KG	SODIUM	6	4	58 2	400	243 8	
MG/KG	NICKEL	48	47	3	37 1	17 8	30

TABLE 10-6

Frequency of Detection for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
MG/KG	LEAD	48	48	7 4	1020	108	30
MG/KG	ANTIMONY	48	22	1 5	355	22 2	7
MG/KG	SELENIUM	48	9	0 24	1 3	0 53	0 8
MG/KG	THALLIUM	48	20	0 22	0 68	0 46	
MG/KG	VANADIUM	6	6	31 8	53 8	41 9	48 4
MG/KG	ZINC	48	44	41 1	935	128	126
Surface Water							
MG/L	ALUMINUM	2	2	11 7	17 8	14 8	5 077
MG/L	ARSENIC	2	2	0 0066	0 0103	0 0085	0 018
MG/L	BERYLLIUM	2	2	0 0007	0 0011	0 0009	
MG/L	CADMIUM	2	1	0 0036	0 0036	0 0036	
MG/L	CHROMIUM, TOTAL	2	2	0 0172	0 0203	0 019	0 0361
MG/L	COPPER	2	1	0 0401	0 0401	0 04	0 0746
MG/L	NICKEL	2	2	0 0192	0 0396	0 029	0 228
MG/L	LEAD	2	2	0 0256	0 0336	0 03	0 0186
MG/L	ZINC	2	2	0 0879	0 131	0 11	0 2873
OC Pesticides							
Subsurface Soils							
MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DI	21	8	0 00078	0 0786	0 021	
MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DI	21	9	0 00021	0 0221	0 0048	0 0015
MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-	21	8	0 00058	0 0164	0 004	0 0072
MG/KG	DIELDRIN	21	6	0 0005	0 016	0 0054	0 37
MG/KG	HEPTACHLOR	21	1	0 00011	0 00011	0 00011	
MG/KG	HEPTACHLOR EPOXIDE	21	1	0 0326	0 0326	0 033	0 0021
MG/KG	METHOXYCHLOR	21	1	0 0502	0 0502	0 05	
MG/KG	TOXAPHENE	21	1	0 167	0 167	0 17	
Sediments							
MG/KG	GAMMA-CHLORDANE	2	1	0 0017	0 0017	0 0017	2
MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DI	2	1	0 0062	0 0062	0 0062	0 0061
MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DI	2	2	0 002	0 0392	0 021	0 0072
MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-	2	1	0 0282	0 0282	0 028	
MG/KG	DIELDRIN	2	1	0 0617	0 0617	0 062	0 011
MG/KG	HEPTACHLOR EPOXIDE	2	2	0 0146	0 0356	0 025	0 23
MG/KG	METHOXYCHLOR	2	1	0 0682	0 0682	0 068	
Surface Soils							
MG/KG	ALPHA-CHLORDANE	28	8	0 00025	0 0058	0 0022	0 029
MG/KG	GAMMA-CHLORDANE	28	7	0 0003	0 0042	0 0021	0 026
MG/KG	DDD (1,1-bis(CHLOROPHENYL)-2,2-DI	28	21	0 00024	0 126	0 023	0 0067
MG/KG	DDE (1,1-bis(CHLOROPHENYL)-2,2-DI	28	23	0 00057	0 6	0 091	0 16
MG/KG	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-	28	24	0 00029	1 46	0 2	0 074
MG/KG	DIELDRIN	28	20	0 00054	0 964	0 1	0 086
MG/KG	ENDOSULFAN SULFATE	28	6	0 0043	0 0911	0 036	
MG/KG	ENDRIN	28	1	0 0036	0 0036	0 0036	
MG/KG	ENDRIN KETONE	28	1	0 003	0 003	0 003	
MG/KG	HEPTACHLOR EPOXIDE	28	2	0 0034	0 029	0 016	0 0045
MG/KG	METHOXYCHLOR	28	2	0 0042	0 0543	0 029	
Organics							
Subsurface Soils							
MG/KG	1,4-Dithiane	29	3	0 0018	0 0019	0 0019	
MG/KG	1,4-Oxathiane	29	3	0 001	0 0011	0 0011	
Surface Soils							
MG/KG	1,4-Dithiane	5	1	0 0017	0 0017	0 0017	
MG/KG	1,4-Oxathiane	5	1	0 001	0 001	0 001	
Polynuclear Aromatic Hydrocarbons							
Subsurface Soils							
MG/KG	2-METHYLNAPHTHALENE	28	1	0 12	0 12	0 12	
MG/KG	ACENAPHTHENE	28	1	0 055	0 055	0 055	
MG/KG	ACENAPHTHYLENE	28	1	0 079	0 079	0 079	
MG/KG	ANTHRACENE	28	4	0 0045	0 11	0 056	
MG/KG	BENZO(a)ANTHRACENE	28	10	0 0041	0 74	0 16	
MG/KG	BENZO(a)PYRENE	28	9	0 0034	0 97	0 21	
MG/KG	BENZO(b)FLUORANTHENE	28	7	0 02	1 2	0 31	
MG/KG	BENZO(g,h,i)PERYLENE	28	7	0 017	0 57	0 19	

TABLE 10-6

Frequency of Detection for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
MG/KG	BENZO(k)FLUORANTHENE	28	7	0.02	0.95	0.27	
MG/KG	CHRYSENE	28	7	0.024	0.91	0.26	
MG/KG	DIBENZ(a,h)ANTHRACENE	28	5	0.041	0.2	0.093	
MG/KG	FLUORANTHENE	28	8	0.052	1.2	0.4	0.045
MG/KG	FLUORENE	28	1	0.042	0.042	0.042	
MG/KG	INDENO(1,2,3-c,d)PYRENE	28	7	0.014	0.69	0.21	
MG/KG	NAPHTHALENE	69	2	0.069	0.082	0.076	
MG/KG	PHENANTHRENE	28	7	0.041	0.56	0.23	
MG/KG	PYRENE	28	8	0.038	1.6	0.39	0.042
Sediments							
MG/KG	ACENAPHTHENE	2	2	0.13	0.94	0.54	0.77
MG/KG	ACENAPHTHYLENE	2	2	0.16	0.24	0.2	
MG/KG	ANTHRACENE	2	2	0.36	1.6	0.98	1.6
MG/KG	BENZO(a)ANTHRACENE	2	2	1.4	5.4	3.4	2.9
MG/KG	BENZO(a)PYRENE	2	2	1.6	5.9	3.75	2.5
MG/KG	BENZO(b)FLUORANTHENE	2	2	1.6	7.4	4.5	2.21605
MG/KG	BENZO(g,h,i)PERYLENE	2	2	0.025	4.6	2.31	1.8
MG/KG	BENZO(k)FLUORANTHENE	2	2	1.6	5	3.3	2.3
MG/KG	CHRYSENE	2	2	1.6	5.8	3.7	3.2
MG/KG	DIBENZ(a,h)ANTHRACENE	2	2	0.3	1.8	1.05	0.7
MG/KG	FLUORENE	2	2	0.2	0.73	0.47	0.87
MG/KG	FLUORANTHENE	2	2	3.7	9.7	6.7	7.1
MG/KG	INDENO(1,2,3-c,d)PYRENE	2	2	1.3	5.1	3.2	1.7
MG/KG	2-METHYLNAPHTHALENE	2	1	0.16	0.16	0.16	
MG/KG	NAPHTHALENE	2	2	0.062	0.19	0.126	0.13
MG/KG	PHENANTHRENE	2	2	2.4	7.3	4.85	6.9
MG/KG	PYRENE	2	2	2.5	7.9	5.2	2.882
Surface Soils							
MG/KG	ACENAPHTHENE	29	8	0.014	1.3	0.29	
MG/KG	ANTHRACENE	29	9	0.0084	1.8	0.43	0.096
MG/KG	BENZO(a)ANTHRACENE	29	19	0.0093	5.8	0.82	0.71
MG/KG	BENZO(a)PYRENE	29	19	0.057	6.7	0.89	0.96
MG/KG	BENZO(b)FLUORANTHENE	29	17	0.074	8.2	1.17	0.9
MG/KG	BENZO(g,h,i)PERYLENE	29	20	0.035	3.8	0.58	0.82
MG/KG	BENZO(k)FLUORANTHENE	29	18	0.069	6.3	0.87	0.78
MG/KG	CHRYSENE	29	19	0.068	6.3	0.9	0.94
MG/KG	DIBENZ(a,h)ANTHRACENE	29	15	0.02	1.6	0.27	0.26
MG/KG	FLUORENE	29	7	0.01	0.86	0.24	
MG/KG	FLUORANTHENE	29	20	0.098	17	1.88	1.6
MG/KG	INDENO(1,2,3-c,d)PYRENE	29	19	0.038	4.6	0.66	0.7
MG/KG	2-METHYLNAPHTHALENE	29	2	0.11	0.34	0.23	
MG/KG	NAPHTHALENE	29	3	0.041	0.26	0.18	
MG/KG	PHENANTHRENE	29	18	0.011	13	1.38	0.61
MG/KG	PYRENE	29	20	0.072	12	1.55	1.5
Surface Water							
MG/L	BENZO(b)FLUORANTHENE	2	2	0.00028	0.00035	0.00032	
MG/L	CHRYSENE	2	2	0.00032	0.00046	0.00039	
MG/L	FLUORANTHENE	2	2	0.00066	0.00068	0.00067	
MG/L	INDENO(1,2,3-c,d)PYRENE	2	1	0.00027	0.00027	0.00027	
MG/L	PHENANTHRENE	2	2	0.0003	0.00034	0.00032	
MG/L	PYRENE	2	2	0.0004	0.00052	0.00046	
Polychlorinated Biphenyls							
Subsurface Soils							
MG/KG	PCB-1260 (AROCHLOR 1260)	21	2	0.008	0.0201	0.014	
Sediments							
MG/KG	PCB-1260 (AROCHLOR 1260)	2	1	0.0553	0.0553	0.055	
Surface Soils							
MG/KG	PCB-1254 (AROCHLOR 1254)	28	1	0.0121	0.0121	0.012	
MG/KG	PCB-1260 (AROCHLOR 1260)	28	5	0.0045	0.12	0.044	0.11
Semivolatile Organics							
Subsurface Soils							
MG/KG	1,2,4-TRICHLOROBENZENE	69	1	0.094	0.094	0.094	
MG/KG	2,4,6-TRICHLOROPHENOL	28	1	0.27	0.27	0.27	

TABLE 10-6

Frequency of Detection for All Media (except Groundwater) in the Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	28	5	0.021	0.16	0.055	
MG/KG	CARBAZOLE	28	2	0.096	0.097	0.097	
MG/KG	DI-n-BUTYL PHTHALATE	28	2	0.012	0.035	0.024	
MG/KG	DIBENZOFURAN	28	1	0.023	0.023	0.023	0.72
MG/KG	DIETHYL PHTHALATE	28	2	0.0087	0.16	0.084	
MG/KG	HEXACHLOROBUTADIENE	69	1	0.00309	0.00309	0.0031	
MG/KG	PENTACHLOROPHENOL	28	1	0.22	0.22	0.22	
MG/KG	PHENOL	28	1	0.022	0.022	0.022	19
Sediments							
MG/KG	CARBAZOLE	2	2	0.37	1.6	0.99	1.1
MG/KG	DIBENZOFURAN	2	2	0.11	0.38	0.245	0.38
Surface Soils							
MG/KG	BENZYL BUTYL PHTHALATE	29	1	0.0034	0.0034	0.0034	0.645
MG/KG	bis(2-ETHYLHEXYL) PHTHALATE	29	6	0.016	0.17	0.11	
MG/KG	CARBAZOLE	29	8	0.049	2	0.51	0.067
MG/KG	DIBENZOFURAN	29	3	0.077	0.52	0.3	0.647
MG/KG	DIETHYL PHTHALATE	29	2	0.0044	0.15	0.077	
MG/KG	DI-n-BUTYL PHTHALATE	29	2	0.01	0.018	0.014	
Surface Water							
MG/L	DIETHYL PHTHALATE	2	1	0.00046	0.00046	0.00046	
MG/L	DI-n-BUTYL PHTHALATE	2	1	0.00042	0.00042	0.00042	
MG/L	2-NITROPHENOL	2	1	0.00035	0.00035	0.00035	
Volatile Organics							
Subsurface Soils							
MG/KG	1,1,2,2-TETRACHLOROETHANE	155	56	0.003	160	6.18	
MG/KG	1,1,2-TRICHLOROETHANE	155	25	0.0003	2.2	0.18	
MG/KG	1,1-DICHLOROETHENE	155	8	0.0004	0.06	0.014	
MG/KG	1,2-DICHLOROETHANE	155	5	0.001	0.046	0.016	
MG/KG	1,2-DICHLOROPROPANE	155	3	0.0003	0.005	0.0019	
MG/KG	2-HEXANONE	155	1	0.035	0.035	0.035	
MG/KG	ACETONE	154	4	0.0651	0.933	0.36	
MG/KG	BENZENE	155	4	0.0003	0.003	0.0013	
MG/KG	BROMODICHLOROMETHANE	155	4	0.001	0.011	0.0053	
MG/KG	CARBON DISULFIDE	155	7	0.001	0.004	0.0026	0.002
MG/KG	CARBON TETRACHLORIDE	155	16	0.0005	6.8	0.52	
MG/KG	CHLOROBENZENE	155	5	0.0004	0.007	0.0031	
MG/KG	CHLOROETHANE	155	1	0.003	0.003	0.003	
MG/KG	CHLOROFORM	154	37	0.0008	14	0.94	
MG/KG	cis-1,2-DICHLOROETHYLENE	49	40	0.0007	0.132	0.013	
MG/KG	ETHYLBENZENE	155	2	0.0005	0.004	0.0023	
MG/KG	BUTANONE)	155	20	0.002	0.13	0.011	
MG/KG	METHYL-2-PENTANONE)	155	3	0.001	0.004	0.0023	
MG/KG	METHYLENE CHLORIDE	155	20	0.0005	0.039	0.0071	
MG/KG	STYRENE	155	10	0.0002	0.0007	0.00038	
MG/KG	TETRACHLOROETHYLENE(PCE)	155	56	0.0004	4.4	0.16	
MG/KG	TOLUENE	155	9	0.0004	0.008	0.0029	
MG/KG	TOTAL 1,2-DICHLOROETHENE	105	42	0.0006	190	7.93	
MG/KG	trans-1,2-DICHLOROETHENE	49	22	0.00069	0.0444	0.0054	
MG/KG	TRICHLOROETHYLENE (TCE)	155	92	0.0005	460	7.89	
MG/KG	VINYL CHLORIDE	155	15	0.002	7	0.64	
MG/KG	XYLENES, TOTAL	106	4	0.0006	0.02	0.0069	0.002
Surface Soils							
MG/KG	ACETONE	45	2	0.2	0.44	0.32	
MG/KG	BENZENE	45	4	0.002	0.028	0.0088	
MG/KG	TOLUENE	45	4	0.0008	0.026	0.008	0.002
MG/KG	CARBON DISULFIDE	45	1	0.015	0.015	0.015	0.002
MG/KG	CARBON TETRACHLORIDE	45	2	0.001	0.039	0.02	
MG/KG	1,1-DICHLOROETHENE	45	1	0.002	0.002	0.002	
MG/KG	TOTAL 1,2-DICHLOROETHENE	45	7	0.0009	0.87	0.16	
MG/KG	1,2-DICHLOROPROPANE	45	1	0.002	0.002	0.002	
MG/KG	ETHYLBENZENE	45	1	0.006	0.006	0.006	
MG/KG	BUTANONE)	45	27	0.002	0.039	0.015	0.002
MG/KG	METHYLENE CHLORIDE	45	1	0.0007	0.0007	0.0007	

TABLE 10-6

Frequency of Detection for All Media (except Groundwater) in the Disposal Area

Rov 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
MG/KG	1,1,2,2-TETRACHLOROETHANE	45	2	0 007	0 083	0 045	
MG/KG	TETRACHLOROETHYLENE(PCE)	45	9	0 0003	0 049	0 013	
MG/KG	STYRENE	45	4	0 0002	0 0008	0 00048	
MG/KG	1,1,2-TRICHLOROETHANE	45	1	0 002	0 002	0 002	
MG/KG	TRICHLOROETHYLENE (TCE)	45	11	0 0009	0 85	0 16	
MG/KG	CHLOROFORM	45	7	0 001	0 089	0 016	
MG/KG	VINYL CHLORIDE	45	1	0 11	0 11	0 11	
MG/KG	XYLENES, TOTAL	45	1	0 011	0 011	0 011	0 009

Note Data evaluated includes field duplicates and normal samples

MG/KG = milligram per kilogram

Table 10-7

Comparison of Soil Concentrations to Groundwater Protection Criteria

Rev 1 Memphis Depot Dunn Field RI

SOIL TYPE	STATISTIC	1,1,2,2-TETRACHLOROETHANE	1,1,2-TRICHLOROETHANE	1,1-DICHLOROETHENE	1,2-DICHLOROETHANE	CARBON TETRACHLORIDE	CHLOROFORM	TETRACHLOROETHYLENE(PCE)	TOTAL 1,2-DICHLOROETHENE	TRICHLOROETHYLENE (TCE)	VINYL CHLORIDE
	Groundwater Protection Criteria Value (mg/kg) [1]	0 003	0 02	0 06	0 02	0 07	0 6	0 06	NA	0 06	0 01
Surface Soil	Number Detected Above Background	2	1	1	0	2	7	9	7	11	1
	Minimum Concentration (mg/kg)	0 007	0 002	0 002	- -	0 001	0 001	0 0003	0 001	0 001	0 11
	Maximum Concentration (mg/kg)	0 083	0 002	0 002	- -	0 039	0 089	0 049	0 87	0 85	0 11
	Average Concentration (mg/kg)	0 045	0 002	0 002	- -	0 02	0 016	0 013	0 160	0 160	0 11
	Number Exceeding GWP Criteria	2	0	0	- -	0	0	0	NA	5	1
Subsurface Soil	Number Detected Above Background	56	25	8	5	16	37	56	42	92	15
	Minimum Concentration (mg/kg)	0 003	0 0003	0 0004	0 001	0 0005	0 0008	0 0004	0 0006	0 0005	0 002
	Maximum Concentration (mg/kg)	160	2 2	0 06	0 046	6 8	14	4 4	190	460	7
	Average Concentration (mg/kg)	6 180	0 17898	0 014	0 016	0 516	0 942	0 160	7 900	7 890	0 640
	Number Exceeding GWP Criteria	53	6	0	2	5	6	7	NA	45	9

Notes [1] GWP values from *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites Peer Review Draft* USEPA, OSWER March 2001 Generic SSLs for Residential Scenario with Attenuation-dilution factor (DAF) of 20 used due to depth (>50 ft) to groundwater

mg/kg = milligram per kilogram

TABLE 10-8

Subsurface Soil Samples Exceeding VOC Groundwater Protection Criteria Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Station	Boring Number*	Depth Range	Parameter Name	Concentration	Qualifier	Units
SBLAB		8 0 to 10 0	CARBON TETRACHLORIDE	0 13	=	MG/KG
SBLAB		8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 041	=	MG/KG
SBLAB		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 1	=	MG/KG
SBLAB		14 0 to 16 0	CARBON TETRACHLORIDE	0 57	J	MG/KG
SBLAB		14 0 to 16 0	CHLOROFORM	2 4	=	MG/KG
SBLAB		14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 14	J	MG/KG
SBLAB		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG
SBLAB		28 0 to 30 0	1 1 2 2 TETRACHLOROETHANE	0 009	J	MG/KG
SBLAB		28 0 to 30 0	CARBON TETRACHLORIDE	0 35	J	MG/KG
SBLAB		28 0 to 30 0	CHLOROFORM	1 7	=	MG/KG
SBLAB		28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 089	=	MG/KG
SBLBC		8 0 to 10 0	VINYL CHLORIDE	0 018	=	MG/KG
SBLBC		14 0 to 16 0	VINYL CHLORIDE	0 066	=	MG/KG
SBLBC		28 0 to 30 0	1 1,2 2-TETRACHLOROETHANE	0 055	=	MG/KG
SBLBC		28 0 to 30 0	VINYL CHLORIDE	0 011	=	MG/KG
SBLBD		8 0 to 10 0	CARBON DISULFIDE	0 004	J	MG/KG
SBLBD		14 0 to 16 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG
SBLBD		14 0 to 16 0	CHLOROFORM	0 004	J	MG/KG
SBLBD		14 0 to 16 0	METHYLENE CHLORIDE	0 0005	J	MG/KG
SBLBD		14 0 to 16 0	STYRENE	0 0003	J	MG/KG
SBLBD		14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG
SBLBD		14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 001	J	MG/KG
SBLBD		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 017	=	MG/KG
SBLBD		28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 005	J	MG/KG
SBLCA		8 0 to 10 0	1 1 2,2-TETRACHLOROETHANE	0 24	=	MG/KG
SBLCA		8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	1 9	=	MG/KG
SBLCA		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	6 8	=	MG/KG
SBLCA		14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	6 6	=	MG/KG
SBLCA		14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	1 9	=	MG/KG
SBLCA		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	9 5	=	MG/KG
SBLCA		28 0 to 30 0	1,1,2,2 TETRACHLOROETHANE	33	=	MG/KG
SBLCA		28 0 to 30 0	1 1 2-TRICHLOROETHANE	0 027	=	MG/KG
SBLCA		28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 31	J	MG/KG
SBLCA		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	18	=	MG/KG
SBLCA		28 0 to 30 0	VINYL CHLORIDE	0 047	=	MG/KG
SBLCA	SB1	33 0 to 33 0	1 1 2,2-TETRACHLOROETHANE	0 0157	=	MG/KG
SBLCA	SB1	33 0 to 33 0	TRICHLOROETHYLENE (TCE)	0 132	=	MG/KG
SBLCA	SB1	64 0 to 64 0	1,1 2,2-TETRACHLOROETHANE	0 0121	=	MG/KG
SBLCA	SB1	64 0 to 64 0	TRICHLOROETHYLENE (TCE)	0 0746	=	MG/KG
SBLCA	SB10	57 5 to 57 5	1,1 2 2-TETRACHLOROETHANE	0 265	=	MG/KG
SBLCA	SB10	72 5 to 72 5	1 1,2,2-TETRACHLOROETHANE	0 0999	=	MG/KG
SBLCA	SB11	81 0 to 81 0	1,1,2 2 TETRACHLOROETHANE	5 98	=	MG/KG
SBLCA	SB11	81 0 to 81 0	TRICHLOROETHYLENE (TCE)	0 0888	=	MG/KG
SBLCA	SB11	81 0 to 81 0	TRICHLOROETHYLENE (TCE)	0 0485	=	MG/KG
SBLCA	SB12	74 0 to 74 0	1 1 2 2-TETRACHLOROETHANE	0 203	=	MG/KG
SBLCA	SB12	74 0 to 74 0	1 1 2,2-TETRACHLOROETHANE	0 033	J	MG/KG
SBLCA	SB13	77 0 to 77 0	1 1 2,2-TETRACHLOROETHANE	0 365	=	MG/KG
SBLCA	SB14	83 0 to 83 0	1,1,2,2-TETRACHLOROETHANE	0 00842	=	MG/KG
SBLCA	SB15	80 0 to 80 0	1 1 2,2 TETRACHLOROETHANE	0 204	=	MG/KG
SBLCA	SB15	80 0 to 80 0	1,1,2,2-TETRACHLOROETHANE	0 21	J	MG/KG
SBLCA	SB2	44 0 to 44 0	1 1 2 2 TETRACHLOROETHANE	22 6	=	MG/KG
SBLCA	SB2	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 176	=	MG/KG
SBLCA	SB2	44 0 to 44 0	1,1,2,2-TETRACHLOROETHANE	13 9	=	MG/KG
SBLCA	SB2	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 309	=	MG/KG
SBLCA	SB2	68 0 to 68 0	1,1 2,2-TETRACHLOROETHANE	15 1	=	MG/KG
SBLCA	SB2	73 0 to 73 0	1,1 2,2-TETRACHLOROETHANE	13 6	=	MG/KG
SBLCA	SB2	73 0 to 73 0	TRICHLOROETHYLENE (TCE)	0 145	=	MG/KG
SBLCA	SB3	44 0 to 44 0	1 1 2 2-TETRACHLOROETHANE	0 0173	=	MG/KG
SBLCA	SB3	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 0747	=	MG/KG
SBLCA	SB3	53 0 to 53 0	1 1,2 2 TETRACHLOROETHANE	0 0869	=	MG/KG
SBLCA	SB3	67 0 to 67 0	1 1 2 2-TETRACHLOROETHANE	1 07	=	MG/KG
SBLCA	SB3	67 0 to 67 0	TRICHLOROETHYLENE (TCE)	0 0633	=	MG/KG
SBLCA	SB4	42 0 to 42 0	TRICHLOROETHYLENE (TCE)	0 089	=	MG/KG
SBLCA	SB4	52 0 to 52 0	1,1,2,2-TETRACHLOROETHANE	0 0223	=	MG/KG
SBLCA	SB4	75 0 to 75 0	1 1 2,2-TETRACHLOROETHANE	2 03	=	MG/KG
SBLCA	SB4	75 0 to 75 0	TRICHLOROETHYLENE (TCE)	0 164	=	MG/KG
SBLCA	SB4	75 0 to 75 0	1 1,2 2-TETRACHLOROETHANE	0 96	=	MG/KG
SBLCA	SB4	75 0 to 75 0	TRICHLOROETHYLENE (TCE)	0 068	=	MG/KG
SBLCA	SB5	44 0 to 44 0	1 1 2 2-TETRACHLOROETHANE	0 914	=	MG/KG
SBLCA	SB5	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 0609	=	MG/KG
SBLCA	SB5	54 0 to 54 0	1 1 2,2-TETRACHLOROETHANE	3 42	=	MG/KG
SBLCA	SB5	54 0 to 54 0	TRICHLOROETHYLENE (TCE)	0 0992	=	MG/KG
SBLCA	SB5	77 0 to 77 0	1 1 2 2 TETRACHLOROETHANE	0 159	=	MG/KG
SBLCA	SB5	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 179	=	MG/KG
SBLCA	SB8	52 0 to 52 0	1 1 2 2 TETRACHLOROETHANE	0 021	=	MG/KG
SBLCA	SB8	52 0 to 52 0	TRICHLOROETHYLENE (TCE)	0 161	=	MG/KG
SBLCA	SB8	52 0 to 52 0	1,1 2,2-TETRACHLOROETHANE	0 0145	=	MG/KG
SBLCA	SB8	52 0 to 52 0	TRICHLOROETHYLENE (TCE)	0 0941	=	MG/KG
SBLCA	SB8	72 0 to 72 0	1 1,2,2-TETRACHLOROETHANE	0 399	=	MG/KG
SBLCA	SB8	72 0 to 72 0	TETRACHLOROETHYLENE(PCE)	0 0657	=	MG/KG
SBLCA	SB8	72 0 to 72 0	TRICHLOROETHYLENE (TCE)	0 322	=	MG/KG
SBLCA	SB9	56 0 to 56 0	1 1 2 2 TETRACHLOROETHANE	0 082	=	MG/KG
SBLCA	SB9	56 0 to 56 0	TRICHLOROETHYLENE (TCE)	0 074	=	MG/KG
SBLCA	SB9	77 0 to 77 0	1 1 2,2-TETRACHLOROETHANE	0 124	=	MG/KG
SBLCA	SB9	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 0652	=	MG/KG
SBLCA	SB2S	44 0 to 44 0	1 1 2 2-TETRACHLOROETHANE	6 7	=	MG/KG

TABLE 10-8

Subsurface Soil Samples Exceeding VOC Groundwater Protection Criteria - Disposal Area

Rev 1 Memphis Depot Dunn Field RI

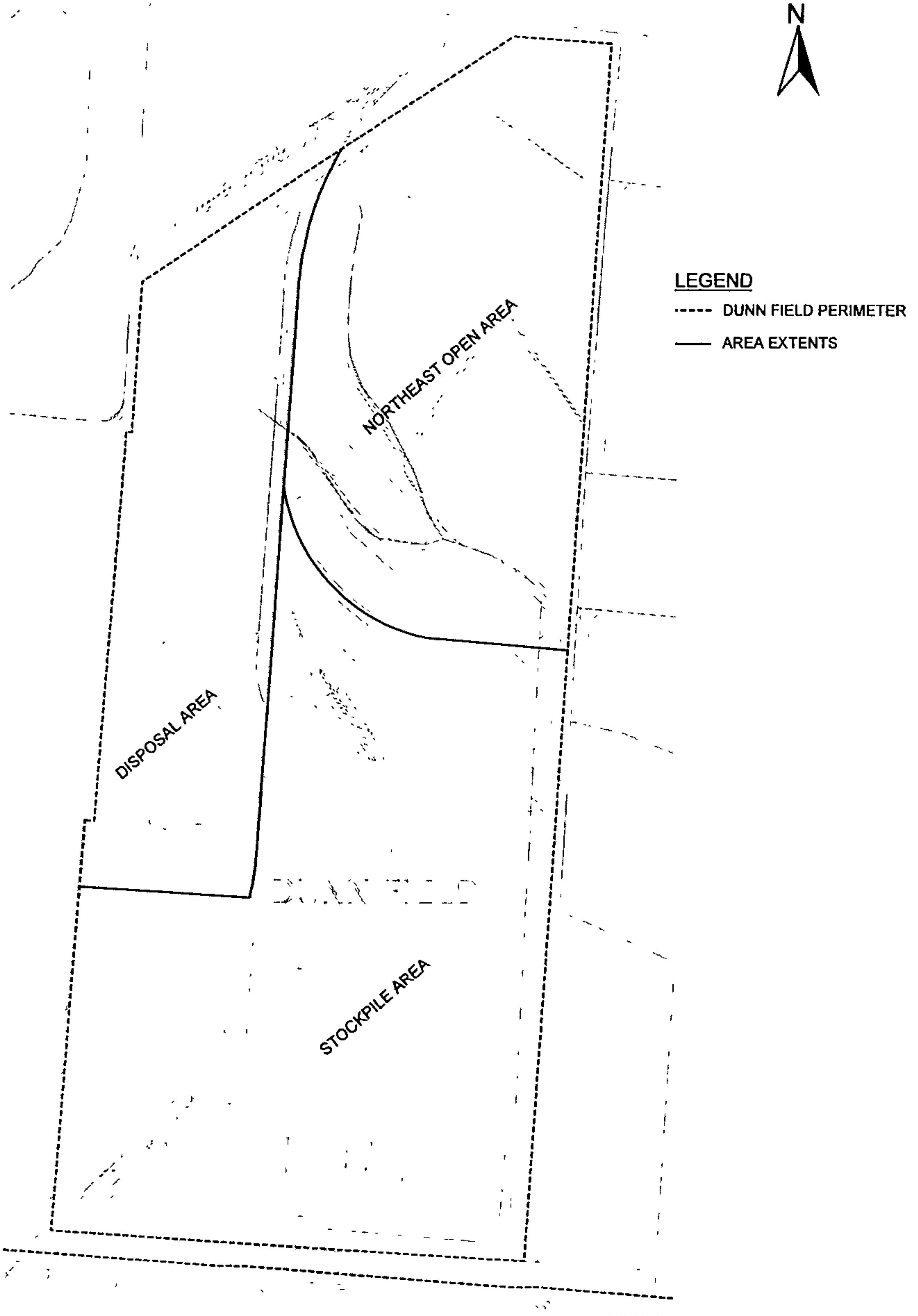
Station	Boring Number*	Depth Range	Parameter Name	Concentration	Qualifier	Units
SBLCA	SB2S	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG
SBLCA	SB4S	75 0 to 75 0	1,1 2,2-TETRACHLOROETHANE	1 8	=	MG/KG
SBLCA	SB8S	47 0 to 47 0	1 1 2 2-TETRACHLOROETHANE	0 003	J	MG/KG
SBLCB		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 68	=	MG/KG
SBLCB		14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	0 003	J	MG/KG
SBLCB		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 96	=	MG/KG
SBLCB		28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 027	=	MG/KG
SBLCB		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	1 3	=	MG/KG
SBLCB		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 47	=	MG/KG
SBLCC		14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	0 007	J	MG/KG
SBLCD		8 0 to 10 0	1 1 2,2-TETRACHLOROETHANE	1 6	=	MG/KG
SBLCD		8 0 to 10 0	1,1 2-TRICHLOROETHANE	0 034	=	MG/KG
SBLCD		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	1 9	=	MG/KG
SBLCD		14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	2 5	=	MG/KG
SBLCD		14 0 to 16 0	1,1,2-TRICHLOROETHANE	0 075	=	MG/KG
SBLCD		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	4 9	=	MG/KG
SBLCD		28 0 to 30 0	1 1 2,2-TETRACHLOROETHANE	0 91	=	MG/KG
SBLCD		28 0 to 30 0	1,1,2-TRICHLOROETHANE	0 1	=	MG/KG
SBLCD		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	3 9	=	MG/KG
SBLCF		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	1 1	=	MG/KG
SBLDA		28 0 to 30 0	1 1 2,2-TETRACHLOROETHANE	0 004	J	MG/KG
SBLDB		14 0 to 16 0	1,1 2,2-TETRACHLOROETHANE	0 003	J	MG/KG
SBLDC		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 073	=	MG/KG
SBLDC		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG
SBLDC		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 59	=	MG/KG
SBLDC		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 55	=	MG/KG
SBLDD		28 0 to 30 0	CHLOROFORM	0 85	=	MG/KG
SBLDF		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 093	=	MG/KG
SBLDG		14 0 to 16 0	1,1,2 2-TETRACHLOROETHANE	0 003	J	MG/KG
SBLDG		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 11	=	MG/KG
SBLDG		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 071	=	MG/KG
SBLEE		8 0 to 10 0	1,1 2,2-TETRACHLOROETHANE	160	=	MG/KG
SBLEE		8 0 to 10 0	1 1 2-TRICHLOROETHANE	2	J	MG/KG
SBLEE		8 0 to 10 0	METHYLENE CHLORIDE	0 031	=	MG/KG
SBLEE		8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	4 4	J	MG/KG
SBLEE		8 0 to 10 0	TRICHLOROETHYLENE (TCE)	460	=	MG/KG
SBLEE		8 0 to 10 0	VINYL CHLORIDE	2	J	MG/KG
SBLEE		14 0 to 16 0	1 1,2,2-TETRACHLOROETHANE	46	=	MG/KG
SBLEE		14 0 to 16 0	1 1 2-TRICHLOROETHANE	2 2	=	MG/KG
SBLEE		14 0 to 16 0	1 1-DICHLOROETHENE	0 06	=	MG/KG
SBLEE		14 0 to 16 0	1,2-DICHLOROETHANE	0 046	=	MG/KG
SBLEE		14 0 to 16 0	METHYLENE CHLORIDE	0 039	=	MG/KG
SBLEE		14 0 to 16 0	TRICHLOROETHYLENE (TCE)	210	=	MG/KG
SBLEE		14 0 to 16 0	VINYL CHLORIDE	7	=	MG/KG
SBLEE		28 0 to 30 0	1 1 2 2-TETRACHLOROETHANE	0 009	J	MG/KG
SBLEE		28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 19	=	MG/KG
SBLEE		28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 027	=	MG/KG
SBLEE	SB1	5 0 to 5 0	VINYL CHLORIDE	0 0552	=	MG/KG
SBLEE	SB1	67 0 to 67 0	1 1 2,2-TETRACHLOROETHANE	0 153	=	MG/KG
SBLEE	SB1S	34 0 to 34 0	VINYL CHLORIDE	0 074	=	MG/KG
SBLEF		14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	0 032	=	MG/KG
SBLEF		28 0 to 30 0	1 1 2 2-TETRACHLOROETHANE	0 004	J	MG/KG
SBLFG		8 0 to 10 0	CARBON TETRACHLORIDE	6 8	=	MG/KG
SBLFG		8 0 to 10 0	CHLOROFORM	14	=	MG/KG
SBLFG		8 0 to 10 0	METHYLENE CHLORIDE	0 036	=	MG/KG
SBLFG		14 0 to 16 0	CARBON TETRACHLORIDE	0 36	=	MG/KG
SBLFG		14 0 to 16 0	CHLOROFORM	14	=	MG/KG

Only applicable to borings installed during 2000 DNAPL Investigation

(=) Definite detection.

J = Estimated detection. Contaminant detected at or below laboratory detection limit.

Figures



Source RI Report, 1990

FIGURE 10-1
Area Designations at Dunn Field
Rev 0 Memphis Depot
Dunn Field RI

ATL/CAD1/PROJECTS/148071 DDMT/DunnField RI 2001/8071DFRI01-1-3 dgn

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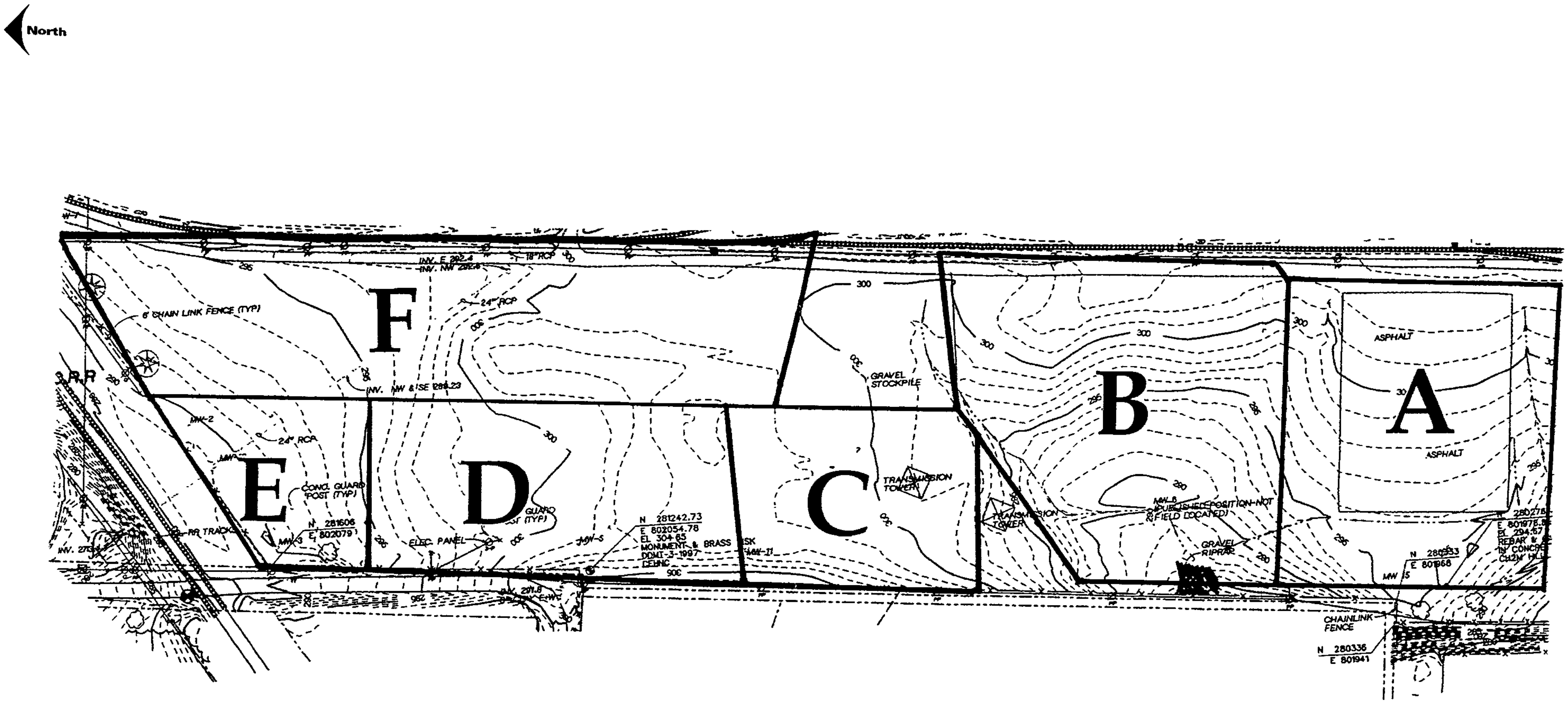
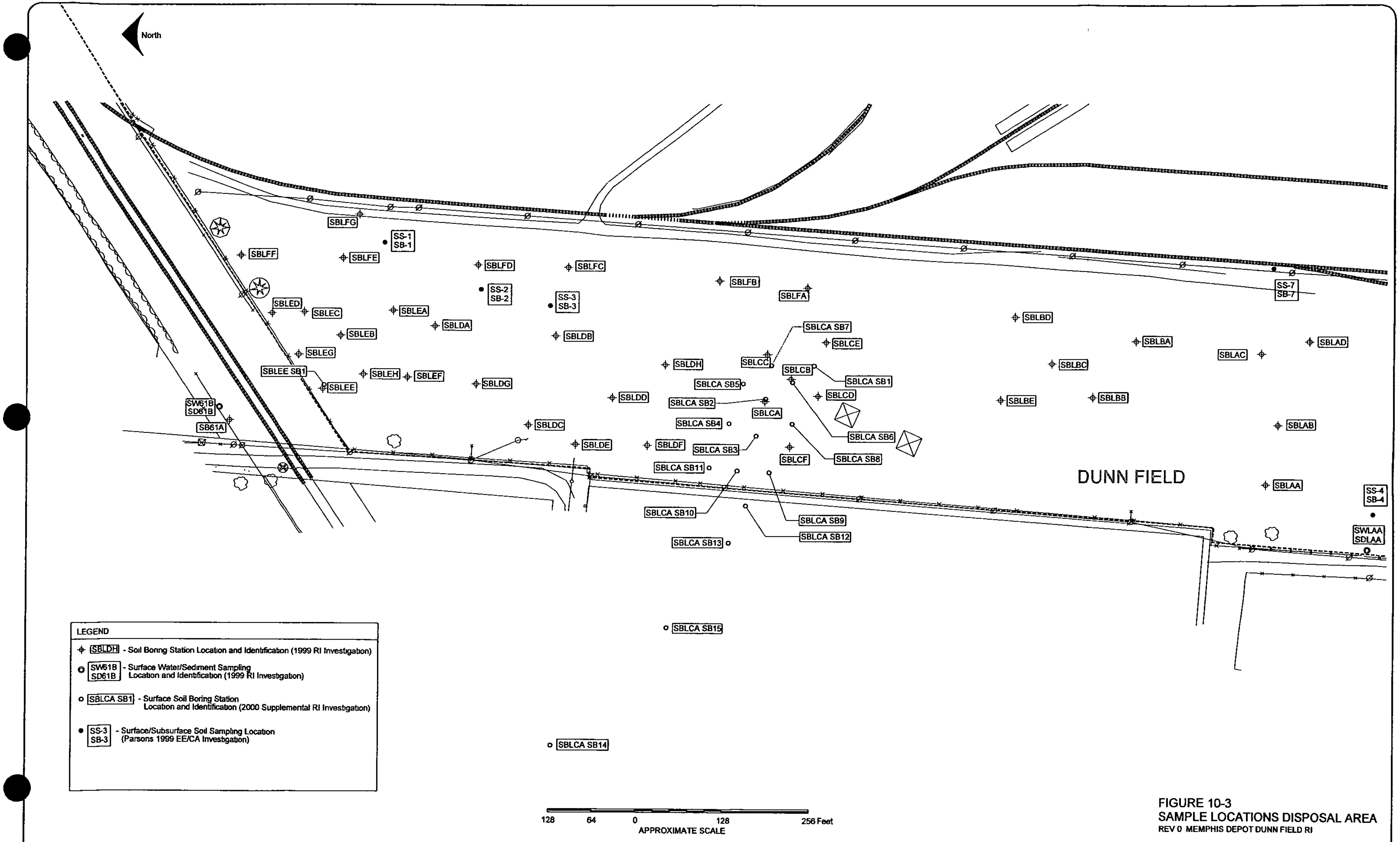


FIGURE 10-2
DUNN FIELD DISPOSAL AREA
CONSOLIDATED LOCATION MAP
REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn133 FH8

CH2MHILL



LEGEND

- ⌖ SBLDH - Soil Boring Station Location and Identification (1999 RI Investigation)
- ⊙ SW61B SD61B - Surface Water/Sediment Sampling Location and Identification (1999 RI Investigation)
- ○ SBLCA SB1 - Surface Soil Boring Station Location and Identification (2000 Supplemental RI Investigation)
- ● SS-3 SB-3 - Surface/Subsurface Soil Sampling Location (Parsons 1999 EE/CA Investigation)

FIGURE 10-3
SAMPLE LOCATIONS DISPOSAL AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

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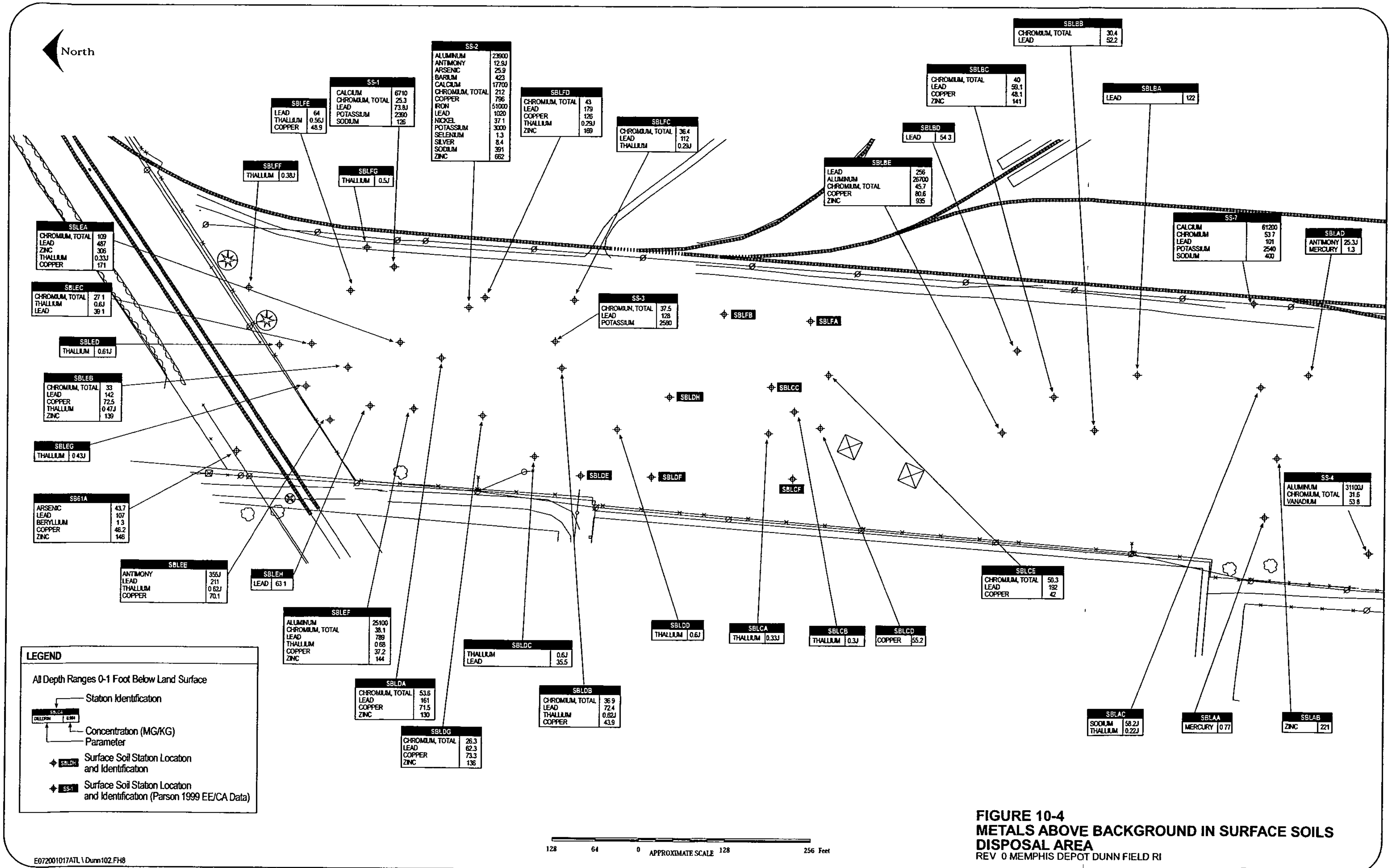
ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 31-OCT-2001 08071DFRI01-10-3 dgn

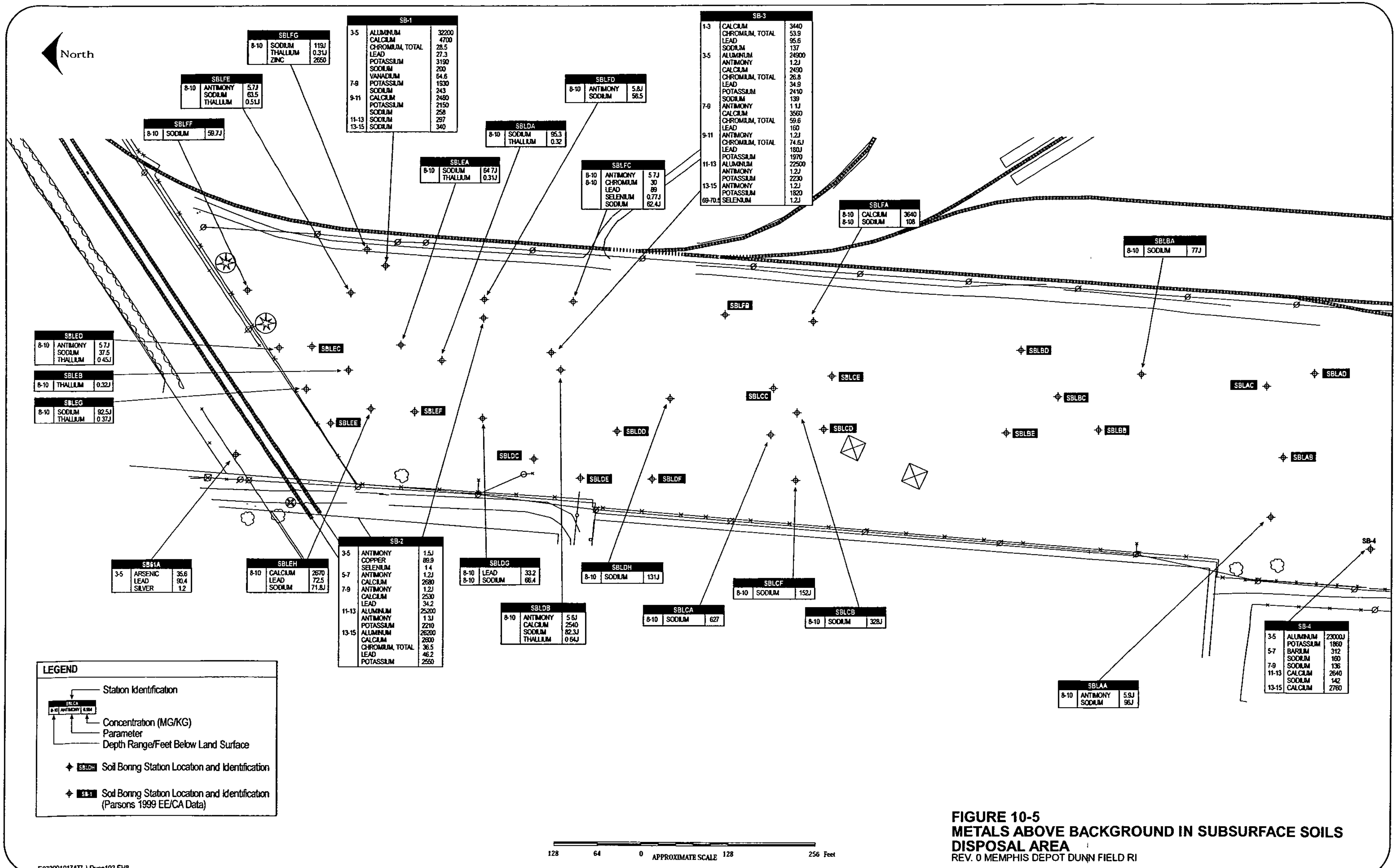


E072001017ATL \ Dunn102.FH8

FIGURE 10-4
METALS ABOVE BACKGROUND IN SURFACE SOILS DISPOSAL AREA

REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



SBLFG		
8-10	SODIUM	119J
	THALLIUM	0.31J
	ZINC	2650

SBLFE		
8-10	ANTIMONY	5.7J
	SODIUM	63.5
	THALLIUM	0.51J

SBLFF		
8-10	SODIUM	59.7J

SB-1		
3-5	ALUMINUM	32200
	CALCIUM	4700
	CHROMIUM, TOTAL	28.5
	LEAD	27.3
	POTASSIUM	3190
	SODIUM	200
	VANADIUM	64.6
7-9	POTASSIUM	1930
	SODIUM	243
9-11	CALCIUM	2460
	POTASSIUM	2150
	SODIUM	258
11-13	SODIUM	297
13-15	SODIUM	340

SBLDA		
8-10	SODIUM	95.3
	THALLIUM	0.32

SBLEA		
8-10	SODIUM	64 7J
	THALLIUM	0.31J

SBLFD		
8-10	ANTIMONY	5.8J
	SODIUM	56.5

SBLFC		
8-10	ANTIMONY	5 7J
8-10	CHROMIUM	30
	LEAD	89
	SELENIUM	0.77J
	SODIUM	62.4J

SB-3		
1-3	CALCIUM	3440
	CHROMIUM, TOTAL	53.9
	LEAD	95.6
	SODIUM	137
3-5	ALUMINUM	24900
	ANTIMONY	1.2J
	CALCIUM	2490
	CHROMIUM, TOTAL	26.8
	LEAD	34.9
	POTASSIUM	2410
	SODIUM	139
7-9	ANTIMONY	1 1J
	CALCIUM	3560
	CHROMIUM, TOTAL	59.6
	LEAD	160
9-11	ANTIMONY	1.2J
	CHROMIUM, TOTAL	74.6J
	LEAD	180J
	POTASSIUM	1970
11-13	ALUMINUM	22500
	ANTIMONY	1.2J
	POTASSIUM	2230
13-15	ANTIMONY	1.2J
	POTASSIUM	1820
69-70.5	SELENIUM	1.2J

SBLFA		
8-10	CALCIUM	3640
8-10	SODIUM	108

SBLBA		
8-10	SODIUM	77J

SBLED		
8-10	ANTIMONY	5 7J
	SODIUM	37.5
	THALLIUM	0 45J

SBLEB		
8-10	THALLIUM	0.32J

SBLEG		
8-10	SODIUM	92.5J
	THALLIUM	0 37J

SB61A		
3-5	ARSENIC	35.6
	LEAD	90.4
	SILVER	1.2

SBLEH		
8-10	CALCIUM	2670
	LEAD	72.5
	SODIUM	71.8J

SB-2		
3-5	ANTIMONY	1.5J
	COPPER	89.9
	SELENIUM	1 4
5-7	ANTIMONY	1.2J
	CALCIUM	2680
7-9	ANTIMONY	1.2J
	CALCIUM	2530
	LEAD	34.2
11-13	ALUMINUM	25200
	ANTIMONY	1 3J
	POTASSIUM	2210
13-15	ALUMINUM	26200
	CALCIUM	2600
	CHROMIUM, TOTAL	36.5
	LEAD	46.2
	POTASSIUM	2550

SBLDG		
8-10	LEAD	33.2
8-10	SODIUM	66.4

SBLDB		
8-10	ANTIMONY	5 6J
	CALCIUM	2540
	SODIUM	82.3J
	THALLIUM	0 64J

SBLDH		
8-10	SODIUM	131J

SBLCA		
8-10	SODIUM	627

SBLCF		
8-10	SODIUM	152J

SBLCB		
8-10	SODIUM	328J

SBLAA		
8-10	ANTIMONY	5.9J
	SODIUM	96J

SB-4		
3-5	ALUMINUM	23000J
	POTASSIUM	1860
5-7	BARIUM	312
	SODIUM	160
7-9	SODIUM	136
11-13	CALCIUM	2640
	SODIUM	142
13-15	CALCIUM	2760

FIGURE 10-5
METALS ABOVE BACKGROUND IN SUBSURFACE SOILS
DISPOSAL AREA
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn103 FH8

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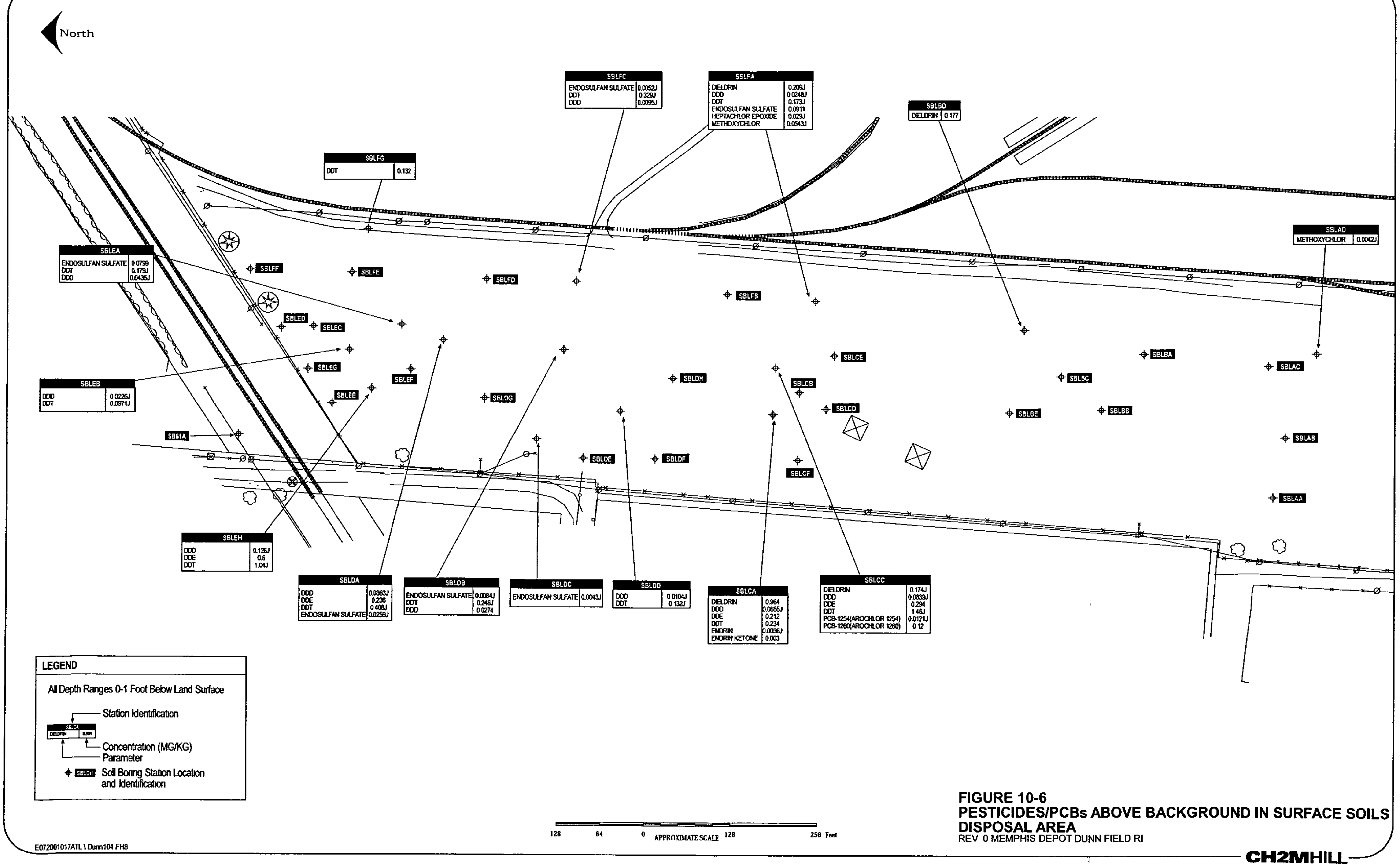


FIGURE 10-6
PESTICIDES/PCBs ABOVE BACKGROUND IN SURFACE SOILS
DISPOSAL AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

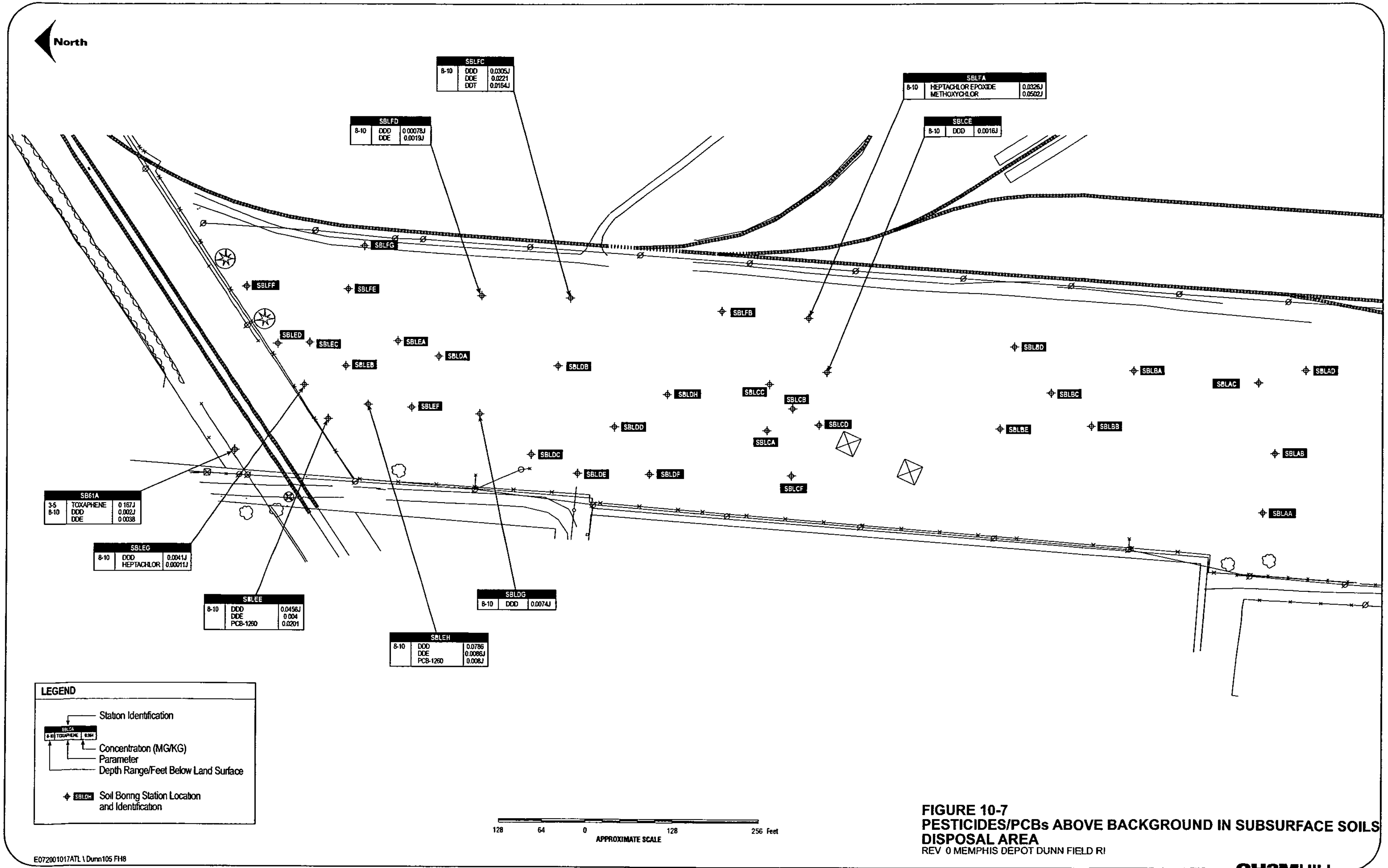
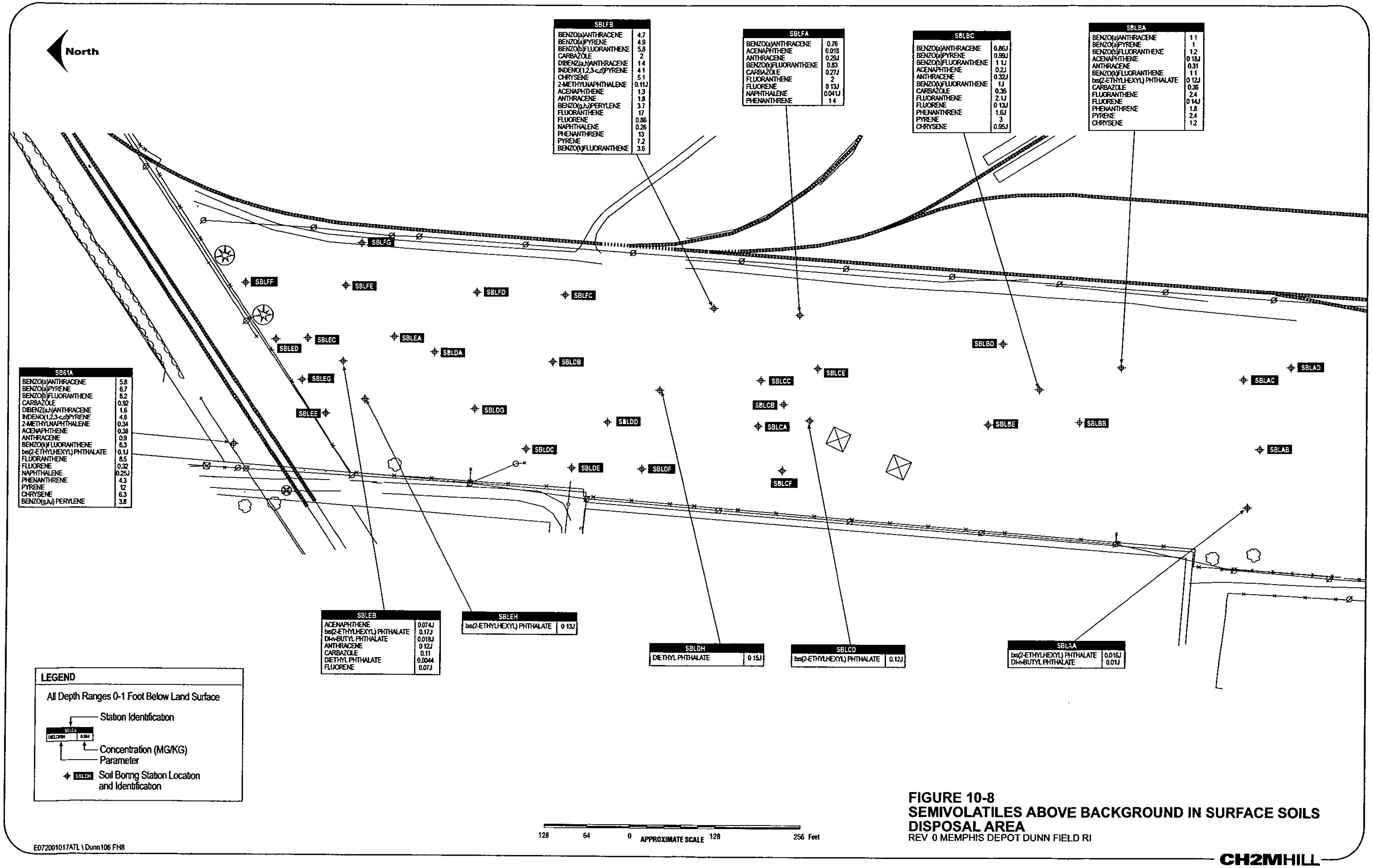


FIGURE 10-7
PESTICIDES/PCBs ABOVE BACKGROUND IN SUBSURFACE SOILS
DISPOSAL AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



SBLFB	
BENZO(a)ANTHRACENE	4.7
BENZO(a)PYRENE	4.9
BENZO(b)FLUORANTHENE	5.8
CARBAZOLE	2
DIBENZ(a,h)ANTHRACENE	1.4
INDENO(1,2,3-c,d)PYRENE	4.1
CHRYSENE	5.1
2-METHYLNAPHTHALENE	0.11J
ACENAPHTHENE	1.3
ANTHRACENE	1.8
BENZO(g,h,i)PERYLENE	3.7
FLUORANTHENE	17
FLUORENE	0.86
NAPHTHALENE	0.26
PHENANTHRENE	13
PYRENE	7.2
BENZO(k)FLUORANTHENE	3.6

SBLFA	
BENZO(a)ANTHRACENE	0.76
ACENAPHTHENE	0.018
ANTHRACENE	0.29J
BENZO(k)FLUORANTHENE	0.83
CARBAZOLE	0.27J
FLUORANTHENE	2
FLUORENE	0.13J
NAPHTHALENE	0.041J
PHENANTHRENE	1.4

SBLBC	
BENZO(a)ANTHRACENE	0.86J
BENZO(a)PYRENE	0.99J
BENZO(b)FLUORANTHENE	1.1J
ACENAPHTHENE	0.2J
ANTHRACENE	0.32J
BENZO(k)FLUORANTHENE	1J
CARBAZOLE	0.35
FLUORANTHENE	2.1J
FLUORENE	0.13J
PHENANTHRENE	1.6J
PYRENE	3
CHRYSENE	0.95J

SBLBA	
BENZO(a)ANTHRACENE	1.1
BENZO(a)PYRENE	1
BENZO(b)FLUORANTHENE	1.2
ACENAPHTHENE	0.18J
ANTHRACENE	0.31
BENZO(k)FLUORANTHENE	1.1
bis(2-ETHYLHEXYL) PHTHALATE	0.12J
CARBAZOLE	0.36
FLUORANTHENE	2.4
FLUORENE	0.14J
PHENANTHRENE	1.8
PYRENE	2.4
CHRYSENE	1.2

SB61A	
BENZO(a)ANTHRACENE	5.8
BENZO(a)PYRENE	6.7
BENZO(b)FLUORANTHENE	8.2
CARBAZOLE	0.92
DIBENZ(a,h)ANTHRACENE	1.6
INDENO(1,2,3-c,d)PYRENE	4.6
2-METHYLNAPHTHALENE	0.34
ACENAPHTHENE	0.38
ANTHRACENE	0.9
BENZO(k)FLUORANTHENE	6.3
bis(2-ETHYLHEXYL) PHTHALATE	0.1J
FLUORANTHENE	8.5
FLUORENE	0.32
NAPHTHALENE	0.25J
PHENANTHRENE	4.3
PYRENE	12
CHRYSENE	6.3
BENZO(g,h,i) PERYLENE	3.8

SBLEB	
ACENAPHTHENE	0.074J
bis(2-ETHYLHEXYL) PHTHALATE	0.17J
DI-n-BUTYL PHTHALATE	0.018J
ANTHRACENE	0.12J
CARBAZOLE	0.11
DIETHYL PHTHALATE	0.0044
FLUORENE	0.07J

SBLEH	
bis(2-ETHYLHEXYL) PHTHALATE	0.13J

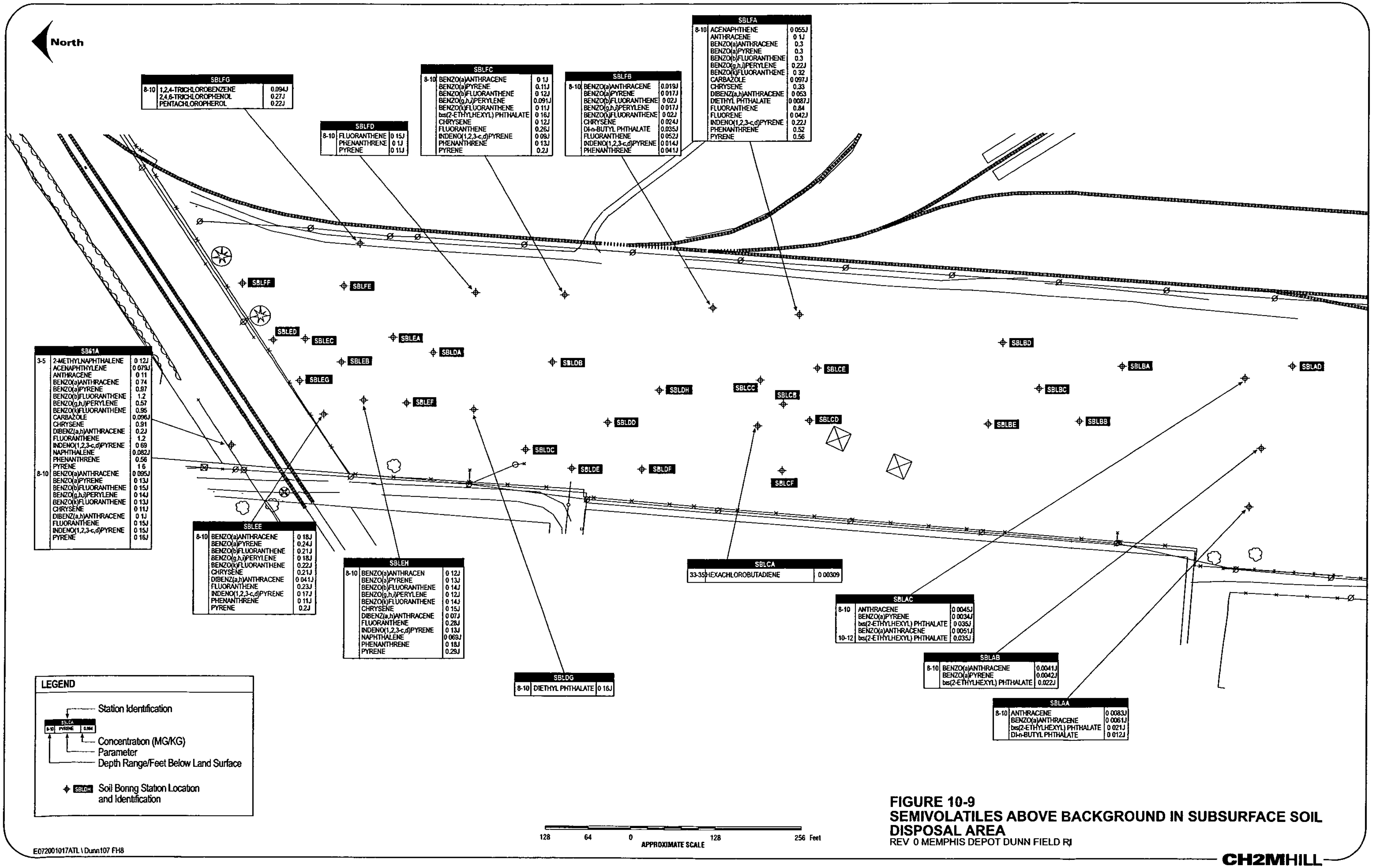
SBLDH	
DIETHYL PHTHALATE	0.15J

SBLCD	
bis(2-ETHYLHEXYL) PHTHALATE	0.12J

SBLAA	
bis(2-ETHYLHEXYL) PHTHALATE	0.016J
DI-n-BUTYL PHTHALATE	0.01J

FIGURE 10-8
SEMIVOLATILES ABOVE BACKGROUND IN SURFACE SOILS
DISPOSAL AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



SBLFG		
8-10	1,2,4-TRICHLOROBENZENE	0.094J
	2,4,6-TRICHLOROPHENOL	0.27J
	PENTACHLOROPHEROL	0.22J

SBLFD		
8-10	FLUORANTHENE	0 15J
	PHENANTHRENE	0 1J
	PYRENE	0 11J

SBLFC		
8-10	BENZO(a)ANTHRACENE	0 1J
	BENZO(a)PYRENE	0.11J
	BENZO(b)FLUORANTHENE	0 12J
	BENZO(g,h,i)PERYLENE	0.091J
	BENZO(k)FLUORANTHENE	0 11J
	bis(2-ETHYLHEXYL) PHTHALATE	0 16J
	CHRYSENE	0 12J
	FLUORANTHENE	0.26J
	INDENO(1,2,3-c,d)PYRENE	0 09J
	PHENANTHRENE	0 13J
	PYRENE	0.2J

SBLFB		
8-10	BENZO(a)ANTHRACENE	0.019J
	BENZO(a)PYRENE	0 017J
	BENZO(b)FLUORANTHENE	0 02J
	BENZO(g,h,i)PERYLENE	0 017J
	BENZO(k)FLUORANTHENE	0 02J
	CHRYSENE	0 024J
	DI-n-BUTYL PHTHALATE	0.035J
	FLUORANTHENE	0 052J
	INDENO(1,2,3-c,d)PYRENE	0 014J
	PHENANTHRENE	0 041J

SBLFA		
8-10	ACENAPHTHENE	0 055J
	ANTHRACENE	0 1J
	BENZO(a)ANTHRACENE	0.3
	BENZO(a)PYRENE	0.3
	BENZO(b)FLUORANTHENE	0.3
	BENZO(g,h,i)PERYLENE	0.22J
	BENZO(k)FLUORANTHENE	0 32
	CARBAZOLE	0 097J
	CHRYSENE	0.33
	DIBENZ(a,h)ANTHRACENE	0 053
	DIETHYL PHTHALATE	0 0087J
	FLUORANTHENE	0.84
	FLUORENE	0 042J
	INDENO(1,2,3-c,d)PYRENE	0.22J
	PHENANTHRENE	0.52
	PYRENE	0.56

SB61A		
3-5	2-METHYLNAPHTHALENE	0 12J
	ACENAPHTHYLENE	0 079J
	ANTHRACENE	0 11
	BENZO(a)ANTHRACENE	0 74
	BENZO(a)PYRENE	0.97
	BENZO(b)FLUORANTHENE	1.2
	BENZO(g,h,i)PERYLENE	0.57
	BENZO(k)FLUORANTHENE	0.95
	CARBAZOLE	0.096J
	CHRYSENE	0.91
	DIBENZ(a,h)ANTHRACENE	0.2J
	FLUORANTHENE	1.2
	INDENO(1,2,3-c,d)PYRENE	0 69
	NAPHTHALENE	0.082J
	PHENANTHRENE	0.56
	PYRENE	1 6
8-10	BENZO(a)ANTHRACENE	0 095J
	BENZO(a)PYRENE	0 13J
	BENZO(b)FLUORANTHENE	0 15J
	BENZO(g,h,i)PERYLENE	0 14J
	BENZO(k)FLUORANTHENE	0 13J
	CHRYSENE	0 11J
	DIBENZ(a,h)ANTHRACENE	0 1J
	FLUORANTHENE	0 15J
	INDENO(1,2,3-c,d)PYRENE	0 15J
	PYRENE	0 16J

SBLEE		
8-10	BENZO(a)ANTHRACENE	0 18J
	BENZO(a)PYRENE	0.24J
	BENZO(b)FLUORANTHENE	0.21J
	BENZO(g,h,i)PERYLENE	0 18J
	BENZO(k)FLUORANTHENE	0.22J
	CHRYSENE	0.21J
	DIBENZ(a,h)ANTHRACENE	0 041J
	FLUORANTHENE	0.23J
	INDENO(1,2,3-c,d)PYRENE	0 17J
	PHENANTHRENE	0 11J
	PYRENE	0.2J

SBLEH		
8-10	BENZO(a)ANTHRACEN	0 12J
	BENZO(a)PYRENE	0 13J
	BENZO(b)FLUORANTHENE	0 14J
	BENZO(g,h,i)PERYLENE	0 12J
	BENZO(k)FLUORANTHENE	0 14J
	CHRYSENE	0 15J
	DIBENZ(a,h)ANTHRACENE	0 07J
	FLUORANTHENE	0.28J
	INDENO(1,2,3-c,d)PYRENE	0 13J
	NAPHTHALENE	0 069J
	PHENANTHRENE	0 18J
	PYRENE	0.29J

SBLDG		
8-10	DIETHYL PHTHALATE	0 16J

SBLCA		
33-35	HEXACHLOROBUTADIENE	0 00309

SBLAC		
8-10	ANTHRACENE	0 0045J
	BENZO(a)PYRENE	0 0034J
	bis(2-ETHYLHEXYL) PHTHALATE	0 035J
	BENZO(a)ANTHRACENE	0 0051J
10-12	bis(2-ETHYLHEXYL) PHTHALATE	0.035J

SBLAB		
8-10	BENZO(a)ANTHRACENE	0.0041J
	BENZO(a)PYRENE	0.0042J
	bis(2-ETHYLHEXYL) PHTHALATE	0.022J

SBLAA		
8-10	ANTHRACENE	0 0083J
	BENZO(a)ANTHRACENE	0 0061J
	bis(2-ETHYLHEXYL) PHTHALATE	0 021J
	DI-n-BUTYL PHTHALATE	0 012J

LEGEND

SBLCA		
8-10	PYRENE	0.964

Station Identification
Concentration (MG/KG)
Parameter
Depth Range/Feet Below Land Surface

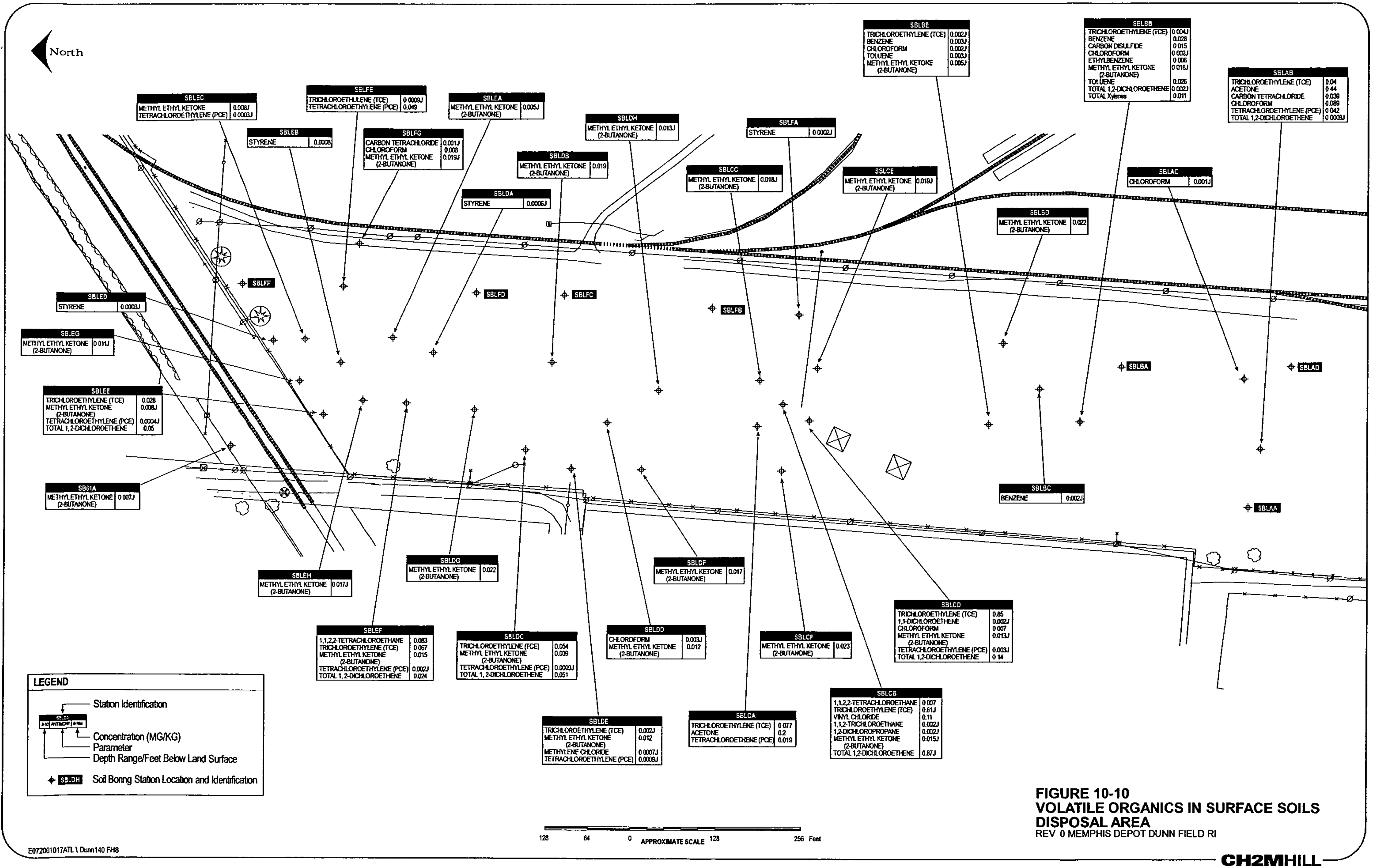
⌖ SBLDH Soil Boring Station Location
and Identification

FIGURE 10-9
SEMIVOLATILES ABOVE BACKGROUND IN SUBSURFACE SOIL DISPOSAL AREA

REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn107 FH8

CH2MHILL



SBLEC	
METHYL ETHYL KETONE	0.008J
TETRACHLOROETHYLENE (PCE)	0.0003J

SBLFE	
TRICHLOROETHULENE (TCE)	0.0009J
TETRACHLOROETHYLENE (PCE)	0.049

SBLEA	
METHYL ETHYL KETONE (2-BUTANONE)	0.005J

SBLEB	
STYRENE	0.0008

SBLFG	
CARBON TETRACHLORIDE	0.001J
CHLOROFORM	0.008
METHYL ETHYL KETONE (2-BUTANONE)	0.019J

SBLDH	
METHYL ETHYL KETONE (2-BUTANONE)	0.013J

SBLDB	
METHYL ETHYL KETONE (2-BUTANONE)	0.019

SBLDA	
STYRENE	0.0006J

SBLFA	
STYRENE	0.0002J

SBLCC	
METHYL ETHYL KETONE (2-BUTANONE)	0.018J

SBLCE	
METHYL ETHYL KETONE (2-BUTANONE)	0.019J

SBLBE	
TRICHLOROETHYLENE (TCE)	0.002J
BENZENE	0.003J
CHLOROFORM	0.002J
TOLUENE	0.003J
METHYL ETHYL KETONE (2-BUTANONE)	0.005J

SBLBB	
TRICHLOROETHYLENE (TCE)	0.004J
BENZENE	0.028
CARBON DISULFIDE	0.015
CHLOROFORM	0.002J
ETHYLBENZENE	0.006
METHYL ETHYL KETONE (2-BUTANONE)	0.016J
TOLUENE	0.026
TOTAL 1,2-DICHLOROETHENE	0.002J
TOTAL Xylenes	0.011

SBLAB	
TRICHLOROETHYLENE (TCE)	0.04
ACETONE	0.44
CARBON TETRACHLORIDE	0.039
CHLOROFORM	0.089
TETRACHLOROETHYLENE (PCE)	0.042
TOTAL 1,2-DICHLOROETHENE	0.0009J

SBLAC	
CHLOROFORM	0.001J

SBLBD	
METHYL ETHYL KETONE (2-BUTANONE)	0.022

SBLED	
STYRENE	0.0003J

SBLEG	
METHYL ETHYL KETONE (2-BUTANONE)	0.011J

SBLEE	
TRICHLOROETHYLENE (TCE)	0.028
METHYL ETHYL KETONE (2-BUTANONE)	0.008J
TETRACHLOROETHYLENE (PCE)	0.0004J
TOTAL 1, 2-DICHLOROETHENE	0.05

SB61A	
METHYL ETHYL KETONE (2-BUTANONE)	0.007J

SBLBC	
BENZENE	0.002J

SBLEH	
METHYL ETHYL KETONE (2-BUTANONE)	0.017J

SBLDG	
METHYL ETHYL KETONE (2-BUTANONE)	0.022

SBLDF	
METHYL ETHYL KETONE (2-BUTANONE)	0.017

SBLCD	
TRICHLOROETHYLENE (TCE)	0.85
1,1-DICHLOROETHENE	0.002J
CHLOROFORM	0.007
METHYL ETHYL KETONE (2-BUTANONE)	0.013J
TETRACHLOROETHYLENE (PCE)	0.003J
TOTAL 1,2-DICHLOROETHENE	0.14

SBLEF	
1,1,2,2-TETRACHLOROETHANE	0.083
TRICHLOROETHYLENE (TCE)	0.067
METHYL ETHYL KETONE (2-BUTANONE)	0.015
TETRACHLOROETHYLENE (PCE)	0.002J
TOTAL 1, 2-DICHLOROETHENE	0.024

SBLDC	
TRICHLOROETHYLENE (TCE)	0.054
METHYL ETHYL KETONE (2-BUTANONE)	0.039
TETRACHLOROETHYLENE (PCE)	0.0009J
TOTAL 1, 2-DICHLOROETHENE	0.051

SBLDD	
CHLOROFORM	0.003J
METHYL ETHYL KETONE (2-BUTANONE)	0.012

SBLCF	
METHYL ETHYL KETONE (2-BUTANONE)	0.023

SBLDE	
TRICHLOROETHYLENE (TCE)	0.002J
METHYL ETHYL KETONE (2-BUTANONE)	0.012
METHYLENE CHLORIDE	0.0007J
TETRACHLOROETHYLENE (PCE)	0.0009J

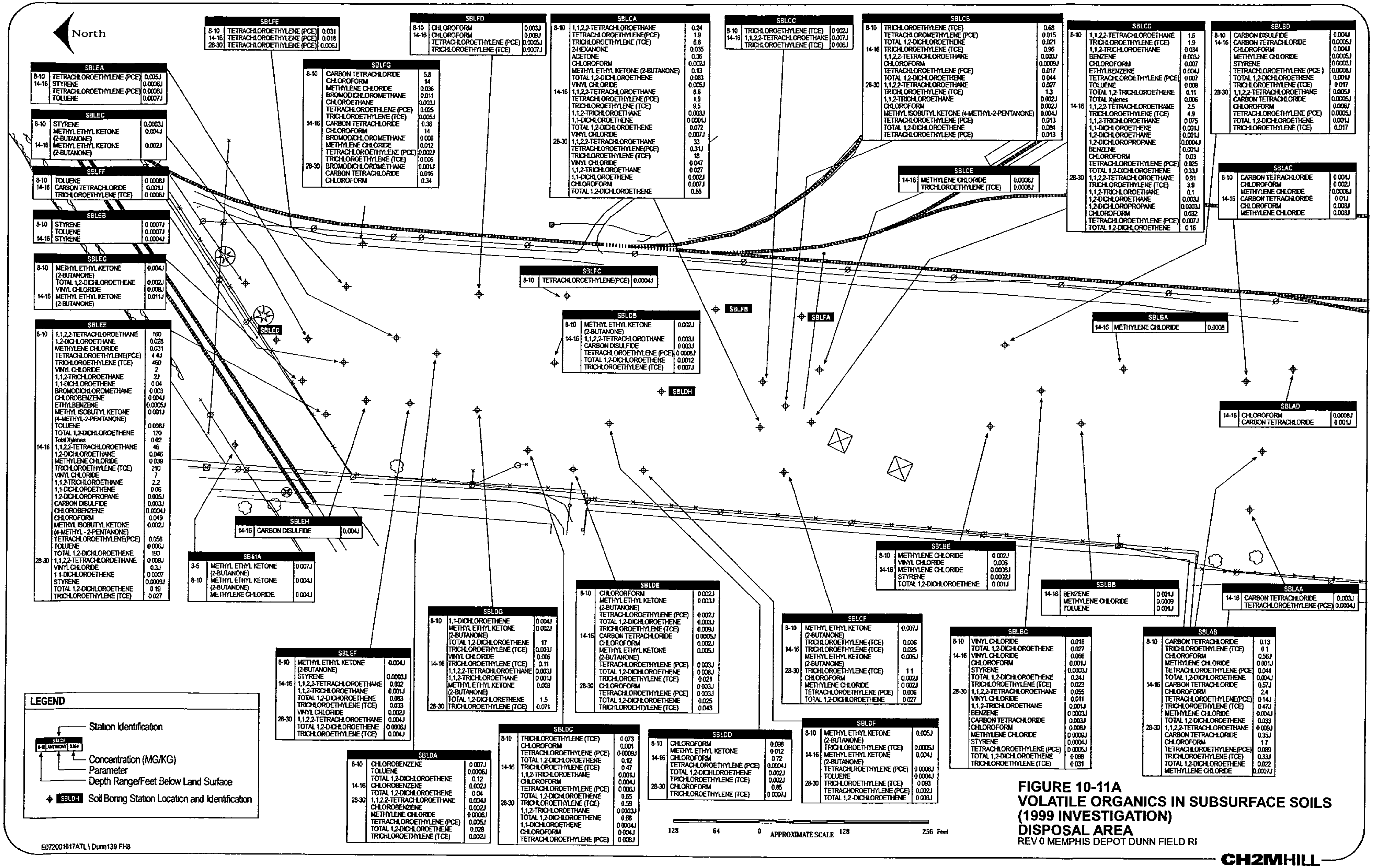
SBLCA	
TRICHLOROETHYLENE (TCE)	0.077
ACETONE	0.2
TETRACHLOROETHENE (PCE)	0.019

SBLCB	
1,1,2,2-TETRACHLOROETHANE	0.007
TRICHLOROETHYLENE (TCE)	0.61J
VINYL CHLORIDE	0.11
1,1,2-TRICHLOROETHANE	0.002J
1,2-DICHLOROPROPANE	0.002J
METHYL ETHYL KETONE (2-BUTANONE)	0.015J
TOTAL 1,2-DICHLOROETHENE	0.87J

LEGEND

Station Identification
Concentration (MG/KG)
Parameter
Depth Range/Feet Below Land Surface
◆ SBLDH Soil Boring Station Location and Identification

FIGURE 10-10
VOLATILE ORGANICS IN SURFACE SOILS DISPOSAL AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI



SBLEA

8-10	TETRACHLOROETHYLENE (PCE)	0.005J
14-16	STYRENE	0.0006J
	TETRACHLOROETHYLENE (PCE)	0.0006J
	TOLUENE	0.0007J

SBLEC

8-10	STYRENE	0.0003J
	METHYL ETHYL KETONE (2-BUTANONE)	0.004J
14-16	METHYL ETHYL KETONE (2-BUTANONE)	0.002J

SBLFF

8-10	TOLUENE	0.0008J
14-16	CARBON TETRACHLORIDE	0.001J
	TRICHLOROETHYLENE (TCE)	0.0006J

SBLEB

8-10	STYRENE	0.0007J
	TOLUENE	0.0007J
14-16	STYRENE	0.0004J

SBLEG

8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.004J
	TOTAL 1,2-DICHLOROETHENE	0.002J
	VINYL CHLORIDE	0.008J
14-16	METHYL ETHYL KETONE (2-BUTANONE)	0.011J

SBLEE

8-10	1,1,2,2-TETRACHLOROETHANE	160
	1,2-DICHLOROETHANE	0.028
	METHYLENE CHLORIDE	0.031
	TETRACHLOROETHYLENE(PCE)	4.4J
	TRICHLOROETHYLENE (TCE)	460
	VINYL CHLORIDE	2
	1,1,2-TRICHLOROETHANE	2J
	1,1-DICHLOROETHENE	0.04
	BROMODICHLOROMETHANE	0.003
	CHLOROBENZENE	0.004J
	ETHYLBENZENE	0.0005J
	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	0.001J
	TOLUENE	0.008J
	TOTAL 1,2-DICHLOROETHENE	120
	Total Xylenes	0.02
14-16	1,1,2,2-TETRACHLOROETHANE	46
	1,2-DICHLOROETHANE	0.046
	METHYLENE CHLORIDE	0.039
	TRICHLOROETHYLENE (TCE)	210
	VINYL CHLORIDE	7
	1,1,2-TRICHLOROETHANE	2.2
	1,1-DICHLOROETHENE	0.06
	1,2-DICHLOROPROPANE	0.005J
	CARBON DISULFIDE	0.003J
	CHLOROBENZENE	0.0004J
	CHLOROFORM	0.049
	METHYL ISOBUTYL KETONE (4-METHYL - 2-PENTANONE)	0.002J
	TETRACHLOROETHYLENE(PCE)	0.056
	TOLUENE	0.006J
	TOTAL 1,2-DICHLOROETHENE	190
28-30	1,1,2,2-TETRACHLOROETHANE	0.009J
	VINYL CHLORIDE	0.3J
	1,1-DICHLOROETHENE	0.0007
	STYRENE	0.0003J
	TOTAL 1,2-DICHLOROETHENE	0.19
	TRICHLOROETHYLENE (TCE)	0.027

SBLFE

8-10	TETRACHLOROETHYLENE (PCE)	0.031
14-16	TETRACHLOROETHYLENE (PCE)	0.018
28-30	TETRACHLOROETHYLENE (PCE)	0.006J

SBLFG

8-10	CARBON TETRACHLORIDE	6.8
	CHLOROFORM	14
	METHYLENE CHLORIDE	0.036
	BROMODICHLOROMETHANE	0.011
	CHLOROETHANE	0.003J
	TETRACHLOROETHLENE (PCE)	0.025
	TRICHLOROETHYLENE (TCE)	0.005J
14-16	CARBON TETRACHLORIDE	0.36
	CHLOROFORM	14
	BROMODICHLOROMETHANE	0.006
	METHYLENE CHLORIDE	0.012
	TETRACHLOROETHYLENE (PCE)	0.002J
	TRICHLOROETHYLENE (TCE)	0.006
28-30	BROMODICHLOROMETHANE	0.001J
	CARBON TETRACHLORIDE	0.016
	CHLOROFORM	0.34

SBLFD

8-10	CHLOROFORM	0.003J
14-16	CHLOROFORM	0.009J
	TETRACHLOROETHYLENE (PCE)	0.0005J
	TRICHLOROETHYLENE (TCE)	0.0007J

SBLCA

8-10	1,1,2,2-TETRACHLOROETHANE	0.24
	TETRACHLOROETHYLENE(PCE)	1.9
	TRICHLOROETHYLENE (TCE)	6.8
	2-HEXANONE	0.035
	ACETONE	0.36
	CHLOROFORM	0.002J
	METHYL ETHYL KETONE (2-BUTANONE)	0.13
	TOTAL 1,2-DICHLOROETHENE	0.083
	VINYL CHLORIDE	0.005J
14-16	1,1,2,2-TETRACHLOROETHANE	8.6
	TETRACHLOROETHYLENE(PCE)	1.9
	TRICHLOROETHYLENE (TCE)	9.5
	1,1,2-TRICHLOROETHANE	0.003J
	1,1-DICHLOROETHENE	0.0004J
	TOTAL 1,2-DICHLOROETHENE	0.072
	VINYL CHLORIDE	0.007J
28-30	1,1,2,2-TETRACHLOROETHANE	33
	TETRACHLOROETHYLENE(PCE)	0.31J
	TRICHLOROETHYLENE (TCE)	18
	VINYL CHLORIDE	0.047
	1,1,2-TRICHLOROETHANE	0.027
	1,1-DICHLOROETHENE	0.002J
	CHLOROFORM	0.007J
	TOTAL 1,2-DICHLOROETHENE	0.55

SBLCC

8-10	TRICHLOROETHYLENE (TCE)	0.002J
14-16	1,1,2,2-TETRACHLOROETHANE	0.007J
	TRICHLOROETHYLENE (TCE)	0.006J

SBLCB

8-10	TRICHLOROETHYLENE (TCE)	0.68
	TETRACHLOROMETHYLENE (PCE)	0.015
	TOTAL 1,2-DICHLOROETHENE	0.021
14-16	TRICHLOROETHYLENE (TCE)	0.96
	1,1,2,2-TETRACHLOROETHANE	0.003J
	CHLOROFORM	0.0009J
	TETRACHLOROETHYLENE (PCE)	0.017
	TOTAL 1,2-DICHLOROETHENE	0.044
28-30	1,1,2,2-TETRACHLOROETHANE	0.027
	TRICHLOROETHYLENE (TCE)	1.3
	1,1,2-TRICHLOROETHANE	0.002J
	CHLOROFORM	0.002J
	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	0.004J
	TETRACHLOROETHYLENE (PCE)	0.013
	TOTAL 1,2-DICHLOROETHENE	0.084
	TETRACHLOROETHYLENE (PCE)	0.013

SBLCE

14-16	METHYLENE CHLORIDE	0.0006J
	TRICHLOROETHYLENE (TCE)	0.0008J

SBLCD

8-10	1,1,2,2-TETRACHLOROETHANE	1.6
	TRICHLOROETHYLENE (TCE)	1.9
	1,1,2-TRICHLOROETHANE	0.034
	BENZENE	0.003J
	CHLOROFORM	0.007
	ETHYLBENZENE	0.004J
	TETRACHLOROETHYLENE (PCE)	0.007
	TOLUENE	0.008
	TOTAL 1,2-TRICHLOROETHENE	0.11
	TOTAL Xylenes	0.006
14-16	1,1,2,2-TETRACHLOROETHANE	2.5
	TRICHLOROETHYLENE (TCE)	4.9
	1,1,2-TRICHLOROETHANE	0.075
	1,1-DICHLOROETHENE	0.001J
	1,2-DICHLOROETHANE	0.001J
	1,2-DICHLOROPROPANE	0.0004J
	BENZENE	0.001J
	CHLOROFORM	0.03
	TETRACHLOROETHYLENE (PCE)	0.025
	TOTAL 1,2-DICHLOROETHENE	0.33J
28-30	1,1,2,2-TETRACHLOROETHANE	0.91
	TRICHLOROETHYLENE (TCE)	3.9
	1,1,2-TRICHLOROETHANE	0.1
	1,2-DICHLOROETHANE	0.003J
	1,2-DICHLOROPROPANE	0.0003J
	CHLOROFORM	0.032
	TETRACHLOROETHYLENE (PCE)	0.007J
	TOTAL 1,2-DICHLOROETHENE	0.16

SBLED

8-10	CARBON DISULFIDE	0.004J
14-16	CARBON TETRACHLORIDE	0.0005J
	CHLOROFORM	0.004J
	METHYLENE CHLORIDE	0.0005J
	STYRENE	0.0003J
	TETRACHLOROETHYLENE (PCE)	0.0008J
	TOTAL 1,2-DICHLOROETHENE	0.001J
	TRICHLOROETHYLENE (TCE)	0.017
28-30	1,1,2,2-TETRACHLOROETHANE	0.005J
	CARBON TETRACHLORIDE	0.0005J
	CHLOROFORM	0.006J
	TETRACHLOROETHYLENE (PCE)	0.0005J
	TOTAL 1,2-DICHLOROETHENE	0.001J
	TRICHLOROETHYLENE (TCE)	0.017

SBLAC

8-10	CARBON TETRACHLORIDE	0.004J
	CHLOROFORM	0.002J
	METHYLENE CHLORIDE	0.0008J
14-16	CARBON TETRACHLORIDE	0.01J
	CHLOROFORM	0.003J
	METHYLENE CHLORIDE	0.003J

SBLFC

8-10	TETRACHLOROETHYLENE(PCE)	0.0004J

SBLDB

8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.002J
14-16	1,1,2,2-TETRACHLOROTHANE	0.003J
	CARBON DISULFIDE	0.003J
	TETRACHLOROETHYLENE (PCE)	0.0008J
	TOTAL 1,2-DICHLOROETHENE	0.0012
	TRICHLOROETHYLENE (TCE)	0.007J

SBLBA

14-16	METHYLENE CHLORIDE	0.0008

SBLAD

14-16	CHLOROFORM	0.0008J
	CARBON TETRACHLORIDE	0.001J

SBLEH

14-16	CARBON DISULFIDE	0.004J

SB61A

3-5	METHYL ETHYL KETONE (2-BUTANONE)	0.007J
8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.004J
	METHYLENE CHLORIDE	0.004J

SBLEF

8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.004J
	STYRENE	0.0003J
14-16	1,1,2,2-TETRACHLOROETHANE	0.032
	1,1,2-TRICHLOROETHANE	0.001J
	TOTAL 1,2-DICHOROETHENE	0.083
	TRICHLOROETHYLENE (TCE)	0.033
	VINYL CHLORIDE	0.002J
28-30	1,1,2,2-TETRACHLOROETHANE	0.004J
	TOTAL 1,2-DICHLOROETHENE	0.0006J
	TRICHLOROETHYLENE (TCE)	0.004J

SBLDG

8-10	1,1-DICHLOROETHENE	0.004J
	METHYL ETHYL KETONE (2-BUTANONE)	0.002J
	TOTAL 1,2-DICHLOROETHENE	17
	TRICHLOROETHYLENE (TCE)	0.003J
	VINYL CHLORIDE	0.006
14-16	TRICHLOROETHYLENE (TCE)	0.11
	1,1,2,2-TETRACHLOROETHANE	0.003J
	1,1,2-TRICHLOROETHANE	0.001J
	METHYL ETHYL KETONE (2-BUTANONE)	0.003
	TOTAL 1,2-DICHLORETHENE	1.5
28-30	TRICHLOROETHYLENE (TCE)	0.071

SBLDA

8-10	CHLOROBENZENE	0.007J
	TOLUENE	0.0006J
	TOTAL 1,2-DICHLOROETHENE	0.12
14-16	CHLOROBENZENE	0.002J
	TOTAL 1,2-DICHLOROETHENE	0.04
28-30	1,1,2,2-TETRACHLOROETHANE	0.004J
	CHLOROBENZENE	0.002J
	METHYLENE CHLORIDE	0.0006J
	TETRACHLOROETHYLENE (PCE)	0.005J
	TOTAL 1,2-DICHLOROETHENE	0.028
	TRICHLOROETHYLENE (TCE)	0.002J

SBLDC

8-10	TRICHLOROETHYLENE (TCE)	0.073
	CHLOROFORM	0.001
	TETRACHLOROETHYLENE (PCE)	0.0009J
	TOTAL 1,2-DICHLOROETHENE	0.12
14-16	TRICHLOROETHYLENE (TCE)	0.47
	1,1,2-TRICHLOROETHANE	0.001J
	CHLOROFORM	0.004J
	TETRACHLOROETHYLENE (PCE)	0.006J
	TOTAL 1,2-DICHLOROETHENE	0.65
28-30	TRICHLOROETHYLENE (TCE)	0.59
	1,1,2-TRICHLOROETHANE	0.0003J
	TOTAL 1,2-DICHLOROETHENE	0.68
	1,1-DICHLOROETHENE	0.0004J
	CHLOROFORM	0.004J
	TETRACHLOROETHYLENE (PCE)	0.008J

SBLDE

8-10	CHLORORFORM	0.002J
	METHYL ETHYL KETONE (2-BUTANONE)	0.003J
	TETRACHLOROETHYLENE (PCE)	0.002J
	TOTAL 1,2-DICHLOROETHENE	0.003J
	TRICHLOROETHYLENE (TCE)	0.009J
14-16	CARBON TETRACHLORIDE	0.0005J
	CHLOROFORM	0.002J
	METHYL ETHYL KETONE (2-BUTANONE)	0.005J
	TETRACHLOROETHYLENE (PCE)	0.003J
	TOTAL 1,2-DICHLOROETHENE	0.008J
	TRICHLOROETHYLENE (TCE)	0.021
28-30	CHLOROFORM	0.003J
	TETRACHLOROETHYLENE (PCE)	0.003J
	TOTAL 1,2-DICHLOROETHENE	0.025
	TRICHLOROEHTYLENE (TCE)	0.043

SBLDD

8-10	CHLOROFORM	0.098
	METHYL ETHYL KETONE	0.012
14-16	CHLOROFORM	0.72
	TETRACHLOROETHYLENE (PCE)	0.0004J
	TOTAL 1,2-DICHLOROETHENE	0.002J
	TRICHLOROETHYLENE (TCE)	0.002J
28-30	CHLOROFORM	0.85
	TRICHLOROETHYLENE (TCE)	0.0007J

SBLCF

8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.007J
	TRICHLOROETHYLENE (TCE)	0.006
14-16	TRICHLOROETHYLENE (TCE)	0.025
	METHYL ETHYL KETONE (2-BUTANONE)	0.005J
28-30	TRICHLOROETHYLENE (TCE)	1.1
	CHLOROFORM	0.002J
	METHYLENE CHLORIDE	0.002J
	TETRACHLOROETHYLENE (PCE)	0.006
	TOTAL 1,2-DICHLOROETHENE	0.027

SBLDF

8-10	METHYL ETHYL KETONE (2-BUTANONE)	0.005J
	TRICHLOROETHYLENE (TCE)	0.0005J
14-16	METHYL ETHYL KETONE (2-BUTANONE)	0.004J
	TETRACHLROETHYLENE (PCE)	0.0006J
	TOLUENE	0.0004J
28-30	TRICHLOROETHYLENE (TCE)	0.093
	TETRACHOROETHYLENE (PCE)	0.002J
	TOTAL 1,2 -DICHLOROETHENE	0.003J

SBLBE

8-10	METHYLENE CHLORIDE	0.002J
	VINYL CHLORIDE	0.006
14-16	METHYLENE CHLORIDE	0.0006J
	STYRENE	0.0002J
	TOTAL 1,2-DICHLOROETHENE	0.001J

SBLBB

14-16	BENZENE	0.001J
	METHYLENE CHLORIDE	0.0009
	TOLUENE	0.001J

SBLAA

14-16	CARBON TETRACHLORIDE	0.003J
	TETRACHLOROETHYLENE (PCE)	0.0004J

SBLBC

8-10	VINYL CHLORIDE	0.018
	TOTAL 1,2-DICHLOROETHENE	0.027
14-16	VINYL CHLORIDE	0.066
	CHLOROFORM	0.001J
	STYRENE	0.0003J
	TOTAL 1,2-DICHLOROETHENE	0.24J
	TRICHLOROETHYLENE (TCE)	0.023
28-30	1,1,2,2-TETRACHLOROETHANE	0.055
	VINYL CHLORIDE	0.011
	1,1,2-TRICHLOROETHANE	0.001J
	BENZENE	0.0003J
	CARBON TETRACHLORIDE	0.003J
	CHLOROFORM	0.008J
	METHYLENE CHLORIDE	0.0009J
	STYRENE	0.0004J
	TETRACHLOROETHYLENE (PCE)	0.0005J
	TOTAL 1,2-DICHLOROETHENE	0.088
	TRICHLOROETHYLENE (TCE)	0.031

SBLAB

8-10	CARBON TETRACHLORIDE	0.13
	TRICHLOROETHYLENE (TCE)	0.1
	CHLOROFORM	0.56J
	METHYLENE CHLORIDE	0.001J
	TETRACHLOROETHYLENE (PCE)	0.041
	TOTAL 1,2-DICHLOROETHENE	0.004J
14-16	CARBON TETRACHLORIDE	0.57J
	CHLOROFORM	2.4
	TETRACHLOROETHYLENE(PCE)	0.14J
	TRICHLOROETHYLENE (TCE)	0.47J
	METHYLENE CHLORIDE	0.004J
	TOTAL 1,2-DICHLOROETHENE	0.033
28-30	1,1,2,2-TETRACHLOROETHANE	0.009J
	CARBON TETRACHLORIDE	0.35J
	CHLOROFORM	1.7
	TETRACHLOROETHYLENE(PCE)	0.089
	TRICHLOROETHYLENE (TCE)	0.33J
	TOTAL 1,2-DICHLOROETHENE	0.022
	METHYLLENE CHLORIDE	0.0007J

LEGEND

Station Identification

8-10	ANTIMONY	0.064

Concentration (MG/KG)
Parameter
Depth Range/Feet Below Land Surface
◆ SBLDH Soil Boring Station Location and Identification

128 64 0 APPROXIMATE SCALE 128 256 Feet

FIGURE 10-11A
VOLATILE ORGANICS IN SUBSURFACE SOILS (1999 INVESTIGATION)
DISPOSAL AREA

REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn139 FH8

CH2MHILL

SBLEE-SB1		
5	ACETONE	0 065
	cis-1,2-DICHLOROETHENE	0 004
	trans-1,2-DICHLOROETHENE	0 003
	VINYL CHLORIDE	0 055
34	ACETONE	0 079
67	1,1,2,2-TETRACHLOROETHANE	0 153
	1,1,2-TRICHLOROETHANE	0 002
	cis-1,2-DICHLOROETHENE	0 019
	trans-1,2-DICHLOROETHENE	0 003
	TRICHLOROETHENE(TCE)	0 011
SBLEE-SB1 (CAS)		
34	1,2-DICHLOROETHANE	0 001J
	cis-1,2-DICHLOROETHENE	0 009
	trans-1,2-DICHLOROETHENE	0 004J
	TRICHLOROETHENE(TCE)	0 002J
	VINYL CHLORIDE	0 074

SBLCA-SB11		
27 5	TRICHLOROETHENE(TCE)	0 009
37 5	cis-1,2-DICHLOROETHENE	0 002
	TRICHLOROETHENE(TCE)	0 059
81	1,1,2,2-TETRACHLOROETHANE	5 98
	1,1,2-TRICHLOROETHANE	0 001
	cis-1,2-DICHLOROETHENE	0 012
	trans-1,2-DICHLOROETHENE	0 002J
	TRICHLOROETHENE(TCE)	0 888
SBLCA-SB11 (CAS)		
27 5	METHYLENE CHLORIDE	0 001J
	TRICHLOROETHENE(TCE)	0 009

SBLCA-SB14		
83	1,1,2,2-TETRACHLOROETHANE	0 008

SBLCA-SB15		
80	1,1,2,2-TETRACHLOROETHANE	0 204
	TRICHLOROETHENE(TCE)	0 012
SBLCA-SB15 (CAS)		
80	1,1,2,2-TETRACHLOROETHANE	0 210J
	cis-1,2-DICHLOROETHENE	0 0007J
	TRICHLOROETHENE(TCE)	0 011

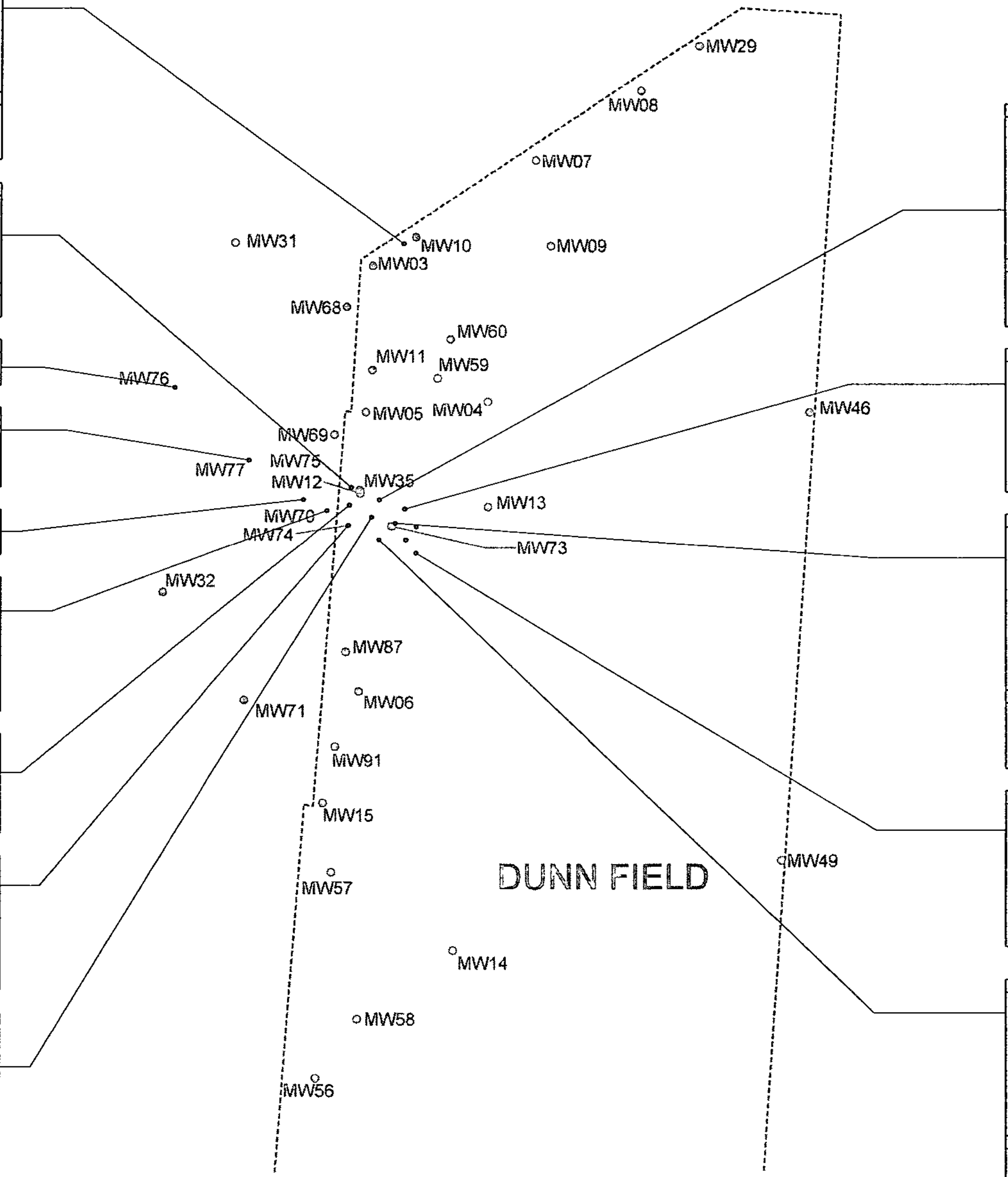
SBLCA-SB13		
77	1,1,2,2-TETRACHLOROETHANE	0 365
	cis-1,2-DICHLOROETHENE	0 004
	TRICHLOROETHENE(TCE)	0 038

SBLCA-SB12		
46 5	1,1,2,2-TETRACHLOROETHANE	0 131
	cis-1,2-DICHLOROETHENE	0 010
	TRICHLOROETHENE(TCE)	0 055
74	1,1,2,2-TETRACHLOROETHANE	0 203
	cis-1,2-DICHLOROETHENE	0 004
	trans-1,2-DICHLOROETHENE	0 0009J
	TRICHLOROETHENE(TCE)	0 043
SBLCA-SB12 (CAS)		
74	1,1,2,2-TETRACHLOROETHANE	0 033J
	cis-1,2-DICHLOROETHENE	0 002J
	TRICHLOROETHENE(TCE)	0 036

SBLCA-SB10		
12.5	cis-1,2-DICHLOROETHENE	0 007
37 5	cis-1,2-DICHLOROETHENE	0 006
	TRICHLOROETHENE(TCE)	0 058
57 5	1,1,2,2-TETRACHLOROETHANE	0.265
	cis-1,2-DICHLOROETHENE	0 005
	TRICHLOROETHENE(TCE)	0 045
72 5	1,1,2,2-TETRACHLOROETHANE	0 099
	TRICHLOROETHENE(TCE)	0 008

SBLCA-SB9		
22	cis-1,2-DICHLOROETHENE	0 002
42	cis-1,2-DICHLOROETHENE	0 0009J
	TRICHLOROETHENE(TCE)	0 021
56	TRICHLOROETHENE(TCE)	0 012
77	1,1,2,2-TETRACHLOROETHANE	0 124
	cis-1,2-DICHLOROETHENE	0 004
	TRICHLOROETHENE(TCE)	0 065
SBLCA-SB9 (CAS)		
56	1,1,2,2-TETRACHLOROETHANE	0 082
	cis-1,2-DICHLOROETHENE	0 008
	TRICHLOROETHENE(TCE)	0 074

SBLCA-SB3		
44	1,1,2,2-TETRACHLOROETHANE	0 017
	cis-1,2-DICHLOROETHENE	0 007
	TETRACHLOROETHENE (PCE)	0 001J
	trans-1,2-DICHLOROETHENE	0 001J
	TRICHLOROETHENE(TCE)	0 075
53	1,1,2,2-TETRACHLOROETHANE	0 087
	cis-1,2-DICHLOROETHENE	0 003
	TETRACHLOROETHENE (PCE)	0 001
	TRICHLOROETHENE(TCE)	0 054
67	1,1,2,2-TETRACHLOROETHANE	1 07
	cis-1,2-DICHLOROETHENE	0 005
	TETRACHLOROETHENE (PCE)	0 0009J
	trans-1,2-DICHLOROETHENE	0 0009J
	TRICHLOROETHENE(TCE)	0 063



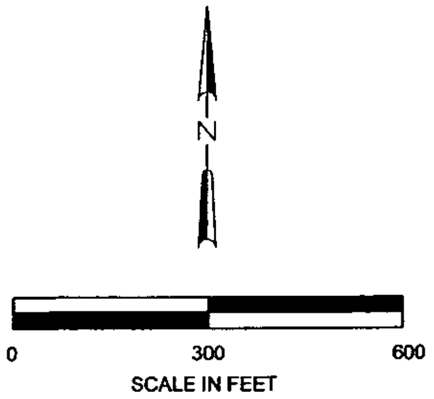
SBLCA-SB4		
42	cis-1,2-DICHLOROETHENE	0 0076
	TETRACHLOROETHENE (PCE)	0 0012J
	trans-1,2-DICHLOROETHENE	0 003
	TRICHLOROETHENE(TCE)	0 089
52	1,1,2,2-TETRACHLOROETHANE	0 022
	cis-1,2-DICHLOROETHENE	0 005
	TRICHLOROETHENE(TCE)	0 055
75	1,1,2,2-TETRACHLOROETHANE	2.03
	1,1,2-TRICHLOROETHANE	0 002J
	cis-1,2-DICHLOROETHENE	0 017
	TETRACHLOROETHENE (PCE)	0 001J
	trans-1,2-DICHLOROETHENE	0 002J
	TRICHLOROETHENE(TCE)	0 164
SBLCA-SB4 (CAS)		
75	1,1,2,2-TETRACHLOROETHANE	0 96
	1,1,2-TRICHLOROETHANE	0 001J
	cis-1,2-DICHLOROETHENE	0 006
	trans-1,2-DICHLOROETHENE	0 0007J
	TRICHLOROETHENE(TCE)	0 068

SBLCA-SB5		
44	1,1,2,2-TETRACHLOROETHANE	0 914
	cis-1,2-DICHLOROETHENE	0 005
	TRICHLOROETHENE(TCE)	0 061
54	1,1,2,2-TETRACHLOROETHANE	3 42
	cis-1,2-DICHLOROETHENE	0 023
	trans-1,2-DICHLOROETHENE	0 006
	TRICHLOROETHENE(TCE)	0 099
77	1,1,2,2-TETRACHLOROETHANE	0 159
	cis-1,2-DICHLOROETHENE	0 011
	TETRACHLOROETHENE (PCE)	0 002
	trans-1,2-DICHLOROETHENE	0 004
	TRICHLOROETHENE(TCE)	0 179

SBLCA-SB2		
44	1,1,2,2-TETRACHLOROETHANE	22.6
	1,1,2-TRICHLOROETHANE	0 002J
	cis-1,2-DICHLOROETHENE	0 04
	TETRACHLOROETHENE (PCE)	0 004
	trans-1,2-DICHLOROETHENE	0 014
	TRICHLOROETHENE(TCE)	0 176
68	1,1,2,2-TETRACHLOROETHANE	15 1
	cis-1,2-DICHLOROETHENE	0 004
	TRICHLOROETHENE(TCE)	0 041
73	1,1,2,2-TETRACHLOROETHANE	13 6
	1,1,2-TRICHLOROETHANE	0 003
	cis-1,2-DICHLOROETHENE	0 011
	TETRACHLOROETHENE (PCE)	0 001
	trans-1,2-DICHLOROETHENE	0 002
	TRICHLOROETHENE(TCE)	0 145
SBLCA-SB2 (CAS)		
44	1,1,2,2-TETRACHLOROETHANE	6 7
	1,1,2-TRICHLOROETHANE	0 002
	CHLOROFORM	0 0008
	TETRACHLOROETHENE (PCE)	0 009
	TOTAL 1,2-DICHLOROETHENE	0 056J
	TRICHLOROETHENE(TCE)	0 47J

SBLCA-SB1		
33	1,1,2,2-TETRACHLOROETHANE	0 016
	ACETONE	0 933
	cis-1,2-DICHLOROETHENE	0 005
	TETRACHLOROETHENE (PCE)	0 006
	trans-1,2-DICHLOROETHENE	0 002
	TRICHLOROETHENE(TCE)	0 132
64	1,1,2,2-TETRACHLOROETHANE	0 012
	1,1,2-TRICHLOROETHANE	0 003
	cis-1,2-DICHLOROETHENE	0 016
	trans-1,2-DICHLOROETHENE	0 002
	TRICHLOROETHENE(TCE)	0 075
74	1,1,2,2-TETRACHLOROETHANE	0 008
	TRICHLOROETHENE(TCE)	0 009

SBLCA-SB8		
47	TRICHLOROETHENE(TCE)	0 006
52	1,1,2,2-TETRACHLOROETHANE	0 021
	cis-1,2-DICHLOROETHENE	0 011
	TETRACHLORDETHENE (PCE)	0 002J
	trans-1,2-DICHLOROETHENE	0 003
	TRICHLOROETHENE(TCE)	0.161
72	1,1,2,2-TETRACHLOROETHANE	0.399
	1,1,2-TRICHLOROETHANE	0 01
	CHLOROFORM	0 005
	cis-1,2-DICHLOROETHENE	0 132
	TETRACHLOROETHENE (PCE)	0 066
	trans-1,2-DICHLOROETHENE	0 044
	TRICHLOROETHENE(TCE)	0 322
SBLCA-SB8 (CAS)		
47	1,1,2,2-TETRACHLOROETHANE	0 003J
	cis-1,2-DICHLOROETHENE	0 002J
	TRICHLOROETHENE(TCE)	0 027



LEGEND

SBLCA-SB4		
75	1,1,2,2-TETRACHLOROETHANE	2.03

DEPTH RANGE/FT BELOW LAND SURFACE — PARAMETER — CONCENTRATION (MG/KG)

- ● LOCATION OF SOIL BORING STATION
- ◎ EXISTING MONITORING WELL LOCATION
- (CAS) SPLIT SAMPLES FOR VERIFICATION

FIGURE 10-11B
VOLATILE ORGANICS IN SUBSURFACE SOILS (2000 INVESTIGATION) DISPOSAL AREA AND OFFSITE

REV 0 MEMPHIS DEPOT DUNN FIELD RI

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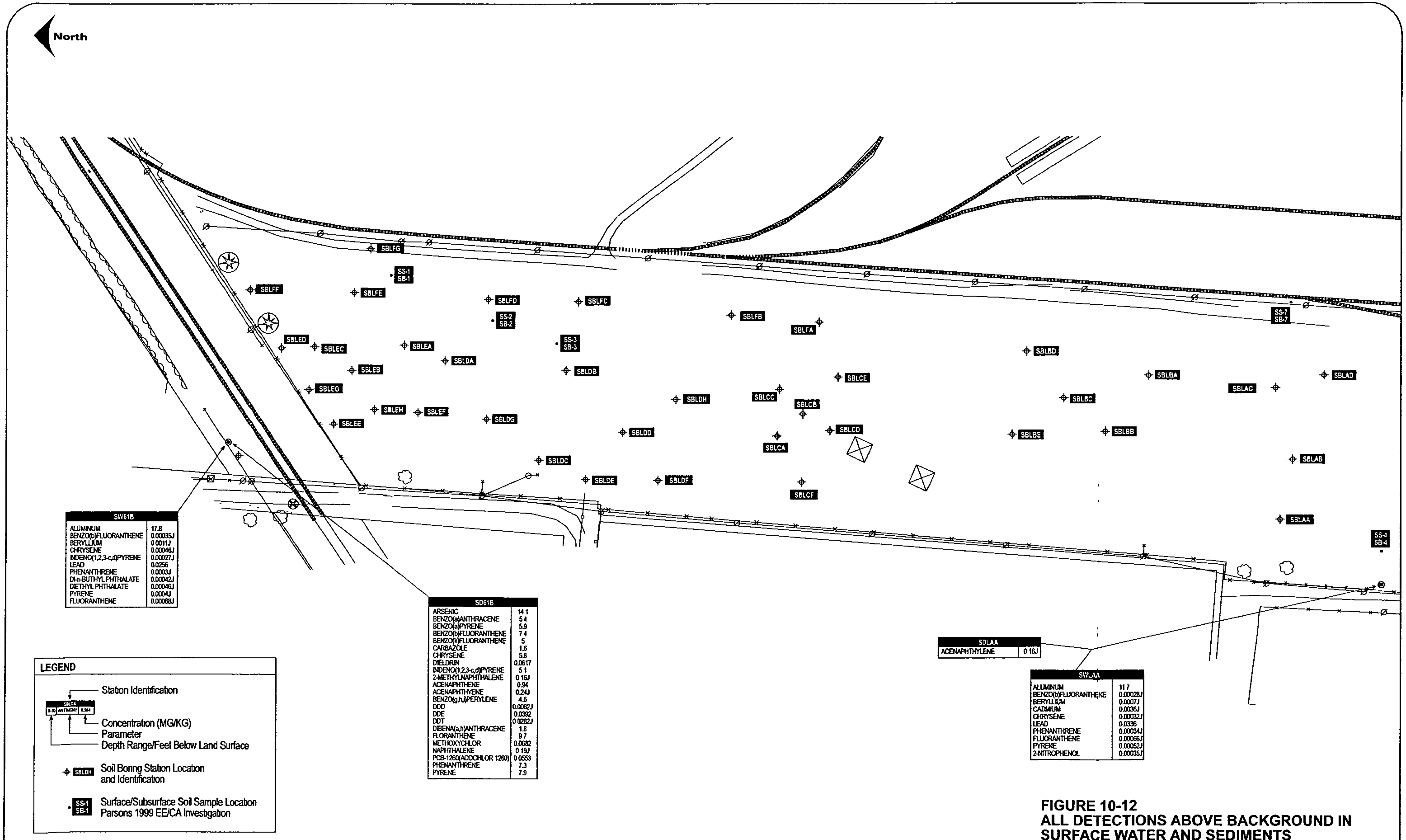

SW61B	
ALUMINUM	17.8
BENZO(b)FLUORANTHENE	0.00035J
BERYLLIUM	0 0011J
CHRYSENE	0.00046J
INDENO(1,2,3-c,d)PYRENE	0.00027J
LEAD	0.0256
PHENANTHRENE	0.0003J
DI-n-BUTHYL PHTHALATE	0.00042J
DIETHYL PHTHALATE	0.00046J
PYRENE	0.0004J
FLUORANTHENE	0.00068J

SD61B	
ARSENIC	14 1
BENZO(a)ANTHRACENE	5 4
BENZO(a)PYRENE	5.9
BENZO(b)FLUORANTHENE	7 4
BENZO(k)FLUORANTHENE	5
CARBAZOLE	1.6
CHRYSENE	5.8
DIELDRIN	0.0617
INDENO(1,2,3-c,d)PYRENE	5 1
2-METHYLNAPHTHALENE	0 16J
ACENAPHTHENE	0.94
ACENAPHTHYENE	0.24J
BENZO(g,h,i)PERYLENE	4.6
DDD	0.0062J
DDE	0.0392
DDT	0 0282J
DIBENA(a,h)ANTHRACENE	1.8
FLORANTHENE	9 7
METHOXYCHLOR	0.0682
NAPHTHALENE	0 19J
PCB-1260(ACOCHLOR 1260)	0 0553
PHENANTHRENE	7.3
PYRENE	7.9

SDLAA	
ACENAPHTHYLENE	0 16J

SWLAA	
ALUMINUM	11 7
BENZO(b)FLUORANTHENE	0.00028J
BERYLLIUM	0.0007J
CADMIUM	0.0036J
CHRYSENE	0.00032J
LEAD	0.0336
PHENANTHRENE	0.00034J
FLUORANTHENE	0.00066J
PYRENE	0.00052J
2-NITROPHENOL	0.00035J

LEGEND

SBLCA | 8-10 | ANTIMONY | 0.864
- Station Identification
- Concentration (MG/KG)
- Parameter
- Depth Range/Feet Below Land Surface

SBLDH Soil Boring Station Location and Identification

SS-1 SB-1 Surface/Subsurface Soil Sample Location Parsons 1999 EE/CA Investigation

FIGURE 10-12
ALL DETECTIONS ABOVE BACKGROUND IN SURFACE WATER AND SEDIMENTS DISPOSAL AREA

REV 0 MEMPHIS DEPOT DUNN FIELD RI

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TAB

Section 11

11.0 Baseline Risk Assessment for Disposal Area

11.1 Human Health Evaluation for Disposal Area

The Disposal Area consists of a mowed grassy area west of the railroad tracks and is approximately 21 acres in size. The exposure unit assumptions used are described in Section 7.0. The Disposal Area was previously investigated by taking soil-gas measurements Soil samples for chemical analysis by EPA methods were collected from the areas with the highest soil gas readings. Additionally, groundwater was monitored extensively by re-sampling the existing wells and by installing and sampling new wells (2000-2001) for chemicals detected in subsurface soil.

Figure 11-1 presents the two exposure units within the Disposal Area: (1) the Area-wide exposure unit and (2) the surrogate site selected based on the highest PRE value. This approach is consistent with the Main Installation as well as other areas within Dunn Field. The Area-wide exposure unit was evaluated for exposures of the current and future worker populations. The surrogate site was evaluated as a high-end exposure representative for future industrial and utility workers, and future hypothetical residential receptors Potential for exposure of offsite receptors to Disposal Area soil and groundwater contamination was also characterized using the surface soil data for dust-borne chemical exposure to offsite residents, and groundwater monitoring data from the offsite downgradient residential wells. In addition, the soil-to-air migration pathway was evaluated assuming exposure to subsurface vapors migrating from onsite soils or groundwater to hypothetical future residential and industrial buildings using EPA's Johnson-Ettinger model. Exposure to indoor vapors was evaluated separately for different parts of the Disposal Area using data collected from each of the disposal cells identified as Sites A-F and at surrogate site, Site 61. The evaluation of the potential contribution of groundwater to air is discussed in Section 15. Because the groundwater is deeper than the soil contamination, relative risks from this scenario are expected to be smaller, as noted in Section 15; these values are also presented in the risk summary tables at the end of this section.

The PRE results, used as the basis for selecting the surrogate site, are presented in Appendix C.

The Disposal Area is the approximate area thought to contain buried solvent wastes as identified through field screening techniques (e.g., soil-gas readings). Based on the nature of historical site use, where wastes were buried below the ground surface, much of the contamination is in the subsurface. The Disposal Area includes Locations A, B, C, D, E, and F, as well as Site 61. Landfill/disposal areas occupy a major portion of the Disposal Area. As described in Section 10, there are approximately 15 former disposal sites in the Disposal Area that have had limited to no investigation and information is limited as to the materials that are buried in each site. These sites have been given priority designation by the

Memphis Depot BCT for future remedial action with some investigative action as well. The BCT has developed the following qualitative risks associated with these sites:

- Buried containers of hazardous liquids could leak and discharge to the environment and impact groundwater and any selected groundwater remedy(s)
- Buried containerized hazardous liquids could be accessed through future intrusive activities and cause immediate injury to human health and release to the environment
- Buried hazardous solids/residuals that could leach contaminants to groundwater and/or cause immediate injury to human health if accessed through intrusive activities

Remedial action objectives for these sites are defined in Section 11.3.

The analysis presented in this section focuses on summarizing the risk assessment results conducted for all Area-wide surface media and groundwater data. As noted above, Site 61 is the surrogate site for the Disposal Area (see Table 7-2 and Appendix C). A separate human health risk assessment was conducted at Site 61 and is included toward the end of this section. RGOs were calculated for COPCs presenting excessive risks for an industrial worker, if the calculated risks were above the upper limit of the acceptable range of 10^{-6} to 10^{-4} within the Disposal Area and/or Site 61 risk estimates.

11.1.1 Selection of COPCs for Disposal Area

As previously noted, data collected from consolidated locations, RI sites, and screening sites were used for the Disposal Area risk assessment. The exact location of buried wastes was unknown, as potential source areas were created based on anecdotal reports. Therefore, extensive soil-gas monitoring was conducted for qualitative evaluation, and soil borings were installed in the areas with the highest soil-gas readings. This area with buried wastes is identified as the "Disposal Area." The media of interest for the Disposal Area were soil (surface and subsurface), sediments and surface water (drainage ditches), and onsite groundwater. The surface water from drainage ditches along the northwest and southern fence-lines was sampled. Onsite and offsite groundwater near Dunn Field is discussed in Section 15. Samples collected from the following areas were used for selection of COPCs:

- Surface soil and subsurface soil samples collected from landfill/disposal areas and along the boundary of the Disposal Area; and
- Sediment and surface water samples collected from drainage ditches within the Disposal Area.

The risk evaluation for most of the groundwater beneath the Disposal Area and offsite areas to the west is discussed in Section 15. The results of the groundwater risk evaluation were included in the risk summary tables in this section to include potential cumulative risks from use of the Disposal Area under future land use conditions. The concentrations of all detected chemicals in soil samples collected in the Disposal Area and the surrogate site were compared against background values and health-based criteria (i.e., Region III RBC), as described in Section 7.0. COPCs for surface soil, subsurface soil, sediment, and surface water, are presented in Tables 11-1 through 11-4, respectively. A more detailed table showing human health screening criteria by medium and the results of the COPC selection screening is provided in Appendix D.

Twenty-eight surface soil samples (0 to 2 feet bgs) were analyzed for SVOCs, 40 samples were analyzed for VOCs, and 40 samples analyzed inorganic chemicals from the Disposal Area. Based on an exceedance above background and screening criteria, the COPCs for the Disposal Area surface soils are antimony, chromium, lead, thallium, dieldrin, 1,2-DCE, TCE, 1,1,2,2-tetrachloroethane, vinyl chloride, several PAHs, and carbazole.

One hundred thirty-five subsurface soil samples (>2 feet bgs) including multiple depths from the same locations (up to shallow groundwater) were analyzed for VOCs, 23 were analyzed for inorganic chemicals, and 27 were analyzed for SVOCs within the Disposal Area. Additional subsurface soil samples were collected from previous high-detection areas during well installation. The COPCs for the Disposal Area subsurface soils are 11 chlorinated VOCs, 4 metals, and 2 SVOCs.

COPCs for soil column (0 to 10 feet bgs) exposures are a combination of both surface and subsurface soil COPCs.

Two samples were analyzed for sediment and surface water in the Disposal Area. The COPCs for the Disposal Area sediments are arsenic, PAHs, and dieldrin. The COPCs for the associated surface water samples are benzo(b)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, phenanthrene, aluminum, beryllium, and 2-nitrophenol.

Section 15 presents the detailed analysis of groundwater underneath Dunn Field, including the Disposal Area. Groundwater contamination was detected under a significant portion of the Disposal Area Based on flow direction to the northwest and west, groundwater plumes were divided into a north plume and west plume. The west plume is further divided into the northwest plume and southwest plume because of the difference in the nature of contamination detected. Thus risks associated with groundwater were estimated for three separate plumes. All the groundwater samples were analyzed for VOCs, inorganic chemicals, and SVOCs.

11.1.2 Exposure Assessment for Disposal Area

The regional land use within a 3-mile radius of the Depot is presented in Figure 2-17. The historical activities in the Disposal Area can be generalized as various landfill and disposal operations. The following text presents a CSM for the Disposal Area, and potentially exposed human receptors within the Disposal Area under current and future land use scenarios.

11.1.2.1 Conceptual Site Model and Fate and Transport Overview

Figure 11-2 presents the conceptual site (exposure) model for the Disposal Area. Each of the components of a CSM are discussed below, including the primary and secondary sources of contamination, primary and secondary release pathways, mechanisms, potential receptors, and routes of exposure

The primary sources of COPCs in the soil at the Disposal Area are suspected to be from the burial of contaminants in the landfills Another form of release is the surface runoff of pesticides and herbicides from the grassy areas into the ditches.

Specific migration pathways for VOCs are as a concentrated liquid from a disposal site, leachate from soil via water infiltrating from the surface, volatilization into ambient air or indoor building air from surface contamination or subsurface soils after disturbance or exposure, or, if contaminants exist in surface soil, entrainment with dust particles. Based on the large number of VOCs identified as COPCs and their presence at relatively high concentrations in the subsurface soils and groundwater, volatilization and leaching are perhaps the more prominent migration pathways for the Disposal Area. Chemical that tend to remain bound to soil particles (e.g. SVOCs, inorganic chemicals) in the surface soil could migrate through erosion to low lying areas such as drainage ditches and accumulate in the sediments. These potential migration pathways were evaluated by sampling various media at the site, and are further discussed below.

To evaluate the potential leaching contribution of soil underneath the Disposal Area, chemicals detected in surface and subsurface soils were screened against generic soil screening levels (SSLs). Table 11-2A presents the result of this analysis. Table 6-4 in Section 6.0 provides a more detailed evaluation of the samples collected in Site 22 of the Disposal Area. Results of these analyses indicate the presence of several CVOCs in the subsurface soils underneath the Disposal Area that could continue to leach to groundwater. In the 155 subsurface soil samples, 1,1,2,2-PCA was detected in more than 50 samples at levels above SSL values, considered protective against leaching. Of the 92 TCE detected concentrations, 43 were above levels considered protective against leaching to groundwater. Concentrations of other CVOCs also exceeded SSLs, although at much lower frequency, in localized areas. Overall, subsurface soil could serve as a continued source of groundwater contamination under the Disposal Area.

Since several of these CVOCs are highly volatile, they could migrate vertically upward through soil pore spaces. Volatilization to the air was evaluated using the Johnson-Ettinger model.

The remaining inorganic, SVOC, and pesticide type COPCs are generally considered background because they are either naturally occurring inorganic chemicals or they originate from non-point anthropogenic sources such as facility maintenance, vehicular traffic, or past railroad operations. Migration of these chemicals in surface soil could occur via surface runoff and/or dust-borne emissions. The subsurface tri- and pentachlorophenols are possibly from buried wood treatment chemicals. If these are mixed with other VOCs, they could migrate to the subsurface. The subsurface investigations indicate the presence of these chemicals in sporadic areas at low concentrations compared to the screening criteria. Such isolated sporadic presence is not a leachability concern, as these chemicals are limited in occurrence and not very soluble and thus are not likely to migrate through the loess to reach groundwater.

Potential exposure points onsite include areas where human activities and/or ecological receptor occurrences are likely, and could result in physical contact with surface soils. Sediments and surface water are not important media at this site, because the drainage ditch is dry for most of the year and is concrete-lined in some of the areas. Most of the Disposal Area is inactive and the current human activity in this area is expected to be limited to maintenance workers performing activities such as lawn-mowing and weed removal in and around landfill/disposal areas. The potential for direct human exposure depends on the presence of exposed contaminated soil and the types of activities within the contaminated areas. Direct human exposure is limited by pavement or grass cover (see Figures 1-2 and 10-1).

11.1.2.2 Exposure Pathway Evaluation

Much of the surface of the Disposal Area is covered by grass, with a few areas covered by gravel or pavement. Exposure to soils could occur in the open areas during maintenance activities. However, for the purposes of this risk evaluation, current and future exposures were evaluated assuming unrestricted land use and assuming that all soils are available for exposure. The "unrestricted or unlimited land use" is assumed to mean unconditional use, where there are no restrictions on the future use of the site. This could include constructing new buildings or drastically changing the landscape, as if no contamination were present This could include future industrial use with higher frequency and duration of time spent outdoors, or building a house in a currently paved area. It could also include future use of the site for residential use. These assumptions provide for a conservative risk analysis. Exposures under future unlimited land use, therefore, assume exposures to varied human activities such as maintenance workers, industrial workers, and future residential receptors (CH2M HILL, 1999e). The utility worker scenario assumes that these individuals can work anywhere in the Disposal Area and, therefore, can be exposed to the larger exposure unit. However, Site 61 was used as a surrogate, potential RME site to evaluate both the industrial and utility workers' exposures. These theoretical assumptions were included to evaluate the site under conservative exposure assumptions.

Based the historical landfill/burial type of activities in the area and redevelopment plan proposed for Disposal Area in *The Memphis Depot Redevelopment Plan* (The Pathfinders *et al.*, 1997), the Disposal Area is likely to remain light industrial. Potential exposure routes for the current and future maintenance worker include incidental ingestion and dermal contact with surface soil, sediment, and surface water, and inhalation of particulate emissions via dust from surface soil. Due to the presence of grass cover over the Disposal Area, dust generation is anticipated to be limited. In the future if the area is redeveloped, construction activities may also expose workers to subsurface soils.

The groundwater under the Disposal Area is not likely to be used, as City water is supplied for potable and industrial uses in the area. However, for theoretically possible assessments, future use of groundwater below the Disposal Area is assumed. Thus, future exposures to subsurface soils and groundwater are evaluated in this risk assessment. Groundwater reaching offsite areas was evaluated for direct exposures through potable or commercial use. Additionally, volatilization of the subsurface contamination (soil and/or groundwater) into ambient and indoor air were evaluated in this risk assessment.

Additionally, this risk assessment addresses exposures to chemicals detected during site investigations to date. However, because some of the uncertainty associated with discovery of buried wastes, future intrusive activities, such as excavations and drilling, may encounter physical hazards from buried material. Workers involved in excavation or other soil disturbing activities (e.g. utility worker) could be exposed to such physical or chemical subsurface hazards.

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11.1.2.3 Potentially Exposed Population and Identification of Complete Exposure Pathways

Currently, the landfill areas of the Disposal Area are not in use and the facility is inactive. Potentially exposed populations under current conditions could be maintenance workers occasionally cutting the grass. Future plans may include a light industrial use for the area (The Pathfinders *et al.*, 1997) The site is not likely to be used for residential land use due to buried wastes in the subsurface and presence of groundwater contamination. Under current and foreseeable future conditions, potentially exposed receptors could include maintenance workers, similar to those identified under current land use. In addition, the presence of buried waste and some amount of uncertainty associated with identification all buried material, the Disposal Area is likely to remain as light industrial, commercial, or municipal use only, which would also provide economic benefits to the surrounding community. Therefore, current and future potentially exposed populations are likely to be maintenance and industrial workers.

However, to provide maximum flexibility in future land use considerations, a residential land use was also evaluated for the Disposal Area. Evaluation of future residential use is included in the event resulting risks are low or the site is considered for future unrestricted land use, or if other uncertainties are within acceptable range as part of site risk management. For conservative risk estimation purposes, future outdoor workers are assumed to contact soils routinely on a daily basis, during their entire occupational exposure duration (25 years). A general description of activities to be performed by a maintenance worker within the Depot is provided in Section 7.0. Although subtle differences may exists between current and future maintenance workers activities, exposure assumptions used for maintenance workers are assume to be conservative, in order to account for the most exposed of the different types of maintenance workers, as discussed in Section 7.0. The calculation of exposure to future industrial workers use all default exposure assumptions, in order to represent the relatively highest exposure conditions.

As noted previously, future base redevelopment is expected to focus on light manufacturing, so site activities will remain generally industrial. Therefore, potentially exposed populations are expected to consist of current maintenance workers and future full-time onsite, industrial workers. It was assumed that the Disposal Area would be converted to a light industrial area that would require workers to spend more time on the site, with a higher frequency of visits to the contaminated soil areas. This represents the RME scenario for industrial land use. Routes of exposure include incidental ingestion, dermal contact, and inhalation of volatile chemicals and dust from surface soils, volatile emissions from subsurface soils, and ingestion of and dermal contact with sediments/ surface waters. Groundwater underneath Dunn Field is addressed in Section 15. To estimate the worst-case cumulative exposures and risks, it is assumed that future industrial workers would utilize onsite groundwater as a potable water source. Exposure factors used were the default values for industrial workers from the *Exposure Factors Handbook* (EPA, 1997b) and other published sources as referenced in Appendix H. Summaries of the exposure factors are presented in Tables 7-4a through 7-4c.

The CVOCs detected in the subsurface soils under the Disposal Area could become air-borne. Thus, inhalation exposure to such emissions is a potentially complete exposure pathway. Because of their high FOD in the subsurface soils, CVOCs were included in estimates of exposure of onsite current and future workers and hypothetical onsite and offsite residents. Migration of VOCs in subsurface soils to indoor air was evaluated for potential receptors in the Disposal Area. Furthermore, onsite contaminants leaching into groundwater could migrate to other onsite and, potentially, offsite areas. As a result, emissions from VOCs in groundwater to indoor air were evaluated for future onsite workers and hypothetical onsite and offsite residents This is a conservative evaluation, as groundwater under the site is deep (>35 feet), and volatilization is likely to be a minor exposure pathway.

Table 11-5 summarizes potential current and future exposure pathways for the Disposal Area. Receptors were conservatively selected to be protective of the relatively lower exposure receptor population for quantitative risk evaluation for this Area. Appendix E compares each potential receptor to the selected representative exposure scenarios. Under these assumed conditions for exposure under current and future land use, the receptor groups considered in deriving estimates of exposure and health risk for the Disposal Area are as follows:

- Current onsite maintenance worker;
- Future onsite commercial/industrial worker; and
- Future utility worker

Future onsite resident (exposures to soil, evaluated as part of the Surrogate Site below):

- Future onsite resident (exposure to indoor VOCs from subsurface soils), and
- Offsite resident (exposure to air-borne VOCs and groundwater. see Section 15).

11.1.2.4 Maintenance Worker

Routine grounds maintenance was evaluated for a maintenance worker in this risk assessment. A default future maintenance worker is assumed to have a soil and sediment ingestion rate of 50 mg/day, for 50 days per year, with an exposure duration of 25 years. The ingestion rate of 50 mg/kg is same as the default value suggested for future industrial worker. Us eof this ingestion rate is intended to protect other maintenance workers with less exposures, as discussed in Section 7.0. Dermal contact with soils was estimated for the exposed skin area (2,679 cm^2/event). Dust exposure intake estimations were based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day.

Based on occupational duties, it is assumed that a maintenance worker spends 4 hours of an 8-hour workday in contaminated parts of the Area, therefore, half of the total incidentally ingested soil is assumed to come from the contaminated soil. Thus, the fraction ingested (FI) or exposure time (ET) term of the dose estimates is 0.5. Site-specific factors used for exposure frequency and duration discussed above (e.g., ½ a workday) are based on best professional judgment. Based on current occupational activities and the current lack of indoor facilities in the Disposal Area, exposure to indoor air is currently an incomplete pathway. Furthermore, exposure to onsite groundwater through potable use is incomplete due to use of municipal water supplies. Exposure factors and the rationale for their selection are included in Appendix H.

11.1.2.5 Industrial Worker

Because recreational land use is not a certainty, default exposure scenarios were evaluated for future industrial use of the Disposal Area and surrogate site. A default future industrial worker is assumed to have a soil and sediment ingestion rate of 50 mg/day, for 8 hours a day, for 250 days per year, with an exposure duration of 25 years. Dermal contact with soils was estimated for the exposed skin area (2,679 cm^2/event). Dust exposure intake estimations were based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day. Groundwater ingestion assumes a daily intake of 1 L/day, for 250 days per year, for an exposure duration of 25 days. Inhalation exposure to estimated (using Johnson-Ettinger model) indoor air vapors from subsurface (soils or groundwater) VOCs was based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day.

11.1.2.6 Utility Worker

A utility worker exposure is evaluated in both the Disposal Area-wide risk assessment and the surrogate site risk assessment, due to the widespread subsurface soil contamination at this Area. In the future, if the site is subject to redevelopment that requires building new structures and/or installation of underground utilities, construction and utility workers involved in such activities could be exposed to surface and subsurface soils during excavation. The depth to which these workers have access is assumed to be as much as 10 feet bgs. Since the construction activities are similar to utility maintenance activities, except utility maintenance work could occur more often over a longer duration at a facility, this scenario was chosen for risk analysis. A utility worker is assumed to have a higher soil ingestion rate at 100 mg/day, once every other week (25 days/year), for 25 years working at the same facility. Since the entire area is not uniformly contaminated to the 10-foot depth, about 50 percent of the exposures to soil are assumed to come from contaminated soils, at EPC levels. All other factors (e.g., body weight, averaging time) are similar to those used for other worker populations.

11.1.2.7 Landscape Worker

In the future the site may be redeveloped for light industrial land use. Under such a scenario, selected areas of the site could be landscaped during the property transition to the new use. However, exposure of the landscape workers during such transitions is expected to be of short duration. None of the contaminated areas are planned for landscaping at the present time (The Pathfinders *et al.*, 1997), so future maintenance workers and industrial workers are assumed to conservatively represent a landscape worker. Therefore, this scenario is not included for quantitative risk assessment.

11.1.2.8 Offsite Residents

Exposure of offsite residents to contaminants in the Disposal Area is assumed to potentially occur via two pathways. Contaminants originating from source areas within the Disposal Area may enter groundwater and migrate offsite. Fate and transport and sampling data support this type of exposure pathway. As a result, risk associated with ingestion of offsite groundwater from individual offsite monitoring wells was evaluated. Subsurface volatilization of VOCs in groundwater to indoor air for a future onsite residents was evaluated by estimating indoor air concentrations using EPA's Johnson-Ettinger model (see Appendix F) and the evaluation is summarized in Table 15-11. In addition, a default exposure scenario was evaluated for offsite air-borne VOC releases from surface and subsurface soil contamination in the Disposal Area. It is assumed that air from the Area could reach the downwind offsite areas. The residents in the area could breathe the air while performing outdoor activities such as gardening. The offsite resident's exposure to onsite contaminants is assumed to be through ingestion and inhalation of volatiles from groundwater use, inhalation of volatiles migrating from groundwater into indoor air, and dust coming from the site. The exposures to such offsite residents were conservatively evaluated assuming residents in the offsite areas are outdoors most of the day, the wind is blowing in the same direction at all times, and chemicals are not degrading with distance. Residential adults are assumed to have an inhalation rate of 20 m^3/day (children 15 m^3/day) and are assumed to live in the area for 30 years; children with a body weight of 15 kg live in the nearby residences up to an age of 6 years. Further details of the exposure factors are included in Appendix H.

The nearest offsite houses are assumed to be about 600 feet (182 meters) from the Disposal Area, as presented in Section 2, Figures 2-1 and 2-17 The results of the quantitative exposure analysis (dose estimates), along with the risk calculations, are included in Appendix G-3.

Additionally, offsite monitoring well samples in residential areas were used to estimate risks from potable use and subsurface emissions into indoor air. The well data were input into the J-E model. Results of this evaluation are included in Section 15.

11.1.2.9 Onsite Residential Scenario

The default residential scenario in a risk assessment presents the upper-bound exposure scenario. Generally, a residential risk scenario is evaluated to provide maximum flexibility for future land sue at a site, and for use by site risk managers as a comparative risk scenario to assess the reasonable maximum exposure in determining risk management decisions for a site. Thus, the residential scenario is often a hypothetical exposure scenario considered protective of unrestricted land use and for site management purposes.

The onsite residential scenario evaluation included a surrogate site risk assessment (below) for direct contact with site soils, direct exposure to onsite groundwater, and exposure to soil column VOCs. In addition, exposure of residential receptors to indoor vapors from subsurface soils and groundwater was evaluated using the Johnson-Ettinger model. Although direct contact with soils and groundwater was not evaluated for residential receptors in the Area-wide risk evaluation, location-specific (A-F) evaluations of residential receptors to indoor air vapors were included to provide a conservative assessment of indoor air risks at this site. Ingestion of potable water was assumed to be 2 L/day and 1L/day for adults and children, respectively. An age-adjusted ingestion rate of 1.1 L-year/kg-day was used for a carcinogenic scenario Dermal exposure was assumed to be through a daily 10-minute shower. Inhalation exposure to groundwater for potable use was assumed to be equivalent to the ingestion intake. Inhalation rates for noncarcinogenic chemical-related intake estimates of 20 m^3/day and 15 m^3/day were assumed for an adult and a child, respectively. Further details of the exposure factors are included in Appendix H.

The results of the quantitative exposure analysis (dose estimates), along with the risk calculations, are included in Appendix G.

11.1.2.10 Exposure Quantification

The EPCs for direct contact exposure were either the UCL 95 percent estimates or maximum detected concentrations for the COPCs detected in the surface and subsurface soil. The UCL95 normal value was used in place of the maximum detected value for dieldrin for surface soils. A description of the UCL 95 percent calculation is provided in Appendix F.

Appendix G-3f includes the Johnson-Ettinger model output printouts for **subsurface soil VOCs** along with the assumptions used for the Soil Tier I model input parameters. The Johnson-Ettinger model used is provided by EPA at www.epa.gov/superfund/programs/risk/airmodel/johnson_ettinger.htm. The indoor air concentrations were estimated for VOCs using the average detected concentration for the defined exposure unit (Sites A-F or Site 61). Defining indoor air exposures based on specific sites within the Disposal Area (as opposed to an Area-wide assessment) allows for a detailed, and conservative assessment of indoor air risk. Where available, site-specific parameters such as soil properties (e g. soil type as silty clay to sand), depth to contamination, types of buildings (e.g., basement) were used in the Johnson-Ettinger Tier I model. Further details of the model input and output printouts, and exposure assumptions are included in Appendix G-3f.

Appendix G includes the Johnson-Ettinger Model output printouts for **groundwater VOCs** along with the assumptions used for the Groundwater Tier II model input parameters. The indoor air concentrations were estimated for VOCs using the average concentration from the center of the identified plume. Where available, site-specific parameters such as soil properties (e.g. soil type as silty clay to sand), depth to groundwater, and types of buildings (e.g., basement) were used in the Johnson-Ettinger Tier II model. Further details of the model input and output printouts and exposure assumptions are included in Appendix G.

Section 15 presents the details of the groundwater EPC estimation methods that were used as input for the Johnson-Ettinger model as well as EPCs used for potable use. The average concentrations of the wells in the center of the (three) plumes were used as the EPCs for groundwater from each plume for chemicals that occur in plumes (e.g., CVOCs). For other non-VOC chemicals that do not occur as plumes (e.g., inorganic chemicals), the upperbound EPC was calculated using the UCL 95 percent estimates for all the wells within Dunn Field.

In offsite monitoring wells, the groundwater EPCs for the Johnson-Ettinger model were calculated individually for each well by taking the average concentrations when multiple rounds of sampling exist.

The estimated EPCs are listed in Tables 11-6 through 11-9. The dose (intake) was estimated for each of the complete exposure pathways (see Appendix G).

11.1.3 Toxicity Assessment for Disposal Area

Table 11-10 presents the toxicity factors for COPCs and the WoE classifications for each. Detailed information on the basis of toxicity classification and the uncertainty associated with the listed toxicity factors based on the EPA toxicity database is presented in the master toxicity tables located in Section 7.0, Tables 7-7 and 7-8. All toxicity values used for the COPCs are chronic values. Acute and subchronic values are deemed inappropriate for use based on the long-term exposures assumed for dose estimations.

Toxicity factors for the Disposal Area and the Site 61 soils are listed in Table 11-10. Oral CSFs are available for arsenic, dieldrin, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, pentachlorophenol, 2,4,6-trichlorophenol, carbon tetrachloride, chloroethane, chloroform, methylene chloride, PCE, TCE, 1,2-dichloroethane, 1,1,2,2,-tetrachloroethane, 1,1,2-trichloroethane, and vinyl chloride. Inhalation CSFs are available for total chromium and the same COPCs as above, with the exception of carbazole, pentachlorophenol, and chloroethane. The oral RfD values are available for aluminum, antimony, arsenic, total chromium, thallium, dieldrin, pentachlorophenol, carbon tetrachloride, chloroethane, chloroform, 1,2-DCE, 1,2-dichloroethane, methylene chloride, PCE, TCE, and 1,1,2-trichloroethane Inhalation RfDs were available for aluminum, total chromium, carbon tetrachloride, chloroethane, chloroform, 1,2-dichloroethane, methylene chloride, and PCE. Oral toxicity factors are adjusted by the gastrointestinal ABS_{GI} factors for comparisons with dermal intake estimates. These values were presented in Table 7-10.

Oral toxicity factors were adjusted by the gastrointestinal dermal absorption (ABS_{GI}) factors to account for relative differences in absorption between dermis and gastrointestinal tract. These adjusted dermal toxicity factors are used for comparisons with dermal intake estimates. These values can be found in Section 7, Table 7-10. Twenty-one carcinogenic and 10 noncarcinogenic inorganic and organic chemicals were identified as COPCs at the Disposal Area. All of the chemicals were analyzed for their potential toxicity contribution to represent the combined effect of all site-related chemicals.

The toxicity equivalency factors (TEFs) for various carcinogenic PAHs were selected from EPA Region IV and EPA's provisional guidance (EPA/600/R-93/089) and can be found in Section 7, Table 7-9. They were selected and applied to the toxicity factor for benzo(a)pyrene (B(a)P) to estimate risks from individual PAH compounds. Alternatively, TEFs may be applied to the concentration of individual PAH compounds to convert them to B(a)P concentration, a practice recommended by EPA Region IV. However, since other less toxic PAHs often occur at higher concentrations than B(a)P, to present individual contributions to the total risk, TEFs were applied to the toxicity factors.

EPA RAGS guidance recommends discussion of chemicals without toxicity factors. Of the COPCs, only lead did not have toxicity criteria However, lead was addressed to evaluate levels remaining at Dunn Field. When a lead concentration exceeded the residential screening value for direct exposure, soil target concentrations protective of an adult worker were calculated using EPA's Technical Review Workgroup (TRW) recommended lead model (USEPA, 1996a). Also, site soil lead levels were compared with Integrated Exposure Uptake Biokinetic (IEUBK) model-based values for protection of residential children, as if the site were to be used for unlimited land use purposes.

11.1.4 Risk Characterization for Disposal Area

The methodology used for risk and HI calculations is described in Section 7.0, and risk and HI calculations are included in Appendix G3. The carcinogenic risks and noncarcinogenic HI results from Appendix G are summarized in Tables 11-11 and 11-11A. A set of histograms of the risks and HIs is presented in Figures 11-3 through 11-6. The Disposal Area was evaluated as one exposure unit with the exception of indoor air exposures (see Section 11.1.2 9). A separate analysis for the surrogate site is included below. Workers and residents were assumed to have uniform exposures, and the EPCs were assumed to be present over the entire surface area of the Disposal Area. These are conservative assumptions since some of the areas are covered by gravel and/or pavement (see Figures 1-2 and 10-1), restricting direct contact with soil. Future users of the Disposal Area (industrial or residential receptors) are assumed to use site groundwater for potable purpose.

The surface soil ELCR to an onsite maintenance worker at the Disposal Area was estimated to be 1 x 10^{-6}, which is within the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HI of 0.006 is well below the standard threshold of 1.0. Given the conservatism inherent in the assumptions and parameter values used in this analysis, these results suggest that no significant risks of adverse health impacts exist at this site for maintenance workers from exposure to surface soil

The ELCRs from sediment and surface waters to a **maintenance worker** from the Disposal Area are estimated at 1 X 10^{-6} and 2 X 10^{-6}, respectively. These carcinogenic risks are within the acceptable risk range of 1 to 100 in one million (10^{-6} to 10^{-4}). Surface water risks are primarily due to PAHs. The noncarcinogenic HIs are estimated to be 0.001 and 0.0003, respectively. Thus, maintenance worker exposure to the site sediments and surface waters is not a concern, given that the risks and HIs are below acceptable limits. Also, the surface water COPCs could be from suspended particulates in the rainwater, as these constituents are not very soluble and thus are not expected to be present in the water.

Combined risks from soil, sediment, and surface water exposure pathways for the **maintenance worker** resulted in a total ELCR of 4 x 10^{-6} and a total HI of 0.008. The cumulative surface media exposure is within acceptable limits, as stated above.

The ELCR to a **future onsite industrial worker** from the surface soils at the Disposal Area was estimated to be 9 x 10^{-6}, primarily due to arsenic, benzo(a)pyrene, and dieldrin. The estimated risk is within the 10^{-6} to 10^{-4} acceptable range typically considered adequately protective of public health. Total noncarcinogenic HI was estimated at 0.06, which is well below a value of 1.0. The risks from combined soils from the soil column are estimated at 6 x 10^{-6}, and HIs are estimated at 0.03, which are less than those from surface soil exposures alone and are, therefore, not included in the total risk calculations. Exposures to the ambient air VOCs from subsurface soils to future industrial workers in the area are estimated to be 2x 10^{-5}, and the HI is at 0.3.

The potential risks to a future worker from potable use of site groundwater from the North plume is estimated to include an ELCR of 1 x 10^{-4} and an HI of 0.9 (mostly from inorganic chemicals). Contribution to indoor air presents negligible risks (7 x10^{-8}) and HI (0.00005). The risks from exposure to the Northwest plume is estimated to include an ELCR of 3 x 10^{-3} and an HI of 6.3 (TCE and chloroform). Again, indoor air risks (7.7 x10^{-8}) and HI (0.0002) are negligible. The risks from exposure to the Southwest plume are estimated to include an ELCR of 5x10^{-4} and an HI of 7. The indoor air risks were at 1 6X10^{-8} and HI at 0.00002.

The estimated ELCRs to an industrial worker from the Disposal Area sediment and surface waters are 5 X 10^{-6} and 8 X 10^{-6}, respectively. Both are within the acceptable risk limit range of 10^{-6} to 10^{-4}. Both risks are primarily due to PAHs. The noncarcinogenic HIs are 0.005 and 0.001, respectively, both of which are well below 1.0. Thus, the sediments and surface waters do not pose a health threat to future industrial workers, despite the conservative exposure assumptions used.

Combined risks from soil, sediment, and surface water exposure pathways for the **industrial worker** resulted in a total ELCR of 4 x 10^{-5} and a total HI of 0.4. The cumulative surface media exposure is within acceptable limits, as stated above. The estimated ELCR to a future **utility worker** from mixed soils from the surface and subsurface (soil column) is 3 x 10^{-6}, this risk is within the acceptable risk limit range of 10^{-6} to 10^{-4}. The noncarcinogenic HI is 0.03, which is well below the target value of 1.0. Thus, the utility worker exposure scenario does not indicate a health threat to future industrial workers, despite the conservative exposure assumptions used.

The indoor air risk estimates for an industrial worker assumed to spend the workday indoors are presented in Table 11-11A. The ELCR for an industrial worker at Sites A-F ranged from 5 x 10^{-8} to 4 x 10^{-5}, which are within the acceptable limits. The noncarcinogenic HI ranged between 0.001 and 3.4. Only Site E within the Disposal Area (HI=3.4) exceeded the acceptable HI of 1.0. This slight exceedence of the acceptable HI at Site E is predominantly due to total-1,2-dichloroethene.

The risk estimates for inhalation of air originating from the Disposal Area subsurface groundwater to an onsite worker are well within acceptable limits (<1 in a million). Offsite public exposures from these subsurface groundwater VOC emissions to ambient air are expected to cause much lower risks and HI.

The onsite and offsite residential groundwater exposures were evaluated as part of the groundwater risk assessment in Section 15. The residential scenario is evaluated as part of the surrogate site discussion below.

11.1.5 Health-based Evaluation for Lead

The maximum observed lead concentration in surface soil at the Disposal Area is 789 mg/kg, with an estimated arithmetic mean of 94 mg/kg. Both concentrations, except the maximum, are below a residential exposure-based screening level of 400 mg/kg, and all concentrations are below an industrial worker exposure-based target concentration of 1,536 mg/kg Thus, the observed lead levels at the site are not expected to pose health hazards.

11.1.5.1 Uncertainty Analysis

Section 7.0 presents the general concepts and sources of uncertainty at a given site. The following are some of the major points pertaining to the Disposal Area

11.1.5.2 Contaminants of Potential Concern

Data were collected from 1996 to 1999. Many of the COPCs, such as PAHs and metals, were also detected in background soils. Dieldrin was not used in the landfill/disposal operations; however, they pesticides were applied as part of routine maintenance of the gassy areas, which are not directly related to the site operations within Dunn Field Likewise, sitewide data statistical evaluations indicated that the contaminants were similarly distributed in the background samples.

11.1.5.3 Exposure Assessment

There are no routine exposures under current conditions other than occasional maintenance activities. Most of the area within the Disposal Area is paved or grass-covered. Some of the samples collected were adjacent to paved areas, which were assumed to be readily available for exposure. There are no human receptors in the Disposal Area, as mentioned previously. This site is generally not regarded for possible residential use without significant structural changes to the landfill/disposal areas. Future land use for the Disposal Area is expected to remain light industrial. Utility and future industrial worker exposure to the subsurface soil

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becoming surface soil is a conservative risk estimation scenario that would apply to the surrogate site where compounds were detected in subsurface soil.

Most of the quantitative exposure values such as exposure frequency (EF) and duration (ED) are assumed values, and actual likely exposure of a receptor is not known. Most of the uncertainty within risk assessments is attributable to this exposure quantitation step.

The EPCs estimated using several of the default assumptions as input factors for the Johnson-Ettinger model likely produce a conservative estimate of the potential emission from deep soils.

11.1.5.4 Toxicity Assessment

The toxicity criteria used are those recommended by EPA through the toxicity databases; therefore, the uncertainty associated with the toxicity assessment is pre-determined by the methods used and the studies selected by EPA in calculating these toxicity factors. The quantitative uncertainty factors (UF) associated with toxicity factors are included in the master toxicity factors tables (Tables 7-7 and 7-8). Some of the primary sources of uncertainty are listed here. Most of the toxicity factors are based on studies from animals extrapolated to humans using arbitrary assumptions (e.g., UF, or modification factor [MF]), which introduces a major uncertainty. In extrapolating from carcinogenic dose to estimate slope factor, no threshold for toxicity is assumed. Some of the metal toxicity factors are based on evidence of toxicity from occupational exposures (e.g., chromium) involving a high level of exposures to chromic acid fumes and air-borne particles Application of these data to environmental exposures introduced substantial uncertainty.

11.1.5.5 Risk Characterization

As noted previously, the risks and hazards estimated in this assessment are conservative. Several scenarios were evaluated to simulate possible alternative future land uses for the Disposal Area The fact that samples were collected from biased locations within suspected past activity/spill areas as defined by the soil gas survey adds to the conservatism of the estimates. Thus, the areas represented by each sample in the combined assessment at the Disposal Area level represent the areas of highest contamination within the site and Area.

11.2 Human Health Evaluation for Site 61

A 1-acre area around SB61A, associated with Site 61, is selected as the surrogate site. The data collected within this 1-acre area is used to represent the risks and HIs from Surrogate Site 61 for the Disposal Area. This site is selected because sampling point SB61A resulted in the highest human health risk ratio during the PRE (see Appendix C-2). The PRE risks are primarily due to arsenic and PAHs in surface soils at this site. Site 61 is addressed exclusively below as a surrogate site for the Disposal Area.

11.2.1 Selection of COPCs for Site 61

Five of the samples from this area were analyzed for PAHs, and seven were analyzed for inorganic chemicals from the surface soil (0 to 1 foot deep). The maximum detected chemical concentration within this data group was compared against background concentrations and the RBCs for direct exposure, as well as groundwater protection concentrations (SSLs) for COPC selection. Twenty-four samples were analyzed for VOCs, and 13 were analyzed for inorganic chemicals from surface to deeper soil (0 to 10 feet) samples, (duplicate samples included). The maximum detected concentrations were compared with the background concentrations and SSL criteria for COPC selection.

The COPC selection indicated that surface soils at the site contained arsenic, antimony, thallium, and PAHs exceeding the background levels and/or comparison criteria (see Table 11-13). The PRE indicates arsenic as the primary risk driver (Appendix C-2) in surface soil. The mixed soils (column 0 foot to water) contained the same constituents plus several VOCs (see Table 11-14).

11.2.2 Exposure Assessment for Site 61

Figure 11-1 depicts the site and its relative location within the Disposal Area. Figure 11-5 presents the conceptual site (exposure) model for Site 61.

11.2.3 Potentially Exposed Human Population and Identification of Potentially Complete Exposure Pathways

Dunn Field has been inactive since the closure of the Depot. There are no potentially exposed populations under current conditions specific to this site. Under assumed future use conditions, maintenance workers for the Depot involved in weed control and other maintenance-related activities could be present for limited periods of time.

Potentially exposed populations under future land use are unknown at this time On the basis of *The Memphis Depot Redevelopment Plan* (The Pathfinders *et al.*, 1997), it is likely that Site 61 will be used in the future for light industrial operations. Under such a scenario, likely future receptors are also site maintenance/industrial workers, with longer duration of exposure, and more frequent visits. Future residential use of this site is not likely, due to the site's historical use as a landfill/disposal area. Hypothetical future residential exposures were evaluated as the worst-case exposure scenario for comparison purposes and to provide a basis for unrestricted land use, if appropriate, in risk management decisions. A detailed list of exposure factors and the rationale for their selection are included in Appendix H.

Subsurface soils were evaluated for direct exposure of a future utility worker and an industrial worker. These scenarios are based on the assumption that, in the future, if the contaminated subsurface soil (0 to 10 feet bgs) is disturbed (e.g., for installation or maintenance of underground utilities), utility workers or future industrial workers in the area could be exposed to contaminated subsurface soil. A summary of exposure pathways for Site 61 is included in Table 11-15.

A UCL 95 percent concentration was estimated for EPCs for surface soil (0 to1 foot) and subsurface soil (0 to 10 feet) data for the COPCs identified The EPCs for subsurface soil for the UCL 95 percent were estimated by combining samples collected from 0- to 10-foot depths (assuming future soil conditions if surface and subsurface soils are mixed during construction/excavation activities). The EPC defaulted to the maximum detected concentrations for all COPCs in surface soils, possibly due to the relatively small sample size, and a variation in concentration levels between the samples. However, the EPCs for direct exposure-based intakes for the soil column were based on UCL 95 percent estimates on the mean concentration. The input concentration values for the ambient and indoor air emission estimations are the average detected concentrations in the soil column. Indoor air EPCs were estimated using the appropriate model as described in Section 11.1.1.1 These values are listed in Tables 11-16 and 11-17, and the estimation methodology is described in Appendix G (soils) and Appendix G-3 (air). The dose (intake) was estimated for each of the complete exposure pathways. The dose estimates are included in Appendix G

Additionally, groundwater contamination detected under the Disposal Area was evaluated for future residential potable use. Each of the three VOC contaminant plumes was evaluated separately.

Table 11-10 presents the toxicity factors for COPCs identified at Site 61

11.3 Risk Characterization for Site 61

The carcinogenic risks and noncarcinogenic HIs are summarized in Table 11-18. A set of histograms is included in Figures 11-8 through 11-11. The ELCRs and HIs were estimated for a future industrial and a utility worker, as well as for a hypothetical residential adult and child scenario. A set of histograms is also included in Figures 11-12 through 11-13 for the ELCR and HI for indoor air exposure of subsurface soil VOC volatilization for the future onsite worker and hypothetical residential adult and child scenarios.

The carcinogenic risks for an outdoor **industrial worker** exposures to Site 61 surface soil resulted in an estimated risk of 3×10^{-5} and a noncarcinogenic HI of 0.6. The majority of the risk is from inhalation exposures to volatile COPCs and from ingestion exposures to antimony, arsenic, and PAHs. This worker scenario assumes a full workday exposure, 250 days per year, for an exposure period of 25 years. Assuming future potable use of site groundwater by this receptor, the ELCR and HI for exposure to site groundwater are 1×10^{-4} and 0.88, respectively (Table 11-18).

The combined pathway ELCR and HI for a future industrial worker assumed to spend the workday indoors (office worker) at Site 61 are 2×10^{-4} and 6, respectively. The ELCR exceeds the acceptable risk range due to ingestion of arsenic and chlorinated solvents in potable groundwater and from inhalation of chlorinated solvents from subsurface soils. The noncarcinogenic HI exceeds acceptable limits and is due to total-1,2-dichlorethene intruding to indoor air from subsurface soils (Table 11-18).

Exposures to a **utility worker** assume surface and subsurface soil mixed during excavation. Exposure of the utility worker resulted in an ELCR of 2×10^{-5} and noncarcinogenic HI of 0.2. Both carcinogenic and non-carcinogenic health risks are well below acceptable limits of 10^{-6} to 10^{-4} and 1.0, respectively. Thus, excavation-type activities do not pose a health threat to these utility workers.

The total ELCR to future **hypothetical onsite adult and child residents** at Site 61 was estimated using age-adjusted soil ingestion, dermal surface area, and inhalation rate factors. The estimated cancer risk from all media is $1X10^{-3}$, which exceeds the upper-bound limit on the acceptable range of 10^{-6} to 10^{-4}. A separate child cancer risk was not estimated because the adult risk represents a time-adjusted exposure. Risk is associated with direct contact exposure to surface soils, ingestion and inhalation exposure from potable groundwater, and indoor air vapors migrating up from subsurface soils The indoor air exposures to a future resident are estimated at an ELCR of 5×10^{-4}. Ingestion of groundwater results in an ELCR of 5E-4 and direct contact with soils results in an ELCR of 2E-4. The total noncarcinogenic health hazard was estimated to be an HI of 25 for an adult and an HI of 94 for a child. The HI exceeds unity for all exposure routes for both receptors For a residential adult, HI for indoor air, groundwater ingestion, and direct soil contact are 25, 2.1, and 1.0, respectively. For a child, indoor air HI is 75, groundwater ingestion is 5.7, and direct contact with soils is 14. Both cancer risks and non-cancer hazards exceed acceptable levels.

The risks and HI from potable use of groundwater under the Disposal Area were highest for the **North plume.** This plume is assumed to be a potable water source for receptors in Site 61 and are included in the total receptor risk and HI estimates for these receptors to provide a reasonable estimate of upper-bound risk that could be encountered by current and future receptors at this site. The ELCR was estimated to be 5 x 10^{-4} for an age-adjusted adult (exposed for 6 years as a child and 24 years as an adult); and the HIs for an adult and a child are 2.5 and 6.0, respectively. The risks and HI for indoor air exposures from subsurface volatiles entering indoor air are at 1.8 x 10^{-7}, and HI is 0.0001 for an adult and 0.0002 for a child.

Overall findings for the Disposal Area indicate that cumulative risks from surface media and groundwater potable use are unacceptable, due to the presence of chlorinated solvents in the groundwater. Indoor air risks from groundwater are negligible, although localized subsurface soil concentrations in Surrogate Site 61 indicate unacceptable indoor air concentrations for future unrestricted use.

Uncertainties associated with this risk assessment are similar to those listed in the Disposal Area risk assessment subsection (see Section 11.1.4). The estimations for a future industrial worker resulted in acceptable risk limits for direct exposures to soil. Indirect exposures through inhalation of VOCs from subsurface soil to an indoor worker are not acceptable. Therefore, RGOs were estimated for subsurface soil in order to reduce indoor air VOC levels for future unlimited land use (see Table 11-12).

The remedial action objectives (RAOs) identified based on the risk assessment results for the Disposal Area are listed in Table 11-19. This table also includes the risks associated with the 15 priority disposal sites.

11.4 Environmental Evaluation for Disposal Area

11.4.1 Introduction

An ERA was conducted at the Disposal Area to evaluate whether contaminants detected in surface soil potentially pose adverse ecological effects to terrestrial receptors. The Disposal Area consists of the pits and trenches in the northwest portion of Dunn Field where subsurface disposal of hazardous and nonhazardous waste materials occurred. The Disposal Area is completely open with a ground cover of routinely mowed grass and, therefore, provides poor quality habitat for terrestrial wildlife. The large maintained grassy areas, however, can provide foraging habitat for terrestrial avian species that feed on soil invertebrates. There are no aquatic habitats in this area. EPA ERA guidance (USEPA, 1997b) recommends a screening-level ERA for risk management decisions. Although the Disposal Area does not provide significant terrestrial habitat, a screening-level ERA was initiated to aid in risk

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management decisions. This ERA was conducted in accordance with the *Ecological Risk Assessment Guidance for Superfund· Process for Designing and Conducting Ecological Risk Assessments* (*Process Document*)(EPA, 1997b). Steps 1, 2, and 3 of the EPA ERA model were completed, as summarized in Section 7.8.

11.4.2 Step 1: Screening-Level Problem Formulation and Effects Evaluation

This is the initial step in the ERA and includes all the elements of a problem formulation and ecological effects analysis, but on a screening level. The results of this step support the exposure estimates and risk calculation in Step 2.

11.4.2.1 Environmental Setting and Contaminants at the Site

The environmental setting at the Depot is described in Section 2. An ecological assessment checklist was completed as described in the Process Document (USEPA, 1997b) and is provided in Appendix J. Site characteristics most relevant to the ERA are discussed here.

The Disposal Area is a currently inactive portion of Dunn Field that is covered by mowed grass and has no trees or water bodies. The area is open with a relatively level terrain that is maintained. large drainage swale that occurs near the southwest corner of the Disposal Area discharges to the western fenceline through Outfall 010; however, this swale does not retain water following storm events. The site is surrounded by a sparse residential area to the north (beyond the perimeter fence), by Dunn Field property to the east (Northeast Open Area) and south (Stockpile Area), and by an active warehouse and MLGW substation opposite the west fenceline. Overall, the maintained terrestrial areas provide insignificant ecological habitat for plants or animals. This site is expected to be developed into a light industrial area; therefore, no future improvement in wildlife habitat quality is expected.

A few urban adapted wildlife species have been observed at Dunn Field. Species observed at Dunn Field that may occur in the grassed Disposal Area include red fox, northern mockingbird, American kestrel, boat-tailed grackle, European starling, mourning dove, common bobwhite, rock dove, and killdeer. It is possible that other small mammals (e.g., mice, shrews, rabbits), birds (e.g., American robin, sparrows), and reptiles (e.g., five-lined skink, eastern garter snake) may also occur at the site. The entire facility is fenced, thereby reducing use by large mammals (e.g., whitetail deer). Overall the terrestrial habitat within the Disposal Area is of poor quality and provides limited habitat value for terrestrial wildlife.

There are no wetlands onsite, and no state or federally listed or proposed endangered or threatened species are known to inhabit the area of the site (TDEC, 1996; USFWS, 1996-Appendix T).

Land use within a 1-mile radius of Dunn Field is highly developed and is primarily residential or industrial. A few undeveloped and isolated forested areas also occur in the general area. The largest is located to the north of Dunn Field at Person Avenue and Rozelle Street. Other areas are located south of the Main Installation along Ball Road and Ketchum Road in the vicinity of the Orchid Manor Apartments and east of the Main Installation on Dwight Street. Large undeveloped forested and grassed areas associated with the flood-plains of Nonconnah Creek and its tributaries occur at least 1 mile to the south and west of the facility.

Surface soil sampled in the Disposal Area is the medium to which terrestrial ecological receptors could be exposed and is, therefore, the only medium evaluated in this ERA. A list of media COPCs at this site is provided in Section 6.2. These generally include many metals and organic compounds (pesticides, PCBs, PAHs, and volatiles)

11.4.2.2 Contaminant Fate and Transport

An overview of contaminant fate and transport of chemicals detected at Dunn Field is provided in Section 6.0. The pathways most significant to ecological receptors are presented here.

Chemicals present in surface soils of the Disposal Area will likely remain in place over time because they are expected to be bound to the soil particles and soil organic carbon. There is a low potential for COPCs detected in the surface soil to migrate via storm water runoff overland into the drainage swale near the southwest corner of the site due to the grassed nature of the site. This swale is dry during most of the year. There are no valuable habitat types immediately offsite that would receive transported site-related chemicals.

The classes of chemicals found at the site include inorganics, pesticides, PCBs, PAHs, and volatiles.

The toxicity of metals and other inorganic constituents in the environment depends of the specific element and the environmental form in which it is found. A number of inorganic elements are essential in small amounts for animal nutrition because they are an integral part of at least one enzyme. Examples include arsenic, calcium, chromium, copper, iron, magnesium, manganese, potassium, sodium, and zinc. Nevertheless, some of these essential elements in high concentrations can produce toxic effects in wild birds and mammals.

Specific considerations in regard to inorganic chemical behavior in the terrestrial environment are summarized as follows (ICF, 1989)·

- Plant roots are not entirely selective in extracting substances from soil. The roots of a plant extract essential and nonessential chemicals.
- Soil pH is often the most important factor affecting the transfer of heavy metals to plants; metal solubility generally increases by a factor of 10 as pH decreases by one unit. Metals with strongly pH-dependent solubility and mobility include manganese, aluminum, copper, nickel, lead, zinc, and possibly arsenic The availability and toxicity of chromium to plants appears to increase as soil pH increases.
- Ingestion of plants can be an important exposure route for some metals Zinc, cadmium, manganese, selenium, and boron are easily absorbed and translocated to food-chain plant tissues, while others such as iron, lead, mercury, aluminum, chromium III, and silver are not easily adsorbed and translocated.
- Several metals are toxic to terrestrial plants at concentrations in edible tissues that are below those toxic to animals that might ingest them. This effectively creates a soil to plant toxicity barrier for chromium III, copper, iron, nickel, lead, arsenic, boron, vanadium, and zinc.

- Contaminated invertebrates facilitate metal uptake in predatory species in a form that can exert toxic effects. Results of field studies indicate that invertebrates can accumulate metals in their tissues at varying concentrations without toxic effects.

Specific considerations in regard to inorganic chemical behavior in the aquatic environment, and the mobility of metals in aquatic food chains, are summarized as follows (EPA, 1984):

- Divalent metals in polluted water often form complexes with a variety of organic and inorganic ligands. The bioavailability of the metal is dependent on factors such as water hardness, pH, and cation exchange capacity
- Metals often partition to sediments or suspended solids through sorption onto hydrous complexes. The transport of a metal within the aquatic environment is controlled by the speciation of the ion In natural waters, complexing agents such as humic acid can bind metals.

Pesticides detected include chlordane, dieldrin, DDE, DDD, and DDT.

Chlordane is a broad spectrum insecticide of the group of polycyclic chlorinated hydrocarbons called cyclodiene insecticides. Chlordane is highly persistent in soils, with a half-life of about 4 years. It does not chemically degrade and is not subject to biodegradation in soils. Chlordane molecules usually remain adsorbed to clay particles or to soil organic matter in the top soil layers and slowly volatilize into the atmosphere. Chlordane is moderately to slightly toxic to birds, and is very highly toxic to fresh water invertebrates and fish. Chlordane bioaccumulates in bacteria and in freshwater fish species, with expected bioaccumulation factors in excess of 3,000 times background water concentrations. Chlordane accumulates in the fatty tissues of land and water wildlife.

Dieldrin is a man made compound in the group of cyclodiene insecticides that were primarily used for control of insect pests of corn and citrus trees. Dieldrin has a low volatility, low solubility in water, and high lipophilicity (affinity for fatty materials). Strong adsorption to soil particles prevents significant leaching to groundwater. These properties cause dieldrin to evaporate slowly and accumulate in fatty tissues of animals and other organic matter in the environment, including the organic portions of sediment and soils. Plants uptake and store dieldrin from the soil. Accumulation in fatty tissues and organic matter results in progressive accumulation in the food chain. Target organs and organ systems most affected by dieldrin toxicity include the central nervous system, liver, kidneys, and skin. Major acute toxic effects are on the central nervous system.

Dichlorodiphenyldichloroethane (DDE) is a high molecular weight chlorinated pesticide. It is also a congener of dichlorodiphenyltrichloroethane (DDT), a full-spectrum pesticide. DDE is stable, accumulates in soil and sediment, and concentrates in fatty tissue. DDE has a low water solubility, and is adsorbed strongly in soils and sediments. Soil and benthic organisms accumulate DDE from soil and sediment Wildlife accumulate DDE in fatty tissue. Following chronic exposure of wildlife to DDE, an equilibrium between absorption and excretion may occur; however, concentrations continue to increase because accumulation is related to fat content, which increases with age.

Polychlorinated biphenyls (PCB) are mixtures of different congeners of chlorobiphenyl PCBs are a group of highly fat-soluble, SVOCs that readily bioaccumulate and biomagnify in ecological receptors, especially upper-trophic-level carnivores in aquatic food webs. In general, PCBs adsorb strongly to soil and sediment, and are soluble in fatty tissues. Volatilization and biodegradation of the lower chlorinated congeners also occur. Biological responses to individual isomers or mixtures vary widely, even among closely related taxonomic species. PCBs can bioaccumulate to significant levels in aquatic species, reptiles, mammals, and birds. The primary biochemical effect of PCBs is to induce hepatic mixed function oxidase systems, and to induce hepatic microsomal enzyme systems that are most likely correlated with adverse reproductive effects.

PAHs are a class of SVOCs that have a high affinity for soil and sediment particles. PAHs have low water solubility. Low molecular weight PAHs volatilize and photolyze from soil and surface water, and may be biodegraded as well. High molecular weight PAHs are resistant to volatilization, photolysis, and biodegradation. PAHs can be bioconcentrated to high concentrations by some aquatic organisms. However, many aquatic organisms can metabolize PAHs. The main PAH exposure route for upper-trophic-level receptors is ingestion. However, wildlife can readily metabolize PAHs and eliminate the by-products. Therefore, food chain transfer and biomagnification are anticipated to be minimal.

VOCs detected include vinyl chloride, TCE, methyl ethyl ketone, and others. These constituents have relatively high vapor pressures and high Henry's Law constants, and they tend to volatilize rapidly from soil or water. VOCs can be taken up by aquatic organisms, but they rapidly transform into other compounds because they are highly water-soluble. Routes of exposure for wildlife include inhalation, ingestion, and dermal exposure. Bioaccumulation in terrestrial and aquatic organisms is not an important process in the environmental fate of VOCs because of the high volatility and the rapid metabolism by higher-tropic-level receptors.

11.4.2.3 Complete Exposure Pathways

For a pathway to be complete, a contaminant must travel from the source medium or media to an ecological receptor and be taken up by the receptor via one or more exposure routes. Although ecological habitats are minimal at the Disposal Area, a conservative assumption was made that a potentially complete exposure pathway may exist for direct contact of terrestrial plants and invertebrates with contaminants detected in surface soil throughout the site.

11.4.2.4 Assessment and Measurement Endpoints

Assessment endpoints are expressions of environmental value(s) to be protected. The assessment endpoint for the Disposal Area is to sustain soil quality and achieve COPC concentrations that are below adverse effect thresholds for terrestrial plants and soil invertebrates Measurement endpoints are measurable ecological characteristics of the assessment endpoint. In this screening-level evaluation, the measurement endpoint is the ratio of maximum surface soil concentrations for the entire area to conservative screening-level benchmarks for surface soil. An exceedance of COPC concentrations compared to the benchmarks would be a "measure" of a potential effect. If an exceedance occurs, it can be inferred that a possible adverse effect to exposed ecological receptors may occur.

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11.4.2.5 Screening-Level Ecological Effects Evaluation

Conservative thresholds for adverse ecological effects, or screening ecotoxicity values, were used for contaminants detected in surface soil, surface water, and sediment. These values were determined as follows

- **Surface Soil**. The soil ecological screening values are those recommended by EPA Region IV (1998). The EPA values were obtained from a variety of sources, including the U.S. Fish and Wildlife Service (USFWS), the Oak Ridge National Laboratory (ORNL),the Canadian Council of Ministers of the Environment, the Netherlands Ministry of Housing, and the Netherlands National Institute of Public Health and Environment (RIVM).

The screening ecotoxicity values are presented in Section 7.8.

11.4.2.6 Uncertainty Assessment

Uncertainty is inherent in each step of the ERA. The following text presents major factors contributing to uncertainty in this assessment.

EPCs were assumed to be maximum media concentrations for the entire area. This is a highly conservative assumption that may overestimate risk. Under this assumption, the receptor spends 100 percent of its life cycle at the highest concentration area. Although this can be true for plants, most terrestrial wildlife receptors are mobile and are likely to be exposed to the complete range of soil concentrations.

The ecological screening values used were obtained from various sources in the literature and may not be representative of actual site conditions. Exposure pathways to terrestrial plants and animals were assumed to be potentially complete, even though the maintained grass areas provide low quality habitat in this generally disturbed and industrial setting.

The site ecology is also controlled to an unknown extent by physical stressors. The primary stressor includes routine mowing and other landscape maintenance activities.

11.4.3 Step 2: Screening-Level Exposure Estimate and Risk Calculation

This step includes estimating exposure levels and screening for ecological risks as the last two phases of the screening-level ERA. At the end of Step 2, an SMDP will be made to determine if ecological risks are negligible or if further evaluation is warranted.

11.4.3.1 Screening-Level Exposure Estimate

The maximum concentration of all chemicals detected in surface soil at the Disposal Area was used as the EPC for estimating risk to directly exposed organisms.

11.4.3.2 Screening-Level Risk Characterization

The quantitative screening-level risk estimate was conducted using the hazard quotient (HQ) approach. This approach divides the EPCs (maximum detected media value) by the EPA screening ecotoxicity values.

Table 11-20 summarizes the results of the surface soil screening-level risk calculations. These tables provide information on the FOD, range of detection, selected ecotoxicity values, and HQs based on comparison of the maximum concentration to the screening criteria. An HQ less than 1 0 indicates that the contaminant is unlikely to cause adverse effects and is therefore not considered further in the ERA (USEPA, 1997b). Contaminants with HQs greater than or equal to 1.0, or contaminants for which criteria were not available, were identified as COPCs and were carried forward to Step 3.

Surface Soil Screening Results - A total of 78 contaminants were detected in surface soil in the Disposal Area, and, of these, 72 percent were identified as surface soil COPCs. The COPCs included 16 inorganic and 41 organic compounds. No screening criteria were available for 15 of the organic compounds, so these were included in the COPC list.

11.4.3.3 Scientific Management Decision Point

The information collected indicates a potential for adverse ecological effects in surface soil, and a more thorough assessment is warranted. The COPCs identified in the screening process are to be carried forward to Step 3.

11.4.4 Step 3: Baseline Risk Assessment Problem Formulation

In Step 3, the problem formulation developed in the screening-level assessment is refined. The results of the screening-level assessment and additional site-specific information are used to determine the scope and goals of the baseline ERA.

11.4.4.1 Refinement of COPCs

In Steps 1 and 2, conservative assumptions were used. As a result, some of the COPCs were retained for Step 3, although they may pose only negligible risk. Therefore, in this first phase of Step 3, the assumptions used were further evaluated, and other site-specific information was considered to refine the list of COPCs. In this refinement phase, the revised assumptions and site-specific considerations used were as follows:

- Arithmetic mean concentrations (for all samples) were considered along with maximum concentrations when a comparison to the benchmarks was conducted;
- Background concentrations were compared to arithmetic mean and maximum values;
- FOD was considered;
- Common elements (calcium, magnesium, potassium, and sodium) were eliminated; and
- Less conservative screening ecotoxicity values were considered in addition to the more conservative ecotoxicity screening values used in Step 2.

For soil, less conservative screening ecotoxicity values are termed "secondary benchmarks" in this report The secondary benchmark selection process for soil focused on identifying the next highest benchmark value among the soil literature references used by EPA Region IV (1998) This was a stepwise process in which the first set of toxicological benchmarks considered was from two ORNL studies (Efroymson *et al.*, 1997). These studies established separate screening benchmarks for soil microorganisms, earthworms, and plants. A secondary screening value was chosen from these three data sets that was the next highest value above the primary EPA Region IV screening value If no values were available, the selection process proceeded to the Netherlands values (MHSPE, 1994). In addition, if the

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selected value from ORNL was found to be greater than the highest Netherlands value, then the ORNL value was rejected and the process moved forward to the Netherlands values as a conservative measure.

The Netherlands values included optimum values and action values. When this set of data was considered, the next highest value above the primary EPA Region IV screening value was selected as a secondary benchmark. If a value was not available, the process proceeded to a final set of data as compiled by the USFWS (Beyer, 1990). The values in this data set represent Dutch background, moderate contamination, and cleanup values. As stated above, the next highest value above the primary EPA Region IV screening value was selected as a secondary benchmark

In Step 3, the conservative ecological exposure pathways used in Step 2 were also re-evaluated based on actual site conditions. All this information provides a WoE to determine which, if any, contaminants should be recommended for further evaluation in a baseline ERA.

The results of the Step 3 refinement of the COPC lists are summarized in Table 11-21. This table presents the maximum and average EPCs, background concentrations, conservative/ primary and less conservative/secondary screening criteria, the range of HQs, background comparisons, and FOD.

Based on the WoE presented in Table 11-21, none of the inorganic or organic COPCs were determined to pose a potential for adverse effects to terrestrial organisms. This was based on an evaluation of the range of HQs, comparison to background, and FOD. In most cases, comparison of maximum and average concentrations to secondary criteria resulted in HQs less than 10, and many HQs were at or below 1. Also, average concentrations for most contaminants were below background concentrations. Surface soil criteria for 13 contaminants were not available for comparison, so HQs could not be determined, however, in many instances the FOD was below 5 percent.

Another key consideration in this refinement step is the lack of ecological exposure pathways at the Disposal Area. The Disposal Area is an entirely grassed section in which the landscape is routinely mowed or maintained, and this land maintenance is expected to continue into the future when the site is developed for light industrial use. The onsite terrestrial habitat is of poor ecological value and is generally supportive of maintained planted grasses and some urbanized wildlife.

Given the poor quality of onsite habitat at the Disposal Area and the lack of surface soil COPCs, ecological impacts are expected to be negligible and are not expected to change in the foreseeable future.

11.4.4.2 Scientific Management Decision Point

Refinement of surface soil COPCs indicated that, based on a WoE, as well as the poor quality of ecological habitat, current and future ecological impacts are negligible.

Based on this evaluation, no further assessment of ecological risk to contaminants at the Disposal Area is warranted.

11.5 Remedial Goal Options

RGOs are the target concentration values that are selected or estimated to reduce risks to human health and the ecological receptors, which will be carried into the remedial alternative analysis. Achieving these goals should achieve compliance with state and federal standards and satisfy NCP requirements to ensure protection of human health and the environment at hazardous waste sites. The RGOs calculated for the Disposal Area are in accordance with *Risk Assessment Guidance for Superfund, Part-B* (USEPA, 1991b) and *EPA Region IV Supplemental Guidance to RAGS* (USEPA, 1994b).

The RGOs are developed only for the chemicals that are detected at the site at concentrations either above the applicable state or federal standards or that present risks or HIs above the acceptable levels. "Acceptable" risks are defined as risk levels below 100 in one million (10^{-4}) or an HI below 1.0, for either current or future exposure pathways analyzed in the risk assessment. The risk evaluations under future land use conditions included potential exposures of maintenance, industrial, and utility workers within the Disposal Area based on activities observed to be applicable to the site. Exposure of a maintenance worker to surface media under current land use conditions did not result in excessive risks associated with the soils, sediments, or surface water. Groundwater is addressed in Section 15. The estimations for a future industrial worker resulted in acceptable risk limits for direct exposures to soil, sediments, and surface water. Indirect exposures through inhalation of VOCs from the subsurface soil to an indoor worker are not acceptable. Therefore, RGOs were estimated for the subsurface soil in order to reduce indoor air VOC levels for future unlimited land use (see Table 11-12). These levels will be compared with target levels protective of groundwater in Section 15. There are no human health protection-based ARARs for soils or sediments. The ARARs for groundwater are presented in Sections 7 (see Table 7-15) and 15. The RAOs identified are listed in Table 11-19.

Tables

Table 11-1

Constituents of Potential Concern in Disposal Area (FU22)—Surface Soil (0 to 2 ft)

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	ɔund ration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC/BASIS	
SS	MG/KG	1,1,2,2-TETRACHLOROETHANE		3 2	0 0030	Yes	A
SS	MG/KG	ALUMINUM	0	7,821		Yes	A
SS	MG/KG	ANTIMONY		3 1	5 0	Yes	A
SS	MG/KG	ARSENIC		0 43	29	Yes	A
SS	MG/KG	BENZO(a)ANTHRACENE		0 87	2 0	Yes	A
SS	MG/KG	BENZO(a)PYRENE		0 087	8 0	Yes	A
SS	MG/KG	BENZO(b)FLUORANTHENE		0 87	5 0	Yes	A
SS	MG/KG	CARBAZOLE	7	32	0 60	Yes	A
SS	MG/KG	CHROMIUM, TOTAL		23	38	Yes	A
SS	MG/KG	DIBENZ(a,h)ANTHRACENE		0 087	2 0	Yes	A
SS	MG/KG	DIELDRIN	6	0 040	0 0040	Yes	A
SS	MG/KG	LEAD		400	400	Yes	A
SS	MG/KG	THALLIUM		0 55	0 70	Yes	A
SS	MG/KG	TOTAL 1,2-DICHLOROETHENE		78	0 40	Yes	A
SS	MG/KG	TRICHLOROETHYLENE (TCE)		58	0 060	Yes	A
SS	MG/KG	VINYL CHLORIDE		0 34	0 010	Yes	A
SS	MG/KG	CHRYSENE		87	160	Yes	G

Note Data evaluated includes field duplicates and normal samples (0-2 feet)

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Cr
E	Chemical is an essential nutrient and professional jud
F	Chemical is a common lab contaminant and professio
G	Chemical is a member of a chemical class which cont

Table 11-2

Constituents of Potential Concern in Disposal Area (FU22)—Subsurface Soil (> 2ft)

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Subsurface Soil (Leachability)	COPC/BASIS	
SB	MG/KG	1,1,2,2-TETRACHLOROETHANE	135	46	0 0020	0 014	0 0030	160	7 0		3 2	0 0030	Yes	A
SB	MG/KG	1,1,2-TRICHLOROETHANE	135	20	0 0020	0 014	3 00E-04	2 2	0 22		11	0 020	Yes	A
SB	MG/KG	1,2-DICHLOROETHANE	135	4	0 0020	0 014	0 0010	0 046	0 020		7 0	0 020	Yes	A
SB	MG/KG	2 4,6-TRICHLOROPHENOL	27	1	0 30	0 30	0 27	0 27	0 27		58	0 20	Yes	A
SB	MG/KG	ARSENIC	23	23			2 2	36	8 7	17	0 43	29	Yes	A
SB	MG/KG	CARBON TETRACHLORIDE	135	15	0 0020	0 014	5 00E-04	6 8	0 55		4 9	0 070	Yes	A
SB	MG/KG	CHLOROFORM	134	34	0 0020	0 014	8 00E-04	14	1 0		105	0 60	Yes	A
SB	MG/KG	CHROMIUM, TOTAL	23	23			9 6	30	14	26	23	38	Yes	A
SB	MG/KG	METHYLENE CHLORIDE	135	19	0 0040	0 026	5 00E-04	0 039	0 0074		85	0 020	Yes	A
SB	MG/KG	PENTACHLOROPHENOL	27	1	0 16	0 16	0 22	0 22	0 22		5 3	0 030	Yes	A
SB	MG/KG	TETRACHLOROETHYLENE(PCE)	135	50	0 0020	0 014	4 00E-04	4 4	0 18		12	0 060	Yes	A
SB	MG/KG	THALLIUM	23	8	0 24	0 71	0 31	0 64	0 40		0 55	0 70	Yes	A
SB	MG/KG	TOTAL 1,2-DICHLOROETHENE	97	39	0 0050	0 014	6 00E-04	190	8 5		78	0 40	Yes	A
SB	MG/KG	TRICHLOROETHYLENE (TCE)	135	78	0 0021	0 014	5 00E-04	460	9 3		58	0 060	Yes	A
SB	MG/KG	VINYL CHLORIDE	135	14	0 0020	0 014	0 0020	7 0	0 68		0 34	0 010	Yes	A
SB	MG/KG	ZINC	23	23			24	2,650	167	114	2,346	12,000	Yes	A

Note Data evaluated includes field duplicates and normal samples (2 feet and below)

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs
H	Chemical is a surface soil COPC

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Table 11-2A
Soil Leachability Evaluation—Soil Criteria (All Depths)
Rev. 1 Memphis Depot Dunn Field RI

Matrix*	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Source Depth for Background Concentration	Regulatory Criteria for Subsurface Soil (Leachability)	Exceeds Leachability Criteria	
SS/CS	MG/KG	1,1,2,2-TETRACHLOROETHANE	175	40	0.0020	0.015	[illegible]	140	6.7			0.0020	Yes	A
SS/SS	MG/KG	1,1,2-TRICHLOROETHANE	175	21	0.0020	0.015	3.00E-04	2.2	0.21			0.030	Yes	A
SS/CS	MG/KG	1,2-DICHLOROETHANE	175	4	0.0029	0.019	0.0016	0.040	0.023			0.020	Yes	A
SS/CS	MG/KG	2,4,6-TRICHLOROPHENOL	58	1	0.30	0.30	0.27	0.27	0.27			0.20	Yes	A
SS	MG/KG	ANTIMONY	40	18	4.3	6.5	4.7	200	26	7.0	CS	5.0	Yes	A
SS	MG/KG	ARSENIC	23	23			7.2	36	8.7	17	CS	29	Yes	A
CS	MG/KG	ARSENIC	40	40			4.6	44	11	23	SS	29	Yes	A
SS	MG/KG	BENZO(a)ANTHRACENE	28	18	0.30	0.30	0.0080	5.1	1.2	0.71	SS	2.0	Yes	A
SS	MG/KG	BENZO(b)FLUORANTHENE	28	16	0.30	0.30	0.074	8.3	1.7	0.88	SS	5.0	Yes	A
SS	MG/KG	CARBAZOLE	25	8	0.30	0.30	0.049	7.0	0.71	0.067	CS	0.60	Yes	A
SS/SS	MG/KG	CARBON TETRACHLORIDE	175	17	0.0023	0.015	5.00E-04	5.8	0.48			0.070	Yes	A
SS/SS	MG/KG	CHLOROFORM	174	40	0.0020	0.016	8.00E-04	14	0.67			0.60	Yes	A
SS	MG/KG	CHROMIUM, TOTAL	40	40			8.1	100	24	28	CS	38	Yes	A
SS	MG/KG	DIELDRIN	23	16	0.0023	0.024	5.40E-04	0.60	0.10	0.086	CS	0.0040	Yes	A
SS/SS	MG/KG	INDENO(1,2,3-c,d)PYRENE	58	25	0.30	0.30	0.014	8.1	0.71			2.0	Yes	A
SS	MG/KG	LEAD	40	40			7.4	790	80	30	SS	400	Yes	A
SS/SS	MG/KG	METHYLENE CHLORIDE	178	20	0.0040	0.029	5.00E-04	0.030	0.0071			0.020	Yes	A
SS/SS	MG/KG	PENTACHLOROPHENOL	66	1	0.10	0.10	0.22	0.22	0.22			0.030	Yes	A
SS/CS	MG/KG	TETRACHLOROETHYLENE(PCE)	175	58	0.0028	0.015	3.00E-04	4.4	0.10			0.060	Yes	A
SS/SS	MG/KG	TOTAL 1,2-DICHLOROETHENE	137	44	0.0040	0.015	6.00E-04	190	7.3			0.40	Yes	A
SS/TS	MG/KG	TRICHLOROETHYLENE (TCE)	175	41	0.0021	0.015	6.00E-04	[illegible]	8.2			0.060	Yes	A

Parameters with background values were screened against either the surface or subsurface background value depending on the location of the sample. Thus, some parameters may be identified as COPCs in both, either, or neither of the soil intervals (CS and SS).
Note: Data evaluated includes greater of Field Duplicate or Sample.

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs
H	Chemical is a surface soil COPC

Table 11-3

Constituents of Potential Concern in Disposal Area (PU22)—Sediment

[illegible]

[illegible]	Units	Parameter Name	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Regulatory Criteria for Sediments	Regulatory Criteria for Leachability	COPC??	COPC/BASIS
[illegible]	[illegible]	ARSENIC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	BENZO(a)ANTHRACENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	BENZO(a)PYRENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	BENZO(b)FLUORANTHENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	CARBAZOLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	DIBENZ(a,h)ANTHRACENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	DIELDRIN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	INDENO(1,2,3-cd)PYRENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	CHRYSENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]
[illegible]	[illegible]	BENZO(k)FLUORANTHENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]

Note:

A [illegible]

B [illegible]

C [illegible]

D [illegible]

E [illegible] COPC

F [illegible] COPC

G [illegible] COPCs.

Table 11-4

Constituents of Potential Concern in Disposal Area (FU22)—Surface Water

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentra-tion	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Water	COPC?	COPC/BASIS
WS	MG/L	BENZO(b)FLUORANTHENE	2	2	0.01	0.01	0 0003	0.0004	0 0003		0 00004	Yes	A
WS	MG/L	CHRYSENE	2	2	0.01	0 01	0 0003	0.0005	0 0004		0 00004	Yes	A
WS	MG/L	INDENO(1 2 3-c,d)PYRENE	2	1	0 01	0 01	0.0003	0.0003	0 0003		0.00004	Yes	A
WS	MG/L	PHENANTHRENE	2	2	0.01	0 01	0.0003	0.0003	0.0003		0 000003	Yes	A
WS	MG/L	2-NITROPHENOL	2	1	0.01	0.01	0 0004	0 0004	0 0004			N/A	D
WS	MG/L	ALUMINUM	2	2	0 2	0 2	12	18	15	5		N/A	D
WS	MG/L	BERYLLIUM	2	2	0 005	0 005	0 0007	0 001	0 0009			N/A	D

Note

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

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TABLE 11-5
Summary of Exposure Pathways to be Quantified at Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Use			
On-site Maintenance Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	Yes	Occasional maintenance work is assumed to involve a worker spending time in the contaminated soil
Future Land Use			
On-site Industrial Worker (Outdoor)	Incidental ingestion, dermal contact, and inhalation	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
On-site Industrial Worker (Indoor)	Inhalation of subsurface VOCs migrating to indoor air	Yes	Hypothetical future reasonable maximum exposure scenario for future indoor workers
On-site Utility Worker	Incidental ingestion, dermal contact, and inhalation from the subsurface soils (0 – 10 ft bgs)	Yes	A hypothetical future utility worker installing or maintaining underground utilities is assumed to be exposed to contaminated subsurface soil. This is evaluated as part of the surrogate site and area-wide exposure units in the Disposal Area, as it was unclear which of the two yields a conservative estimate, due to subsurface VOCs that are not part of PRE
On-site Landscaper	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	No	Landscaper exposure to surface soil would be short exposure duration (less than one year) during property redevelopment Maintenance worker exposure assumptions are protective of landscaper
Hypothetical On-site Residential	Incidental ingestion, dermal contact, and inhalation from surface soils	No	Evaluated as part of surrogate site to represent worst case scenario for comparison purposes only
Hypothetical On-site Residential	Inhalation exposure to subsurface soil and groundwater VOCs through volatilization into indoor air was also evaluated	Yes	Evaluated for conservative risk estimation

Table 11-6

Exposure Point Concentrations for Disposal Area Surface Soil (0-2 ft bgs)

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Aluminum	38	38	12,391	25,100	13,679	13,753	13,753
MG/KG	Antimony	38	18	14	355	29.3	9	9
MG/KG	Arsenic	38	38	11	44	12	12	12
MG/KG	Chromium (total)	38	38	24	109	29	29	29
MG/KG	Lead	38	38	94	789	NA	NA	94
MG/KG	Thallium	38	18	0.33	0.68	0.37	0.40	0.40
MG/KG	Dieldrin	26	18	0.073	0.96	0.14	0.63	0.63
MG/KG	Benzo(a)anthracene	26	16	0.60	5.8	1.1	0.9	0.9
MG/KG	Benzo(a)pyrene	26	16	0.66	6.7	1.2	0.8	0.8
MG/KG	Benzo(b)fluoranthene	26	14	0.8	8.2	1.4	0.9	0.9
MG/KG	Chrysene	26	16	0.66	6.3	1.17	0.83	0.8
MG/KG	Dibenz(a,h)anthracene	26	12	0.22	1.6	0.3	0.3	0.3
MG/KG	Indeno(1,2,3-c,d)pyrene	26	16	0.50	4.6	0.88	0.63	0.6
MG/KG	Carbazole	26	6	0.26	2.0	0.4	0.3	0.3
MG/KG	1,1,2,2-Tetrachloroethane	39	2	0.0066	0.083	0.0100	0.0069	0.007
MG/KG	Total 1,2-Dichloroethene	39	7	0.033	0.87	0.071	0.023	0.02
MG/KG	Trichloroethene	39	10	0.048	0.85	0.092	0.042	0.04
MG/KG	Vinyl chloride	39	1	0.0073	0.11	0.0118	0.007	0.01

UCL = Upper confidence limit

EPC = exposure point concentration

NA = not applicable

Note. EPC is referred to as RME in Appendix tables

Table 11-7

Exposure Point Concentrations for Disposal Area Soil Column (0-10 ft bgs)

Rev 1 Memphis Depot Dunn Field RI

Units	Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	ALUMINUM	63	63	11,119	25,100	11,982	12,036	11,982
MG/KG	ANTIMONY	63	24	9.7	355	6.1	19	6.1
MG/KG	ARSENIC	63	63	10.0	44	11	11	11
MG/KG	CHROMIUM, TOTAL	63	63	20	109	22	24	22
MG/KG	LEAD	63	63	65	789	NA	NA	65
MG/KG	THALLIUM	63	28	0.30	0.68	0.35	0.34	0.34
MG/KG	ZINC	63	63	136	2,650	125	208	125
MG/KG	DIELDRIN	49	25	0.043	0.96	0.099	0.076	0.10
MG/KG	2,4,6-TRICHLOROPHENOL	52	1	0.15	0.27	0.16	0.16	0.27
MG/KG	BENZO(a)ANTHRACENE	52	27	0.51	5.8	0.67	0.79	0.67
MG/KG	BENZO(a)PYRENE	52	27	0.55	6.7	0.72	0.87	0.72
MG/KG	BENZO(b)FLUORANTHENE	52	23	0.65	8.2	0.60	1.0	0.60
MG/KG	CARBAZOLE	52	10	0.23	2.0	0.24	0.31	0.24
MG/KG	CHRYSENE	52	25	0.56	6.3	0.54	0.87	0.54
MG/KG	DIBENZ(a,h)ANTHRACENE	52	19	0.21	1.8	0.24	0.30	0.24
MG/KG	INDENO(1,2,3-c,d)PYRENE	52	25	0.45	5.1	0.45	0.70	0.45
MG/KG	PENTACHLOROPHENOL	52	1	0.083	0.22	0.085	0.087	0.22
MG/KG	1,1,2,2-TETRACHLOROETHAN	81	5	2.0	160	0.028	5.3	160
MG/KG	1,1,2-TRICHLOROETHANE	81	3	0.030	2.0	0.0081	0.071	2.0
MG/KG	1,2-DICHLOROETHANE	81	1	0.0049	0.028	0.0054	0.0055	0.028
MG/KG	CARBON TETRACHLORIDE	81	5	0.090	6.8	0.011	0.23	6.8
MG/KG	CHLOROFORM	80	15	0.19	14	0.016	0.48	0.016
MG/KG	METHYLENE CHLORIDE	81	7	0.0054	0.036	0.0061	0.0063	0.036
MG/KG	TETRACHLOROETHYLENE(P	81	20	0.084	4.4	0.018	0.18	0.018
MG/KG	TOTAL 1,2-DICHLOROETHEN	80	18	1.7	120	0.079	4.3	0.079
MG/KG	TRICHLOROETHYLENE (TCE	81	22	5.8	460	0.16	15	0.16
MG/KG	VINYL CHLORIDE	81	8	0.032	2.0	0.010	0.073	2.0

UCL = Upper confidence limit

EPC = Eexposure point concentration

NA = Value not applicable

Note EPC is referred to as RME in Appendix tables

Table 11-7A

Exposure Point Concentrations for Volitilization from Subsurface Soils

Rev 1 Memphis Depot Dunn Field RI

Site	Minimum Sample Depth	Maximum Sample Depth	Minimum Detection Depth	Maximum Detection Depth	Chemical	Samples	Detects	Mean of Detects	Mean of Samples	Maximum Detect	Units	Estimated Indoor Air Concentration*	Units
A	8	30	28	30	1 1,2 2-TETRACHLOROETHANE	9	1	9 00E-03	1 26E-02	9 00E-03	MG/KG	3 82E-04	UG/M^3
A	8	30	8	30	CARBON TETRACHLORIDE	9	7	1 52E-01	1 22E-01	5 70E-01	MG/KG	5.20E-01	UG/M^3
A	8	30	8	30	CHLOROFORM	9	6	7 78E-01	5 23E-01	2 40E+00	MG/KG	6 92E-01	UG/M^3
A	8	30	8	30	METHYLENE CHLORIDE	9	5	1 90E-03	6 94E-03	4 00E-03	MG/KG	1 33E-03	UG/M^3
A	8	30	8	30	TETRACHLOROETHYLENE(PC	9	4	6 76E-02	3 73E-02	1 40E-01	MG/KG	1 34E-01	UG/M^3
A	8	30	8	30	TOTAL 1 2-DICHLOROETHENE	9	3	1 97E-02	1 52E-02	3 30E-02	MG/KG	1 96E-02	UG/M^3
A	8	30	8	30	TRICHLOROETHYLENE (TCE)	9	3	3 00E-01	1 09E-01	4 70E-01	MG/KG	3 57E-01	UG/M^3
B	8	30	28	30	1,1,2,2-TETRACHLOROETHANE	12	2	3 00E-02	1 24E-02	5 50E-02	MG/KG	1 27E-03	UG/M^3
B	8	30	28	30	1,1,2-TRICHLOROETHANE	12	1	1 00E-03	8 50E-03	1 00E-03	MG/KG	1 56E-04	UG/M^3
B	8	30	14	30	CARBON TETRACHLORIDE	12	3	1 33E-03	6 75E-03	3 00E-03	MG/KG	4 37E-03	UG/M^3
B	8	30	14	30	CHLOROFORM	12	4	4 75E-03	7 00E-03	8 00E-03	MG/KG	4 10E-03	UG/M^3
B	8	30	8	30	METHYLENE CHLORIDE	12	6	9 50E-04	4 31E-03	2 00E-03	MG/KG	6 67E-04	UG/M^3
B	8	30	14	30	TETRACHLOROETHYLENE(PC	12	3	6 00E-04	6 57E-03	6 00E-04	MG/KG	1 14E-03	UG/M^3
B	8	30	8	30	TOTAL 1,2-DICHLOROETHENE	12	6	5 97E-02	3 38E-02	2 40E-01	MG/KG	5 96E-02	UG/M^3
B	8	30	14	30	TRICHLOROETHYLENE (TCE)	12	4	2 20E-02	1 26E-02	3 10E-02	MG/KG	2 52E-02	UG/M^3
B	8	30	8	30	VINYL CHLORIDE	12	4	2 53E-02	1 50E-02	6 60E-02	MG/KG	1 98E-01	UG/M^3
C	8	30	8	30	1,1,2 2-TETRACHLOROETHANE	16	9	5 21E+00	2 93E+00	3 30E+01	MG/KG	2 47E-01	UG/M^3
C	8	30	8	30	1,1,2-TRICHLOROETHANE	16	6	4 02E-02	1 98E-02	1 00E-01	MG/KG	7 05E-03	UG/M^3
C	8	30	14	30	1 2-DICHLOROETHANE	16	2	2 00E-03	7 56E-03	3 00E-03	MG/KG	5 14E-04	UG/M^3
C	8	30	8	30	CHLOROFORM	16	8	1 04E-02	9 18E-03	3 20E-02	MG/KG	9 22E-03	UG/M^3
C	8	30	14	30	METHYLENE CHLORIDE	16	2	1 30E-03	8 60E-03	2 00E-03	MG/KG	8 85E-04	UG/M^3
C	8	30	8	30	TETRACHLOROETHYLENE(PC	16	10	4 20E 01	2 65E-01	1 90E+00	MG/KG	8 32E-01	UG/M^3
C	8	30	8	30	TOTAL 1 2-DICHLOROETHENE	16	10	1 48E-01	9 54E-02	5 50E-01	MG/KG	1 48E-01	UG/M^3
C	8	30	8	30	TRICHLOROETHYLENE (TCE)	16	15	3 27E+00	3 07E+00	1 60E+01	MG/KG	3 89E+00	UG/M^3
C	8	30	8	30	VINYL CHLORIDE	16	3	1 97E-02	1 06E-02	4 70E-02	MG/KG	1 55E-01	UG/M^3
D	8	30	14	30	1,1 2,2-TETRACHLOROETHANE	23	3	3 33E-03	9 43E-03	4 00E-03	MG/KG	1 53E-04	UG/M^3
D	8	30	14	30	1,1,2-TRICHLOROETHANE	23	3	7 67E-04	9 06E-03	1 00E-03	MG/KG	1 30E-04	UG/M^3
D	8	30	14	16	CARBON TETRACHLORIDE	23	1	5 00E 04	9 80E-03	5 00E-04	MG/KG	1 64E-03	UG/M^3
D	8	30	8	30	CHLOROFORM	23	9	1 87E-01	7 87E-02	8 50E-01	MG/KG	3 82E-04	UG/M^3
D	8	30	28	30	METHYLENE CHLORIDE	23	1	6 00E-04	9 81E-03	6 00E-04	MG/KG	3 82E-04	UG/M^3
D	8	30	8	30	TETRACHLOROETHYLENE(PC	23	11	2 70E-03	5 77E 03	6 00E-03	MG/KG	5 35E-03	UG/M^3
D	8	30	8	30	TOTAL 1,2-DICHLOROETHENE	22	14	1 44E+00	9 21E-01	1 70E+01	MG/KG	1 44E+00	UG/M^3
D	8	30	8	30	TRICHLOROETHYLENE (TCE)	23	15	9 97E 02	6 84E-02	5 90E-01	MG/KG	1 19E-01	UG/M^3
D	8	30	8	10	VINYL CHLORIDE	23	1	6 00E-03	1 03E-02	6 00E-03	MG/KG	4 72E-02	UG/M^3
E	8	30	8	30	1,1,2,2 TETRACHLOROETHANE	35	8	5 15E+01	1 18E+01	1 60E+02	MG/KG	1 95E+00	UG/M^3
E	8	30	8	16	1,1,2-TRICHLOROETHANE	35	5	1 68E+00	2 48E-01	2 20E+00	MG/KG	2 46E-01	UG/M^3
E	8	30	8	16	1,2-DICHLOROETHANE	35	4	3 70E-02	1 28E-02	4 60E-02	MG/KG	9 78E-03	UG/M^3
E	8	30	14	16	CHLOROFORM	33	2	4 90E 02	1 21E-02	4 90E-02	MG/KG	4 23E-02	UG/M^3
E	8	30	8	16	METHYLENE CHLORIDE	35	4	3 50E-02	1 26E-02	3 90E-02	MG/KG	2 46E-02	UG/M^3
E	8	30	8	16	TETRACHLOROETHYLENE(PC	35	6	1 49E+00	2 63E-01	4 40E+00	MG/KG	2 21E+00	UG/M^3
E	8	30	8	30	TOTAL 1,2 DICHLOROETHENE	35	10	6 20E+01	1 77E+01	1 90E+02	MG/KG	5 16E+01	UG/M^3
E	8	30	8	30	TRICHLOROETHYLENE (TCE)	35	8	1 68E+02	3 83E+01	4 60E+02	MG/KG	1 59E+02	UG/M^3
E	8	30	8	30	VINYL CHLORIDE	35	9	2 07E+00	5 39E-01	7 00E+00	MG/KG	1 46E+01	UG/M^3
F	3	30	8	30	CARBON TETRACHLORIDE	31	4	1 79E+00	2 44E-01	6 60E+00	MG/KG	6 12E+00	UG/M^3
F	3	30	8	30	CHLOROFORM	31	5	5 67E+00	9 27E-01	1 40E+01	MG/KG	5 04E+00	UG/M^3
F	3	30	8	16	METHYLENE CHLORIDE	31	4	1 33E-02	1 39E-02	3 60E-02	MG/KG	9 30E-03	UG/M^3
F	3	30	8	30	TETRACHLOROETHYLENE(PC	31	7	8 99E-03	1 32E-02	3 10E-02	MG/KG	1 78E-02	UG/M^3
F	3	30	8	16	TRICHLOROETHYLENE (TCE)	31	4	8 08E-03	1 33E-02	2 50E-02	MG/KG	9 61E-03	UG/M^3

* Based on Average Detected Soil Concentration

Units

Depth = feet

Table 11-8

Exposure Point Concentrations for Disposal Area Sediment

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Arsenic	2	2	9	14	39	21247	14
MG/KG	Benzo(a)anthracene	2	2	3	5	16	630317	5
MG/KG	Benzo(a)pyrene	2	2	4	6	17	313229	6
MG/KG	Benzo(b)fluoranthene	2	2	5	7	23	27521301	7
MG/KG	Benzo(k)fluoranthene	2	2	3	5	14	18526	5
MG/KG	Carbazole	2	2	1	2	5	1567305	2
MG/KG	Chrysene	2	2	4	6	17	229897	6
MG/KG	Dibenz(a,h)anthracene	2	2	1	2	6	2095321078	2
MG/KG	Dieldrin	2	1	0 03	0 06	0 2	5409576723390	0
MG/KG	Indeno(1,2,3-c,d)pyrene	2	2	3	5	15	806816	5

UCL = Upper confidence limit

EPC = exposure point concentration

Table 11-9
Exposure Point Concentrations for Disposal Area Surface Water
Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/L	Aluminum	2	2	15	18	34	51	18
MG/L	Beryllium	2	2	0.0009	0.001	0.002	0.004	0.001
MG/L	Benzo(b)fluoranthene	2	2	0.0003	0.0004	0.0005	0.0005	0.0004
MG/L	Chrysene	2	2	0.0004	0.0005	0.0008	0.001	0.0005
MG/L	Indeno(1,2,3-c,d)pyrene	2	1	0.003	0.0003	0.02	1.47E+22	0.0003
MG/L	Phenanthrene	2	2	0.0003	0.0003	0.0004	0.0004	0.0003
MG/L	2-Nitrophenol	2	1	0.003	0.0004	0.02	9.05E+17	0.0004

MG/l = milligrams per liter
UCL = Upper confidence limit
EPC = exposure point concentration

TABLE 11-10
Toxicity Factors for All Media in Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Parameter Name	Weight-of-Evidence Class	Oral SF kg-day/mg	Inhal SF kg-day/mg	C Oral RfD mg/kg-day	C Inhal RfD mg/kg-day
1,1,2,2-Tetrachloroethane	C	2 00E-01	2 03E-01	6 00E-02	
1,1,2-Trichloroethane		5 70E-02	5 60E-02	4 00E-03	
1,2-Dichloroethane		9 10E-02	9 10E-02	3 00E-02	1 40E-03
2,4,6-Trichlorophenol	B2	1 10E-02	1 00E-02		
2-Nitrophenol					
Aluminum				1 00E+00	1 00E+00
Antimony	D			4 00E-04	
Arsenic	A	1 50E+00	1 51E+01	3 00E-04	
Benzo(a)anthracene	B2	7 30E-01	3 10E-01		
Benzo(a)pyrene	B2	7 30E+00	3 10E+00		
Benzo(b)fluoranthene	B2	7 30E-01	3 10E-01		
Benzo(k)fluoranthene	B2	7 30E-02	3 10E-02		
Beryllium	B1		8 40E+00	2 00E-03	5 70E-06
Carbazole	B2	2 00E-02			
Carbon tetrachloride	B2	1 30E-01	5 25E-02	7 00E-04	5 71E-04
Chloroethane					
Chloroform	B2	6 10E-03	8 10E-02	1 00E-02	8 60E-05
Chromium (total)	A		4.20E+01	3 00E-03	2 86E-05
Chrysene	B2	7 30E-03	3 10E-03		
Dibenz(a,h)anthracene	B2	7 30E+00	3 10E+00		
Dieldrin	B2	1 60E+01	1 60E+01	5 00E-05	
Indeno(1,2,3-c,d)pyrene	B2	7 30E-01	3 10E-01		
Lead	B2				
Methylene chloride	B2	7 50E-03	1 65E-03	6 00E-02	8 57E-01
Pentachlorophenol	B2	1 20E-01		3 00E-02	
Phenanthrene					
Tetrachloroethene	C-B2	5 20E-02	2 00E-03	1 00E-02	1 71E-01
Thallium	D			8 00E-05	
Total 1,2-Dichloroethene	D			9 00E-03	1 00E-03
Trichloroethene	B2	1 10E-02	6 00E-03	6 00E-03	
Vinyl chloride		1 90E+00	3 00E-01		

SF = Slope Factor
C = Carcinogen
RfD = Reference Dose
Inhal = Inhalation
day/mg = day per milligram
mg/kg-day = milligrams per kilograms per day

Table 11-11

Summary of Risks and Hazards at Disposal Area

Rev. 1 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Ingestion	Dermal	Inhalation	Total ELCR	Ingestion	Dermal	Inhalation	Total HI	COPCs
Industrial Worker									
Surface Water	6 E-09	8 E-06	N/A	**8E-06**	0.0007	0.0004	N/A	**0.001**	PAHs
Sediment	3 E-06	1 E-06	N/A	**5E-06**	0.005	0.0005	N/A	**0.005**	BaP
Surface Soil	7 E-06	2 E-06	2 E-07	**9E-06**	0.05	0.006	0.0002	**0.06**	Arsenic, BaP, dieldrin
Soil Column - Ambient Air	N/A	N/A	3 E-05	**4E-05**	N/A	N/A	0.2	**0.3**	1,1,2,2-Tetrachloroethane, Vinyl chloride, TCE
Total Risks & Hazards (combined from all pathways)[1]				***6E-05***				***0.3***	***As, PAHs, dieldrin, 1,1,2,2-Tetrachloroethane, VCl, TCE***
Soil Column - Indoor Air	N/A	N/A	8 E-04	**8E-04**	N/A	N/A	4	**4**	1,1,2,2-Tetrachloroethane,1,1,2-TCA, TCE, VCl, CCl4
Maintenance Worker									
Surface Water	2 E-09	2 E-06	N/A	**2E-06**	0.0002	0.00009	N/A	**0.0003**	PAHs
Sediment	8 E-07	3 E-07	N/A	**1E-06**	0.001	0.0001	N/A	**0.001**	N/A
Surface Soil	7 E-07	4 E-07	2 E-08	**1E-06**	0.005	0.001	0.00003	**0.006**	N/A
Total Risks & Hazards (combined from all pathways)				***4E-06***				***0.008***	***PAHs***
Utility Worker									
Soil Column	4 E-07	3 E-07	5 E-08	**8E-07**	0.004	0.001	0.002	**0.007**	N/A
Soil Column - Ambient Air	N/A	N/A	3 E-08	**8E-07**	N/A	N/A	0.0002	**0.005**	N/A
Total Risks & Hazards (combined from all pathways)				***8E-07***				***0.002***	***N/A***
Offsite Residential									
Soil Column - Ambient Air	N/A	N/A	4 E-06	**4E-06**	N/A	N/A	0.02	**0.02**	1,1,2,2-Tetrachloroethane
Total Risks & Hazards (combined from all pathways)				***4E-06***				***0.02***	***1,1,2,2-Tetrachloroethane***

Note

1 = Industrial Worker Soil Column risks (6E-06) were not included in Total Risks & Hazards because they were less than Surface Soil risks (9E-06)

Indoor Air is also not included in this summary

Where

As	Arsenic
BaP	Benzo(a)pyrene
CCl4	Carbon tetrachloride
PAHs	Polyaromatic hydrocarbons
1,1,2-TCA	1,1,2-Trichloroethane
TCE	Trichloroethane
VCl	Vinyl chloride

Table 11-11A

Summary of Indoor Air Risks and Hazards at Disposal Area

Rev 0 Memphis Depot Dunn Field RI

Site	Onsite Indoor Air Risk[1]					
	ELCR			HI		
	Future Onsite Worker (Indoor)	Future Onsite Residential Adult*	Future Onsite Residential Child	Future Onsite Worker (Indoor)	Future Onsite Residential Adult	Future Onsite Residential Child
A	2.0E-06	1.5E-05	NA	0.0013	0.0056	0.020
B	1.6E-07	1.3E-06	NA	0.0043	0.018	0.064
C	1.9E-06	1.4E-05	NA	0.010	0.043	0.15
D	5.4E-08	4.2E-07	NA	0.093	0.39	1.4
E	4.2E-05	3.3E-04	NA	3.4	14	50
F	1.7E-05	1.3E-04	NA	7.42E-06	3.15E-05	1.10E-04

* Age-adjusted to reflect 6 years as a child and 24 years as an adult (Exposure Time = 30 years)

[1] Calculated using Johnson Ettinger Model provided by EPA (1997), Appendix I3-F

Table 11-12

Remedial Goal Options for Disposal Area

Rev 1 Memphis Depot Dunn Field RI

Chemical	Carcinogenic Effects						Noncarcinogenic Effects					
	Industrial worker			Residential Adult			Industrial worker			Residential Adult		
	TR = 1E-06	TR = 1E-05	TR = 1E-04	TR = 1E-06	TR = 1E-05	TR = 1E-04	THI =0.1	THI =1	THI =10	THI =0.1	THI =1	THI =10
Pesticides												
Dieldrin	3E-01	3E+00	3E+01	4E-02	4E-01	4E+00	7.7	77	773	2.8	28	280
Metals												
Arsenic	3E+00	3E+01	3E+02	4E-01	4E+00	4E+01	55	549	5487	20	197	1971
Semivolatiles												
Benzo(a)anthracene	5E+00	5E+01	5E+02	7E-01	7E+00	7E+01						
Benzo(a)pyrene	5E-01	5E+00	5E+01	7E-02	7E-01	7E+00						
Benzo(b)fluoranthene	5E+00	5E+01	5E+02	7E-01	7E+00	7E+01						
Carbazole	2E+02	2E+03	2E+04	3E+01	3E+02	3E+03						
Chrysene	5E+02	5E+03	5E+04	7E+01	7E+02	7E+03						
Dibenz(a,h)anthracene	5E-01	5E+00	5E+01	7E-02	7E-01	7E+00						
Indeno(1,2,3-c,d)pyrene	5E+00	5E+01	5E+02	7E-01	7E+00	7E+01						
Volatiles												
1,1,2,2-Tetrachloroethane	1E+00	1E+01	1E+02	4E-01	4E+00	4E+01						
1,1,2-Trichloroethane	2E+00	2E+01	2E+02	8E-01	8E+00	8E+01	802	8017	80169	287	2866	28664
1,2-Dichloroethane	7E-01	7E+00	7E+01	3E-01	3E+00	3E+01	3.1	31	313	2.5	25	245
Carbon tetrachloride	6E-01	6E+00	6E+01	3E-01	3E+00	3E+01	0.67	6.7	67	0.52	5.2	52
Tetrachloroethene	2E+01	2E+02	2E+03	5E+00	5E+01	5E+02	222	2222	22216	154	1537	15366
Trichloroethene	9E+00	9E+01	9E+02	4E+00	4E+01	4E+02	1108	11077	110770	398	3978	39783
Vinyl chloride	4E-02	4E-01	4E+00	2E-02	2E-01	2E+00						

Note. All units are mg/kg

Formulas

Age-adjusted Carcinogenic calculation (ADULT only)

$$\text{RBC (mg/kg)} = \frac{TR \times ATc}{EF \times (A+B+C)}$$

Where

Ac = (SFo x IRing_adj x FI x CF)

Bc = (SFd x SA_adj x AF x ABS x CF)

Cc = (SFI x IRinh_adj x ((1/VF)+(1/PEF)))

Carcinogenic calculation (INDUSTRIAL WORKER only)

$$\text{RBC (mg/kg)} = \frac{TR \times BW \times ATc}{ED \times (A+B+C)}$$

Where:

Ac = (SFo x IRing x FI x CF)

Bc = (SFd x SA x AF x ABS x CF)

Cc = (SFI x IRinh x ((1/VF)+(1/PEF)))

Noncarcinogenic calculation (ALL RECEPTORS)

$$\text{RBC (mg/kg)} = \frac{THI \times BW \times ATnc}{EF \times ED \times (A+B+C)}$$

An = ((1/RfDo) x IRing x FI x CF)

Bn = ((1/RfDd) x SA x AF x ABS x CF)

Cn = ((1/RfDI) x IRinh x ((1/VF)+(1/PEF)))

Note

RBC	Risk Based Concentration	EF	Exposure Frequency	RfDo	Reference Dose-oral
TR	Target Risk	FI	Fraction Ingested	SA	Skin Surface Area
ABS	Absorbance Factor	IRING	Intake Rate-Ingestion	SA_adj	Skin Surface Area, Age-adjusted
AF	Soil-to-Skin Adherence Factor	IRing_adj	Intake Rate-Ingestion, Age-adjusted	SFd	Slope Factor-dermal
ATc	Averaging Time-Carcinogens	IRinh	Intake Rate-Inhalation	SFi	Slope Factor-ingestion
ATnc	Averaging Time-Noncarcinogens	IRinh_adj	Intake Rate-Inhalation, Age-adjusted	SFo	Slope Factor-oral
BW	Weight	PEF	Particulate Emmision Factor	THI	Target Hazard Index
CF	Conversion Factor	RfDd	Reference Dose-dermal	VF	Volatilization Factor
ED	Exposure Duration	RfDi	Reference Dose-Inhalation		

Table 11-13

Constituents of Potential Concern in Surrogate Site 61LE—Surface Soil

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC1?	COPC/BASIS
SS	MG/KG	ANTIMONY	7	4	N/A	N/A	6	355	55	7	3	5	Yes	A
SS	MG/KG	ARSENIC	7	7	N/A	N/A	9	44	15	20	0 4	29	Yes	A
SS	MG/KG	BENZO(a)ANTHRACENE	5	3	N/A	N/A	0 2	6	1	0 7	0 9	2	Yes	A
SS	MG/KG	BENZO(a)PYRENE	5	3	N/A	N/A	0 2	7	1	1	0 09	8	Yes	A
SS	MG/KG	BENZO(b)FLUORANTHENE	5	3	N/A	N/A	0 2	8	2	0 9	0 9	5	Yes	A
SS	MG/KG	CARBAZOLE	5	2	N/A	N/A	0 05	0 9	0 3	0 07	32	0 6	Yes	A
SS	MG/KG	DIBENZ(a,h)ANTHRACENE	5	3	N/A	N/A	0 06	2	0 4	0 3	0 09	2	Yes	A
SS	MG/KG	INDENO(1,2,3-c,d)PYRENE	5	3	N/A	N/A	0 2	5	1	0 7	0 9	14	Yes	A
SS	MG/KG	THALLIUM	7	5	N/A	N/A	0 4	0 6	0 5		0 6	0 7	N/A	A
SS	MG/KG	CHRYSENE	5	3	N/A	N/A	0 2	6	1	0 9	87	160	Yes	G

Note Data evaluated includes field duplicates and normal samples (0-2 feet)

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

Table 11-14

Constituents of Potential Concern in Surrogate Site 61LE—Soil Column

Rev 1 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC1?	COPC/BASIS
DEEP	MG/KG	1,1,2,2-TETRACHLOROETHANE	24	3	N/A	N/A	0 009	160	9		3	0 003	N/A	A
DEEP	MG/KG	1,1,2-TRICHLOROETHANE	24	2	N/A	N/A	2	2	0 2		11	0 02	N/A	A
DEEP	MG/KG	1,2-DICHLOROETHANE	24	2	N/A	N/A	0 03	0 05	0 007		7	0 02	N/A	A
DEEP	MG/KG	ANTIMONY	13	5	N/A	N/A	6	355	31	7	3	5	Yes	A
DEEP	MG/KG	ARSENIC	13	13	N/A	N/A	6	44	14	20	0 4	29	Yes	A
DEEP	MG/KG	BENZO(a)ANTHRACENE	11	7	N/A	N/A	0 1	6	0 7	0 7	0 9	2	Yes	A
DEEP	MG/KG	BENZO(a)PYRENE	11	7	N/A	N/A	0 1	7	0 8	1	0 09	8	Yes	A
DEEP	MG/KG	BENZO(b)FLUORANTHENE	11	7	N/A	N/A	0 1	8	1	0 9	0 9	5	Yes	A
DEEP	MG/KG	CARBAZOLE	11	3	N/A	N/A	0 05	0 9	0 2	0 07	32	0 6	Yes	A
DEEP	MG/KG	DIBENZ(a,h)ANTHRACENE	11	7	N/A	N/A	0 04	2	0 2	0 3	0 09	2	Yes	A
DEEP	MG/KG	INDENO(1,2,3-c,d)PYRENE	11	7	N/A	N/A	0 1	5	0 6	0 7	0 9	14	Yes	A
DEEP	MG/KG	METHYLENE CHLORIDE	24	3	N/A	N/A	0 004	0 04	0 007		85	0 02	N/A	A
DEEP	MG/KG	TETRACHLOROETHYLENE(PCE)	24	4	N/A	N/A	0 0003	4	0 2		12	0 06	N/A	A
DEEP	MG/KG	THALLIUM	13	8	N/A	N/A	0 3	0 6	0 4		0 6	0 7	N/A	A
DEEP	MG/KG	TOTAL 1,2-DICHLOROETHENE	24	5	N/A	N/A	0 002	190	13		70	0 4	N/A	A
DEEP	MG/KG	TRICHLOROETHYLENE (TCE)	24	4	N/A	N/A	0 03	460	28		58	0 06	N/A	A
DEEP	MG/KG	VINYL CHLORIDE	24	4	N/A	N/A	0 008	7	0 4		0 3	0 01	N/A	A
DEEP	MG/KG	CHRYSENE	11	7	N/A	N/A	0 1	6	0 8	0 9	87	160	Yes	G

Note Data evaluated includes field duplicates and normal samples

A	Exceeds Cntena
B	Does not exceed Cntena
C	Does not exceed Background
D	No Cntena available & exceeds Background, or no Cntena or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs

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TABLE 11-15

Summary of Exposure Pathways to be Quantified at Surrogate Site 61LE

Rev 1 Memphis Depot Dunn Field RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Use			
On-site Maintenance Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	No	Occasional maintenance work is assumed to spend only a short period of time in this small area (1-acre) Therefore was evaluated as part of the FU-wide RA
Future Land Use			
On-site Industrial Worker (Outdoor)	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
On-site Industrial Worker (Indoor)	Inhalation of subsurface VOCs migrating to indoor air	Yes	Hypothetical future reasonable maximum exposure scenario for future indoor workers
On-site Utility Worker	Incidental ingestion, dermal contact, and dust inhalation from the subsurface soils (0 ft to water bgs)	Yes	A hypothetical future utility worker installing or maintaining underground utilities is assumed to be exposed to contaminated subsurface soil
On-site Landscaper	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	No	Landscaper exposure to surface soil would be shorter exposure duration (less than 1 year) during property redevelopment Maintenance worker exposure assumptions are protective of landscaper
Hypothetical Future On-site Residential	Incidental ingestion, dermal contact, and dust inhalation from the surface soils Subsurface soil VOC volatilization into indoor air was evaluated	Yes	Evaluated for comparison purposes only

Table 11-16
Exposure Point Concentrations for Site 61LE Surface Soil (0-2 ft bgs)

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Antimony	7	4	55	355	152	1943	355
MG/KG	Arsenic	7	7	15	44	24	27	44
MG/KG	Benzo(a)anthracene	5	3	1	6	4	433	6
MG/KG	Benzo(a)pyrene	5	3	1	7	4	666	7
MG/KG	Benzo(b)fluoranthene	5	3	2	8	5	1479	8
MG/KG	Carbazole	5	2	0 3	0 9	0 6	4	0 9
MG/KG	Chrysene	5	3	1	6	4	491	6
MG/KG	Dibenz(a,h)anthracene	5	3	0 4	2	1	28	2
MG/KG	Indeno(1,2,3-c,d)pyrene	5	3	1	4 6	3	148	4.6
MG/KG	Thallium	7	5	0 5	0 6	0 6	0.7	0 6

Note EPC is referred to as RME in Appendix tables

Table 11-17

Exposure Point Concentrations for Site 61LE Soil Column (0-10 ft)

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MG/KG	Antimony	13	5	31	355	79	47	47
MG/KG	Arsenic	13	13	14	44	20	20	20
MG/KG	Benzo(a)anthracene	11	7	0.7	6	2	2	2
MG/KG	Benzo(a)pyrene	11	7	0.8	7	2	2	2
MG/KG	Benzo(b)fluoranthene	11	7	1	8	2	3	3
MG/KG	Carbazole	11	3	0.2	0.9	0.3	0.3	0.3
MG/KG	Chrysene	11	7	0.8	6	2	2	2
MG/KG	Dibenz(a,h)anthracene	11	7	0.2	2	0.5	0.5	0.5
MG/KG	Indeno(1,2,3-c,d)pyrene	11	7	0.6	5	1	1	1
MG/KG	Thallium	13	8	0.4	0.6	0.5	0.5	0.5
MG/KG	1,2-Dichloroethane	24	2	0.007	0.05	0.01	0.009	0.009
MG/KG	1,1,2-Trichloroethane	24	2	0.2	2	0.4	0.1	0.1
MG/KG	1,1,2,2-Tetrachloroethane	24	3	9	160	20	14	14
MG/KG	Tetrachloroethene	24	4	0.2	4	0.5	0.09	0.09
MG/KG	Vinyl chloride	24	4	0.4	7	0.9	0.5	0.5
MG/KG	Total 1,2-Dichloroethene	24	5	13	190	29	58	58
MG/KG	Methylene chloride	24	3	0.007	0.04	0.01	0.009	0.009
MG/KG	Trichloroethene	24	4	28	460	63	118	118

UCL = Upper confidence limit

EPC = exposure point concentration

Table 11-17A

Exposure Point Concentrations for Surrogate Site 61LE Volatilization from Soils

Rev 1 Memphis Depot Dunn Field RI

Site	Minimum Sample Depth	Maximum Sample Depth	Minimum Detection Depth	Maximum Detection Depth	Chemical	Samples	Detects	Mean of Detects	Mean of Samples	Maximum Detect	Units	Estimated Outdoor Air Concentration (Onsite)*	Units
61LE	3	30	8	30	1,1,2,2-TETRACHLOROETHANE	32	6	6 87E+01	1 29E+01	1 60E+02	MG/KG	1 00E+01	UG/M^3
61LE	3	30	8	16	1,1,2-TRICHLOROETHANE	32	4	2 10E+00	2 70E-01	2 20E+00	MG/KG	1 80E-01	UG/M^3
61LE	3	30	8	16	1,2-DICHLOROETHANE	32	4	3 70E-02	1 26E-02	4 60E-02	MG/KG	1 40E-03	UG/M^3
61LE	3	30	14	16	CHLOROFORM	30	2	4 90E-02	1 17E-02	4 90E-02	MG/KG	3 70E-03	UG/M^3
61LE	3	30	8	16	METHYLENE CHLORIDE	32	5	2 88E-02	1 22E-02	3 90E-02	MG/KG	4 30E-03	UG/M^3
61LE	3	30	8	16	TETRACHLOROETHYLENE(PCE)	32	4	2 23E+00	2 86E-01	4 40E+00	MG/KG	3 20E-01	UG/M^3
61LE	3	30	8	30	TOTAL 1,2-DICHLOROETHENE	32	8	7 75E+01	1 94E+01	1 90E+02	MG/KG	1 10E+01	UG/M^3
61LE	3	30	8	30	TRICHLOROETHYLENE (TCE)	32	6	2 23E+02	4 19E+01	4 60E+02	MG/KG	2 70E+01	UG/M^3
61LE	3	30	8	30	VINYL CHLORIDE	32	8	2 33E+00	5 89E-01	7 00E+00	MG/KG	3 30E-01	UG/M^3

* Based on Average Detected Soil Concentration

Units

Depth = feet

UG/M^3= micrograms per cubic meters

Note EPC is referred to as RME in Appendix tables

Table 11-18

Summary of Risks and Hazards from all Media at Surrogate Site 61LE1

Rev 1 Memphis Depot Dunn Field RI

	Carcinogenic Risks				Noncarcinogenic Hazard Index				
Exposure Route/Receptors	**Ingestion**	**Dermal**	**Inhalation**	**Total ELCR**	**Ingestion**	**Dermal**	**Inhalation**	**Total HI**	**COPCs**
Industrial Worker (Outdoor) [2]									
Surface Media									
Surface Soil	2 E-05	9 E-06	4 E-08	3E-05	0 5	0 04	NA	0 6	PAH, AS, SB
Groundwater									
North Plume (Avg VOCs)	8 E-05	3 E-08	3 E-05	1E-04	0 84	7 01E-04	0 040	0 88	AS, PCA, DCA12, DCE11, CTCL, PCE, TCLME, TCE
Total Risks & Hazards (all media & with ambient air)				***1E-04***				***1 4***	*AS, SB, PAH PCA, TCE, DCA12, DCE11, CTCL PCE, TCLME*
Industrial Worker (Indoor) [1]									
Indoor Air									
Soil-to-Indoor Air			7 E-05	7 E-05			5 0	5 0	PCA, TCE, VC, TOT12DCE
Groundwater (Potable Use)									
North Plume (Avg VOCs)	8 E-05	3 E-08	3 E-05	1E-04	0 84	7 01E-04	0 040	0 88	AS, PCA, DCA12, DCE11, CTCL PCE, TCLME, TCE
Total Risks & Hazards (combined from all pathways)				***2E-04***				***6***	*AS, PCA, DCA12 DCE11, CTCL PCE, TCLME, TCE, VC, TOT12DCE*
Utility Worker									
Surface Media									
Surface Soil	2 E-06	3 E-06	4 E-09	5E-06	0 05	0 01	0	0 06	AS, BaP
Total Risks & Hazards (all media & with ambient air)				***2E-06***				***0.01***	*AS BaP*
Residential Child (Onsite)									
Surface Media									
Surface Soil	N/A	N/A	N/A	NA	13	0 2	NA	14	PAH, AS, SB
Groundwater									
North Plume (Avg VOCs)	NA	NA	N/A	NA	5 5	0 011	0 26	5 7	
Indoor Air									
Soil-to-Indoor Air	NA	NA	N/A	NA			75	75	TOT12DCE
Total Risks & Hazards (combined from all pathways)				***NA***				***94***	*PAH, AS, SB, TOT12DCE*
Residential Adult (Onsite)									
Surface Media									
Surface Soil	2 E-04	6 E-06	2 E-08	2E-04	1	0 02	NA	1	PAH, AS, SB
Groundwater									
North Plume (Ave VOCs)	4 E-04	4 E-07	1 E-04	5E-04	2 3	0 0073	0 11	2 5	AS PCA, DCA12, DCE11, CTCL, PCE, TCLME, TCE
Indoor Air									
Soil-to-Indoor Air			5 E-04	5E-04			21	21	PCA, 112TCA PCE, TCE, VC, TOT12DCE
Total Risks & Hazards (with average ambient air)				***1E-03***				***25***	*PAH, AS, SB PCA, TCE, DCA12, DCE11, CTCL, PCE, TCLME, TOT12DCE, 112TCA, VC*

Note

1 = Indoor air risks from subsurface volatilization from soils is found in Table 11-18A

2 = Worker is assumed to spend all time outdoors

COPCs are the chemicals contributing to risks at or above 1 in a million, and/or to HI at or above 1 0

Where

As	Arsenic		TCLME	Chloroform
BaP	Benzo(a)pyrene		TOT12DCE	Total-1,2-Dichloroethene
CTCL	Carbon tetrachloride		VC	Vinyl Chloride
12DCA	1,2-Dichloroethane		11DCE	1 1-Dichloroethene
PAH	Polyaromatic hydrocarbons		PCE	Tetrachloroethene
SB	Antimony			
112TCA	1 1,2-Trichloroethane			
TCE	Trichloroethane			

Table 11-18A

Summary of Indoor Air Risks and Hazards from Soils at Surrogate Site 61

Rev. 1 Memphis Depot Dunn Field RI

Site	*Onsite* Indoor Air Risk[1]					
	ELCR			HI		
	Future Onsite Worker (Indoor)	Future Onsite Residential Adult*	Future Onsite Residential Child	Future Onsite Worker (Indoor)	Future Onsite Residential Adult	Future Onsite Residential Child
61LE	6.6E-05	5.1E-04	NA	5.0	21	75

* Age-adjusted to reflect 6 years as a child and 24 years as an adult (Exposure Time = 30 years)

[1] Calculated using Johnson Ettinger Model provided by EPA (1997), Appendix I3-F

Table 11-19
Remedial Action Objectives for the Disposal Area
Rev 1 Memphis Depot Dunn Field RI

Media	Land Use	Remedial Action Objectives (from RI)	General Response Actions
Surface Soil	Maintenance Worker	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Industrial Worker (Outdoor)	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Residential Adult	Risks exceed acceptable range of 1 in 10,000 to one million and hazard index (HI) is greater than 1 0, for ingestion, dermal and inhalation exposures combined	Institutional Controls Excavation Containment/In-situ Treatment
	Residential Child	Hazard index (HI) is greater than 1 0, for ingestion, dermal and inhalation exposures combined	Institutional Controls Excavation Containment/In-situ Treatment
Soil Column	Utility Worker	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion dermal and inhalation exposures combined	No Action
Subsurface Soil (Buried Waste)	Utility Worker	Buried wastes may present a physical or chemical hazard to workers during activities which would disturb subsurface soil such as excavation, drilling, etc.	Institutional Controls to prevent subsurface disturbance of buried wastes
Groundwater	Industrial worker	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs for combined ingestion, dermal, and inhalation exposures to potable groundwater	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
	Residential Adult	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs for combined ingestion, dermal, and inhalation exposures to potable groundwater	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
	Residential Child	HI exceeds 1 0 due to presence of chlorinated VOCs for combined ingestion dermal, and inhalation exposures to potable groundwater	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
Indoor Air (Soil-to-Indoor Air)	Industrial worker	Risks exceed acceptable range of 1 in 10,000 to one million, and hazard index (HI) is greater than 1 0, for inhalation exposures due to chlorinated VOCs in some localized locations across the Disposal Area	Institutional Controls for localized contaminants Excavation Containment
	Residential Adult	Risks exceed acceptable range of 1 in 10,000 to one million, and hazard index (HI) is greater than 1 0, for inhalation exposures due to chlorinated VOCs in some localized locations across the Disposal Area	Institutional Controls for localized contaminants Excavation Containment
	Residential Child	HI is greater than 1 0, for inhalation exposures due to chlorinated VOCs in some localized locations across the Disposal Area	Institutional Controls for localized contaminants Excavation Containment
Indoor Air (Groundwater-to-Indoor Air)	Industrial worker	Risks below acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for inhalation exposures to indoor air	No Action
	Residential Adult	Risks below acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for inhalation exposures to indoor air	No Action
	Residential Child	HI is less than 1 0 for inhalation exposures to indoor air	No Action
Sediment & Surface Water	Maintenance Worker	Risks within acceptable range of 1 in 10,000 to one million and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Industrial Worker	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
Disposal Sites		See Risk definition in Section 11 1	Eliminate potential for groundwater impacts from a release of buried containerized hazardous liquids and the leaching of contaminants from buried hazardous soilds, and, eliminate future unacceptable risk of direct contact with buried hazardous liquid and/or solids due to intrusive activities during future land use or site development

TABLE 11-20
Step 2 Surface Soil Screening Level Risk Calculations for the Disposal Area
Memphis Depot Dunn Field RI

Parameter	Frequency of Detection		Range of Detected Values						
	Number Analyzed	Number Detected	Minimum (mg/kg)	Qual	Maximum (mg/kg)	Qual	Surface Soil Screening Value[1] (mg/kg)	Hazard Quotient (based on Max. detect)	Retained as a COPC?
Inorganics									
ALUMINUM	38	38	6070		25100		50	**502**	Yes
ANTIMONY	38	18	4.7		355		3.5	**101**	Yes
ARSENIC	38	38	4.6		43.7		10	**4**	Yes
BARIUM	1	1	115		115		165	0.7	No
BERYLLIUM	38	30	0.29		1.3		1.1	**1.2**	Yes
CADMIUM	38	4	0.64		1.2		1.6	0.8	No
CALCIUM	1	1	986		986		NA	**NA**	Yes
CHROMIUM, TOTAL	38	38	9.5		109		0.4	**273**	Yes
COBALT	2	2	7.4		10.3		20	0.5	No
COPPER	38	38	6.8		171		40	**4**	Yes
IRON	1	1	25600		25600		200	**128**	Yes
LEAD	38	38	7.4		789		50	**16**	Yes
MAGNESIUM	1	1	2960		2960		NA	**NA**	Yes
MANGANESE	1	1	866		866		100	**9**	Yes
MERCURY	38	10	0.03		1.3		0.1	**13**	Yes
NICKEL	38	37	9.9		27.2		30	0.9	No
POTASSIUM	1	1	1320		1320		NA	**NA**	Yes
SELENIUM	38	8	0.24		0.59		0.81	0.7	No
SILVER	38	11	0.65		1.5		2	0.8	No
SODIUM	1	1	58.2		58.2		NA	**NA**	Yes
THALLIUM	38	18	0.22		0.68		1	0.7	No
VANADIUM	1	1	33.6		33.6		2	**17**	Yes
ZINC	38	38	44.2		935		50	**19**	Yes
Organics									
OCTACHLORODIBENZO-p-DIOXIN	1	1	0.00013		0.00013		0.1	0.0	No
ALPHA-CHLORDANE	26	7	0.00025		0.0058		0.1	0.1	No
DIELDRIN	26	18	0.00054		0.964		0.0005	**1928**	Yes
ENDOSULFAN SULFATE	26	5	0.0043		0.0799		NA	**NA**	Yes
ENDRIN	26	1	0.0036		0.0036		0.001	**4**	Yes
ENDRIN KETONE	26	1	0.003		0.003		0.001	**3**	Yes
GAMMA-CHLORDANE	26	6	0.0003		0.0042		0.1	0.0	No
HEPTACHLOR EPOXIDE	26	2	0.0034		0.029		NA	**NA**	Yes

TABLE 11-20
Step 2 Surface Soil Screening Level Risk Calculations for the Disposal Area
Memphis Depot Dunn Field RI

Parameter	Frequency of Detection		Range of Detected Values						
	Number Analyzed	Number Detected	Minimum (mg/kg)	Qual	Maximum (mg/kg)	Qual	Surface Soil Screening Value^1 (mg/kg)	Hazard Quotient (based on Max. detect)	Retained as a COPC?
METHOXYCHLOR	26	2	0.0042		0.0543		NA	**NA**	Yes
p,p'-DDD	26	19	0.00024		0.126		0.0025	**50**	Yes
p,p'-DDE	26	21	0.00057		0.6		0.0025	**240**	Yes
p,p'-DDT	26	22	0.00029		1.46		0.0025	**584**	Yes
2-METHYLNAPHTHALENE	26	2	0.11		0.34		0.1	**3**	Yes
ACENAPHTHENE	26	6	0.014		1.3		20	0.1	No
ANTHRACENE	26	7	0.0084		1.8		0.1	**18**	Yes
BENZO(a)ANTHRACENE	26	16	0.0093		5.8		0.1	**58**	Yes
BENZO(a)PYRENE	26	16	0.057		6.7		0.1	**67**	Yes
BENZO(b)FLUORANTHENE	26	14	0.074		8.2		0.1	**82**	Yes
BENZO(g,h,i)PERYLENE	26	17	0.035		3.8		0.1	**38**	Yes
BENZO(k)FLUORANTHENE	26	15	0.069		6.3		0.1	**63**	Yes
CHRYSENE	26	16	0.068		6.3		0.1	**63**	Yes
DIBENZ(a,h)ANTHRACENE	26	12	0.02		1.6		0.1	**16**	Yes
FLUORANTHENE	26	17	0.098		17		0.1	**170**	Yes
FLUORENE	26	5	0.01		0.86		0.1	**9**	Yes
INDENO(1,2,3-c,d)PYRENE	26	16	0.038		4.6		0.1	**46**	Yes
NAPHTHALENE	26	2	0.25		0.26		0.1	**3**	Yes
PHENANTHRENE	26	15	0.011		13		0.1	**130**	Yes
PYRENE	26	17	0.072		12		0.1	**120**	Yes
PCB-1254 (AROCHLOR 1254)	26	1	0.0121		0.0121		0.02	0.6	No
PCB-1260 (AROCHLOR 1260)	26	4	0.0045		0.12		0.02	**6**	Yes
BENZYL BUTYL PHTHALATE	26	1	0.0034		0.0034		0.1	0.0	No
bis(2-ETHYLHEXYL) PHTHALATE	26	6	0.016		0.17		0.1	**2**	Yes
CARBAZOLE	26	6	0.049		2		NA	**NA**	Yes
DI-n-BUTYL PHTHALATE	26	2	0.01		0.018		0.1	0.2	No

TABLE 11-20
Step 2 Surface Soil Screening Level Risk Calculations for the Disposal Area
Memphis Depot Dunn Field RI

	Frequency of Detection		Range of Detected Values						
Parameter	**Number Analyzed**	**Number Detected**	**Minimum (mg/kg)**	**Qual**	**Maximum (mg/kg)**	**Qual**	**Surface Soil Screening Value[1] (mg/kg)**	**Hazard Quotient (based on Max. detect)**	**Retained as a COPC?**
DIBENZOFURAN	26	2	0.3		0.52		0.1	**5**	Yes
DIETHYL PHTHALATE	26	1	0.15		0.15		0.1	**2**	Yes
1,1,2,2-TETRACHLOROETHANE	39	2	0.007		0.083		0.1	0.8	No
1,1,2-TRICHLOROETHANE	39	1	0.002		0.002		NA	**NA**	Yes
1,1-DICHLOROETHENE	39	1	0.002		0.002		NA	**NA**	Yes
1,2-DICHLOROPROPANE	39	1	0.002		0.002		NA	**NA**	Yes
ACETONE	39	2	0.2		0.44		NA	**NA**	Yes
BENZENE	39	3	0.002		0.028		0.05	0.6	No
CARBON DISULFIDE	39	1	0.015		0.015		NA	**NA**	Yes
CARBON TETRACHLORIDE	39	2	0.001		0.039		1000	0.0	No
CHLOROFORM	39	6	0.001		0.089		0.001	**89**	Yes
ETHYLBENZENE	39	1	0.006		0.006		0.05	0.1	No
METHYL ETHYL KETONE (2-BUTANONE)	39	24	0.002		0.039		NA	**NA**	Yes
METHYLENE CHLORIDE	39	1	0.0007		0.0007		0.1	0.0	No
STYRENE	39	3	0.0003		0.0008		0.1	0.0	No
TETRACHLOROETHYLENE(PCE)	39	9	0.0003		0.049		0.01	**5**	Yes
TOLUENE	39	3	0.0008		0.026		0.05	0.5	No
TOTAL 1,2-DICHLOROETHENE	39	7	0.0009		0.87		0.1	**9**	Yes
Total Xylenes	39	1	0.011		0.011		NA	**NA**	Yes
TRICHLOROETHYLENE (TCE)	39	10	0.0009		0.85		0.001	**850**	Yes
VINYL CHLORIDE	39	1	0.11		0.11		0.01	**11**	Yes

1 = Memorandum, Ecological Risk Assessment at Military Bases Process Consideration, Timing, of Activities, and Inclusion of Stakeholders EPA Region 4, December 22, 1998

TABLE 11-21
Step 3 Refinement of Surface Soil Contaminants of Concern for the Disposal Area
Memphis Depot Dunn Field RI

COPCs	COPC Concentrations (mg/kg)			Comparison Criteria (mg/kg)				Hazard Quotients				Background Comparisons		
	Maximum	Average[a]	Background	Primary Soil Screening Criterion	Basis	Secondary Soil Screening Criterion	Basis	Max Compared to Primary	Avg Compared to Primary	Max Compared to Secondary	Avg Compared to Secondary	Maximum Exceeds Background	Average Exceeds Background	Frequency of Detection (%)
Inorganics														
ALUMINUM	25100	12391	23810	50	2	600	3	502	248	42	21	Yes	No	100
ANTIMONY	355	14	7	3.5	9	5	2	101	4	71	3	Yes	Yes	47
ARSENIC	43.7	10.8	20.0	10	2	29	4	4	1.1	2	0.4	Yes	No	100
BERYLLIUM	1.3	0.5	1.1	1.1	9			1.2	0.5			Yes	No	79
CHROMIUM, TOTAL	109	24	25	0.4	1	1	2	273	61	109	24	Yes	No	100
COPPER	171	37	34	40	9	50	2,6	4	0.9	3	0.7	Yes	Yes	100
IRON	25600	25600	37040	200	3			128	128			No	No	100
LEAD	789	94	30	50	2,6	500	1	16	2	2	0.2	Yes	Yes	100
MANGANESE	866	866	1304	100	3	500	2	9	9	2	2	No	No	100
MERCURY	1.3	0.1	0.4	0.1	1	0.3	2,4	13	1.0	4	0.3	Yes	No	26
VANADIUM	33.6	33.6	48.4	2	2	20	3	17	17	2	2	No	No	100
ZINC	935	121	126	50	2	100	3	19	2	9	1.2	Yes	No	100
Organics														
DIELDRIN	0.964	0.073	0.086	0.0005	4			1928	146			Yes	No	69
ENDOSULFAN SULFATE	0.0799	0.0130												19
ENDRIN	0.0036	0.0084												4
ENDRIN KETONE	0.003	0.008												4
HEPTACHLOR EPOXIDE	0.029	0.009	0.0045									Yes	Yes	8
METHOXYCHLOR	0.0543	0.0179												8
p,p'-DDD	0.126	0.018	0.0067	0.0025	4	4	5	50	7	0.0	0.0	Yes	Yes	73
p,p'-DDE	0.6	0.1	0.16	0.0025	4	4	5	240	30	0.2	0.0	Yes	No	81
p,p'-DDT	1.46	0.17	0.074	0.0025	4	4	5	584	68	0.4	0.0	Yes	Yes	85
2-METHYLNAPHTHALENE	0.34	0.16		0.1	6	5	7	3	2	0.1	0.0			8
ANTHRACENE	1.8	0.2	0.096	0.1	6	10	7	18	2	0.2	0.0	Yes	Yes	27
BENZO(a)ANTHRACENE	5.8	0.6	0.71	0.1	6	1	7	58	6	6	0.6	Yes	No	62
BENZO(a)PYRENE	6.7	0.7	0.96	0.1	6	1	7	67	7	7	0.7	Yes	No	62
BENZO(b)FLUORANTHENE	8.2	0.8	0.9	0.1	6	1	7	82	8	8	0.8	Yes	No	54
BENZO(g,h,i)PERYLENE	3.8	0.5	0.82	0.1	6	1	7	38	5	4	0.5	Yes	No	65
BENZO(k)FLUORANTHENE	6.3	0.6	0.78	0.1	6	1	7	63	6	6	0.6	Yes	No	58
CHRYSENE	6.3	0.7	0.94	0.1	6	1	7	63	7	6	0.7	Yes	No	62
DIBENZ(a,h)ANTHRACENE	1.6	0.2	0.26	0.1	6	1	7	16	2	2	0.2	Yes	No	46
FLUORANTHENE	17	1	1.6	0.1	6	10	7	170	14	2	0.1	Yes	No	65
FLUORENE	0.86	0.18		0.1	6	1	7	9	2	0.9	0.2			19
INDENO(1,2,3-c,d)PYRENE	4.6	0.5	0.7	0.1	6	1	7	46	5	5	0.5	Yes	No	62
NAPHTHALENE	0.26	0.16		0.1	6	5	7	3	2	0.1	0.0			8
PHENANTHRENE	13	0.9	0.61	0.1	6	5	7	130	9	3	0.2	Yes	Yes	58
PYRENE	12	1.1	1.5	0.1	6	10	7	120	11	1.2	0.1	Yes	No	65
PCB-1260 (AROCHLOR 1260)	0.12	0.01	0.11	0.02	4	1	5	6	0.6	0.1	0.0	Yes	No	15
bis(2-ETHYLHEXYL) PHTHALATE	0.17	0.14		0.1	4	100	4	2	1.4	0.0	0.0			23
CARBAZOLE	2	0.3	0.067									Yes	Yes	23
DIBENZOFURAN	0.52	0.17	0.647	0.1	6	1	7	5	2	0.5	0.2	No	No	8
DIETHYL PHTHALATE	0.15	0.15		0.1	4	100	2	2	2	0.0	0.0			4

TABLE 11-21
Step 3 Refinement of Surface Soil Contaminants of Concern for the Disposal Area
Memphis Depot Dunn Field RI

	COPC Concentrations (mg/kg)			Comparison Criteria (mg/kg)				Hazard Quotients				Background Comparisons		
COPCs	Maximum	Average[a]	Background	Primary Soil Screening Criterion	Basis	Secondary Soil Screening Criterion	Basis	Max. Compared to Primary	Avg Compared to Primary	Max Compared to Secondary	Avg Compared to Secondary	Maximum Exceeds Background	Average Exceeds Background	Frequency of Detection (%)
1,1,2-TRICHLOROETHANE	0 002	0 004												3
1,1-DICHLOROETHENE	0 002	0 005												3
1,2-DICHLOROPROPANE	0 002	0 004												3
ACETONE	0 44	0 05												5
CARBON DISULFIDE	0 015	0 005	0 002									Yes	Yes	3
CHLOROFORM	0 089	0 007		0 001	*4*	10	5	89	7	0 0	0 0			15
METHYL ETHYL KETONE (2-BUTANONE)	0 039	0 012	0 002									Yes	Yes	62
TETRACHLOROETHYLENE(PCE)	0 049	0 006		0 01	*4*	0 1	6	5	0 6	0 5	0 1			23
TOTAL 1,2-DICHLOROETHENE	0 87	0 03		0 1	*6*	5	7	9	0 3	0 2	0 0			18
Total Xylenes	0 011	0 005	0 009	0 05	*4,6*	25	5	0 2	0 1	0 0	0 0	Yes	No	3
TRICHLOROETHYLENE (TCE)	0 85	0 05		0 001	*4*	0 1	6	850	48	9	0 5			26
VINYL CHLORIDE	0 11	0 01												3

Notes
a Average of all sample data (includes non-detects)
Ca, Mg, K, Na were detected, however these parameters were not evaluated since they are commonly occurring elements
1 Efroymson, R A et al 1997a Oak Ridge National Laboratory, toxicological banchmarks for earthworms
2 Efroymson, R A et al 1997b Oak Ridge National Laboratory, toxicological banchmarks for plants
3 Efroymson, R A et al 1997a Oak Ridge National Laboratory, toxicological banchmarks for microorganisms
4 Ministry of Housing, Spatial Planning and Environment, 1994 optimum soil quality standards
5 Beyer, W N 1990 US Fish and Wildlife Service Dutch background
6 Crommenttuijn, T et al , 1997 RIVM Report No 601501002

Figures

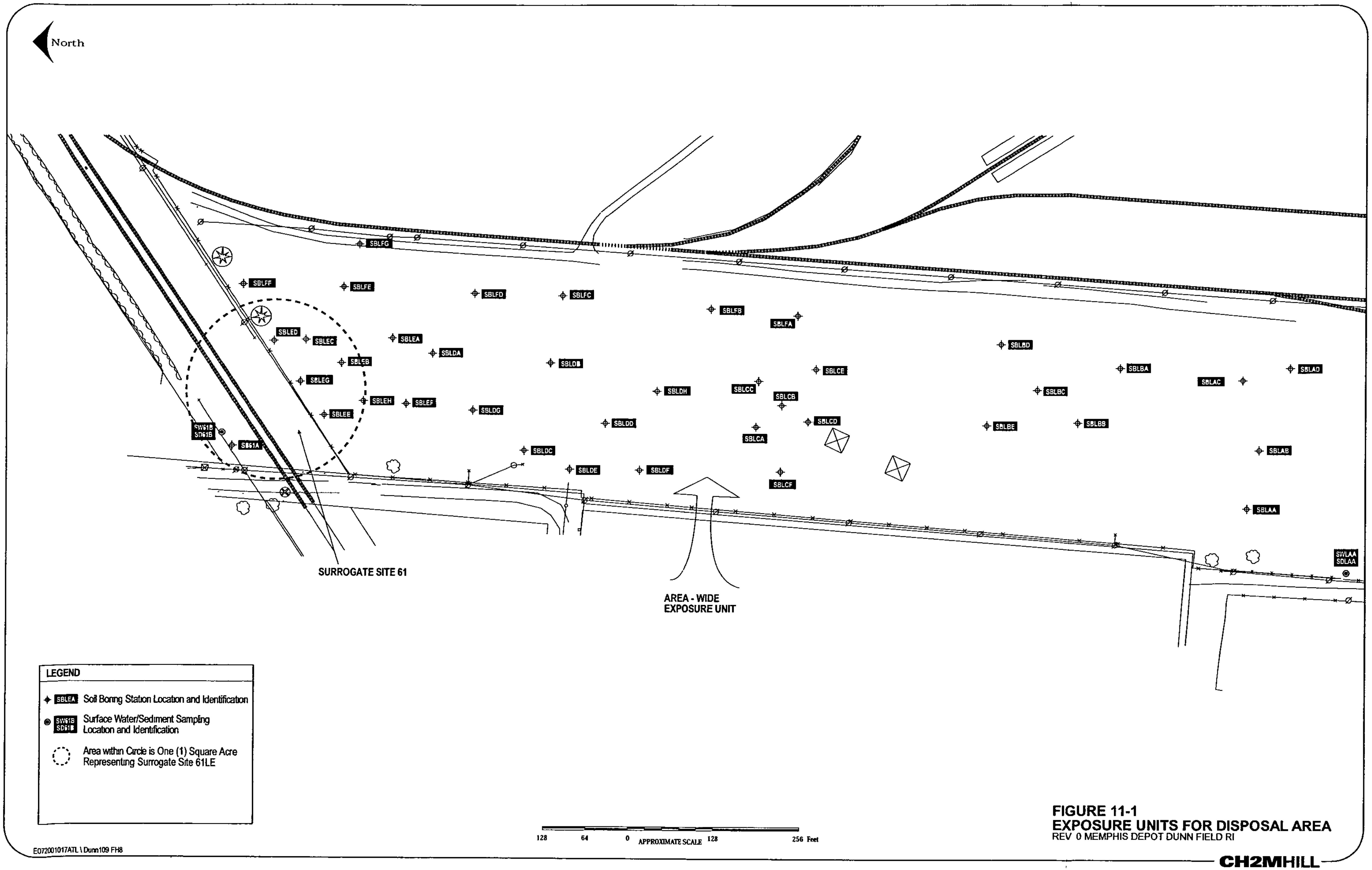
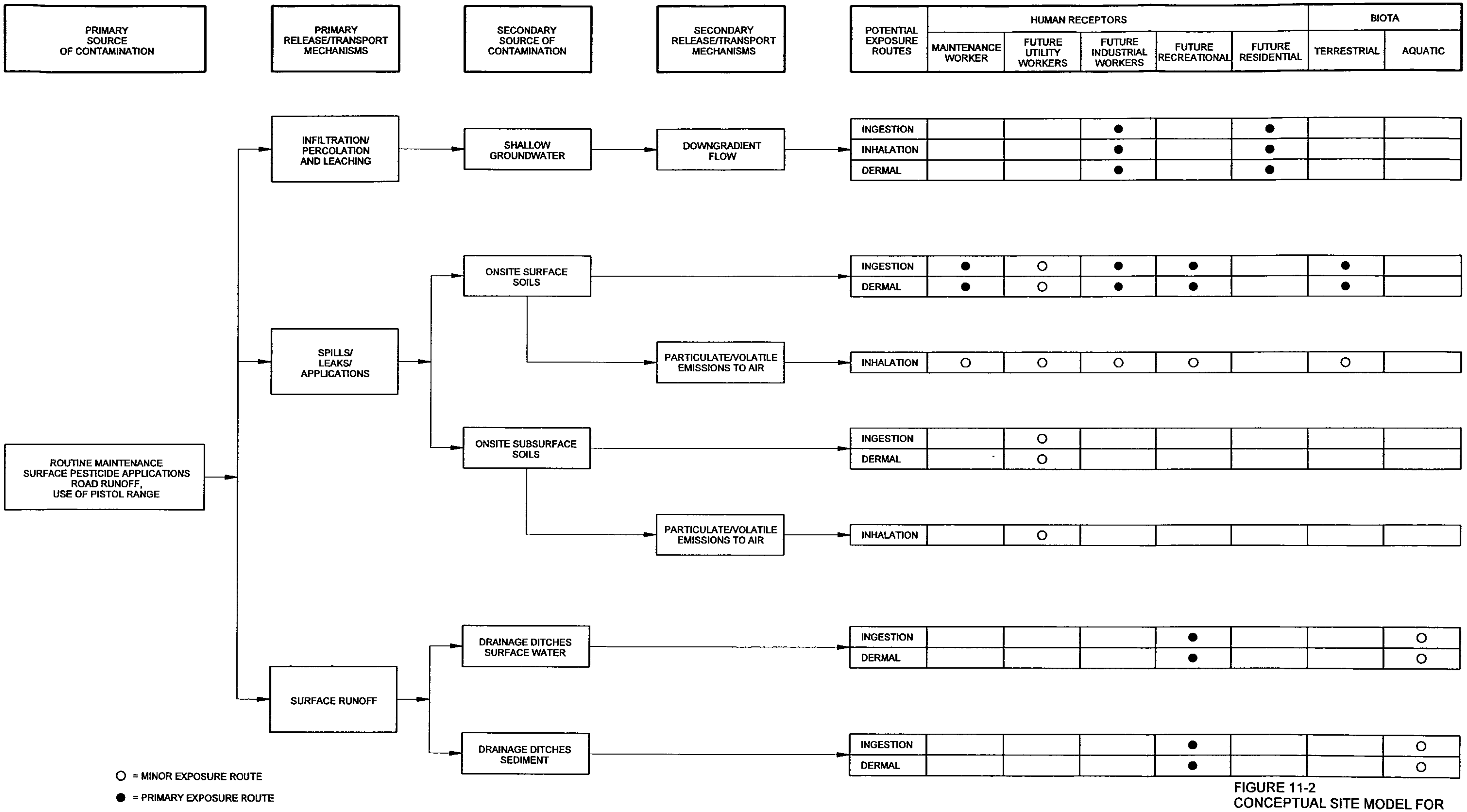


FIGURE 11-1
EXPOSURE UNITS FOR DISPOSAL AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI



POTENTIAL EXPOSURE ROUTES	HUMAN RECEPTORS					BIOTA	
	MAINTENANCE WORKER	FUTURE UTILITY WORKERS	FUTURE INDUSTRIAL WORKERS	FUTURE RECREATIONAL	FUTURE RESIDENTIAL	TERRESTRIAL	AQUATIC
INGESTION			●		●		
INHALATION			●		●		
DERMAL			●		●		
INGESTION	●	○	●	●		●	
DERMAL	●	○	●	●		●	
INHALATION	○	○	○	○		○	
INGESTION		○					
DERMAL		○					
INHALATION		○					
INGESTION				●			○
DERMAL				●			○
INGESTION				●			○
DERMAL				●			○

FIGURE 11-2
CONCEPTUAL SITE MODEL FOR POTENTIAL HUMAN AND ECOLOGICAL EXPOSURES DUNN FIELD DISPOSAL AREA
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 18-OCT-2001 8071dfn01-11-2 dgn

Figure 11-3. Total Excess Lifetime Cancer Risk for Surface Media Exposure at Dunn Field

Rev. 0 Memphis Depot Dunn Field RI

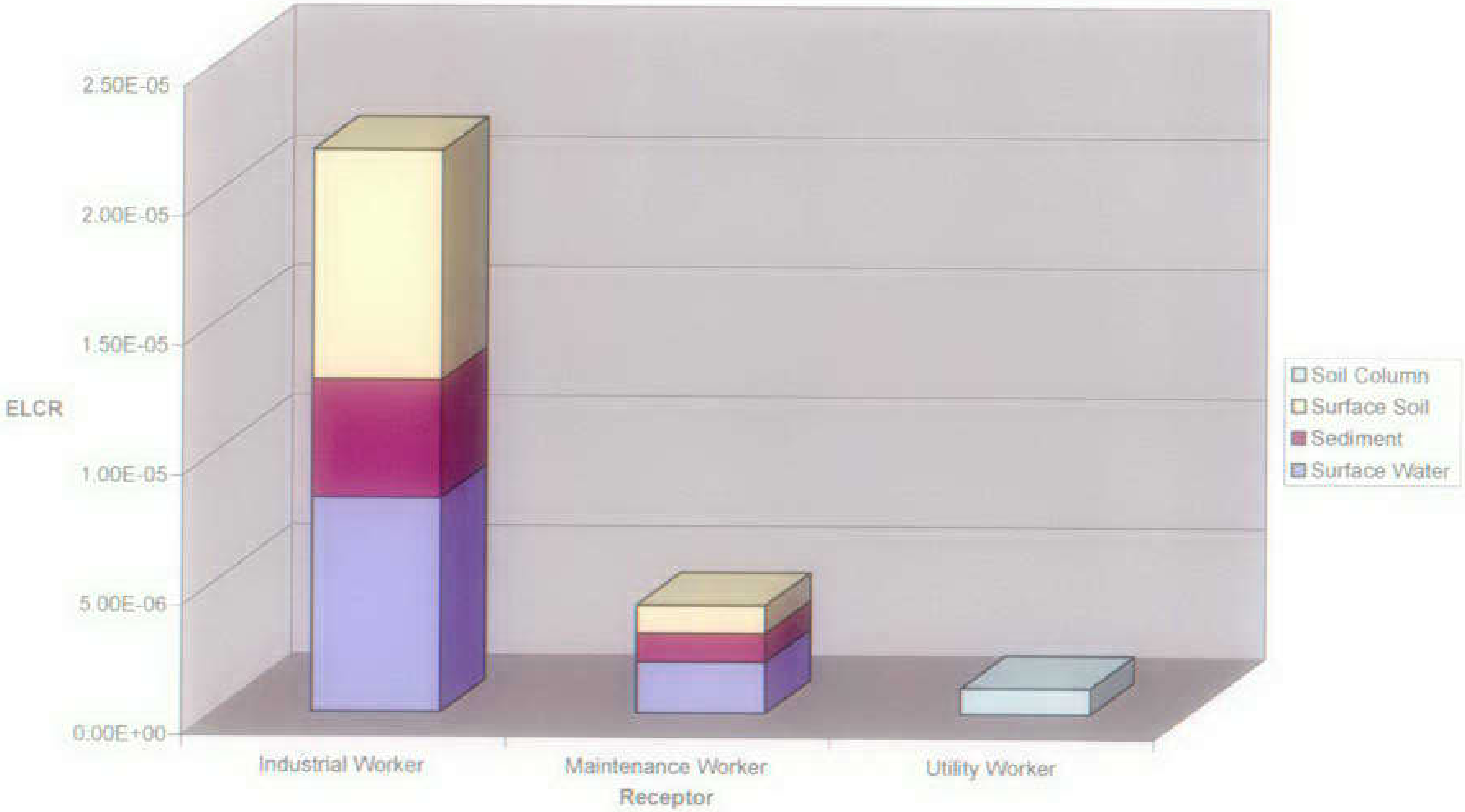


Figure 11-4. Total Hazard Index for Surface Media Exposure at Dunn Field

Rev. 0 Memphis Depot Dunn Field RI

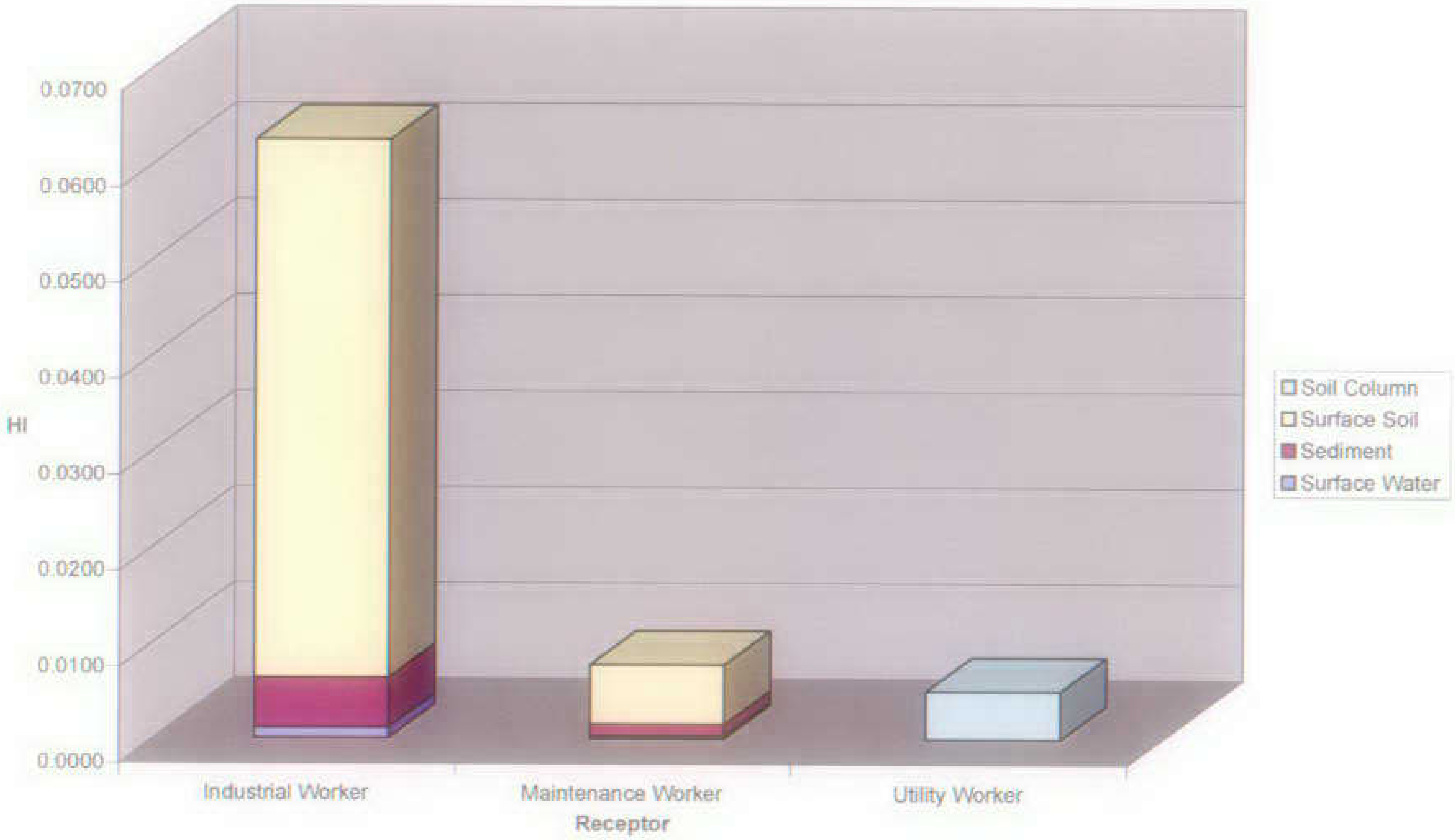
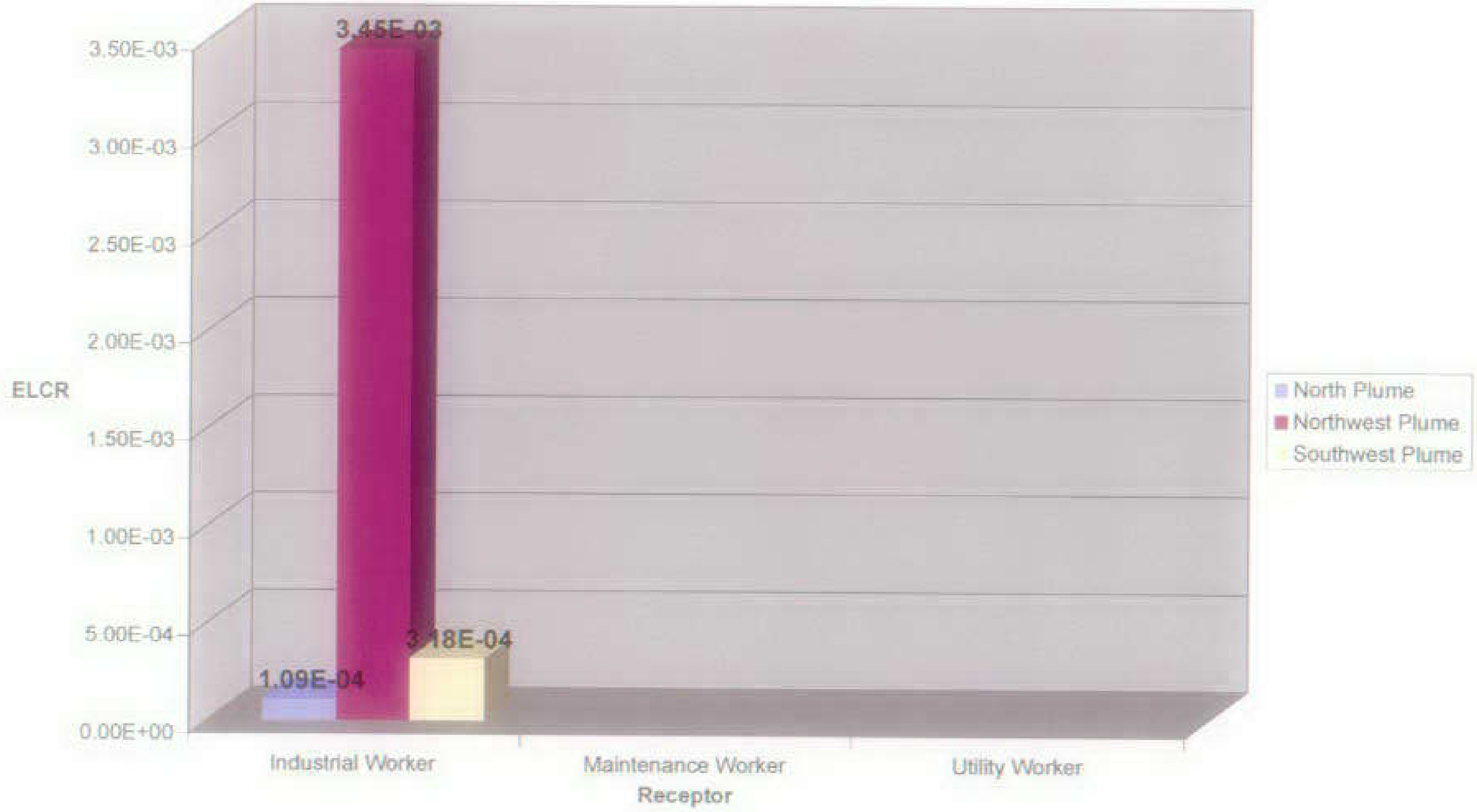


Figure 11-5. Excess Lifetime Cancer Risk for Groundwater Exposure at Disposal Area

Rev. 0 Memphis Depot Dunn Field RI



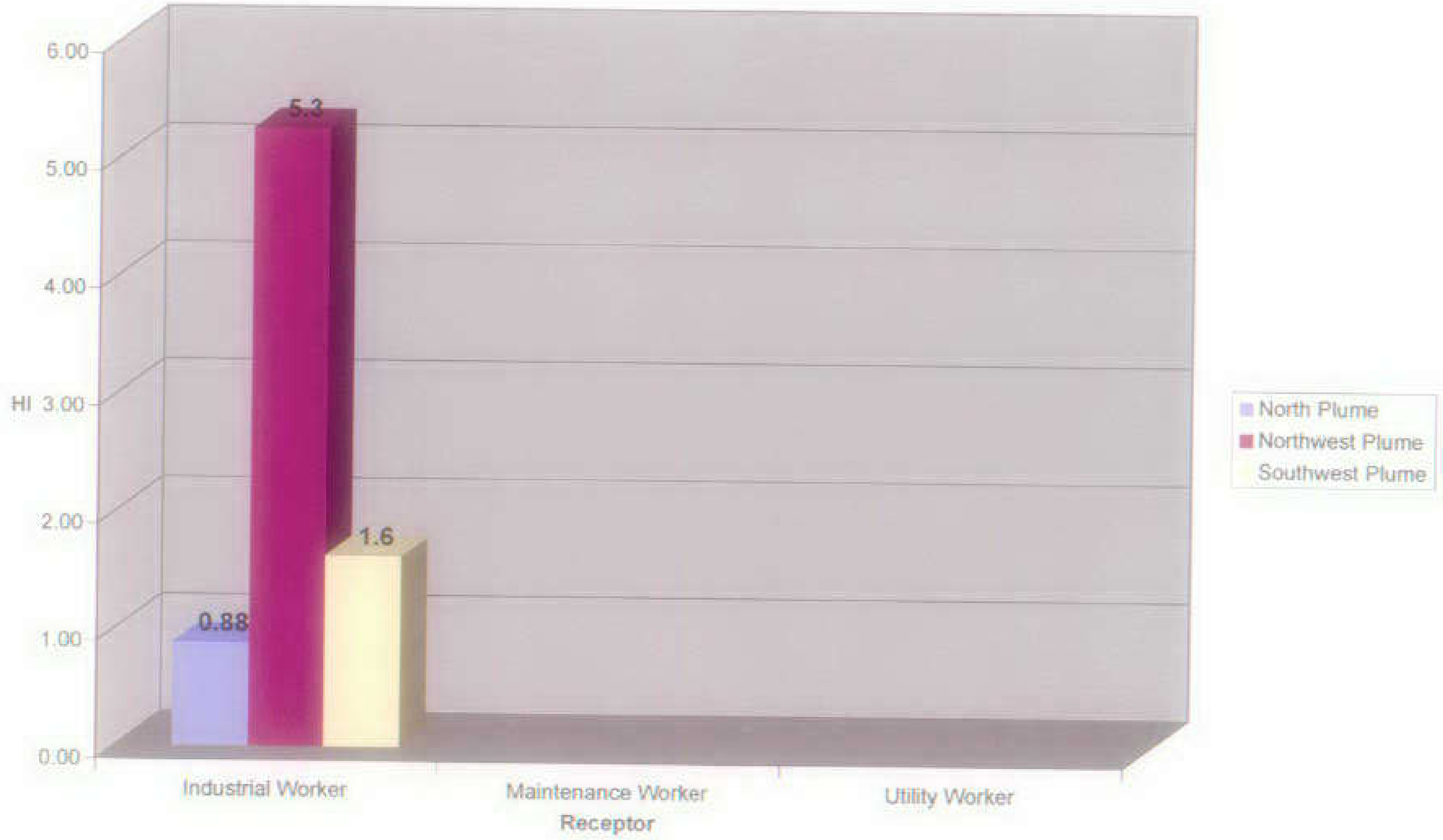


Figure 11-6. Total HI for Groundwater Exposure at Disposal Area

Rev. 0 Memphis Depot Dunn Field RI

Figure 11-7. Hazard Indices for Surface Soil Exposure at Surrogate Site 61LE.

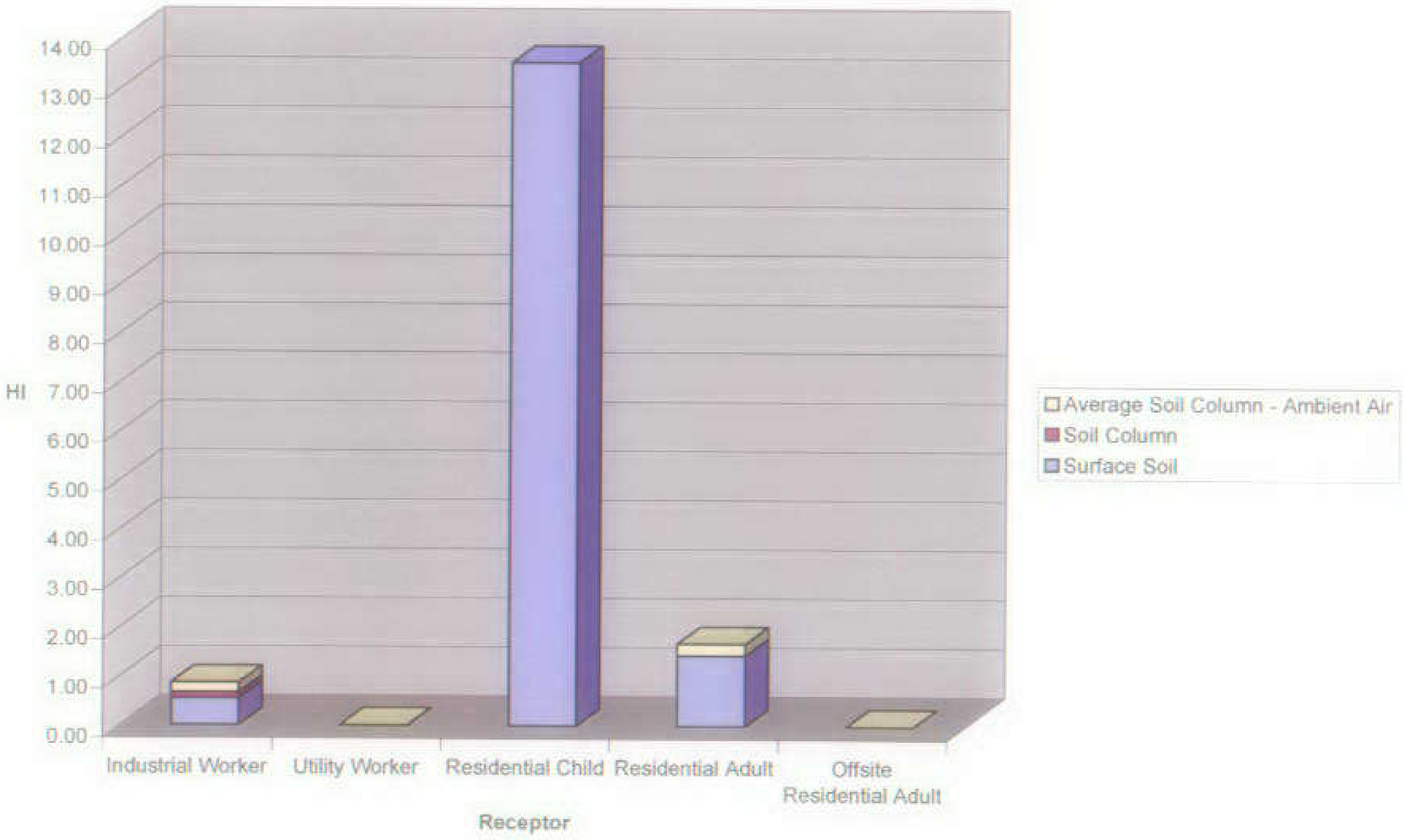


Figure 11-8. Total Excess Lifetime Cancer Risk for Surface Media Exposure at Surrogate Site 61LE

Rev. O Memphis Depot Dunn Field RI

Figure 11-9. Hazard Indices for Surface Media Exposure at Surrogate Site 61LE
Rev. O Memphis Depot Dunn Field RI

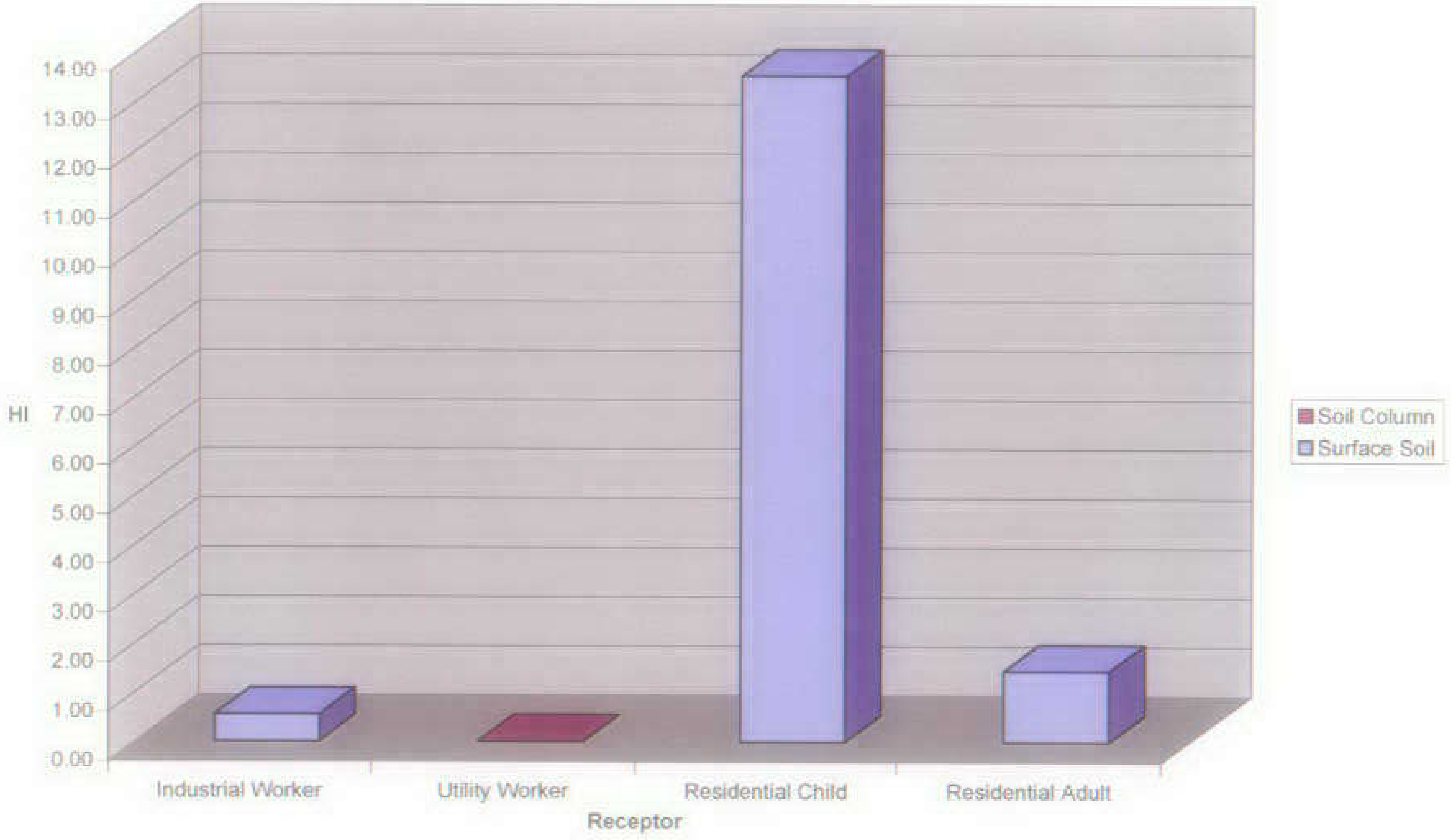


Figure 11-10. Excess Lifetime Cancer Risk for Groundwater Exposure at Surrogate Site 61LE
Rev. O Memphis Depot Dunn Field RI

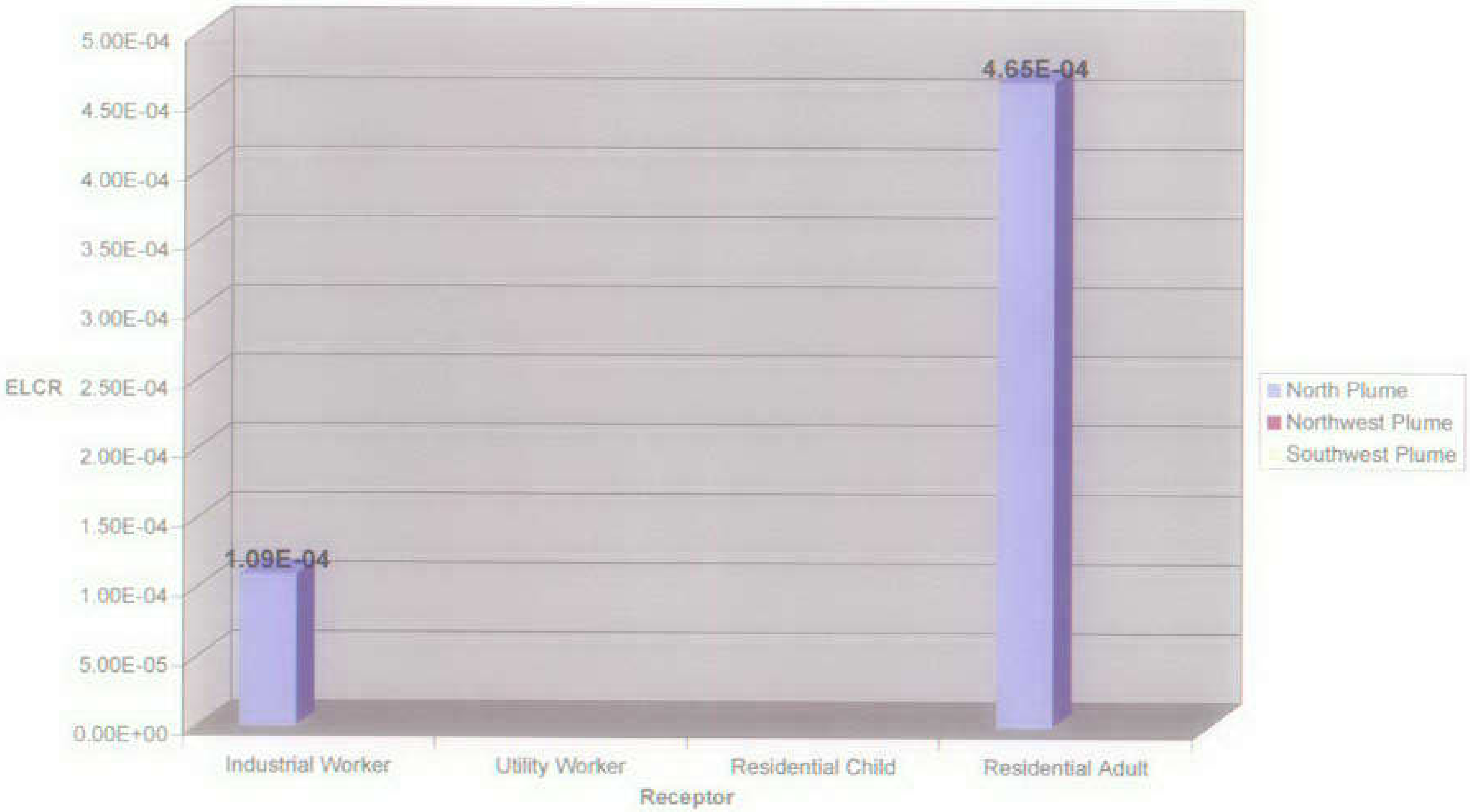


Figure 11-11. Hazard Index for Groundwater Exposure at Surrogate Site 61LE

Rev. O Memphis Depot Dunn Field RI

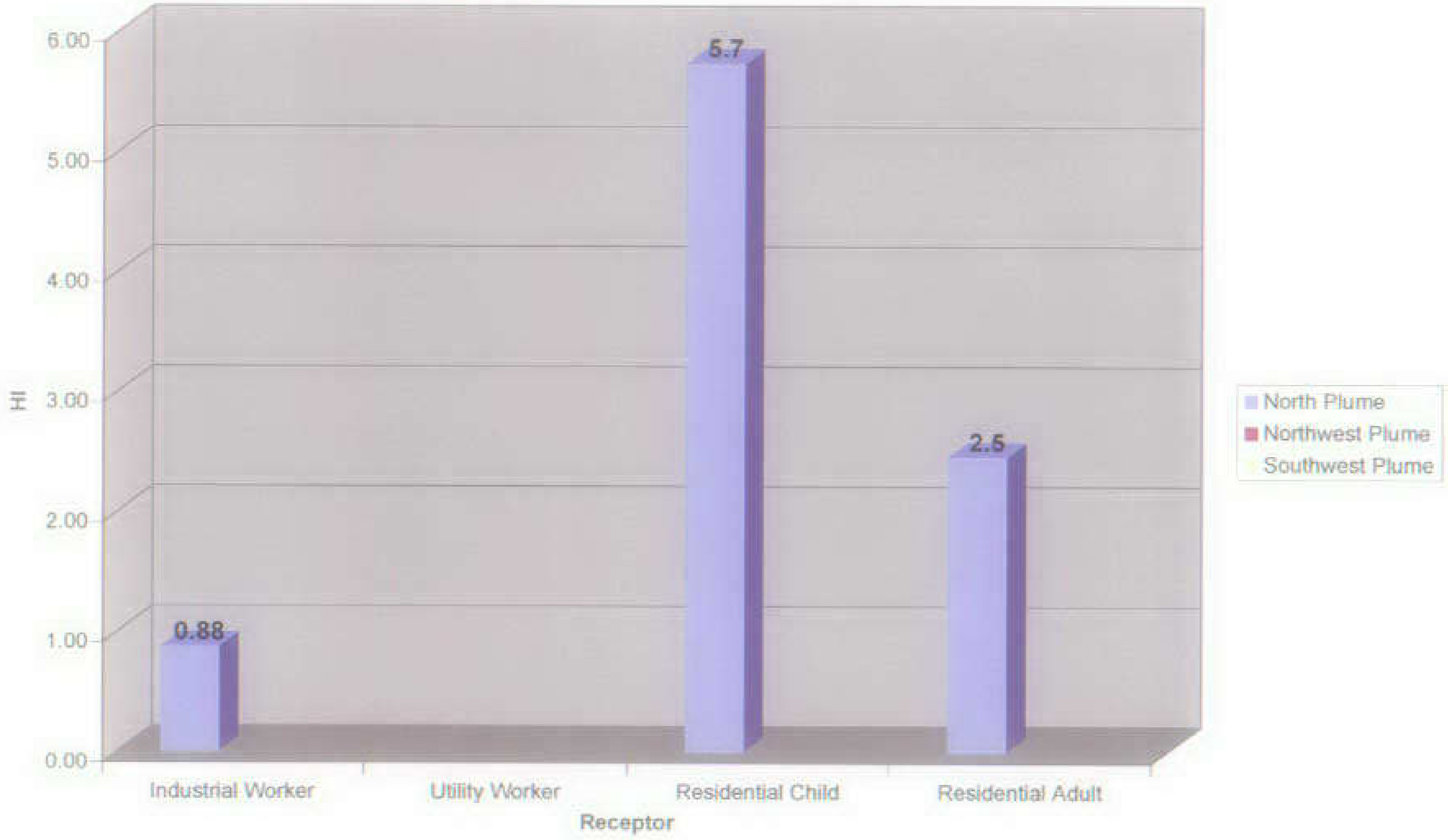


Figure 11-12. ELCR for Indoor Air Exposure from Subsurface Soil Volatilization
Rev. O Memphis Depot Dunn Field RI

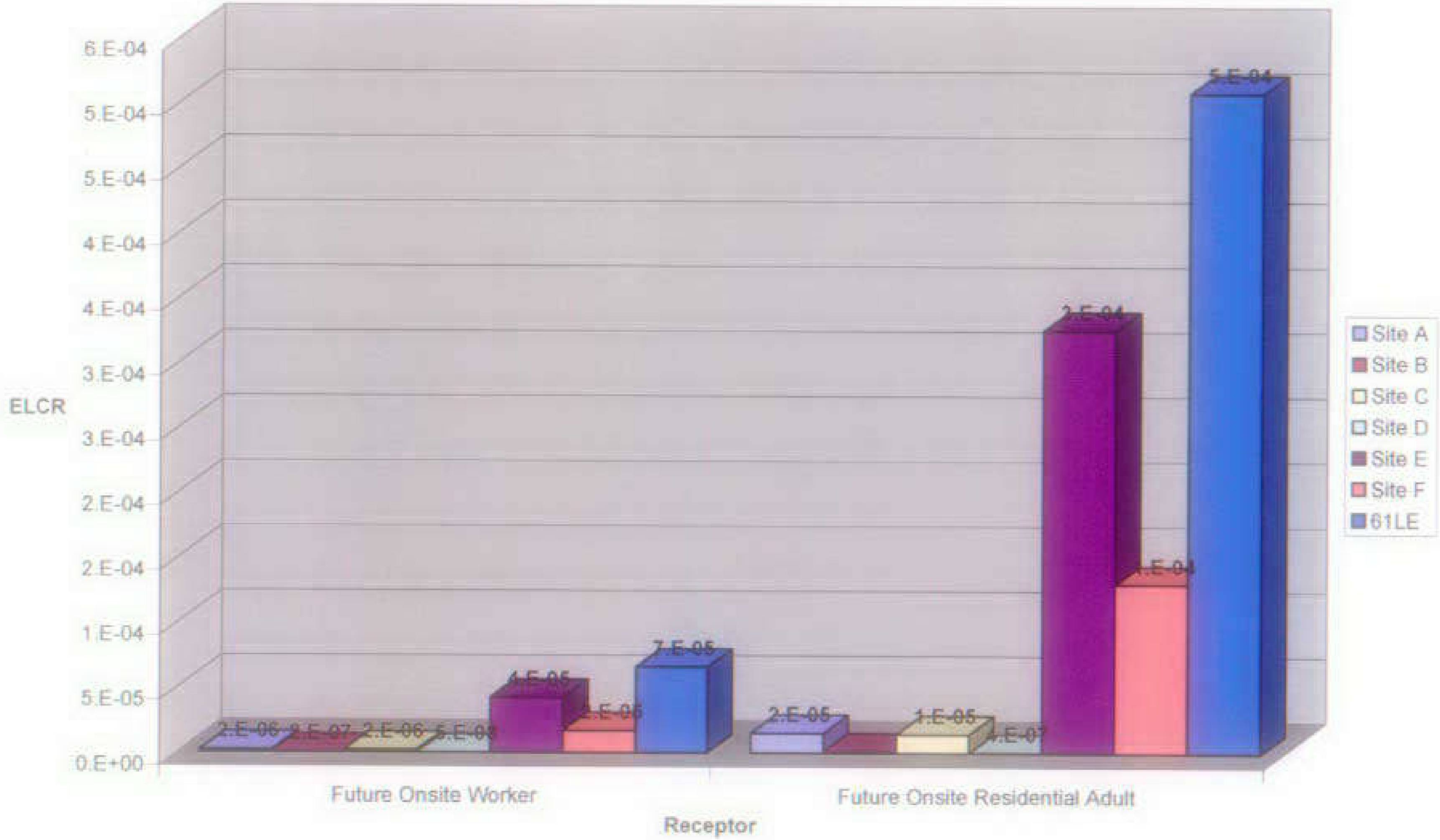
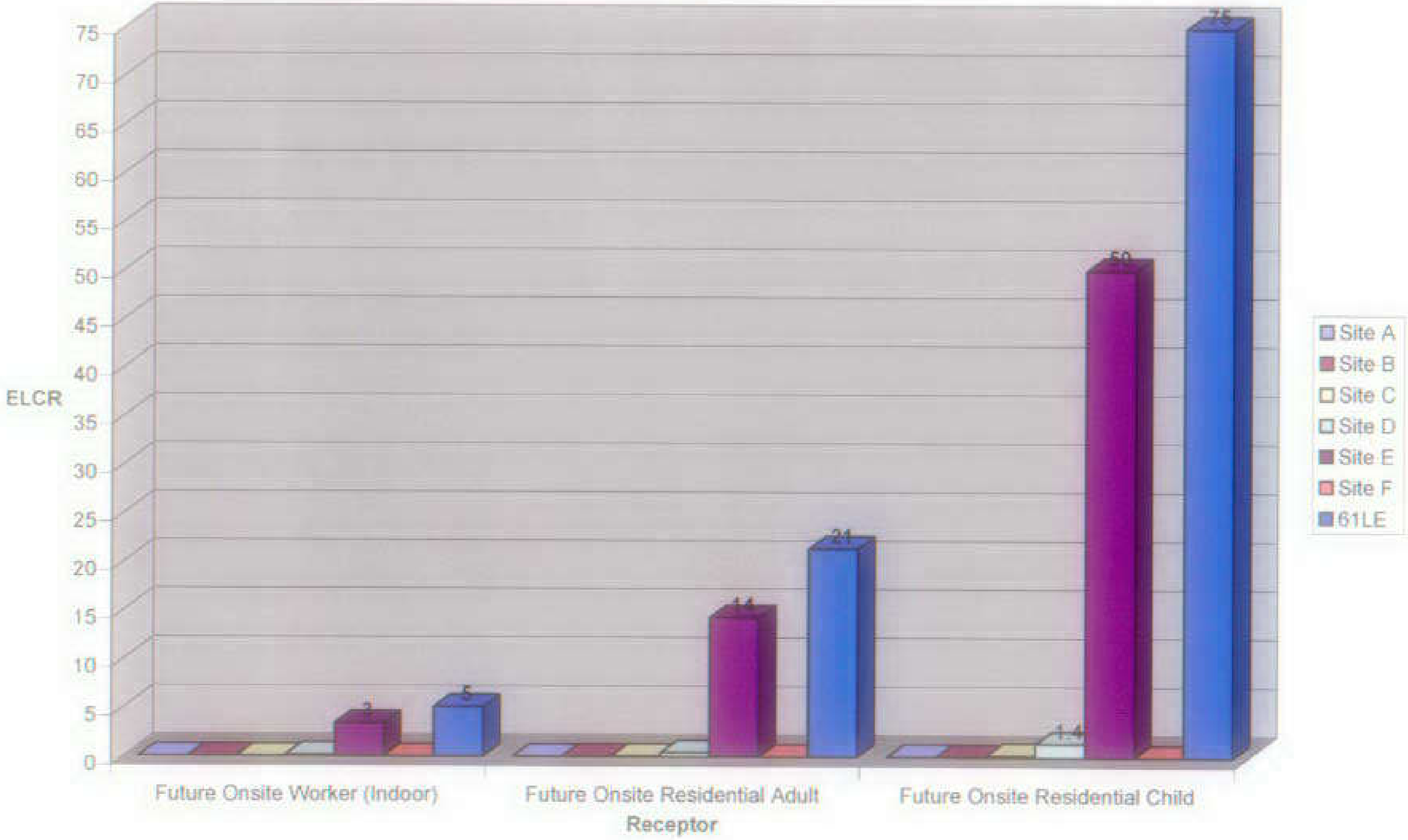


Figure 11-13. HI for Indoor Air Exposure from Subsurface Soil Volatilization

Rev. O Memphis Depot Dunn Field RI



TAB

Section 12

12.0 Nature and Extent of Contamination in Stockpile Area of Dunn Field

This section addresses the nature and extent of contamination within the Stockpile Area of Dunn Field (Figure 12-1). The subsections below describe how the Stockpile Area was defined, the probable sources of contamination that exist within the Stockpile Area, and the contaminants of concern and their distribution in the Stockpile Area.

The Stockpile Area includes several historic Dunn Field sites (mineral stockpiles) identified in the *OU 1 Field Sampling Plan* (CH2M HILL, September 1995e) and the *Screening Sites Field Sampling Plan* (CH2M HILL, September 1995e), and investigated as possible sources of contaminant releases to the environment. This section addresses the nature and extent of contamination within the Stockpile Area by evaluating the current and historical site data.

12.1 Stockpile Area Background

12.1.1 Stockpile Area Physical Description

The Stockpile Area consists of a mowed grassy area in the southeast and southwest sections of Dunn Field. The topography is mostly level over the entire area Ground elevation ranges from approximately 282 feet msl measured at the western boundary of the Stockpile Area to 315 feet msl in the southeastern corner

Large fluorspar and bauxite stockpiles were formerly located in this area. The stockpiles have all been removed and portions of the site graded and seeded. A spur to the Depot railway system was also located in this area but was removed in 1999; however, the railroad tracks located on the western side of the Stockpile Area are still in place.

12.1.2 Stockpile Area History

This portion of Dunn Field was used for vehicle storage in the 1940s, and for aboveground storage of fluorspar and bauxite beginning in the 1950s (Sites 62, 63, and 64). According to the ASR (USACE, January 1995) a Former Flame Thrower Test Area is located on the eastern half of Dunn Field in the northern portion of the Stockpile Area. The ASR also documents the possible burial of 86,100 pounds of CC-2 (impregnite) in a 6- to 8-foot deep, 8-foot wide, and 40-foot long trench in the west-southwest portion of the Stockpile Area in 1947 (see Figure 12-2). The ASR also states that "the Containers were completely macerated by driving a D-8 bulldozer over the material introduced into the trench. Earth coverage of from 4 to 6 ft. was placed over the burial material". Based on this information, it appears that the CC-2 was in product form (in containers), and not clothing permeated with impregnite (CC-2). Impregnite (unstabilized, CC-2 and stabilized, XXCC-3 [stabilized with zinc oxide]) was used for impregnating or permeating protective clothing after laundering to protect personnel against the action of vesicant-type chemical agents. This area was later used for the storage of bauxite and was designated as Site 64

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Site 24-B, which is the chlorinated lime slurry pit used for the neutralization of the contents of the 29 bomb casings used to transport mustard agent (the bomb casings were buried in Site 24-A in the Disposal Area), is also located in the southwestern corner of Dunn Field. The EE/CA investigation completed by Parsons ES (Parsons, June 1999) addresses this site, with removal action taking place in 2000 and 2001 as part of the removal of CWM from Dunn Field (UXB, December 2001). Section 1 presents additional information on the CWM removal activities at Dunn Field.

12.2 Summary of Remedial Investigations at Stockpile Area

12.2.1 Historical Remedial Investigations

Past characterization of potential contamination in the Stockpile Area has been limited to the sampling of soil near the presumed location of Site 24-B (Parsons, June 1999) and two surface soil samples (SS-8 and SS-9) collected during the 1989/1990 RI (Law, August 1990a). No investigations have been performed specifically at Sites 62, 63, 64 and the CC-2 burial trench In addition, the ore stockpiles that comprised Sites 62, 63, and 64 have been removed from Dunn Field and are no longer located at the Depot.

12.2.2 Summary of Findings from Past Remedial Investigations

The Parsons EE/CA identifies the likely location of Site 24-B through review of historical data, aerial photographs, and surface geophysical investigation. This area was subsequently confirmed by UXB as being Site 24-B during the CWM removal action in 2000/2001. Soil and groundwater samples collected from soil borings and monitoring wells installed immediately downgradient of the geophysical anomalies identified by Parsons indicate little or no migration of CWM/OE related contaminants from the chlorinated lime slurry pit. The analytical data from the soil samples that Parsons collected during the EE/CA are included in the data summary, Section 12.5.

12.2.3 Current Remedial Investigation

The sites within the Stockpile Area were removed prior to the CH2M HILL investigation. Borings and surface soil sampling stations were located within the Stockpile Area near former lows filled in during the early 1940s with construction of the Depot. The intent was to verify that the Stockpile Area was not used for waste disposal prior to the placement of the aboveground bauxite and fluorspar stockpiles. The CH2M HILL field activities in the Stockpile Area began and ended in October 1999. At that time, the surface soil was sampled to assess the nature and horizontal extent of contamination within the Stockpile Area, and the subsurface soil was sampled to assess the vertical extent of contamination Surface water or sediment does not occur in the Stockpile Area. No waste was observed in the borings. The sampling rationale for the Stockpile Area was developed during the August 1999 BCT meeting and subsequent site walkover with representatives of DLA and TDEC.

12.3 Potential Sources of Contamination

Other than Site 24-B that existed on the western side of the Stockpile Area, no subsurface disposal activities have been documented. A potential source of contamination to soils within the Stockpile Area (and all of Dunn Field) includes releases associated with railroad activities and pesticide/herbicide application in grassy areas. Surface soil Location SSLFF was located in the area of the Former Flame Thrower Test Area.

The alleged CC-2 burial trench, as documented in the ASR, is suspected as being located adjacent/near to Site 24-B and was not directly investigated during the RI field activities due to the pending CWM removal action (that was completed in 2001). As stated in Section 8, XXCC-3 was produced by mixing CC-2 with zinc oxide (ZnO) CC-2 was a chemical produced by E. I. DuPont de Nemours during the 1940s and 1950s. CC-2, (sym. dichlorbis(2,4,6 trichlorphenyl)urea) a labile (unstable) organic compound, is difficult to detect because of its instability. Additional information from the South Research Institute in Birmingham, Alabama, indicates the impregnite (CC-2) is finely ground N-bis(2,4,6-trichlorophenyl)dichlorourea. It appeared as a fine white granular crystal with a chlorine-like odor. It deteriorates upon exposure to moisture. Additional investigation may be needed at this location during the RD/RA process to determine if this former burial site poses an unacceptable treat to groundwater or human health. However, the findings of the investigation at Site 21 (XXCC-3 [stabilized impregnite] Burial Site) in the Northeast Open Area did not indicate an unacceptable risk to the groundwater or human health.

The following sections describe operations that have taken place at these sites and at other areas of concern (Figure 12-2) within the Stockpile Area.

12.3.1 Site 62 – Bauxite Storage

Site 62 was comprised of three bauxite stockpiles covering approximately 4 acres (Figure 12-2) located in the eastern half of Dunn Field The northern-most former stockpile is located in the Northeast Open Area. These storage areas contained only bauxite, a non-hazardous commodity. Bauxite is a naturally occurring mixture of hydrous aluminum oxides (diaspra, gibbsite, and boehmite) that contains iron. The primary use of bauxite is aluminum ore production. Bauxite was stored continuously from June 14, 1950, until 1999, when it was removed from the Depot.

12.3.2 Site 63 – Fluorspar Storage

Site 63 was comprised of seven fluorspar stockpiles covering approximately 6 acres (Figure 12-2) located in the eastern half of Dunn Field. These storage areas contained only fluorspar, a non-hazardous commodity. Fluorspar, the commercial name for fluorite, is a naturally occurring mineral composed of calcium and fluorine. The primary use of fluorspar is in glass and enamel production, as well as the manufacture of hydrofluoric acid. Fluorspar was stored continuously from June 14, 1950, until 1999, when it was removed from the Depot.

12.3.3 Site 64 – Bauxite Storage, Southwestern Quadrant of Dunn Field

Site 64 was comprised of one, relatively large bauxite stockpile covering most of the southwestern portion of Dunn Field (Figure 12-2). Site 64 was located in the southwestern quadrant of Dunn Field extending from the Stockpile Area into the southern portion of the Disposal Area to the north. Historical information indicates that Site 64 was placed over Site 24-B. This storage area contained only bauxite. Bauxite was stored continuously from June 14, 1950, until 1972, when it was removed from the Depot.

12.3.4 Site 24-B Chlorinated Lime Neutralization Pit

In July 1946, three railcars identified as containing leaking mustard bombs were unloaded at the Depot. The leaking bomb casings were then drained of mustard into a pit containing a chlorinated lime slurry for neutralization. The exact location of Site 24-B was not known; however, its location was estimated during the Parsons EE/CA activities in 1998. The location of the site was confirmed during the CWM removal (approximately 425-feet north of the south boundary and 170 east of the west boundary of Dunn Field). Site 24-B was excavated and removed in 2000 and 2001, and is documented in the *Draft Final Chemical Warfare Materiel Investigation/Removal Action Report* (UXB, October 2001). Discrete soil samples were collected from the excavation at Site 24-B by representatives of UXB in March 2001. The samples were cleared for CWM compounds by UXB and then custody of the samples were transferred to CH2M HILL. A total of 2 floor samples and 1 sidewall sample from the excavation were submitted for laboratory analyses for TCL VOCs, SVOCs, pesticides, PCBs and TAL metals using approved SW-846 methods.

12.4 Basis and Objectives for Stockpile Area Sampling

Overall objectives for the investigation at Dunn Field are presented in Section 4.2. The objectives for the Stockpile Area are presented in this section. Specific sampling objectives within the Stockpile Area were to:

- Evaluate potential impact of past usage on this area; and
- Delineate horizontal and vertical extent of contaminants, if found to be present.

12.4.1 Field Investigation

Six soil borings were drilled and sampled. Samples were collected at 0- to 1-, 8- to 10-, 14- to 15-, and 28- to 30-foot intervals in four of the borings, and samples were collected at 0- to 1-, and 3- to 5-foot intervals in two of the borings. If debris was observed in the boring, then a sample was to be collected from that depth and analyzed for TCL/TAL to identify a broad range of potential contaminants. No debris was observed. The surface soil samples (0- to 1-foot interval) from each of the 6 borings were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, herbicides and TAL metals. Subsurface samples (3- to 5-foot interval) from borings SBLFE and SBLFF (including a duplicate sample) were also analyzed for TCL VOCs, SVOCs, pesticides, PCBs, herbicides and TAL metals. All subsurface samples were analyzed for TCL VOCs; however, subsurface samples from borings SBLFC and SBLFD were also analyzed for TAL metals.

Surface soil samples were also collected from 10 additional locations across the Stockpile Area. Surface soil samples were collected from 0- to 1- and 1- to 2-foot intervals from each of the 10 locations, for a total of 20 samples. All of these 20 samples (including 2 duplicate samples) were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, herbicides and TAL metals.

Table 12-1 summarizes the analytical program for the soil samples collected from the Stockpile Area. Figure 12-3 presents the soil boring and surface soil sampling locations in the Stockpile Area.

12.5 Surface Soils and Subsurface Soils Nature and Extent of Contamination

To characterize the nature and extent of contamination within the Stockpile Area, surface and subsurface soil samples were collected and analyzed as defined above. Appendix B presents a summary of all surface and subsurface soil samples collected at the Stockpile Area. Table 12-2 presents the sampling results within the Stockpile Area, including those compounds that exceeded established background concentration, listed by sample location and sample interval. This table also includes the data collected by Parsons during the EE/CA investigation. The nature and extent of the Stockpile Area contaminant groups and/or individual contaminants that were detected above background values are discussed below

12.5.1 Surface Soils Metals Results

In the Stockpile Area, 28 surface soil samples (including duplicates) were collected and analyzed for all TAL metals–aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, thallium, vanadium and zinc. The FOD for these metals is presented in Table 12-3. Figure 12-4a presents the locations within the Stockpile Area where samples were collected for metals analysis and highlights the metals with concentrations above background or where there were detections of metals which do not have background concentrations established.

The metals detected were divided into three categories based on the number of sample concentrations that exceeded background and the relative importance of the metal as a potential contaminant. Each metal was classified as a primary metal of concern, a distributed metal, or a naturally occurring mineral as defined below:

- Primary metals of concern were detected above background in a significant number of samples and may indicate a release from a source area in the Stockpile Area;
- Distributed metals were detected above background in a relatively small and insignificant number of samples; and
- Naturally occurring minerals were metals associated with the natural soil conditions that were detected above background levels.

12.5.1.1 Primary Metals of Concern

Aluminum, calcium, and lead were detected at concentrations that exceeded background levels (Table 12-2 and Figure 12-4a). Aluminum is associated with the former bauxite piles and calcium is associated with the former fluorspar piles. Lead has been detected in numerous samples above background across the other study areas in Dunn Field The presence of lead has been attributed to general waste management practices and reworking of contaminated soil at the site

Aluminum. Aluminum was detected in 28 of 28 surface soil samples collected within the Stockpile Area. Aluminum exceeded the background value of 23,810 mg/kg at 5 locations. Concentrations ranged from 2,460 mg/kg to 52,600 mg/kg.

Calcium. This metal (background level of 5,840 mg/kg) was detected in 28 of 28 samples in the Stockpile Area, as shown in Figure 12-4a. Calcium exceeded background concentrations at 11 locations. Concentrations ranged from 811 mg/kg to 162,000 mg/kg.

Lead. Of the 28 surface soil samples in which lead was detected, 9 contained lead concentrations that exceeded the background value of 30 mg/kg, as shown in Figure 12-4a. The lead concentrations detected above background ranged from 32.1 mg/kg to 107 mg/kg

12.5.1.2 Distributed Metals

On the basis of the results of the surface and subsurface soil sampling and subsequent screening against background, iron was found to be a distributed metal, indicating a potential release from a source area.

Iron. This metal (background level of 38,480 mg/kg) was detected in 28 of 28 samples and did not exceed background. Concentrations of the metal ranged from 6,360 mg/kg to 36,400 mg/kg.

12.5.1.3 Naturally Occurring Metals

Nineteen naturally occurring metals (antimony, arsenic, barium, beryllium, cadmium, chromium, copper, cobalt, magnesium, manganese, mercury, nickel, potassium, selenium, sodium, silver, thallium, vanadium, and zinc) were detected in surface soil concentrations; however, few of these detections were above background.

Antimony. This metal was detected in 3 of 28 samples, but none of the concentrations were above the background level of 7 mg/kg. Concentrations ranged from 1.6 to 3.1 mg/kg.

Arsenic. This metal was detected in 28 of 28 samples, with 2 concentrations at or just above the background level of 20 mg/kg. Concentrations ranged from 1.4 to 25.5 mg/kg.

Barium. This metal was detected in 28 of 28 samples, with 2 values just above the background value of 234 mg/kg. Concentrations ranged from 22.4 to 297 mg/kg.

Beryllium. This metal was detected in 28 of 28 samples, but none of the concentrations were above the background value of 1.1 mg/kg. Concentrations ranged from 0.13 to 0.92 mg/kg.

Cadmium. This metal was detected in 27 of 28 samples, but none of the concentrations were above the background value of 1 4 mg/kg. Concentrations ranged from 0.16 to 0.53 mg/kg.

Chromium (total). Total chromium was detected in the surface soils of the Stockpile Area in 28 of 28 samples, but only exceeded the background value of 24.8 mg/kg in 7 surface soil samples The chromium concentrations ranged from 7.3 to 55.7 mg/kg.

Copper. Copper in the surface soils of the Stockpile Area was detected in 28 of 28 samples, but did not exceed the background value of 33.5 mg/kg. Concentrations of the metal ranged from 2 7 to 26.6 mg/kg.

Cobalt. Cobalt in the surface soils of the Stockpile Area was detected in 28 of 28 samples, but only exceeded the background value of 18.3 mg/kg in 1 surface soil sample (20.3 mg/kg).

Magnesium. This metal was detected in 28 of 28 samples. Two concentrations of 5,060 mg/kg and 10,100 mg/kg exceeded the background value of 4,600 mg/kg.

Manganese. Manganese in the surface soils of the Stockpile Area was detected in 28 of 28 samples, and did not exceed the background value of 1,304 mg/kg.

Mercury. This metal was detected in 21 of 30 samples, but none of the concentrations were above the background value of 0.4 mg/kg.

Nickel. This metal was detected in 28 of 28 samples, but none of the concentrations were above the background value of 30 mg/kg.

Potassium. Potassium was detected in surface soils of the Stockpile Area in 26 of 28 samples, but only exceeded the background value of 1,820 mg/kg in 4 surface soil samples, as shown on Figure 12-4a Concentrations ranged from 314 to 4,810 mg/kg.

Selenium. This metal was detected in 1 of 28 samples, but at a concentration below the background value of 0.8 mg/kg.

Sodium. This metal was detected in 19 of 28 samples. The concentrations ranged from 28.7 mg/kg to 2,440 mg/kg. There is no background value established for sodium.

Silver. This metal was detected in 1 of 28 samples, but at a concentration below the background value of 2 mg/kg.

Thallium. This metal was detected in 19 of 28 samples. The concentrations ranged from 0.15 mg/kg to 0.42 mg/kg. There is no background value established for thallium.

Vanadium. Vanadium in the surface soils of the Stockpile Area was detected in 28 of 28 samples, and exceeded the background value of 48.4 mg/kg in 2 surface soil samples, at concentrations of 59.2 and 96.6 mg/kg.

Zinc. This metal was detected in 28 of 28 samples, but none of the concentrations were above the background value of 126 mg/kg.

12.5.1.4 Surface Soils Metals Summary

The aluminum, calcium, and iron contamination in surface soils is most likely the result of past storage of ores at the Stockpile Area. Lead contamination in surface soils has been attributed to general waste management practices and reworking of contaminated soil at the site. The concentrations of the naturally occurring metals were mostly at or below the established background values.

12.5.2 Subsurface Soils Metals Results

Subsurface samples were collected and analyzed from 4 boring locations (Parsons also collected subsurface samples from 2 locations during the EE/CA investigation). The metals that were measured in the Stockpile Area subsurface were primarily below background values. Concentrations of antimony, sodium and thallium were found throughout the subsurface at relatively low concentrations; however, there are no established background values for these compounds. Calcium (6,680J mg/kg), chromium 35.8 mg/kg), lead (143 mg/kg) and selenium (1.2J mg/kg) were found in the subsurface soil from 1- to 7-feet bgs in boring SB-5 at concentrations above background. Calcium was also detected at a concentration of 2,530 mg/kg in the 9- to 11-foot interval from boring SB-6, above the background value. Subsurface soil from the 3- to 5-foot interval collected from boring

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SBLFE indicated concentrations of aluminum (25,100 mg/kg), arsenic (19 mg/kg), copper (37.2 mg/kg), iron (40,4000 mg/kg), manganese (1,610 mg/kg) and potassium (1,910) that were above the established background levels. The analytical results are summarized in Tables 12-2 and 12-3. Figure 12-4b presents the locations within the Stockpile Area where subsurface samples were collected for metals analysis and highlights the metals with concentrations above background or where there were detections of metals which do not have background concentrations established.

12.5.3 Surface and Subsurface Soils Pesticide Results

12.5.3.1 Pesticides in Surface Soil

A total of 11 pesticides were detected in 28 surface soil samples (including duplicates) within the Stockpile Area: aldrin, alpha-chlordane, gamma chlordane, DDT, DDE, DDD, alpha-endosulfan, dieldrin, methoxychlor, endrin, and endrin ketone. The FOD for these pesticides is shown in Table 12-3. Figure 12-5 presents the locations within the Stockpile Area where samples were collected for pesticides analysis, and highlights the one location with concentrations above background.

Aldrin. This pesticide was detected in 1 of 30 samples, with an estimated value of 0.0015J mg/kg, as shown in Figure 12-5. There is no background value for aldrin.

Alpha-chlordane. This pesticide was detected in 7 of 30 samples, with none exceeding the background value of 0.029 mg/kg.

Alpha-endosulfan. This pesticide was detected in 1 of 30 samples, with an estimated value of 0.00031J mg/kg. There is no background value for this pesticide.

Gamma-chlordane. This pesticide was detected in 1 of 30 samples at a concentration of 0.003 mg/kg, which is below the background value of 0.026 mg/kg.

Endrin Ketone. This pesticide was detected in 8 of 28 samples. The range of concentrations was from 0.0015 mg/kg to 0.033 mg/kg. There is no background value for endrin ketone.

Endrin. This pesticide was detected in 1 of 28 samples, with an estimated value of 0.00046J mg/kg. There is no background value for endrin.

Dieldrin. This pesticide was detected in 15 of 30 samples, and exceeded the background value of 0.086 mg/kg at only 1 location with a concentration 0.13 mg/kg

DDD. This pesticide was detected in 2 of 30 samples. Neither concentration exceeded background. The range of concentrations was from 0.0046 mg/kg to 0.0065 mg/kg.

DDE. This pesticide was detected in 14 of 30 samples. No samples were found to exceed background. The range of concentrations was from 0.00039 mg/kg to 0.14 mg/kg.

DDT. This pesticide was detected in 12 of 30 samples Two samples were found to exceed the background concentration (0.074 mg/kg) at values of 0.27 and 0.3 mg/kg. The range of concentrations was from 0.00065 mg/kg to 0.3 mg/kg

Methoxychlor. This pesticide was detected in 5 of 30 samples. There is no background value for methoxychlor. The range of concentrations was from 0.0018 mg/kg to 0.068 mg/kg.

12.5.3.2 Pesticides in Subsurface Soil

Subsurface samples were collected from borings SBLFE and SBLFF from the 3- to 5-foot interval for pesticide analysis. No pesticides were detected in the 2 samples.

12.5.3.3 Summary of Pesticides Nature and Extent

Pesticides were detected across the Stockpile Area in the Surface Soil and do not appear associated with discrete releases in the Stockpile Area. In the past, these pesticides were sprayed routinely on grassy areas and around buildings, and a wide range of variability was observed (CH2M HILL, January 2000)

12.5.4 Surface and Subsurface Soils VOC Results

12.5.4.1 VOCs in Surface Soil

Twenty-eight surface soil samples (including duplicates) were collected for VOC analyses at 16 locations in the Stockpile Area. Figure 12-6 presents the locations within the Stockpile Area where surface soil samples were collected for VOC analyses and highlights the VOCs with concentrations above background, or with any detectable concentration if there is no background value. The FOD for VOCs in surface soils is shown in Table 12-3.

Eight VOCs were detected in surface soil samples from within the Stockpile Area. These VOCs and their respective concentrations or range of concentrations are listed below.

Acetone. Detected in 5 of 28 samples with concentrations ranging from 0.023 mg/kg to 0.28 mg/kg.

Benzene. Detected in 5 of 28 samples with concentrations ranging from 0.001 mg/kg to 0 005 mg/kg.

Toluene. Detected in 2 of 28 samples with concentrations ranging from 0.0009 mg/kg to 0.012 mg/kg.

Carbon Disulfide. Detected in one of 28 samples at a concentration of 0.003 mg/kg.

Ethylbenzene. Detected in 4 of 28 samples with concentrations ranging from 0.0009 to 0.005 mg/kg.

Methyl Ethyl Ketone (2-butanone). Detected in 10 of 28 samples with concentrations ranging from 0.007 mg/kg to 0.043 mg/kg

Methylene Chloride. Detected in 2 of 28 samples with concentrations ranging from 0.0009 to 0.001 mg/kg

Total Xylenes. Detected in 5 of 28 samples with concentrations ranging from 0.003 mg/kg to 0.015 mg/kg.

Of the VOCs found in surface soil samples, four were detected above background values: toluene, total xylenes, carbon disulfide, and methyl ethyl ketone (2-butanone). All of the detections above background were reported with a J-qualifier Acetone and methyl ethyl ketone are commonly attributed to the use of isopropanol in field decontamination procedures as they are constituents of isopropanol Methylene chloride is a commonly used laboratory solvent and, as a result, the detection of this compound is common in samples analyzed for VOCs.

12.5.4.2 VOCs in Subsurface Soil

Fifteen subsurface soil samples (including duplicates) were collected for VOC analyses at soil boring locations in the Stockpile Area. Figure 12-7 presents the locations where subsurface soil samples were collected for VOC analyses and highlights the VOCs with concentrations above background, or with any detectable concentration if there is no background value. The FOD for VOCs in subsurface soils is shown in Table 12-3.

Three VOCs were detected in subsurface soil samples from within the Stockpile Area. These VOCs, their respective estimated concentrations, and the sample depth intervals are presented in Figure 12-7, and are listed below.

Toluene. Detected in 1 of 15 samples at a concentration of 0.003 mg/kg.

Methylene Chloride. Detected in 2 of 15 samples with concentrations ranging from 0.002 to 0.003 mg/kg.

Total Xylenes. Detected in 2 of 15 samples with concentrations ranging from 0.002 mg/kg to 0.014 mg/kg.

12.5.4.3 Summary of VOC Nature and Extent

VOCs were found in both the surface soil and subsurface soil samples collected in the Stockpile Area. These VOC concentration levels in the surface and subsurface soils in the Stockpile Area do not indicate the presence of a release from a definable source area.

12.5.5 Semi-Volatile Organic Compound Results

Figure 12-8 presents the locations within the Stockpile Area where surface soil samples were collected for SVOC analyses and highlights the SVOCs with concentrations above background, or with any detectable concentration if there is no background value. A summary of the SVOC sampling in surface and subsurface soils and the corresponding analytical results follows.

Surface soils. Eleven SVOCs were detected in 7 of 28 surface soils at the Stockpile Area: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i) perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene. The SVOCs that were detected are polynuclear aromatic hydrocarbons (PAHs). The PAHs detected in the samples that did exceed background levels are associated with the former/existing railroad tracks and also asphalt roadways on this portion of Dunn Field.

Benzo(a)anthracene. This PAH was detected in 5 of 28 samples, with 5 concentrations above the background level of 0.71 mg/kg. Concentrations ranged from 0.86 to 3 mg/kg.

Benzo(a)pyrene. This PAH was detected in 5 of 28 samples, with 4 of 5 concentrations above the background level of 0.96 mg/kg. Concentrations ranged from 0.9 to 3.8 mg/kg.

Benzo(b)fluoranthene. This PAH was detected in 6 of 28 samples, with 6 values above the background value of 0.9 mg/kg. Concentrations ranged from 0.96 to 5.8 mg/kg.

Benzo(g,h,i)perylene. This PAH was detected in 4 of 28 samples, with 4values above the background value of 0.82 mg/kg Concentrations ranged from 0.92 to 3.1 mg/kg.

Benzo(k)fluoranthene. This PAH was detected in 2 of 28 samples, with 2 values above the background value of 0.78 mg/kg Concentrations ranged from 1 8 to 2.3 mg/kg.

Chrysene. This PAH was detected in 5 of 28 samples, with 5 values above the background value of 0.94 mg/kg. Concentrations ranged from 1.1 to 5 mg/kg.

Dibenz(a,h)anthracene. This PAH was detected in 3 of 28 samples, but none of the concentrations were above the background value of 1.1 mg/kg. Concentrations ranged from 0.13 to 0.92 mg/kg.

Fluoranthene. This PAH was detected in 7 of 28 samples, with 6 values above the background value of 1.6 mg/kg Concentrations ranged from 1.1 to 6.2 mg/kg.

Indeno(1,2,3-c,d)pyrene. This PAH was detected in 5 of 28 samples, with 5 values above the background value of 0.7 mg/kg. Concentrations ranged from 0.81 to 3.6 mg/kg.

Phenanthrene. This PAH was detected in 6 of 28 samples, with 6 values above the background value of 0.61 mg/kg. Concentrations ranged from 0.99 to 2.6 mg/kg.

Pyrene. This PAH was detected in 7 of 28 samples, with 5 values above the background value of 1.5 mg/kg. Concentrations ranged from 0.89 to 6 mg/kg.

12.6 Nature and Extent Conclusions

Conclusions regarding the nature and extent of contamination, expressed relative to the objectives of the RI established in Section 12 4, are as follows:

- There is no indication that VOCs or SVOCs were disposed of at the Stockpile Area. The elevated concentrations of PAHs detected in surface soil samples appear to be related to former/existing railroad tracks and also asphalt roadways on this portion of Dunn Field.
- Elevated metals are associated with ore storage and in general are close to background levels.
- The distribution of pesticides across the Stockpile Area is similar to that at the Main Installation, indicating widespread surficial pesticide application rather than releases.
- The alleged CC-2 burial trench, as documented in the ASR, is suspected as being located adjacent/near to Site 24-B in the west-south portion of the Stockpile Area. This area was not directly investigated during the RI field activities due to the pending CWM removal action, which was completed in 2001 Additional investigation may be needed at this location during the RD/RA process to determine if this former burial site poses an unacceptable treat to groundwater or human health. However, the findings of the investigation at Site 21 (XXCC-3 [stabilized impregnite] Burial Site) in the Northeast Open Area did not indicate an unacceptable risk to the groundwater or human health.

Tables

TABLE 12-1
Analyte Groups for the Stockpile Area
Rev 1 Memphis Depot Dunn Field RI

Matrix	Station	Sample	Date Collected	General Chemistry	Herbicides	TAL Metals, Total	OC Pesticides/PCBs	TCL Semivolatiles	TCL Volatiles
SB	SBLFA	SBLFA1415	10/05/1999						X
SB	SBLFA	SBLFA2830	10/05/1999						X
SB	SBLFA	SBLFA8-10	10/05/1999						X
SB	SBLFB	SBLFB1415	10/05/1999						X
SB	SBLFB	SBLFB2830	10/05/1999						X
SB	SBLFB	SBLFB8-10	10/05/1999						X
SB	SBLFC	SBLFC1415	10/06/1999			X			X
SB	SBLFC	SBLFC2830	10/06/1999			X			X
SB	SBLFC	SBLFC8-10	10/06/1999			X			X
SB	SBLFD	SBLFD1415	10/05/1999			X			X
SB	SBLFD	SBLFD2830	10/05/1999			X			X
SB	SBLFD	SBLFD8-10	10/05/1999			X			X
SB	SBLFE	SBLFE3-5	10/06/1999	X	X	X	X	X	X
SB	SBLFF	SBLFF3-5	10/06/1999	X		X	X	X	X
SB	SBLFF	SBLFF3-5D	10/06/1999		X	X	X	X	X
SS	BORROW PIT	ETC-1	09/18/1998			X	X	X	X
SS	BORROW PIT	ETC-2	09/18/1998			X	X	X	X
SS	SBLFA	SBLFA0-1	10/05/1999		X	X	X	X	X
SS	SBLFB	SBLFB0-1	10/05/1999		X	X	X	X	X
SS	SBLFC	SBLFC0-1	10/06/1999		X	X	X	X	X
SS	SBLFD	SBLFD0-1	10/05/1999		X	X	X	X	X
SS	SBLFE	SBLFE0-1	10/06/1999	X	X	X	X	X	X
SS	SBLFF	SBLFF0-1	10/06/1999	X	X	X	X	X	X
SS	SSLFA	DJA292	10/14/1999		X	X	X	X	X
SS	SSLFA	DJA293	10/14/1999		X	X	X	X	X
SS	SSLFB	DJA294	10/14/1999		X	X	X	X	X
SS	SSLFB	DJA295	10/14/1999		X	X	X	X	X
SS	SSLFB (dup)	DJA296	10/14/1999		X	X	X	X	X
SS	SSLFC	DJA297	10/14/1999		X	X	X	X	X
SS	SSLFC	DJA298	10/14/1999		X	X	X	X	X
SS	SSLFD	DJA299	10/14/1999		X	X	X	X	X
SS	SSLFD	DJA300	10/14/1999		X	X	X	X	X
SS	SSLFE	DJA301	10/14/1999		X	X	X	X	X
SS	SSLFE	DJA302	10/14/1999		X	X	X	X	X
SS	SSLFF	DJA303	10/14/1999		X	X	X	X	X
SS	SSLFF	DJA304	10/14/1999		X	X	X	X	X
SS	SSLFG	DJA305	10/14/1999		X	X	X	X	X
SS	SSLFG	DJA306	10/14/1999		X	X	X	X	X
SS	SSLFJ	DJA307	10/15/1999		X	X	X	X	X
SS	SSLFJ	DJA308	10/15/1999		X	X	X	X	X
SS	SSLFJ (dup)	DJA309	10/15/1999		X	X	X	X	X
SS	SSLFH	DJA312	10/15/1999		X	X	X	X	X
SS	SSLFH	DJA313	10/15/1999		X	X	X	X	X
SS	SSLFI	DJA310	10/15/1999		X	X	X	X	X
SS	SSLFI	DJA311	10/15/1999		X	X	X	X	X

Note
SB = Soil boring sample
SS= Surface soil sample
PCBs = Polychlorinated biphenyls
dup = Duplicate sample

TABLE 12-2
Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
General Chemistry									
Subsurface Soils									
RW 1	RW 1_71FT	10/20/1999	71 0 to 71 0	TOTAL ORGANIC CARBON	5400	=	MG/KG		
RW-1A	RW 1A70FT	10/26/1999	70 0 to 70 0	TOTAL ORGANIC CARBON	1200	=	MG/KG		
RW-1B	RW 1B67FT	10/25/1999	67 0 to 67 0	TOTAL ORGANIC CARBON	2400	=	MG/KG		
RW-2	RW-2_68FT	10/23/1999	68 0 to 68 0	TOTAL ORGANIC CARBON	4000	=	MG/KG		
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	pH	5	=	PH UNITS		
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	pH	5 16	=	PH UNITS		
Surface Soils									
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	pH	6 24	=	PH UNITS		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	pH	7 7	=	PH UNITS		
Metals									
Subsurface Soils									
SB 5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	ALUMINUM	10700	J	MG/KG	21829	
SB 5	DDMT-081198-SB5-1 3-01	08/12/1998	1 0 to 3 0	ANTIMONY	1 1	J	MG/KG		
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	ARSENIC	9	=	MG/KG	17	
SB-5	DDMT-081198-SB5-1-3-01	08/12/1998	1 0 to 3 0	BARIUM	48 6	=	MG/KG	300	
SB-5	DDMT-081198-SB5-1-3-01	08/12/1998	1 0 to 3 0	CALCIUM	6680	J	MG/KG	2432	X
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	CHROMIUM TOTAL	35 8	=	MG/KG	26 4	X
SB-5	DDMT-081198-SB5-1 3-01	08/12/1998	1 0 to 3 0	COBALT	2.6	=	MG/KG	20 4	
SB 5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	IRON	13100	=	MG/KG	38480	
SB 5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	LEAD	143	=	MG/KG	23 9	X
SB 5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	MAGNESIUM	844	=	MG/KG	4900	
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	MANGANESE	164	J	MG/KG	1540	
SB-5	DDMT-081198-SB5-1 3'-01	08/12/1998	1 0 to 3 0	NICKEL	6 5	=	MG/KG	36 6	
SB 5	DDMT-081198-SB5-1 3'-01	08/12/1998	1 0 to 3 0	POTASSIUM	473	=	MG/KG	1800	
SB 5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	VANADIUM	21 7	=	MG/KG	51 3	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	ALUMINUM	21300	J	MG/KG	21829	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	ARSENIC	12 9	=	MG/KG	17	
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	BARIUM	114	=	MG/KG	300	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	CALCIUM	1160	J	MG/KG	2432	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	CHROMIUM TOTAL	25 8	=	MG/KG	26 4	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	COBALT	7 1	=	MG/KG	20 4	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	IRON	28100	=	MG/KG	38480	
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	LEAD	17 1	=	MG/KG	23 9	
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	MAGNESIUM	3350	=	MG/KG	4900	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	MANGANESE	664	J	MG/KG	1540	
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	MERCURY	0 04	=	MG/KG	0 2	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	NICKEL	22.6	=	MG/KG	36 6	
SB 5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	POTASSIUM	1580	=	MG/KG	1800	
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	SELENIUM	1 2	J	MG/KG	0 6	X
SB-5	DDMT-081198-SB5 15-17'-08	08/12/1998	5 0 to 7 0	VANADIUM	40 6	=	MG/KG	51 3	
SB 5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	ALUMINUM	21500	J	MG/KG	21829	
SB 5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	ARSENIC	12 8	=	MG/KG	17	
SB 5	DDMT-081198-SB5 5-7'-03	08/12/1998	5 0 to 7 0	BARIUM	149	=	MG/KG	300	
SB-5	DDMT-081198-SB5 5-7'-03	08/12/1998	5.0 to 7 0	CALCIUM	920	J	MG/KG	2432	
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	CHROMIUM TOTAL	19 3	=	MG/KG	26 4	
SB 5	DDMT-081198-SB5-5 7'-03	08/12/1998	5 0 to 7 0	COBALT	11 1	=	MG/KG	20 4	
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	IRON	26800	=	MG/KG	38480	
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	LEAD	16 2	=	MG/KG	23 9	
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	MAGNESIUM	3310	=	MG/KG	4900	
SB-5	DDMT-081198-SB5 5-7'-03	08/12/1998	5 0 to 7 0	MANGANESE	868	J	MG/KG	1540	
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	MERCURY	0 04	=	MG/KG	0.2	
SB 5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	NICKEL	22	=	MG/KG	36 6	
SB 5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	POTASSIUM	1680	=	MG/KG	1800	
SB 5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	VANADIUM	41 9	=	MG/KG	51 3	
SB 5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	ALUMINUM	12100	J	MG/KG	21829	
SB-5	DDMT-081298-SB5-11-13-06	08/12/1998	11 0 to 13 0	ANTIMONY	1 3	J	MG/KG		
SB-5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	ARSENIC	8 8	=	MG/KG	17	
SB 5	DDMT-081298-SB5-11 13'-06	08/12/1998	11 0 to 13 0	BARIUM	124	=	MG/KG	300	
SB 5	DDMT-081298-SB5-11-13-06	08/12/1998	11 0 to 13 0	CALCIUM	1410	J	MG/KG	2432	
SB 5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	CHROMIUM TOTAL	15 1	=	MG/KG	26 4	
SB-5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	COBALT	8 2	=	MG/KG	20 4	
SB-5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	IRON	22400	=	MG/KG	38480	
SB 5	DDMT-081298-SB5-11-13-06	08/12/1998	11 0 to 13 0	LEAD	11 5	=	MG/KG	23 9	
SB 5	DDMT-081298-SB5-11 13-06	08/12/1998	11 0 to 13 0	MAGNESIUM	2690	=	MG/KG	4900	
SB 5	DDMT-081298-SB5-11 13-06	08/12/1998	11 0 to 13 0	MANGANESE	670	J	MG/KG	1540	
SB-5	DDMT-081298-SB5-11-13-06	08/12/1998	11 0 to 13 0	NICKEL	20 9	=	MG/KG	36 6	
SB 5	DDMT-081298-SB5 11-13-06	08/12/1998	11 0 to 13 0	POTASSIUM	1180	=	MG/KG	1800	
SB 5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	SODIUM	165	=	MG/KG		
SB 5	DDMT-081298-SB5-11 13-06	08/12/1998	11 0 to 13 0	VANADIUM	30 9	=	MG/KG	51 3	
SB-5	DDMT-081298-SB5-13-15-07	08/12/1998	13 0 to 15 0	ALUMINUM	13600	J	MG/KG	21829	
SB 5	DDMT-081298-SB5-13-15-07	08/12/1998	13 0 to 15 0	ANTIMONY	1 3	J	MG/KG		
SB 5	DDMT-081298-SB5-13-15-07	08/12/1998	13 0 to 15 0	ARSENIC	5 9	=	MG/KG	17	
SB-5	DDMT-081298-SB5-13-15-07	08/12/1998	13 0 to 15 0	BARIUM	90 2	=	MG/KG	300	
SB-5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	CALCIUM	2240	J	MG/KG	2432	
SB 5	DDMT-081298-SB5-13-15-07	08/12/1998	13 0 to 15 0	CHROMIUM TOTAL	16 3	=	MG/KG	26 4	
SB 5	DDMT-081298-SB5-13-15-07	08/12/1998	13 0 to 15 0	COBALT	5	=	MG/KG	20 4	
SB-5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	IRON	20200	=	MG/KG	38480	
SB-5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	LEAD	8 7	=	MG/KG	23 9	

TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB-5	DDMT-081298-SB5-13-15 -07	08/12/1998	13.0 to 15 0	MAGNESIUM	2920	=	MG/KG	4900	
SB-5	DDMT-081298-SB5-13-15 -07	08/12/1998	13 0 to 15 0	MANGANESE	414	J	MG/KG	1540	
SB-5	DDMT-081298-SB5-13-15 -07	08/12/1998	13 0 to 15 0	NICKEL	18.4	=	MG/KG	36 6	
SB 5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	POTASSIUM	1210	=	MG/KG	1800	
SB-5	DDMT-081298-SB5-13-15 -07	08/12/1998	13 0 to 15 0	SODIUM	152	=	MG/KG		
SB-5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	VANADIUM	34 6	=	MG/KG	51 3	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	ALUMINUM	12300	J	MG/KG	21829	
SB-5	DDMT-081298-SB5-17-19 -09	08/12/1998	13 0 to 15 0	ANTIMONY	1 3	J	MG/KG		
SB-5	DDMT-081298-SB5-17-19 -09	08/12/1998	13 0 to 15 0	ARSENIC	5.6	=	MG/KG	17	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	BARIUM	84 5	=	MG/KG	300	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	CALCIUM	2040	J	MG/KG	2432	
SB-5	DDMT-081298-SB5-17-19 -09	08/12/1998	13.0 to 15 0	CHROMIUM, TOTAL	17 1	=	MG/KG	26 4	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	COBALT	4 9	=	MG/KG	20 4	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13.0 to 15 0	IRON	18000	=	MG/KG	38480	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	LEAD	7 5	=	MG/KG	23 9	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	MAGNESIUM	2640	=	MG/KG	4900	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13.0 to 15 0	MANGANESE	371	J	MG/KG	1540	
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	NICKEL	16 8	=	MG/KG	36 6	
SB-5	DDMT-081298-SB5-17-19 -09	08/12/1998	13 0 to 15 0	POTASSIUM	1050	=	MG/KG	1800	
SB-5	DDMT-081298-SB5-17-19 -09	08/12/1998	13 0 to 15 0	SODIUM	170	=	MG/KG		
SB 5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	VANADIUM	32 2	=	MG/KG	51 3	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	ALUMINUM	18600	J	MG/KG	21829	
SB 5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	ANTIMONY	1.3	J	MG/KG		
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	ARSENIC	11 2	=	MG/KG	17	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	BARIUM	90 3	=	MG/KG	300	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	CALCIUM	572	J	MG/KG	2432	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	CHROMIUM TOTAL	17.3	=	MG/KG	26 4	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	COBALT	8.4	=	MG/KG	20 4	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	IRON	25700	=	MG/KG	38480	
SB 5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	LEAD	13 6	=	MG/KG	23 9	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	MAGNESIUM	2900	=	MG/KG	4900	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	MANGANESE	415	J	MG/KG	1540	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	NICKEL	16 6	=	MG/KG	36 6	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	POTASSIUM	1310	=	MG/KG	1800	
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	SODIUM	141	=	MG/KG		
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	VANADIUM	35 1	=	MG/KG	51 3	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55.5	ALUMINUM	1090	=	MG/KG	21829	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55 5	BARIUM	2 6	=	MG/KG	300	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55 5	CHROMIUM TOTAL	7.2	J	MG/KG	26 4	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55 5	IRON	5980	J	MG/KG	38480	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55 5	LEAD	1 1	J	MG/KG	23 9	
SB-5	DDMT-082098-SB5-54-55 5 -08	08/12/1998	54 0 to 55 5	MANGANESE	18 9	J	MG/KG	1540	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55 5	NICKEL	2 1	=	MG/KG	36 6	
SB-5	DDMT-082098-SB5-54-55 5'-08	08/12/1998	54 0 to 55 5	VANADIUM	7 3	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13 0	ALUMINUM	13500	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-11 13'-06	08/12/1998	11 0 to 13 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13 0	ARSENIC	5 2	=	MG/KG	17	
SB-6	DDMT-081298-SB6-11 13 -06	08/12/1998	11 0 to 13 0	BARIUM	91 4	=	MG/KG	300	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13 0	CALCIUM	2080	=	MG/KG	2432	
SB-6	DDMT-081298-SB6-11 13 -06	08/12/1998	11 0 to 13 0	CHROMIUM TOTAL	16 5	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13 0	COBALT	7 7	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13 0	IRON	17200	=	MG/KG	38480	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13.0	LEAD	8 8	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13 0	MAGNESIUM	2730	=	MG/KG	4900	
SB-6	DDMT-081298-SB6-11-13 -06	08/12/1998	11 0 to 13.0	MANGANESE	663	=	MG/KG	1540	
SB-6	DDMT-081298-SB6-11-13'-06	08/12/1998	11 0 to 13 0	NICKEL	18 6	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-11-13'-06	08/12/1998	11 0 to 13 0	POTASSIUM	1020	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-11-13'-06	08/12/1998	11 0 to 13 0	SODIUM	129	=	MG/KG		
SB-6	DDMT-081298-SB6-11 13 -06	08/12/1998	11 0 to 13 0	VANADIUM	34 8	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15 0	ALUMINUM	17400	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15.0	ANTIMONY	1 2	J	MG/KG		
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	ARSENIC	5 3	=	MG/KG	17	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	BARIUM	102	=	MG/KG	300	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	BERYLLIUM	0 76	=	MG/KG	1 2	
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15.0	CALCIUM	2080	=	MG/KG	2432	
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15 0	CHROMIUM TOTAL	20 5	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15 0	COBALT	8.2	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15 0	IRON	19900	=	MG/KG	38480	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	LEAD	9 6	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	MAGNESIUM	2930	=	MG/KG	4900	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	MANGANESE	676	=	MG/KG	1540	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	NICKEL	20 1	=	MG/KG	36.6	
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15 0	POTASSIUM	1140	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-13-15 -07	08/12/1998	13 0 to 15 0	VANADIUM	41 6	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-15-17 -08	08/12/1998	9 0 to 11 0	ALUMINUM	8390	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	ARSENIC	7 2	=	MG/KG	17	
SB-6	DDMT-081298-SB6-15-17 -08	08/12/1998	9.0 to 11 0	BARIUM	77 6	=	MG/KG	300	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	CALCIUM	2290	=	MG/KG	2432	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	CHROMIUM TOTAL	12.7	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	COBALT	8	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	IRON	18600	=	MG/KG	38480	
SB-6	DDMT-081298-SB6 15-17'-08	08/12/1998	9 0 to 11 0	LEAD	9 2	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	MAGNESIUM	2490	=	MG/KG	4900	
SB-6	DDMT-081298 SB6 15-17 -08	08/12/1998	9 0 to 11 0	MANGANESE	642	=	MG/KG	1540	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	NICKEL	20 1	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	POTASSIUM	879	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	SODIUM	130	=	MG/KG		
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	VANADIUM	24 1	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-17-19 -09	08/12/1998	11 0 to 13 0	ALUMINUM	10200	=	MG/KG	21829	

TABLE 12-2
Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB-6	DDMT-081298-SB6-17-19'-09	08/12/1998	11 0 to 13 0	ANTIMONY	1 2	J	MG/KG		
SB-6	DDMT-081298-SB6-17-19'-09	08/12/1998	11 0 to 13 0	ARSENIC	4 7	=	MG/KG	17	
SB-6	DDMT-081298-SB6-17-19 -09	08/12/1998	11 0 to 13 0	BARIUM	76	=	MG/KG	300	
SB-6	DDMT-081298-SB6 17-19'-09	08/12/1998	11 0 to 13 0	CALCIUM	2120	=	MG/KG	2432	
SB-6	DDMT-081298-SB6 17 19 -09	08/12/1998	11 0 to 13 0	CHROMIUM TOTAL	13 5	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-17 19 09	08/12/1998	11 0 to 13 0	COBALT	6 9	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-17 19 -09	08/12/1998	11 0 to 13 0	IRON	15300	=	MG/KG	38480	
SB-6	DDMT-081298-SB6 17-19 09	08/12/1998	11 0 to 13 0	LEAD	8	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6 17-19 -09	08/12/1998	11 0 to 13 0	MAGNESIUM	2470	=	MG/KG	4900	
SB-6	DDMT-081298-SB6-17 19 -09	08/12/1998	11 0 to 13 0	MANGANESE	551	=	MG/KG	1540	
SB-6	DDMT-081298-SB6-17 19 -09	08/12/1998	11 0 to 13 0	NICKEL	17 1	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-17-19 -09	08/12/1998	11 0 to 13 0	POTASSIUM	914	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-17 19 -09	08/12/1998	11 0 to 13 0	SODIUM	145	=	MG/KG		
SB-6	DDMT-081298-SB6-17-19 -09	08/12/1998	11 0 to 13 0	VANADIUM	26 9	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	ALUMINUM	11100	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	ARSENIC	9 5	=	MG/KG	17	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	BARIUM	158	=	MG/KG	300	
SB-6	DDMT-081298-SB6 5 7'-03	08/12/1998	5 0 to 7 0	CALCIUM	2020	=	MG/KG	2432	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	CHROMIUM TOTAL	15 6	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	COBALT	7 3	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	IRON	21100	=	MG/KG	38480	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	LEAD	11 3	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	MAGNESIUM	2810	=	MG/KG	4900	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	MANGANESE	594	=	MG/KG	1540	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	NICKEL	22 8	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	POTASSIUM	1220	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-5 7'-03	08/12/1998	5 0 to 7 0	SODIUM	126	=	MG/KG		
SB-6	DDMT-081298-SB6 5-7'-03	08/12/1998	5 0 to 7 0	VANADIUM	27 1	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-64-66 -08	08/12/1998	64 0 to 66 0	ALUMINUM	1260	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-64-66'-08	08/12/1998	64 0 to 66 0	ARSENIC	1 4	=	MG/KG	17	
SB-6	DDMT-081298-SB6-64-66'-08	08/12/1998	64 0 to 66 0	BARIUM	13 6	=	MG/KG	300	
SB-6	DDMT-081298-SB6-64-66'-08	08/12/1998	64 0 to 66 0	CHROMIUM, TOTAL	15 7	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-64-66 -08	08/12/1998	64 0 to 66 0	COBALT	2 2	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-64-66 -08	08/12/1998	64 0 to 66 0	IRON	7680	=	MG/KG	38480	
SB-6	DDMT-081298-SB6-64-66 -08	08/12/1998	64 0 to 66.0	LEAD	2	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6-64-66 -08	08/12/1998	64 0 to 66 0	MANGANESE	80	J	MG/KG	1540	
SB-6	DDMT-081298-SB6-64-66 -08	08/12/1998	64 0 to 66 0	NICKEL	3 4	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-64-66'-08	08/12/1998	64 0 to 66 0	VANADIUM	10	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	ALUMINUM	9460	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	ARSENIC	6 9	=	MG/KG	17	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	BARIUM	92 8	=	MG/KG	300	
SB-6	DDMT-081298-SB6 7 9'-04	08/12/1998	7 0 to 9 0	CALCIUM	2260	=	MG/KG	2432	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	CHROMIUM TOTAL	12 6	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-7-9 -04	08/12/1998	7 0 to 9 0	COBALT	7 8	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	IRON	20600	=	MG/KG	38480	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	LEAD	10 3	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6 7-9'-04	08/12/1998	7 0 to 9 0	MAGNESIUM	2610	=	MG/KG	4900	
SB-6	DDMT-081298-SB6 7-9'-04	08/12/1998	7 0 to 9 0	MANGANESE	596	=	MG/KG	1540	
SB-6	DDMT-081298-SB6 7-9'-04	08/12/1998	7 0 to 9 0	NICKEL	19 6	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-7 9'-04	08/12/1998	7 0 to 9 0	POTASSIUM	1100	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	VANADIUM	25 8	=	MG/KG	51 3	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	ALUMINUM	10300	=	MG/KG	21829	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	ARSENIC	7 3	=	MG/KG	17	
SB-6	DDMT-081298-SB6-9-11'-05	08/12/1998	9 0 to 11 0	BARIUM	87 7	=	MG/KG	300	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	CALCIUM	2530	=	MG/KG	2432	X
SB-6	DDMT-081298 SB6-9-11 -05	08/12/1998	9 0 to 11 0	CHROMIUM TOTAL	14 6	J	MG/KG	26 4	
SB-6	DDMT-081298-SB6-9-11'-05	08/12/1998	9 0 to 11 0	COBALT	7 8	=	MG/KG	20 4	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	IRON	20200	=	MG/KG	38480	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	LEAD	9 5	=	MG/KG	23 9	
SB-6	DDMT-081298-SB6-9-11'-05	08/12/1998	9 0 to 11 0	MAGNESIUM	2780	=	MG/KG	4900	
SB-6	DDMT-081298 SB6-9-11 -05	08/12/1998	9 0 to 11.0	MANGANESE	643	=	MG/KG	1540	
SB-6	DDMT-081298-SB6-9-11 05	08/12/1998	9 0 to 11 0	NICKEL	20 7	=	MG/KG	36 6	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	POTASSIUM	1200	=	MG/KG	1800	
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	SODIUM	150	=	MG/KG		
SB-6	DDMT-081298-SB6-9-11 -05	08/12/1998	9 0 to 11 0	VANADIUM	29 1	=	MG/KG	51 3	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	ALUMINUM	13300	=	MG/KG	21829	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	ARSENIC	6 2	=	MG/KG	17	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	BARIUM	117	=	MG/KG	300	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	BERYLLIUM	0 71	J	MG/KG	1.2	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	CADMIUM	0 51	J	MG/KG	1 4	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	CALCIUM	1820	J	MG/KG	2432	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	CHROMIUM TOTAL	20 9	J	MG/KG	26 4	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	COBALT	7 1	J	MG/KG	20 4	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	COPPER	13 4	=	MG/KG	32 7	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	IRON	18000	=	MG/KG	38480	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	LEAD	10 9	=	MG/KG	23 9	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	MAGNESIUM	2420	=	MG/KG	4900	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	MANGANESE	391	=	MG/KG	1540	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	NICKEL	16	=	MG/KG	36 6	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	POTASSIUM	795	J	MG/KG	1800	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	SODIUM	72 4	J	MG/KG		
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	THALLIUM	0 15	J	MG/KG		
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	VANADIUM	32	J	MG/KG	51 3	
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	ZINC	39 1	J	MG/KG	114	
SBLFC (2)	SBLFC2830	10/06/1999	28 0 to 30 0	ALUMINUM	6150	=	MG/KG	21829	
SBLFC (2)	SBLFC2830	10/06/1999	28 0 to 30 0	ARSENIC	4 2	J	MG/KG	17	
SBLFC (2)	SBLFC2830	10/06/1999	28 0 to 30 0	BARIUM	9 8	J	MG/KG	300	

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TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	BERYLLIUM	0.3	J	MG/KG	1.2	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	CADMIUM	0.28	J	MG/KG	1.4	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	CALCIUM	582	J	MG/KG	2432	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	CHROMIUM, TOTAL	13.8	J	MG/KG	26.4	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	COBALT	0.84	J	MG/KG	20.4	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	COPPER	4.6	J	MG/KG	32.7	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	IRON	16300	=	MG/KG	38480	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	LEAD	9.1	=	MG/KG	23.9	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	MAGNESIUM	290	J	MG/KG	4900	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	MANGANESE	27.3	=	MG/KG	1540	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	NICKEL	3.2	J	MG/KG	36.6	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	POTASSIUM	191	J	MG/KG	1800	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	SODIUM	30.3	J	MG/KG		
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	VANADIUM	28.8	J	MG/KG	51.3	
SBLFC (2)	SBLFC2830	10/06/1999	28.0 to 30.0	ZINC	5.3	J	MG/KG	114	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	ALUMINUM	6840	=	MG/KG	21829	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	ARSENIC	8	J	MG/KG	17	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	BARIUM	82.2	=	MG/KG	300	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	BERYLLIUM	0.39	J	MG/KG	1.2	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	CADMIUM	0.49	J	MG/KG	1.4	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	CALCIUM	1780	J	MG/KG	2432	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	CHROMIUM, TOTAL	8.9	J	MG/KG	26.4	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	COBALT	7.3	=	MG/KG	20.4	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	COPPER	15.3	=	MG/KG	32.7	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	IRON	16100	=	MG/KG	38480	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	LEAD	10.4	=	MG/KG	23.9	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	MAGNESIUM	2050	=	MG/KG	4900	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	MANGANESE	582	=	MG/KG	1540	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	NICKEL	16.8	=	MG/KG	36.6	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	POTASSIUM	644	J	MG/KG	1800	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	SODIUM	60.5	J	MG/KG		
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	THALLIUM	0.28	J	MG/KG		
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	VANADIUM	18	J	MG/KG	51.3	
SBLFC (2)	SBLFC8-10	10/06/1999	8.0 to 10.0	ZINC	35.8	J	MG/KG	114	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	ALUMINUM	9820	=	MG/KG	21829	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	ARSENIC	4.1	J	MG/KG	17	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	BARIUM	102	=	MG/KG	300	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	BERYLLIUM	0.64	J	MG/KG	1.2	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	CADMIUM	0.58	J	MG/KG	1.4	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	CALCIUM	1590	J	MG/KG	2432	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	CHROMIUM, TOTAL	15	J	MG/KG	26.4	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	COBALT	10.8	J	MG/KG	20.4	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	COPPER	12.6	=	MG/KG	32.7	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	IRON	18600	J	MG/KG	38480	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	LEAD	12.1	J	MG/KG	23.9	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	MAGNESIUM	1990	=	MG/KG	4900	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	MANGANESE	705	J	MG/KG	1540	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	NICKEL	18.3	=	MG/KG	36.6	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	POTASSIUM	632	J	MG/KG	1800	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	SODIUM	54.5	J	MG/KG		
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	THALLIUM	0.14	J	MG/KG		
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	VANADIUM	34.6	J	MG/KG	51.3	
SBLFD (2)	SBLFD1415	10/05/1999	14.0 to 15.0	ZINC	31.7	J	MG/KG	114	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	ALUMINUM	4240	=	MG/KG	21829	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	ARSENIC	0.83	J	MG/KG	17	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	BARIUM	6.8	J	MG/KG	300	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	BERYLLIUM	0.2	J	MG/KG	1.2	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	CADMIUM	0.35	J	MG/KG	1.4	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	CALCIUM	533	J	MG/KG	2432	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	CHROMIUM, TOTAL	11.3	J	MG/KG	26.4	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	COBALT	1.3	J	MG/KG	20.4	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	COPPER	4.2	J	MG/KG	32.7	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	IRON	12700	J	MG/KG	38480	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	LEAD	5.7	J	MG/KG	23.9	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	MAGNESIUM	228	J	MG/KG	4900	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	MANGANESE	16.3	J	MG/KG	1540	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	NICKEL	2	J	MG/KG	36.6	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	SODIUM	23.7	J	MG/KG		
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	VANADIUM	25	J	MG/KG	51.3	
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	ZINC	3.9	J	MG/KG	114	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	ALUMINUM	9890	=	MG/KG	21829	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	ARSENIC	8.6	J	MG/KG	17	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	BARIUM	116	=	MG/KG	300	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	BERYLLIUM	0.49	J	MG/KG	1.2	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	CADMIUM	0.67	J	MG/KG	1.4	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	CALCIUM	1700	J	MG/KG	2432	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	CHROMIUM, TOTAL	12.3	J	MG/KG	26.4	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	COBALT	8.1	J	MG/KG	20.4	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	COPPER	16.9	=	MG/KG	32.7	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	IRON	21300	J	MG/KG	38480	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	LEAD	10.8	J	MG/KG	23.9	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	MAGNESIUM	2500	=	MG/KG	4900	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	MANGANESE	531	J	MG/KG	1540	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	NICKEL	19.2	=	MG/KG	36.6	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	POTASSIUM	987	J	MG/KG	1800	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	SODIUM	62.3	J	MG/KG		
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	THALLIUM	0.19	J	MG/KG		
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	VANADIUM	26	J	MG/KG	51.3	
SBLFD (2)	SBLFD8-10	10/05/1999	8.0 to 10.0	ZINC	52.2	J	MG/KG	114	
SBLFE (2)	SBLFE3-5	10/06/1999	3.0 to 5.0	ALUMINUM	17200	=	MG/KG	21829	

TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	ARSENIC	19	=	MG/KG	17	X
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	BARIUM	156	=	MG/KG	300	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	BERYLLIUM	0 63	J	MG/KG	1 2	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	CADMIUM	0 56	J	MG/KG	1 4	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	CALCIUM	639	J	MG/KG	2432	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	CHROMIUM TOTAL	15 7	J	MG/KG	26 4	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	COBALT	11	J	MG/KG	20 4	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	COPPER	19 7	=	MG/KG	32 7	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	IRON	24900	=	MG/KG	38480	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	LEAD	20 1	=	MG/KG	23 9	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	MAGNESIUM	2720	=	MG/KG	4900	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	MANGANESE	593	=	MG/KG	1540	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	MERCURY	0 06	J	MG/KG	0 2	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	NICKEL	19 4	=	MG/KG	36 6	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	POTASSIUM	1210	J	MG/KG	1800	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	SODIUM	67 2	J	MG/KG		
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	THALLIUM	0 48	J	MG/KG		
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	VANADIUM	33 1	J	MG/KG	51 3	
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	ZINC	61 9	J	MG/KG	114	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	ALUMINUM	12300	=	MG/KG	21829	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	ARSENIC	13 6	=	MG/KG	17	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	BARIUM	164	=	MG/KG	300	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	BERYLLIUM	0 62	J	MG/KG	1 2	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	CADMIUM	0 54	J	MG/KG	1 4	
SBLFF (2)	SBLFF3-5	10/06/1999	3.0 to 5 0	CALCIUM	917	J	MG/KG	2432	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	CHROMIUM, TOTAL	10 3	J	MG/KG	26 4	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	COBALT	11 3	J	MG/KG	20 4	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	COPPER	23 2	=	MG/KG	32.7	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	IRON	24100	=	MG/KG	38480	
SBLFF (2)	SBLFF3-5	10/06/1999	3.0 to 5 0	LEAD	16 2	=	MG/KG	23 9	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	MAGNESIUM	2550	=	MG/KG	4900	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	MANGANESE	1310	=	MG/KG	1540	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	NICKEL	20.8	=	MG/KG	36 6	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	POTASSIUM	757	J	MG/KG	1800	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	SODIUM	84 5	J	MG/KG		
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	THALLIUM	0 42	J	MG/KG		
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	VANADIUM	26 3	J	MG/KG	51 3	
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5.0	ZINC	66 5	J	MG/KG	114	
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	ALUMINUM	25100	=	MG/KG	21829	X
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	ARSENIC	15.7	=	MG/KG	17	
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	BARIUM	245	=	MG/KG	300	
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	BERYLLIUM	1 1	J	MG/KG	1 2	
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	CADMIUM	0 89	J	MG/KG	1 4	
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	CALCIUM	1350	J	MG/KG	2432	
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	CHROMIUM TOTAL	21 1	J	MG/KG	26 4	
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	COBALT	15 5	=	MG/KG	20 4	
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	COPPER	37 2	=	MG/KG	32 7	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	IRON	40400	=	MG/KG	38480	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	LEAD	16	=	MG/KG	23 9	
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	MAGNESIUM	4690	=	MG/KG	4900	
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	MANGANESE	1610	=	MG/KG	1540	X
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	NICKEL	35	=	MG/KG	36 6	
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	POTASSIUM	1910	=	MG/KG	1800	X
SBLFF (2)	SBLFF3 5D	10/06/1999	3 0 to 5 0	SODIUM	134	J	MG/KG		
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	THALLIUM	0 42	J	MG/KG		
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	VANADIUM	51 3	J	MG/KG	51 3	
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	ZINC	109	J	MG/KG	114	

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TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Surface Soils									
SS 5	DDMT-081098-SS5		0 0 to 1 0	ALUMINUM	14500	J	mg/Kg	23810	
SS-5	DDMT-081098-SS5		0 0 to 1 0	ARSENIC	8 1	=	mg/Kg	20	
SS-5	DDMT-081098-SS5		0 0 to 1 0	BARIUM	128	=	mg/Kg	234	
SS-5	DDMT-081098-SS5		0 0 to 1 0	CALCIUM	58400	=	mg/Kg	5840	X
SS-5	DDMT-081098-SS5		0 0 to 1 0	CHROMIUM, TOTAL	28 5	=	mg/Kg	24 8	X
SS-5	DDMT-081098-SS5		0 0 to 1 0	COBALT	6.5	=	mg/Kg	18 3	
SS-5	DDMT-081098-SS5		0 0 to 1 0	IRON	17000	=	mg/Kg	37040	
SS-5	DDMT-081098-SS5		0 0 to 1 0	LEAD	25 5	=	mg/Kg	30	
SS-5	DDMT-081098-SS5		0 0 to 1 0	MAGNESIUM	3920	=	mg/Kg	4600	
SS-5	DDMT-081098-SS5		0 0 to 1 0	MANGANESE	589	=	mg/Kg	1304	
SS-5	DDMT-081098-SS5		0 0 to 1 0	MERCURY	0 04	=	mg/Kg	0 4	
SS-5	DDMT-081098-SS5		0 0 to 1 0	NICKEL	21 5	=	mg/Kg	30	
SS 5	DDMT-081098-SS5		0 0 to 1 0	POTASSIUM	1500	=	mg/Kg	1820	
SS-5	DDMT-081098-SS5		0 0 to 1 0	VANADIUM	30 9	=	mg/Kg	48 4	
SS-6	DDMT-081098-SS6		0 0 to 1 0	ALUMINUM	21700	J	mg/Kg	23810	
SS-6	DDMT-081098-SS6		0 0 to 1 0	ARSENIC	13	=	mg/Kg	20	
SS-6	DDMT-081098-SS6		0 0 to 1 0	BARIUM	120	=	mg/Kg	234	
SS-6	DDMT-081098-SS6		0 0 to 1 0	CALCIUM	1170	=	mg/Kg	5840	
SS-6	DDMT-081098-SS6		0 0 to 1 0	CHROMIUM TOTAL	20.1	=	mg/Kg	24 8	
SS-6	DDMT-081098-SS6		0 0 to 1 0	COBALT	8 4	=	mg/Kg	18 3	
SS-6	DDMT-081098-SS6		0 0 to 1 0	IRON	24300	=	mg/Kg	37040	
SS-6	DDMT-081098-SS6		0 0 to 1 0	LEAD	17 1	=	mg/Kg	30	
SS-6	DDMT-081098-SS6		0 0 to 1 0	MAGNESIUM	2800	=	mg/Kg	4600	
SS-6	DDMT-081098-SS6		0 0 to 1 0	MANGANESE	590	=	mg/Kg	1304	
SS-6	DDMT-081098-SS6		0 0 to 1 0	MERCURY	0 05	=	mg/Kg	0 4	
SS-6	DDMT-081098-SS6		0 0 to 1 0	NICKEL	18 9	=	mg/Kg	30	
SS-6	DDMT-081098-SS6		0 0 to 1 0	POTASSIUM	1560	=	mg/Kg	1820	
SS-6	DDMT-081098-SS6		0 0 to 1 0	VANADIUM	41 2	=	mg/Kg	48 4	
BORROW_PIT	ETC-1	09/18/1998	0 0 to 1 0	CHROMIUM TOTAL	14 6	=	MG/KG	24 8	
BORROW_PIT	ETC-1	09/18/1998	0 0 to 1 0	MERCURY	0 036	=	MG/KG	0 4	
BORROW_PIT	ETC-2	09/18/1998	0 0 to 1 0	CHROMIUM TOTAL	12.9	=	MG/KG	24 8	
BORROW_PIT	ETC-2	09/18/1998	0 0 to 1 0	MERCURY	0 039	=	MG/KG	0 4	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	ALUMINUM	18900	=	MG/KG	23810	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	ARSENIC	4 5	J	MG/KG	20	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	BARIUM	33 5	J	MG/KG	234	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	BERYLLIUM	0.29	J	MG/KG	1 1	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	CADMIUM	0 25	J	MG/KG	1 4	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	CALCIUM	9900	J	MG/KG	5840	X
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	CHROMIUM TOTAL	12 8	J	MG/KG	24 8	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	COBALT	1 5	J	MG/KG	18 3	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	COPPER	4 2	J	MG/KG	33 5	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	IRON	10900	J	MG/KG	37040	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	LEAD	7 5	J	MG/KG	30	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	MAGNESIUM	326	J	MG/KG	4600	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	MANGANESE	32.2	J	MG/KG	1304	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	NICKEL	6 7	J	MG/KG	30	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	SODIUM	32 3	J	MG/KG		
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	VANADIUM	17	J	MG/KG	48 4	
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	ZINC	11	J	MG/KG	126	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	ALUMINUM	2460	=	MG/KG	23810	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	ANTIMONY	1 6	J	MG/KG	7	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	ARSENIC	1 4	J	MG/KG	20	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	BARIUM	91 5	=	MG/KG	234	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	BERYLLIUM	0 13	J	MG/KG	1 1	
SBLFB (2)	SBLFB0-1	10/05/1999	0.0 to 1 0	CADMIUM	0.23	J	MG/KG	1 4	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	CALCIUM	1160	J	MG/KG	5840	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	CHROMIUM TOTAL	7 3	J	MG/KG	24 8	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	COBALT	2 4	J	MG/KG	18 3	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	COPPER	2 7	J	MG/KG	33 5	
SBLFB (2)	SBLFB0-1	10/05/1999	0.0 to 1 0	IRON	7550	J	MG/KG	37040	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	LEAD	3 8	J	MG/KG	30	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	MAGNESIUM	85 2	J	MG/KG	4600	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	MANGANESE	186	J	MG/KG	1304	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	NICKEL	2.5	J	MG/KG	30	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	SODIUM	28 7	J	MG/KG		
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	VANADIUM	11	J	MG/KG	48 4	
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	ZINC	4 3	J	MG/KG	126	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	ALUMINUM	14100	=	MG/KG	23810	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	ANTIMONY	3 1	J	MG/KG	7	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	ARSENIC	5 8	J	MG/KG	20	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	BARIUM	70 4	=	MG/KG	234	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	BERYLLIUM	0 35	J	MG/KG	1 1	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	CADMIUM	0 43	J	MG/KG	1 4	
SBLFC (2)	SBLFC0-1	10/06/1999		CALCIUM	15100	J	MG/KG	5840	X
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	CHROMIUM TOTAL	15 7	J	MG/KG	24 8	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	COBALT	4	J	MG/KG	18 3	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	COPPER	9 8	=	MG/KG	33 5	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	IRON	11300	=	MG/KG	37040	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	LEAD	38 9	=	MG/KG	30	X
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	MAGNESIUM	2880	=	MG/KG	4600	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	MANGANESE	220	=	MG/KG	1304	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	NICKEL	9 8	=	MG/KG	30	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	POTASSIUM	977	J	MG/KG	1820	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	SODIUM	141	J	MG/KG		
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	THALLIUM	0.24	J	MG/KG		
SBLFC (2)	SBLFC0-1	10/06/1999	0.0 to 1 0	VANADIUM	21 3	J	MG/KG	48 4	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	ZINC	41 6	J	MG/KG	126	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	ALUMINUM	11900	=	MG/KG	23810	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	ARSENIC	10 5	J	MG/KG	20	

TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	BARIUM	97 1	=	MG/KG	234	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	BERYLLIUM	0 51	J	MG/KG	1 1	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	CADMIUM	0 5	J	MG/KG	1 4	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	CALCIUM	836	J	MG/KG	5840	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	CHROMIUM TOTAL	16 2	J	MG/KG	24 8	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	COBALT	6 7	J	MG/KG	18 3	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	COPPER	14 7	=	MG/KG	33 5	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	IRON	22800	J	MG/KG	37040	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	LEAD	12 4	J	MG/KG	30	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	MAGNESIUM	2140	=	MG/KG	4600	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	MANGANESE	360	J	MG/KG	1304	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	NICKEL	15 1	=	MG/KG	30	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	POTASSIUM	971	J	MG/KG	1820	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	SODIUM	67.2	J	MG/KG		
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	THALLIUM	0.26	J	MG/KG		
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	VANADIUM	29 6	J	MG/KG	48 4	
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	ZINC	49 3	J	MG/KG	126	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	ALUMINUM	16200	=	MG/KG	23810	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	ARSENIC	5 7	J	MG/KG	20	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	BARIUM	61 1	=	MG/KG	234	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	BERYLLIUM	0 42	J	MG/KG	1 1	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	CADMIUM	0 41	J	MG/KG	1 4	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	CALCIUM	5550	J	MG/KG	5840	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	CHROMIUM, TOTAL	18 4	J	MG/KG	24 8	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	COBALT	3 9	J	MG/KG	18 3	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	COPPER	9 2	=	MG/KG	33 5	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	IRON	15400	=	MG/KG	37040	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	LEAD	18 5	=	MG/KG	30	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	MAGNESIUM	1060	J	MG/KG	4600	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	MANGANESE	191	=	MG/KG	1304	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	NICKEL	10 5	=	MG/KG	30	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	POTASSIUM	927	J	MG/KG	1820	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	SODIUM	53.7	J	MG/KG		
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	VANADIUM	26 5	J	MG/KG	48 4	
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	ZINC	46 2	J	MG/KG	126	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	ALUMINUM	12300	=	MG/KG	23810	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	ANTIMONY	1 6	J	MG/KG	7	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	ARSENIC	9	J	MG/KG	20	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	BARIUM	101	=	MG/KG	234	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	BERYLLIUM	0 49	J	MG/KG	1 1	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	CADMIUM	0 53	J	MG/KG	1 4	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	CALCIUM	20500	J	MG/KG	5840	X
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	CHROMIUM TOTAL	14 6	J	MG/KG	24 8	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	COBALT	6 2	J	MG/KG	18 3	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	COPPER	14 6	=	MG/KG	33 5	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	IRON	17200	=	MG/KG	37040	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	LEAD	13 2	=	MG/KG	30	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	MAGNESIUM	10100	=	MG/KG	4600	X
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	MANGANESE	424	=	MG/KG	1304	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	NICKEL	16 2	=	MG/KG	30	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	POTASSIUM	1620	=	MG/KG	1820	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	SODIUM	146	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	THALLIUM	0 29	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	VANADIUM	30	J	MG/KG	48 4	
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	ZINC	42	J	MG/KG	126	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ALUMINUM	16200	=	MG/KG	23810	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ARSENIC	8 8	J	MG/KG	20	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BARIUM	92.1	=	MG/KG	234	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BERYLLIUM	0 36	J	MG/KG	1 1	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	CALCIUM	22400	=	MG/KG	5840	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	CHROMIUM TOTAL	15 2	=	MG/KG	24 8	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	COBALT	3 5	J	MG/KG	18 3	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	COPPER	8 2	=	MG/KG	33 5	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	IRON	13300	=	MG/KG	37040	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	LEAD	16 9	=	MG/KG	30	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	MAGNESIUM	3020	=	MG/KG	4600	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	MANGANESE	238	=	MG/KG	1304	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	MERCURY	0 07	=	MG/KG	0 4	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	NICKEL	10 3	=	MG/KG	30	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	POTASSIUM	893	J	MG/KG	1820	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	THALLIUM	0 16	J	MG/KG		
SSLFA	DJA292	10/14/1999	0 0 to 1 0	VANADIUM	22 8	=	MG/KG	48 4	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ZINC	29 3	=	MG/KG	126	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	ALUMINUM	17600	=	MG/KG	23810	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	ARSENIC	14 9	J	MG/KG	20	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	BARIUM	98 1	=	MG/KG	234	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	BERYLLIUM	0 53	J	MG/KG	1 1	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	CADMIUM	0 17	J	MG/KG	1 4	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	CALCIUM	6450	=	MG/KG	5840	X
SSLFA	DJA293	10/14/1999	1 0 to 2 0	CHROMIUM TOTAL	15 4	=	MG/KG	24 8	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	COBALT	10 3	J	MG/KG	18 3	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	COPPER	19 4	=	MG/KG	33 5	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	IRON	26100	=	MG/KG	37040	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	LEAD	17 3	=	MG/KG	30	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	MAGNESIUM	3290	=	MG/KG	4600	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	MANGANESE	683	=	MG/KG	1304	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	MERCURY	0 07	J	MG/KG	0 4	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	NICKEL	20 6	=	MG/KG	30	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	POTASSIUM	1020	J	MG/KG	1820	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	THALLIUM	0 39	J	MG/KG		

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TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFA	DJA293	10/14/1999	1 0 to 2 0	VANADIUM	32 3	=	MG/KG	48 4	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	ZINC	65 2	=	MG/KG	126	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ALUMINUM	31100	=	MG/KG	23810	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ARSENIC	24 8	J	MG/KG	20	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	BARIUM	237	=	MG/KG	234	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	BERYLLIUM	0.91	J	MG/KG	1 1	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	CADMIUM	0 24	J	MG/KG	1 4	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	CALCIUM	14200	=	MG/KG	5840	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	CHROMIUM TOTAL	28	=	MG/KG	24 8	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	COBALT	10 8	J	MG/KG	18 3	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	COPPER	22 7	=	MG/KG	33 5	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	IRON	28800	=	MG/KG	37040	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	LEAD	54 3	=	MG/KG	30	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	MAGNESIUM	4040	=	MG/KG	4600	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	MANGANESE	695	=	MG/KG	1304	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	MERCURY	0 07	=	MG/KG	0 4	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	NICKEL	23 7	=	MG/KG	30	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	POTASSIUM	3420	=	MG/KG	1820	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	SELENIUM	0.55	J	MG/KG	0 8	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	SODIUM	122	J	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	THALLIUM	0 42	J	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	VANADIUM	59.2	=	MG/KG	48 4	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ZINC	90 4	=	MG/KG	126	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	ALUMINUM	19500	=	MG/KG	23810	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	ARSENIC	16 3	J	MG/KG	20	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	BARIUM	177	=	MG/KG	234	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	BERYLLIUM	0 8	J	MG/KG	1 1	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	CADMIUM	0 2	J	MG/KG	1 4	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	CALCIUM	3770	=	MG/KG	5840	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	CHROMIUM, TOTAL	18 7	=	MG/KG	24 8	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	COBALT	20 3	=	MG/KG	18 3	X
SSLFB	DJA295	10/14/1999	1 0 to 2 0	COPPER	22 1	=	MG/KG	33 5	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	IRON	28900	=	MG/KG	37040	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	LEAD	21 2	=	MG/KG	30	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	MAGNESIUM	3350	=	MG/KG	4600	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	MANGANESE	1080	=	MG/KG	1304	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	MERCURY	0 07	J	MG/KG	0 4	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	NICKEL	23 4	=	MG/KG	30	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	POTASSIUM	1350	=	MG/KG	1820	
SSLFB	DJA295	10/14/1999	1 0 to 2 0	THALLIUM	0 4	J	MG/KG		
SSLFB	DJA295	10/14/1999	1 0 to 2.0	VANADIUM	38 5	=	MG/KG	48 4	
SSLFB	DJA295	10/14/1999	1 0 to 2.0	ZINC	72	=	MG/KG	126	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	ALUMINUM	22500	=	MG/KG	23810	
SSLFB	DJA296	10/14/1999	1 0 to 2.0	ARSENIC	15 6	J	MG/KG	20	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	BARIUM	208	=	MG/KG	234	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	BERYLLIUM	0 92	J	MG/KG	1 1	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	CADMIUM	0.27	J	MG/KG	1 4	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	CALCIUM	2830	=	MG/KG	5840	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	CHROMIUM TOTAL	22 1	=	MG/KG	24 8	
SSLFB	DJA296	10/14/1999	1 0 to 2.0	COBALT	12 5	J	MG/KG	18 3	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	COPPER	24.3	=	MG/KG	33 5	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	IRON	32500	=	MG/KG	37040	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	LEAD	19 8	=	MG/KG	30	
SSLFB	DJA296	10/14/1999	1 0 to 2.0	MAGNESIUM	3990	=	MG/KG	4600	
SSLFB	DJA296	10/14/1999	1 0 to 2.0	MANGANESE	907	=	MG/KG	1304	
SSLFB	DJA296	10/14/1999	1 0 to 2.0	MERCURY	0 07	J	MG/KG	0 4	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	NICKEL	25 7	=	MG/KG	30	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	POTASSIUM	1950	=	MG/KG	1820	X
SSLFB	DJA296	10/14/1999	1 0 to 2 0	THALLIUM	0 42	J	MG/KG		
SSLFB	DJA296	10/14/1999	1 0 to 2 0	VANADIUM	47 3	=	MG/KG	48 4	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	ZINC	80 9	=	MG/KG	126	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	ALUMINUM	16800	=	MG/KG	23810	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	ARSENIC	15 7	J	MG/KG	20	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	BARIUM	136	=	MG/KG	234	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	BERYLLIUM	0 64	J	MG/KG	1 1	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	CADMIUM	0 22	J	MG/KG	1 4	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	CALCIUM	2590	=	MG/KG	5840	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	CHROMIUM TOTAL	16.2	=	MG/KG	24 8	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	COBALT	11 9	J	MG/KG	18 3	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	COPPER	22	=	MG/KG	33 5	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	IRON	26800	=	MG/KG	37040	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	LEAD	26 4	=	MG/KG	30	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	MAGNESIUM	3050	=	MG/KG	4600	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	MANGANESE	745	=	MG/KG	1304	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	MERCURY	0 05	J	MG/KG	0 4	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	NICKEL	21 9	=	MG/KG	30	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	POTASSIUM	1250	=	MG/KG	1820	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	THALLIUM	0.25	J	MG/KG		
SSLFC	DJA297	10/14/1999	0.0 to 1 0	VANADIUM	33 7	=	MG/KG	48 4	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	ZINC	72 8	=	MG/KG	126	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	ALUMINUM	14300	=	MG/KG	23810	
SSLFC	DJA298	10/14/1999	1 0 to 2.0	ARSENIC	16 2	J	MG/KG	20	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	BARIUM	166	=	MG/KG	234	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	BERYLLIUM	0 66	J	MG/KG	1 1	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	CADMIUM	0 17	J	MG/KG	1 4	
SSLFC	DJA298	10/14/1999	1 0 to 2.0	CALCIUM	1500	=	MG/KG	5840	
SSLFC	DJA298	10/14/1999	1 0 to 2.0	CHROMIUM TOTAL	13 4	=	MG/KG	24 8	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	COBALT	9 6	J	MG/KG	18 3	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	COPPER	21 9	=	MG/KG	33 5	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	IRON	26000	=	MG/KG	37040	

TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFC	DJA298	10/14/1999	1 0 to 2 0	LEAD	18 5	=	MG/KG	30	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	MAGNESIUM	2850	=	MG/KG	4600	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	MANGANESE	800	=	MG/KG	1304	
SSLFC	DJA298	10/14/1999	1 0 to 2.0	MERCURY	0 06	J	MG/KG	0 4	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	NICKEL	21 6	=	MG/KG	30	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	POTASSIUM	936	J	MG/KG	1820	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	THALLIUM	0 4	J	MG/KG		
SSLFC	DJA298	10/14/1999	1 0 to 2 0	VANADIUM	28 7	=	MG/KG	48 4	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	ZINC	70 3	=	MG/KG	126	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	ALUMINUM	19800	=	MG/KG	23810	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	ARSENIC	8 2	J	MG/KG	20	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	BARIUM	297	=	MG/KG	234	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	BERYLLIUM	0 52	J	MG/KG	1 1	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	CADMIUM	0.36	=	MG/KG	1 4	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	CALCIUM	101000	=	MG/KG	5840	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	CHROMIUM TOTAL	17 8	=	MG/KG	24 8	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	COBALT	3 2	J	MG/KG	18 3	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	COPPER	14 5	=	MG/KG	33 5	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	IRON	11000	=	MG/KG	37040	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	LEAD	2 8	=	MG/KG	30	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	MAGNESIUM	1400	=	MG/KG	4600	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	MANGANESE	243	=	MG/KG	1304	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	MERCURY	0 08	=	MG/KG	0 4	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	NICKEL	9 3	=	MG/KG	30	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	POTASSIUM	4810	=	MG/KG	1820	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	SODIUM	2440	=	MG/KG		
SSLFD	DJA299	10/14/1999	0 0 to 1 0	VANADIUM	24 8	=	MG/KG	48 4	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	ZINC	74 4	=	MG/KG	126	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	ALUMINUM	15400	=	MG/KG	23810	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	ARSENIC	7	J	MG/KG	20	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	BARIUM	57 6	=	MG/KG	234	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	BERYLLIUM	0 31	J	MG/KG	1 1	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	CADMIUM	0 19	J	MG/KG	1 4	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	CALCIUM	19200	=	MG/KG	5840	X
SSLFD	DJA300	10/14/1999	1 0 to 2 0	CHROMIUM TOTAL	16 6	=	MG/KG	24 8	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	COBALT	1 9	J	MG/KG	18 3	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	COPPER	6 1	=	MG/KG	33 5	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	IRON	10200	=	MG/KG	37040	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	LEAD	44 3	=	MG/KG	30	X
SSLFD	DJA300	10/14/1999	1 0 to 2 0	MAGNESIUM	368	J	MG/KG	4600	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	MANGANESE	63 6	=	MG/KG	1304	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	MERCURY	0 04	J	MG/KG	0 4	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	NICKEL	7 8	J	MG/KG	30	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	POTASSIUM	733	J	MG/KG	1820	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	SODIUM	116	J	MG/KG		
SSLFD	DJA300	10/14/1999	1 0 to 2 0	VANADIUM	16 1	=	MG/KG	48 4	
SSLFD	DJA300	10/14/1999	1 0 to 2 0	ZINC	38.2	=	MG/KG	126	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	ALUMINUM	16800	=	MG/KG	23810	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	ARSENIC	10 9	J	MG/KG	20	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	BARIUM	75 5	=	MG/KG	234	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	BERYLLIUM	0 42	J	MG/KG	1 1	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	CADMIUM	0.26	J	MG/KG	1 4	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	CALCIUM	9290	=	MG/KG	5840	X
SSLFE	DJA301	10/14/1999	0 0 to 1 0	CHROMIUM TOTAL	19 3	=	MG/KG	24 8	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	COBALT	5 6	J	MG/KG	18 3	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	COPPER	26 6	=	MG/KG	33 5	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	IRON	18600	=	MG/KG	37040	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	LEAD	40 8	=	MG/KG	30	X
SSLFE	DJA301	10/14/1999	0 0 to 1 0	MAGNESIUM	953	J	MG/KG	4600	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	MANGANESE	301	=	MG/KG	1304	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	MERCURY	0 1	=	MG/KG	0 4	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	NICKEL	12 9	=	MG/KG	30	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	POTASSIUM	796	J	MG/KG	1820	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	THALLIUM	0 32	J	MG/KG		
SSLFE	DJA301	10/14/1999	0 0 to 1 0	VANADIUM	27 8	=	MG/KG	48 4	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	ZINC	33 6	=	MG/KG	126	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	ALUMINUM	12400	=	MG/KG	23810	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	ARSENIC	15	J	MG/KG	20	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	BARIUM	198	=	MG/KG	234	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	BERYLLIUM	0 66	J	MG/KG	1 1	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	CADMIUM	0 22	J	MG/KG	1 4	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	CALCIUM	1760	=	MG/KG	5840	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	CHROMIUM TOTAL	14 8	=	MG/KG	24 8	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	COBALT	10 6	J	MG/KG	18 3	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	COPPER	20 8	=	MG/KG	33 5	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	IRON	26300	=	MG/KG	37040	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	LEAD	17	=	MG/KG	30	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	MAGNESIUM	2930	=	MG/KG	4600	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	MANGANESE	841	=	MG/KG	1304	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	MERCURY	0 05	J	MG/KG	0 4	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	NICKEL	23	=	MG/KG	30	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	POTASSIUM	981	J	MG/KG	1820	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	SODIUM	103	J	MG/KG		
SSLFE	DJA302	10/14/1999	1 0 to 2 0	THALLIUM	0.38	J	MG/KG		
SSLFE	DJA302	10/14/1999	1 0 to 2 0	VANADIUM	27 9	=	MG/KG	48 4	
SSLFE	DJA302	10/14/1999	1 0 to 2 0	ZINC	69	=	MG/KG	126	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	ALUMINUM	31300	=	MG/KG	23810	X
SSLFF	DJA303	10/14/1999	0 0 to 1 0	ARSENIC	25 5	J	MG/KG	20	X
SSLFF	DJA303	10/14/1999	0 0 to 1 0	BARIUM	87 4	=	MG/KG	234	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	BERYLLIUM	0 37	J	MG/KG	1 1	

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TABLE 12-2
Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFF	DJA303	10/14/1999	0 0 to 1 0	CADMIUM	0 33	J	MG/KG	1 4	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	CALCIUM	1400	=	MG/KG	5840	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	CHROMIUM TOTAL	16 7	=	MG/KG	24 8	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	COBALT	5 5	J	MG/KG	18.3	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	COPPER	14 6	=	MG/KG	33 5	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	IRON	36400	=	MG/KG	37040	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	LEAD	17 4	=	MG/KG	30	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	MAGNESIUM	1370	=	MG/KG	4600	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	MANGANESE	550	=	MG/KG	1304	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	MERCURY	0 09	=	MG/KG	0 4	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	NICKEL	12 1	=	MG/KG	30	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	POTASSIUM	615	J	MG/KG	1820	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	SILVER	0 52	J	MG/KG	2	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	THALLIUM	0.33	J	MG/KG		
SSLFF	DJA303	10/14/1999	0 0 to 1 0	VANADIUM	29 8	=	MG/KG	48 4	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	ZINC	45 4	=	MG/KG	126	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	ALUMINUM	23000	=	MG/KG	23810	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	ARSENIC	14.2	J	MG/KG	20	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	BARIUM	90 3	=	MG/KG	234	
SSLFF	DJA304	10/14/1999	1 0 to 2.0	BERYLLIUM	0 38	J	MG/KG	1 1	
SSLFF	DJA304	10/14/1999	1 0 to 2.0	CADMIUM	0 35	J	MG/KG	1 4	
SSLFF	DJA304	10/14/1999	1 0 to 2.0	CALCIUM	811	J	MG/KG	5840	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	CHROMIUM TOTAL	11	=	MG/KG	24 8	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	COBALT	6 1	J	MG/KG	18 3	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	COPPER	15 4	=	MG/KG	33 5	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	IRON	33300	=	MG/KG	37040	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	LEAD	16	=	MG/KG	30	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	MAGNESIUM	1460	=	MG/KG	4600	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	MANGANESE	673	=	MG/KG	1304	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	MERCURY	0 06	J	MG/KG	0 4	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	NICKEL	12 7	=	MG/KG	30	
SSLFF	DJA304	10/14/1999	1 0 to 2.0	POTASSIUM	655	J	MG/KG	1820	
SSLFF	DJA304	10/14/1999	1 0 to 2.0	THALLIUM	0 2	J	MG/KG		
SSLFF	DJA304	10/14/1999	1 0 to 2 0	VANADIUM	24 4	=	MG/KG	48 4	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	ZINC	46	=	MG/KG	126	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ALUMINUM	52600	=	MG/KG	23810	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ARSENIC	12 5	J	MG/KG	20	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	BARIUM	96 1	=	MG/KG	234	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	BERYLLIUM	0 55	J	MG/KG	1 1	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	CADMIUM	0 47	J	MG/KG	1 4	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	CALCIUM	9770	=	MG/KG	5840	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	CHROMIUM, TOTAL	55 7	=	MG/KG	24 8	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	COBALT	5 4	J	MG/KG	18 3	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	COPPER	13 3	=	MG/KG	33 5	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	IRON	22500	=	MG/KG	37040	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	LEAD	75 6	=	MG/KG	30	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	MAGNESIUM	1710	=	MG/KG	4600	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	MANGANESE	322	=	MG/KG	1304	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	MERCURY	0 05	J	MG/KG	0 4	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	NICKEL	15	=	MG/KG	30	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	POTASSIUM	1040	J	MG/KG	1820	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	SODIUM	103	J	MG/KG		
SSLFG	DJA305	10/14/1999	0 0 to 1 0	VANADIUM	40 5	=	MG/KG	48 4	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ZINC	78 8	=	MG/KG	126	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ALUMINUM	21500	=	MG/KG	23810	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ARSENIC	8 7	J	MG/KG	20	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	BARIUM	78 4	=	MG/KG	234	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	BERYLLIUM	0 48	J	MG/KG	1 1	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	CADMIUM	0 3	J	MG/KG	1 4	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	CALCIUM	4020	=	MG/KG	5840	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	CHROMIUM TOTAL	28 9	=	MG/KG	24 8	X
SSLFG	DJA306	10/14/1999	1 0 to 1 5	COBALT	6 8	J	MG/KG	18 3	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	COPPER	12 5	=	MG/KG	33 5	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	IRON	20200	=	MG/KG	37040	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	LEAD	90 1	=	MG/KG	30	X
SSLFG	DJA306	10/14/1999	1 0 to 1 5	MAGNESIUM	1680	=	MG/KG	4600	
SSLFG	DJA306	10/14/1999	1 0 to 1.5	MANGANESE	346	=	MG/KG	1304	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	NICKEL	15 2	=	MG/KG	30	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	POTASSIUM	768	J	MG/KG	1820	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	SODIUM	89 1	J	MG/KG		
SSLFG	DJA306	10/14/1999	1 0 to 1 5	VANADIUM	30 6	=	MG/KG	48 4	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ZINC	48.6	=	MG/KG	126	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ALUMINUM	3800	=	MG/KG	23810	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ARSENIC	4 4	J	MG/KG	20	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BARIUM	22 4	J	MG/KG	234	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BERYLLIUM	0 21	J	MG/KG	1 1	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	CADMIUM	0 26	J	MG/KG	1 4	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	CALCIUM	162000	J	MG/KG	5840	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	CHROMIUM TOTAL	9 1	=	MG/KG	24 8	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	COBALT	1 7	J	MG/KG	18 3	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	COPPER	4 4	J	MG/KG	33 5	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	IRON	6360	=	MG/KG	37040	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	LEAD	32 1	=	MG/KG	30	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	MAGNESIUM	5060	=	MG/KG	4600	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	MANGANESE	79 9	J	MG/KG	1304	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	MERCURY	0 05	J	MG/KG	0 4	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	NICKEL	5	J	MG/KG	30	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	POTASSIUM	314	J	MG/KG	1820	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	SODIUM	105	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	VANADIUM	8 7	J	MG/KG	48 4	

TABLE 12-2
Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area
Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ZINC	34 5	=	MG/KG	126	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	ALUMINUM	6300	=	MG/KG	23810	
SSLFH	DJA313	10/15/1999	1 0 to 2.0	ARSENIC	4 7	J	MG/KG	20	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	BARIUM	35 1	J	MG/KG	234	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	BERYLLIUM	0 32	J	MG/KG	1 1	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	CADMIUM	0 3	J	MG/KG	1 4	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	CALCIUM	108000	J	MG/KG	5840	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	CHROMIUM TOTAL	13	=	MG/KG	24 8	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	COBALT	1 9	J	MG/KG	18 3	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	COPPER	6 8	=	MG/KG	33 5	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	IRON	7460	=	MG/KG	37040	
SSLFH	DJA313	10/15/1999	1 0 to 2.0	LEAD	57 6	=	MG/KG	30	X
SSLFH	DJA313	10/15/1999	1 0 to 2.0	MAGNESIUM	4120	=	MG/KG	4600	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	MANGANESE	103	J	MG/KG	1304	
SSLFH	DJA313	10/15/1999	1 0 to 2.0	NICKEL	7 7	J	MG/KG	30	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	POTASSIUM	428	J	MG/KG	1820	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	SODIUM	127	J	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2 0	VANADIUM	11 7	=	MG/KG	48 4	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	ZINC	47 8	=	MG/KG	126	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	ALUMINUM	42000	=	MG/KG	23810	X
SSLFI	DJA310	10/15/1999	0 0 to 1 0	ARSENIC	11 9	J	MG/KG	20	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	BARIUM	112	J	MG/KG	234	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	BERYLLIUM	0 86	J	MG/KG	1 1	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	CADMIUM	0 28	J	MG/KG	1 4	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	CALCIUM	1410	J	MG/KG	5840	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	CHROMIUM TOTAL	34 2	=	MG/KG	24 8	X
SSLFI	DJA310	10/15/1999	0 0 to 1 0	COBALT	7 3	J	MG/KG	18 3	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	COPPER	17 9	=	MG/KG	33 5	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	IRON	28500	=	MG/KG	37040	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	LEAD	20 9	=	MG/KG	30	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	MAGNESIUM	2450	=	MG/KG	4600	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	MANGANESE	446	J	MG/KG	1304	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	MERCURY	0 08	=	MG/KG	0 4	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	NICKEL	17 1	=	MG/KG	30	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	POTASSIUM	1150	J	MG/KG	1820	
SSLFI	DJA310	10/15/1999	0 0 to 1 0	SODIUM	46	J	MG/KG		
SSLFI	DJA310	10/15/1999	0 0 to 1 0	THALLIUM	0 32	J	MG/KG		
SSLFI	DJA310	10/15/1999	0 0 to 1 0	VANADIUM	96 6	=	MG/KG	48 4	X
SSLFI	DJA310	10/15/1999	0 0 to 1 0	ZINC	62 9	=	MG/KG	126	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	ALUMINUM	28100	=	MG/KG	23810	X
SSLFI	DJA311	10/15/1999	1 0 to 2 0	ARSENIC	12	=	MG/KG	20	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	BARIUM	114	J	MG/KG	234	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	BERYLLIUM	0 72	J	MG/KG	1 1	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	CADMIUM	0 18	J	MG/KG	1 4	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	CALCIUM	1140	J	MG/KG	5840	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	CHROMIUM TOTAL	25 2	=	MG/KG	24 8	X
SSLFI	DJA311	10/15/1999	1 0 to 2.0	COBALT	14 5	=	MG/KG	18 3	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	COPPER	21	=	MG/KG	33 5	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	IRON	26800	=	MG/KG	37040	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	LEAD	17 7	=	MG/KG	30	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	MAGNESIUM	3350	=	MG/KG	4600	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	MANGANESE	725	J	MG/KG	1304	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	MERCURY	0 09	=	MG/KG	0 4	
SSLFI	DJA311	10/15/1999	1 0 to 2.0	NICKEL	20 7	=	MG/KG	30	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	POTASSIUM	1850	=	MG/KG	1820	X
SSLFI	DJA311	10/15/1999	1 0 to 2 0	SODIUM	71 4	J	MG/KG		
SSLFI	DJA311	10/15/1999	1 0 to 2 0	THALLIUM	0.37	J	MG/KG		
SSLFI	DJA311	10/15/1999	1 0 to 2 0	VANADIUM	47 5	=	MG/KG	48 4	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	ZINC	66 9	=	MG/KG	126	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ALUMINUM	17600	=	MG/KG	23810	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ARSENIC	6 8	J	MG/KG	20	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BARIUM	94 7	J	MG/KG	234	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BERYLLIUM	0 37	J	MG/KG	1 1	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	CADMIUM	0 32	J	MG/KG	1 4	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	CALCIUM	26800	J	MG/KG	5840	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	CHROMIUM TOTAL	33 9	=	MG/KG	24 8	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	COBALT	4 1	J	MG/KG	18 3	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	COPPER	15 4	=	MG/KG	33 5	
SSLFJ	DJA307	10/15/1998	0 0 to 1 0	IRON	13000	=	MG/KG	37040	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	LEAD	107	=	MG/KG	30	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	MAGNESIUM	2220	J	MG/KG	4600	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	MANGANESE	605	=	MG/KG	1304	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	MERCURY	0 06	=	MG/KG	0 4	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	NICKEL	13 3	=	MG/KG	30	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	POTASSIUM	1170	=	MG/KG	1820	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	SODIUM	288	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	THALLIUM	0 15	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	VANADIUM	21 7	=	MG/KG	48 4	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ZINC	58	=	MG/KG	126	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	ALUMINUM	18200	=	MG/KG	23810	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	ARSENIC	12	J	MG/KG	20	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	BARIUM	128	J	MG/KG	234	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	BERYLLIUM	0 69	J	MG/KG	1 1	
SSLFJ	DJA308	10/15/1999	1 0 to 2.0	CADMIUM	0 16	J	MG/KG	1 4	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	CALCIUM	1660	J	MG/KG	5840	
SSLFJ	DJA308	10/15/1999	1 0 to 2.0	CHROMIUM TOTAL	17 9	=	MG/KG	24 8	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	COBALT	8 3	J	MG/KG	18 3	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	COPPER	17 5	=	MG/KG	33 5	
SSLFJ	DJA308	10/15/1999	1 0 to 2.0	IRON	25200	=	MG/KG	37040	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	LEAD	16 2	=	MG/KG	30	

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TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFJ	DJA308	10/15/1999	1 0 to 2.0	MAGNESIUM	2880	=	MG/KG	4600	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	MANGANESE	678	J	MG/KG	1304	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	NICKEL	20 6	=	MG/KG	30	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	POTASSIUM	1370	=	MG/KG	1820	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	SODIUM	99 5	J	MG/KG		
SSLFJ	DJA308	10/15/1999	1 0 to 2.0	THALLIUM	0 32	J	MG/KG		
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	VANADIUM	35	=	MG/KG	48 4	
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	ZINC	63 5	=	MG/KG	126	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	ALUMINUM	16500	=	MG/KG	23810	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	ARSENIC	10 5	J	MG/KG	20	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	BARIUM	214	J	MG/KG	234	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	BERYLLIUM	0 72	J	MG/KG	1 1	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	CADMIUM	0 16	J	MG/KG	1 4	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	CALCIUM	1310	J	MG/KG	5840	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	CHROMIUM TOTAL	16	=	MG/KG	24 8	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	COBALT	11 4	J	MG/KG	18.3	
SSLFJ	DJA309	10/15/1999	1 0 to 2.0	COPPER	14 9	=	MG/KG	33 5	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	IRON	21400	=	MG/KG	37040	
SSLFJ	DJA309	10/15/1999	1 0 to 2.0	LEAD	15 5	=	MG/KG	30	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	MAGNESIUM	2240	=	MG/KG	4600	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	MANGANESE	1070	J	MG/KG	1304	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	MERCURY	0 07	=	MG/KG	0 4	
SSLFJ	DJA309	10/15/1999	1 0 to 2.0	NICKEL	20 7	=	MG/KG	30	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	POTASSIUM	1280	=	MG/KG	1820	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	SODIUM	87 8	J	MG/KG		
SSLFJ	DJA309	10/15/1999	1 0 to 2.0	THALLIUM	0.26	J	MG/KG		
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	VANADIUM	31	=	MG/KG	48 4	
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	ZINC	57 6	=	MG/KG	126	
OC Pesticides									
Surface Soils									
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	ALPHA-CHLORDANE	0 0028	=	MG/KG	0.029	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLC	0 016	=	MG/KG	0 16	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICH	0 019	=	MG/KG	0 074	
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	GAMMA-CHLORDANE	0 003	=	MG/KG	0 026	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ALDRIN	0 0015	J	MG/KG		
SSLFA	DJA292	10/14/1999	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLC	0 0033	J	MG/KG	0 16	
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ENDRIN KETONE	0 033	=	MG/KG		
SSLFA	DJA293	10/14/1999	1 0 to 2 0	ALPHA ENDOSULFAN (ENDOSULFAN I)	0 00031	J	MG/KG		
SSLFA	DJA293	10/14/1999	1 0 to 2 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLC	0 0012	J	MG/KG	0 16	
SSLFA	DJA293	10/14/1999	1 0 to 2 0	ENDRIN KETONE	0 0079	=	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLC	0 0027	J	MG/KG	0 16	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICH	0 0036	J	MG/KG	0 074	
SSLFB	DJA294	10/14/1999	0 0 to 1 0	DIELDRIN	0 13	=	MG/KG	0 086	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ENDRIN KETONE	0 0015	J	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	METHOXYCHLOR	0 003	J	MG/KG		
SSLFB	DJA295	10/14/1999	1 0 to 2 0	DIELDRIN	0 015	=	MG/KG	0 086	
SSLFB	DJA296	10/14/1999	1 0 to 2 0	DIELDRIN	0 011	=	MG/KG	0 086	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLC	0 00049	J	MG/KG	0 16	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICH	0 00068	J	MG/KG	0 074	
SSLFC	DJA297	10/14/1999	0 0 to 1 0	DIELDRIN	0 034	=	MG/KG	0 086	
SSLFC	DJA298	10/14/1999	1 0 to 2 0	DIELDRIN	0 0078	=	MG/KG	0 086	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	ALPHA-CHLORDANE	0 0067	J	MG/KG	0 029	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLC	0 0027	J	MG/KG	0 16	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2 TRICH	0 0023	J	MG/KG	0 074	
SSLFD	DJA299	10/14/1999	0 0 to 1 0	DIELDRIN	0 0014	J	MG/KG	0 086	
SSLFE	DJA301	10/14/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2,2 TRICH	0 00065	J	MG/KG	0 074	
SSLFF	DJA303	10/14/1999	0.0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLC	0 0018	J	MG/KG	0 16	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2-TRICH	0 007	=	MG/KG	0 074	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	DIELDRIN	0 055	=	MG/KG	0 086	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	METHOXYCHLOR	0 0018	J	MG/KG		
SSLFF	DJA304	10/14/1999	1 0 to 2 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLC	0 00058	J	MG/KG	0 16	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2-TRICH	0 00099	J	MG/KG	0 074	
SSLFF	DJA304	10/14/1999	1 0 to 2 0	DIELDRIN	0 011	=	MG/KG	0 086	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ALPHA-CHLORDANE	0 0042	=	MG/KG	0 029	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLC	0 014	=	MG/KG	0 16	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2,2-TRICH	0 017	=	MG/KG	0 074	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	DIELDRIN	0 016	=	MG/KG	0 086	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ENDRIN KETONE	0 013	J	MG/KG		
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ALPHA-CHLORDANE	0 0014	J	MG/KG	0 029	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLC	0 0069	=	MG/KG	0 16	
SSLFG	DJA306	10/14/1999	1 0 to 1.5	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICH	0 0077	=	MG/KG	0 074	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	DIELDRIN	0 0073	=	MG/KG	0 086	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ENDRIN KETONE	0 0026	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ALPHA-CHLORDANE	0.0034	=	MG/KG	0 029	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLC	0 0046	=	MG/KG	0 0067	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHLC	0 14	=	MG/KG	0 16	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2-TRICH	0 27	=	MG/KG	0 074	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	DIELDRIN	0 047	=	MG/KG	0 086	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ENDRIN KETONE	0 025	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	METHOXYCHLOR	0 06	=	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2 0	ALPHA-CHLORDANE	0 0048	=	MG/KG	0 029	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	DDD (1,1-bis(CHLOROPHENYL)-2 2-DICHLC	0 0065	=	MG/KG	0 0067	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLC	0 14	=	MG/KG	0 16	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICH	0 3	=	MG/KG	0 074	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	DIELDRIN	0 044	=	MG/KG	0 086	
SSLFH	DJA313	10/15/1999	1 0 to 2.0	ENDRIN KETONE	0 028	J	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2 0	METHOXYCHLOR	0 068	=	MG/KG		
SSLFI	DJA310	10/15/1999	0 0 to 1 0	DIELDRIN	0 0042	=	MG/KG	0 086	
SSLFI	DJA311	10/15/1999	1 0 to 2 0	DIELDRIN	0 0033	J	MG/KG	0 086	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ALPHA-CHLORDANE	0 0042	=	MG/KG	0 029	

TABLE 12-2

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2 2-DICHL	0 025	=	MG/KG	0 16	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRIC	0 019	=	MG/KG	0 074	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	DIELDRIN	0 00081	J	MG/KG	0 086	
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ENDRIN	0 00046	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ENDRIN KETONE	0 009	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	METHOXYCHLOR	0 018	J	MG/KG		
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHL	0 00039	J	MG/KG	0 16	
Polynuclear Aromatic Hydrocarbons									
Surface Soils									
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZO(a)ANTHRACENE	1 7	=	MG/KG	0 71	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZO(a)PYRENE	2	=	MG/KG	0 96	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZO(b)FLUORANTHENE	2 8	=	MG/KG	0 9	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZO(g h i)PERYLENE	1 4	=	MG/KG	0 82	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	CHRYSENE	2 3	=	MG/KG	0 94	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0 78	=	MG/KG	0 26	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	FLUORANTHENE	4 1	=	MG/KG	1 6	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	1 7	=	MG/KG	0 7	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	PHENANTHRENE	2 5	=	MG/KG	0 61	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	PYRENE	4 1	=	MG/KG	1 5	X
SSLFA	DJA293	10/14/1999	1 0 to 2 0	BENZO(b)FLUORANTHENE	0 98	=	MG/KG	0 9	X
SSLFA	DJA293	10/14/1999	1 0 to 2 0	FLUORANTHENE	1 7	=	MG/KG	1.6	X
SSLFA	DJA293	10/14/1999	1 0 to 2 0	PHENANTHRENE	0 99	=	MG/KG	0 61	X
SSLFA	DJA293	10/14/1999	1 0 to 2 0	PYRENE	1 3	=	MG/KG	1 5	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	BENZO(a)ANTHRACENE	0 86	=	MG/KG	0 71	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	BENZO(a)PYRENE	0 9	=	MG/KG	0 96	
SSLFG	DJA305	10/14/1999	0 0 to 1 0	BENZO(b)FLUORANTHENE	1 4	=	MG/KG	0 9	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	CHRYSENE	1 1	=	MG/KG	0 94	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	FLUORANTHENE	2 5	=	MG/KG	1 6	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	0 81	=	MG/KG	0 7	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	PHENANTHRENE	1 5	=	MG/KG	0 61	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	PYRENE	2	=	MG/KG	1.5	X
SSLFG	DJA306	10/14/1999	1 0 to 1 5	FLUORANTHENE	1 1	=	MG/KG	1 6	
SSLFG	DJA306	10/14/1999	1 0 to 1 5	PYRENE	0 89	=	MG/KG	1 5	
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BENZO(a)ANTHRACENE	2 6	=	MG/KG	0 71	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BENZO(a)PYRENE	3 2	=	MG/KG	0 96	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BENZO(b)FLUORANTHENE	4 8	=	MG/KG	0 9	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BENZO(g h i)PERYLENE	2.4	=	MG/KG	0 82	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BENZO(k)FLUORANTHENE	1 8	=	MG/KG	0 78	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	CHRYSENE	3 9	=	MG/KG	0 94	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	0.83	=	MG/KG	0 26	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	FLUORANTHENE	5 1	=	MG/KG	1 6	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	2.9	=	MG/KG	0 7	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	PHENANTHRENE	2 1	=	MG/KG	0 61	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	PYRENE	4 6	=	MG/KG	1 5	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	BENZO(a)ANTHRACENE	3	=	MG/KG	0 71	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	BENZO(a)PYRENE	3 8	=	MG/KG	0 96	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	BENZO(b)FLUORANTHENE	5 8	=	MG/KG	0 9	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	BENZO(g h i)PERYLENE	3 1	=	MG/KG	0 82	X
SSLFH	DJA313	10/15/1999	1 0 to 2.0	BENZO(k)FLUORANTHENE	2 3	=	MG/KG	0 78	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	CHRYSENE	5	=	MG/KG	0 94	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	DIBENZ(a,h)ANTHRACENE	1 1	=	MG/KG	0 26	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	FLUORANTHENE	6 2	=	MG/KG	1 6	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	INDENO(1 2 3-c,d)PYRENE	3 6	=	MG/KG	0 7	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	PHENANTHRENE	2 6	=	MG/KG	0 61	X
SSLFH	DJA313	10/15/1999	1 0 to 2.0	PYRENE	6	=	MG/KG	1 5	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BENZO(a)ANTHRACENE	1	=	MG/KG	0 71	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BENZO(a)PYRENE	1 2	=	MG/KG	0 96	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BENZO(b)FLUORANTHENE	1 8	=	MG/KG	0 9	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BENZO(g h,i)PERYLENE	0 92	=	MG/KG	0 82	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	CHRYSENE	1 8	=	MG/KG	0 94	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	FLUORANTHENE	2.9	=	MG/KG	1 6	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	INDENO(1,2 3-c,d)PYRENE	1	=	MG/KG	0 7	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	PHENANTHRENE	1 4	=	MG/KG	0 61	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	PYRENE	2 4	=	MG/KG	1 5	X
Volatile Organics									
Subsurface Soils									
SBLFA (2)	SBLFA8-10	10/05/1999	8 0 to 10 0	METHYLENE CHLORIDE	0 002	J	MG/KG		
SBLFB (2)	SBLFB1415	10/05/1999	14 0 to 15 0	METHYLENE CHLORIDE	0 003	J	MG/KG		
SBLFB (2)	SBLFB8-10	10/05/1999	8 0 to 10 0	XYLENES TOTAL	0 004	J	MG/KG	0 002	X
SBLFD (2)	SBLFD1415	10/05/1999	14 0 to 15 0	XYLENES TOTAL	0 002	J	MG/KG	0 002	
SBLFD (2)	SBLFD2830	10/05/1999	28 0 to 30 0	TOLUENE	0 003	J	MG/KG		
SBLFD (2)	SBLFD2830	10/05/1999	28 0 to 30 0	XYLENES TOTAL	0 014	J	MG/KG	0 002	X
Surface Soils									
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	ACETONE	0 044	J	MG/KG		
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	METHYLENE CHLORIDE	0 0009	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	BENZENE	0 005	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	ETHYLBENZENE	0 005	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	TOLUENE	0 012	J	MG/KG	0 002	X
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	XYLENES TOTAL	0 01	J	MG/KG	0 009	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZENE	0 002	J	MG/KG		
SSLFA	DJA292	10/14/1999	0 0 to 1 0	CARBON DISULFIDE	0 003	J	MG/KG	0 002	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ETHYLBENZENE	0 0009	J	MG/KG		
SSLFA	DJA292	10/14/1999	0 0 to 1 0	XYLENES TOTAL	0 003	J	MG/KG	0 009	
SSLFA	DJA293	10/14/1999	1 0 to 2.0	ACETONE	0 18	=	MG/KG		
SSLFA	DJA293	10/14/1999	1 0 to 2.0	METHYL ETHYL KETONE (2 BUTANONE)	0 024	J	MG/KG	0 002	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ACETONE	0 23	=	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SSLFB	DJA295	10/14/1999	1 0 to 2.0	ACETONE	0 22	=	MG/KG		
SSLFB	DJA295	10/14/1999	1 0 to 2 0	METHYL ETHYL KETONE (2 BUTANONE)	0 013	J	MG/KG	0 002	X
SSLFB	DJA296	10/14/1999	1 0 to 2 0	ACETONE	0 12	=	MG/KG		

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TABLE 12-2
Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFB	DJA296	10/14/1999	1 0 to 2 0	METHYL ETHYL KETONE (2-BUTANONE)	0 008	J	MG/KG	0 002	X
SSLFC	DJA297	10/14/1999	0 0 to 1 0	ACETONE	0 22	=	MG/KG		
SSLFC	DJA297	10/14/1999	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 013	J	MG/KG	0 002	X
SSLFC	DJA298	10/14/1999	1 0 to 2 0	ACETONE	0 12	=	MG/KG		
SSLFC	DJA298	10/14/1999	1 0 to 2 0	METHYL ETHYL KETONE (2 BUTANONE)	0 008	J	MG/KG	0 002	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	ACETONE	0 12	=	MG/KG		
SSLFD	DJA299	10/14/1999	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 007	J	MG/KG	0 002	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	TOLUENE	0 0009	J	MG/KG	0 002	
SSLFF	DJA303	10/14/1999	0 0 to 1 0	ACETONE	0.26	=	MG/KG		
SSLFF	DJA303	10/14/1999	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 02	J	MG/KG	0 002	X
SSLFF	DJA303	10/14/1999	0 0 to 1 0	METHYLENE CHLORIDE	0 001	J	MG/KG		
SSLFF	DJA304	10/14/1999	1 0 to 2.0	ACETONE	0 26	=	MG/KG		
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ACETONE	0 15	=	MG/KG		
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ACETONE	0 12	=	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ACETONE	0 036	=	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	BENZENE	0 001	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	XYLENES TOTAL	0 004	J	MG/KG	0 009	
SSLFH	DJA313	10/15/1999	1 0 to 2 0	ACETONE	0 023	=	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2.0	BENZENE	0 002	J	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2.0	ETHYLBENZENE	0 001	J	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2.0	XYLENES TOTAL	0 01	=	MG/KG	0 009	X
SSLFI	DJA310	10/15/1999	0 0 to 1 0	ACETONE	0.28	=	MG/KG		
SSLFI	DJA311	10/15/1999	1 0 to 2 0	ACETONE	0.21	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ACETONE	0 19	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	BENZENE	0 004	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ETHYLBENZENE	0 003	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 043	=	MG/KG	0 002	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	XYLENES TOTAL	0.015	=	MG/KG	0 009	X
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	ACETONE	0 14	=	MG/KG		
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	METHYL ETHYL KETONE (2-BUTANONE)	0 015	=	MG/KG	0 002	X
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	ACETONE	0 072	=	MG/KG		

J = Estimated detection. Contaminant detected at or below laboratory detection limit.

(=) Definite detection.

MG/KG = milligrams per kilogram

TABLE 12-3

Frequency of Detection for All Media in the Stockpile Area

Rev 1 Memphis Depot Dunn Field RI

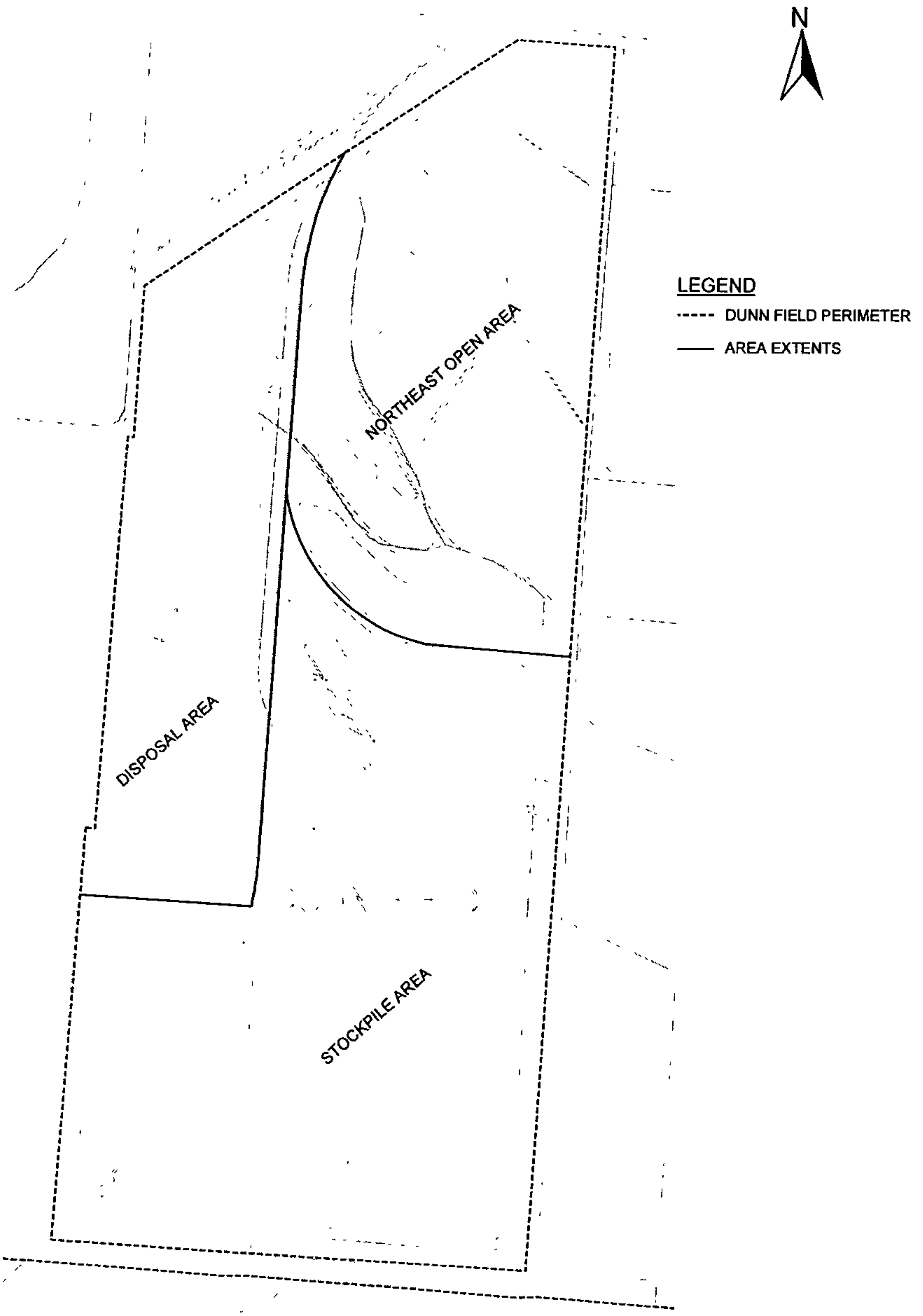
Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
General Chemistry							
Subsurface Soils							
PH UNITS	pH	2	2	5	5 16	5 08	
MG/KG	TOTAL ORGANIC CARBON	5	4	1200	5400	3250	
Surface Soils							
PH UNITS	pH	2	2	6 24	7 7	6 97	
Metals							
Subsurface Soils							
MG/KG	ALUMINUM	25	25	1090	25100	11906	21829
MG/KG	ANTIMONY	25	14	1 1	1 3	1 25	
MG/KG	ARSENIC	25	24	0 83	19	8 17	17
MG/KG	BARIUM	25	25	2 6	245	96	300
MG/KG	BERYLLIUM	25	10	0 2	1 1	0 59	1 2
MG/KG	CADMIUM	25	9	0 28	0 89	0 54	1 4
MG/KG	CALCIUM	25	23	533	6680	1796	2432
MG/KG	CHROMIUM, TOTAL	25	25	7 2	35 8	16 2	26 4
MG/KG	COBALT	25	24	0 84	15 5	7 35	20 4
MG/KG	COPPER	25	9	4 2	37 2	16 3	32 7
MG/KG	IRON	25	25	5980	40400	19730	38480
MG/KG	LEAD	25	25	1 1	143	15 9	23 9
MG/KG	MAGNESIUM	25	23	228	4690	2474	4900
MG/KG	MANGANESE	25	25	16 3	1610	551 8	1540
MG/KG	MERCURY	25	3	0 04	0 06	0 047	0 2
MG/KG	NICKEL	25	25	2	35	16 8	36 6
MG/KG	POTASSIUM	25	22	191	1910	1049	1800
MG/KG	SELENIUM	25	1	1 2	1 2	1 2	0 6
MG/KG	SODIUM	25	18	23 7	170	105	
MG/KG	THALLIUM	25	7	0 14	0 48	0 3	
MG/KG	VANADIUM	25	25	7 3	51 3	29 6	51 3
MG/KG	ZINC	25	9	3 9	109	45	114
Surface Soils							
MG/KG	ALUMINUM	30	30	2460	52600	19179	23810
MG/KG	ANTIMONY	30	3	1 6	3 1	2 1	7
MG/KG	ARSENIC	30	30	1 4	25 5	11 2	20
MG/KG	BARIUM	30	30	22 4	297	117 2	234
MG/KG	BERYLLIUM	30	28	0 13	0 92	0 51	1 1
MG/KG	CADMIUM	30	27	0 16	0 53	0 29	1 4
MG/KG	CALCIUM	30	30	811	162000	20531	5840
MG/KG	CHROMIUM, TOTAL	32	32	7 3	55 7	19 4	24 8
MG/KG	COBALT	30	30	1 5	20 3	7 09	18 3
MG/KG	COPPER	30	28	2 7	26 6	14 9	33 5
MG/KG	IRON	30	30	6360	36400	20536	37040
MG/KG	LEAD	30	30	2 8	107	29 4	30
MG/KG	MAGNESIUM	30	30	85 2	10100	2703	4600
MG/KG	MANGANESE	30	30	32 2	1080	493	1304
MG/KG	MERCURY	32	23	0 036	0 1	0 063	0 4
MG/KG	NICKEL	30	30	2 5	25 7	15 4	30
MG/KG	POTASSIUM	30	28	314	4810	1298	1820
MG/KG	SELENIUM	30	1	0 55	0 55	0 55	0 8
MG/KG	SILVER	30	1	0 52	0 52	0 52	2
MG/KG	SODIUM	30	19	28 7	2440	225	
MG/KG	THALLIUM	30	19	0 15	0 42	0 31	
MG/KG	VANADIUM	30	30	8 7	96 6	31 5	48 4
MG/KG	ZINC	30	28	4 3	90 4	53 6	126
OC Pesticides							
Surface Soils							
MG/KG	ALDRIN	30	1	0 0015	0 0015	0 0015	
MG/KG	ALPHA ENDOSULFAN	30	1	0 00031	0 00031	0 00031	
MG/KG	ALPHA-CHLORDANE	30	7	0 0014	0 0067	0 0039	0 029
MG/KG	DDD (1,1-bis(CHLOROPHENYL)	30	2	0 0046	0 0065	0 0056	0 0067
MG/KG	DDE (1,1-bis(CHLOROPHENYL)	30	14	0 00039	0 14	0 025	0 16
MG/KG	DDT (1,1-bis(CHLOROPHENYL)	30	12	0 00065	0 3	0 054	0 074
MG/KG	DIELDRIN	30	15	0 00081	0 13	0 026	0 086
MG/KG	ENDRIN	30	1	0 00046	0 00046	0 00046	
MG/KG	ENDRIN KETONE	28	8	0 0015	0 033	0 015	

TABLE 12-3
Frequency of Detection for All Media in the Stockpile Area
Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration
MG/KG	GAMMA-CHLORDANE	30	1	0 003	0 003	0 003	0 026
MG/KG	METHOXYCHLOR	30	5	0 0018	0 068	0 03	
Polyaromatic Hydrocarbons							
Surface Soils							
MG/KG	BENZO(a)ANTHRACENE	30	5	0 86	3	1 83	0 71
MG/KG	BENZO(a)PYRENE	30	5	0 9	3 8	2 22	0 96
MG/KG	BENZO(b)FLUORANTHENE	30	6	0 98	5 8	2 93	0 9
MG/KG	BENZO(g,h,i)PERYLENE	30	4	0 92	3 1	1 96	0 82
MG/KG	BENZO(k)FLUORANTHENE	30	2	1 8	2 3	2 05	0 78
MG/KG	CHRYSENE	30	5	1 1	5	2 82	0 94
MG/KG	DIBENZ(a,h)ANTHRACENE	30	3	0 78	1 1	0 9	0 26
MG/KG	FLUORANTHENE	30	7	1 1	6 2	3 37	1 6
MG/KG	INDENO(1,2,3-c,d)PYRENE	30	5	0 81	3 6	2	0 7
MG/KG	PHENANTHRENE	30	6	0 99	2 6	1.85	0 61
MG/KG	PYRENE	30	7	0 89	6	3 04	1 5
Volatile Organics							
Subsurface Soils							
MG/KG	METHYLENE CHLORIDE	15	2	0 002	0 003	0 0025	
MG/KG	TOLUENE	15	1	0 003	0 003	0 003	
MG/KG	XYLENES, TOTAL	15	3	0 002	0 014	0 0067	0 002
Surface Soils							
MG/KG	ACETONE	30	19	0 023	0 28	0 16	
MG/KG	BENZENE	30	5	0 001	0 005	0 0028	
MG/KG	CARBON DISULFIDE	30	1	0 003	0 003	0 003	0 002
MG/KG	ETHYLBENZENE	30	4	0 0009	0 005	0 0025	
MG/KG	METHYL ETHYL KETONE (2-BUTANONE)	30	10	0 007	0 043	0 016	0 002
MG/KG	METHYLENE CHLORIDE	30	2	0 0009	0 001	0 00095	
MG/KG	TOLUENE	30	2	0 0009	0 012	0 0065	0 002
MG/KG	XYLENES, TOTAL	30	5	0 003	0 015	0 0084	0 009

MG/KG = milligrams per kilogram

Figures



Source RI Report, 1990

FIGURE 12-1
Area Designations at Dunn Field
Rev 0 Memphis Depot
Dunn Field RI

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ATL/CAD1/PROJECTS/148071 DDMT/DunnField RI 2001/8071DFRI01-1-3 dgn

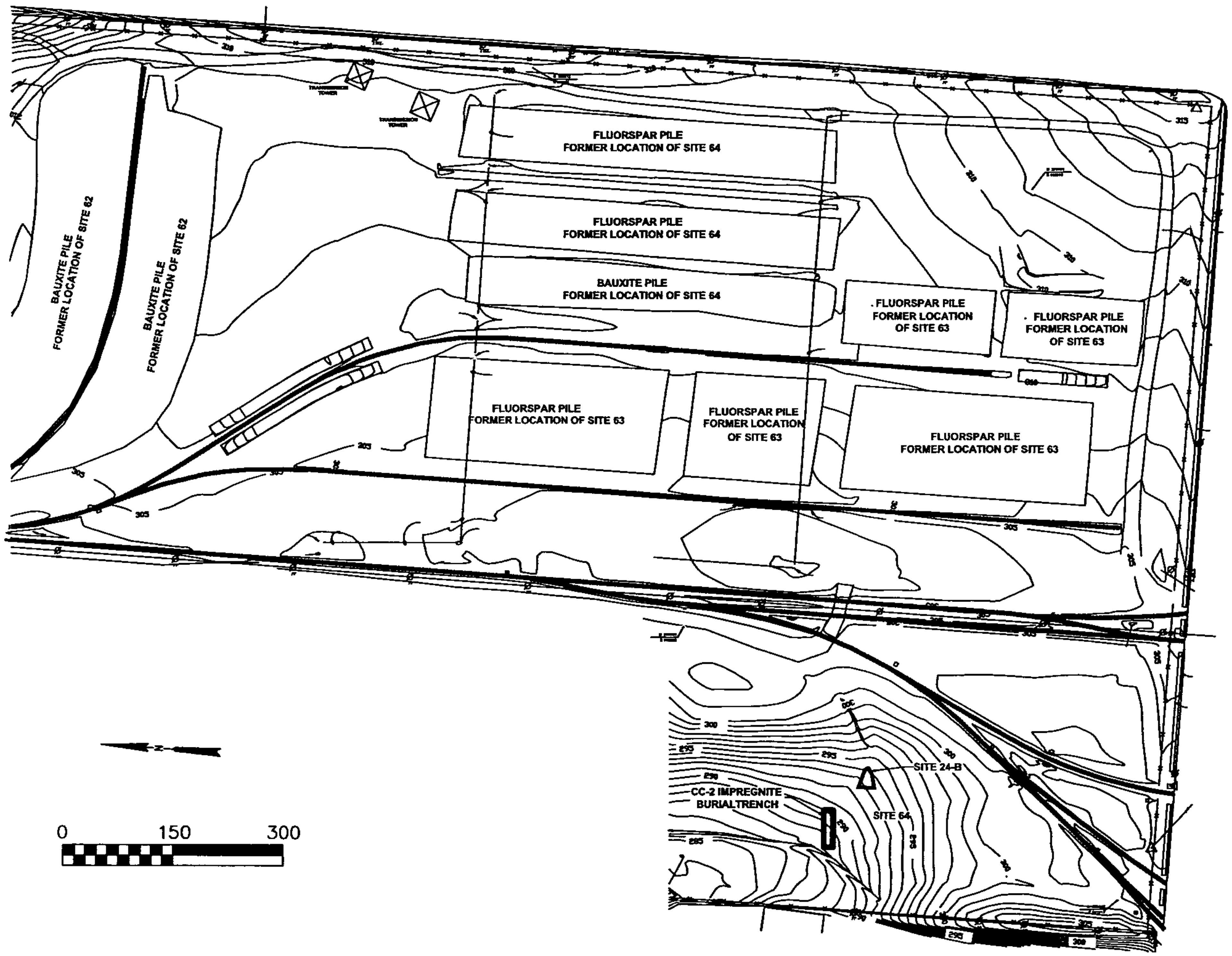

FIGURE 12-2
DUNN FIELD STOCKPILE AREA TOPOGRAPHY AND LOCATIONS OF FORMER MINERAL STOCKPILES
REV. 1 MEMPHIS DEPOT DUNN FIELD RI

ATL/CAD1/PROJECTS/148071 DDMT

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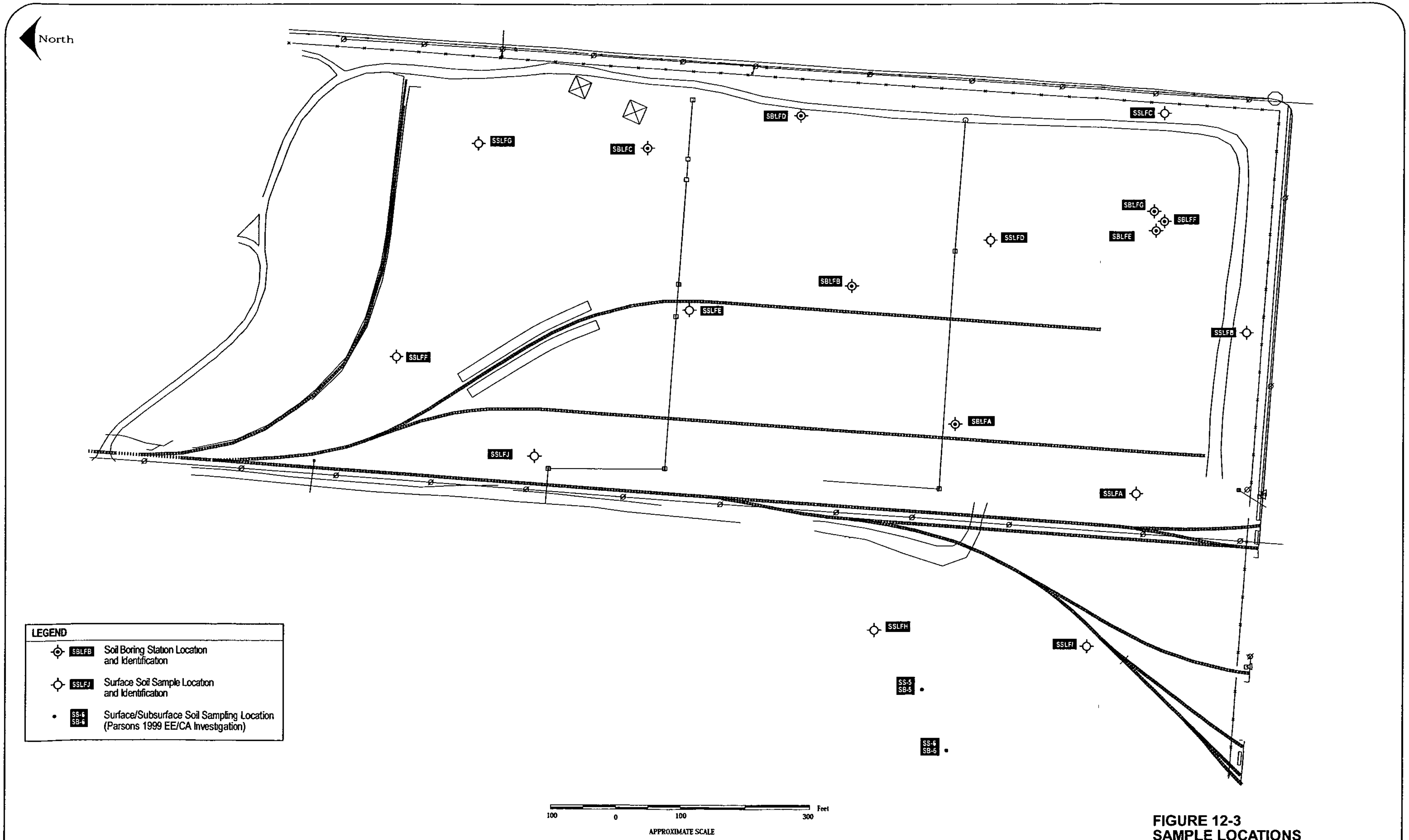
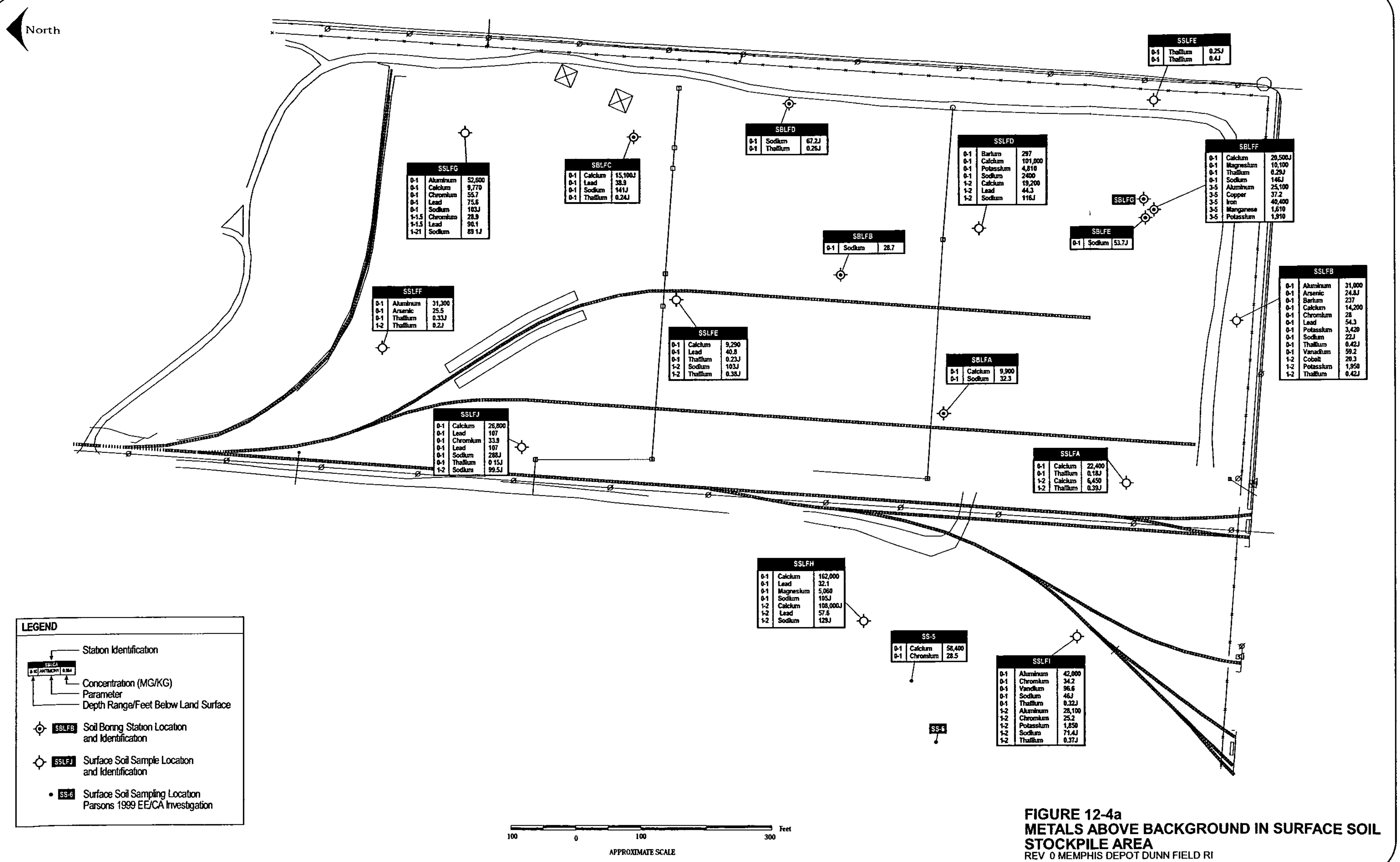


FIGURE 12-3
SAMPLE LOCATIONS
STOCKPILE AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn110 FH8

CH2MHILL



SSLFE		
0-1	Thallium	0.25J
0-1	Thallium	0.4J

SBLFF		
0-1	Calcium	20,500J
0-1	Magnesium	10,100
0-1	Thallium	0.29J
0-1	Sodium	146J
3-5	Aluminum	25,100
3-5	Copper	37.2
3-5	Iron	40,400
3-5	Manganese	1,610
3-5	Potassium	1,910

SBLFE		
0-1	Sodium	53.7J

SSLFB		
0-1	Aluminum	31,000
0-1	Arsenic	24.8J
0-1	Barium	237
0-1	Calcium	14,200
0-1	Chromium	28
0-1	Lead	54.3
0-1	Potassium	3,420
0-1	Sodium	22J
0-1	Thallium	0.42J
0-1	Vanadium	59.2
1-2	Cobalt	20.3
1-2	Potassium	1,950
1-2	Thallium	0.42J

SBLFD		
0-1	Sodium	67.2J
0-1	Thallium	0.26J

SSLFD		
0-1	Barium	297
0-1	Calcium	101,000
0-1	Potassium	4,810
0-1	Sodium	2400
1-2	Calcium	19,200
1-2	Lead	44.3
1-2	Sodium	116J

SBLFB		
0-1	Sodium	28.7

SSLFG		
0-1	Aluminum	52,600
0-1	Calcium	9,770
0-1	Chromium	55.7
0-1	Lead	75.6
0-1	Sodium	103J
1-1.5	Chromium	28.9
1-1.5	Lead	90.1
1-21	Sodium	89 1J

SBLFC		
0-1	Calcium	15,100J
0-1	Lead	38.9
0-1	Sodium	141J
0-1	Thallium	0.24J

SSLFF		
0-1	Aluminum	31,300
0-1	Arsenic	25.5
0-1	Thallium	0.33J
1-2	Thallium	0.2J

SSLFE		
0-1	Calcium	9,290
0-1	Lead	40.8
0-1	Thallium	0.23J
1-2	Sodium	103J
1-2	Thallium	0.38J

SBLFA		
0-1	Calcium	9,900
0-1	Sodium	32.3

SSLFJ		
0-1	Calcium	26,800
0-1	Lead	107
0-1	Chromium	33.9
0-1	Lead	107
0-1	Sodium	288J
0-1	Thallium	0 15J
1-2	Sodium	99.5J

SSLFA		
0-1	Calcium	22,400
0-1	Thallium	0.18J
1-2	Calcium	6,450
1-2	Thallium	0.39J

SSLFH		
0-1	Calcium	162,000
0-1	Lead	32.1
0-1	Magnesium	5,060
0-1	Sodium	105J
1-2	Calcium	108,000J
1-2	Lead	57.6
1-2	Sodium	129J

SS-5		
0-1	Calcium	58,400
0-1	Chromium	28.5

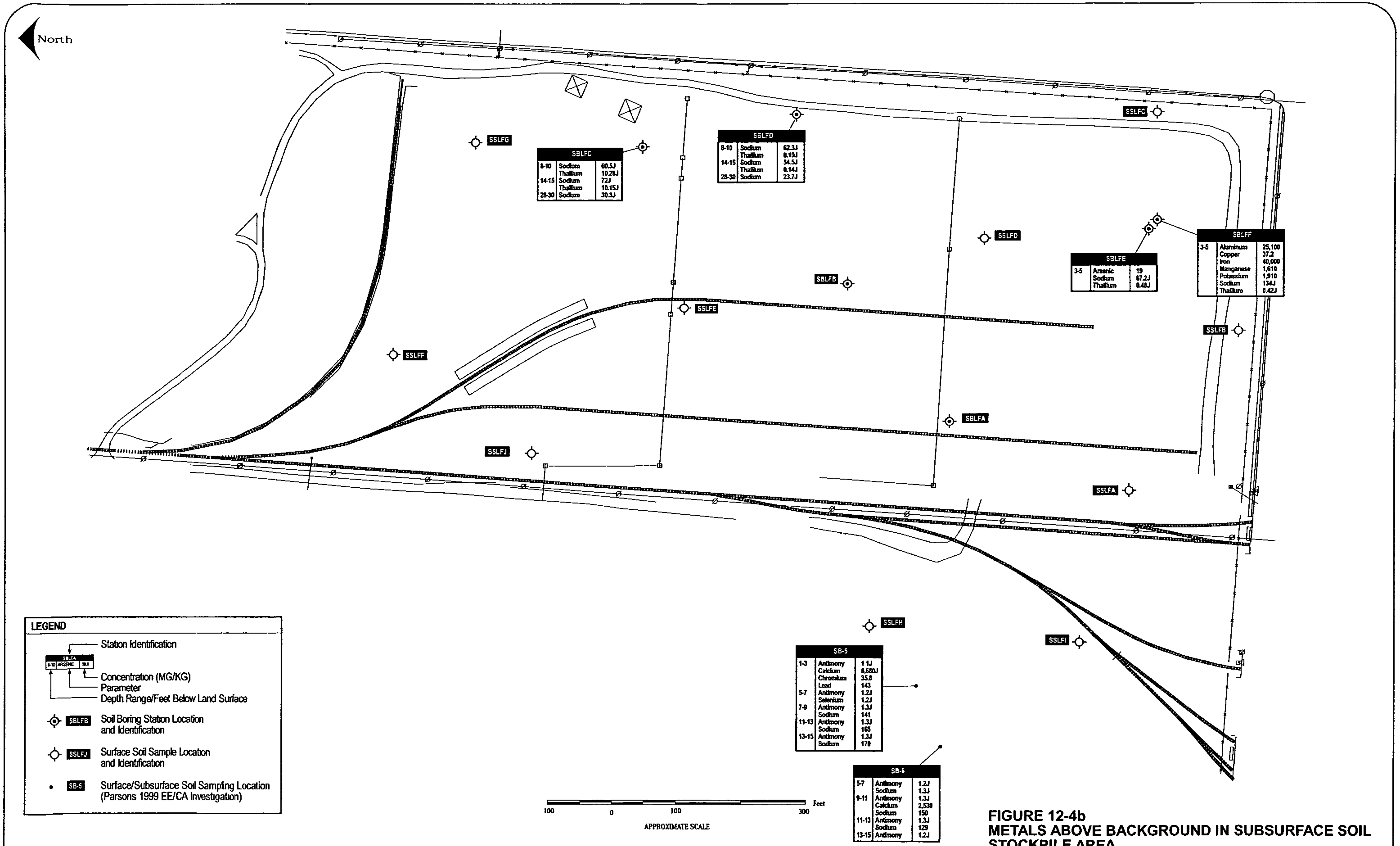
SSLFI		
0-1	Aluminum	42,000
0-1	Chromium	34.2
0-1	Vandium	96.6
0-1	Sodium	46J
0-1	Thallium	0.32J
1-2	Aluminum	28,100
1-2	Chromium	25.2
1-2	Potassium	1,850
1-2	Sodium	71.4J
1-2	Thallium	0.37J

FIGURE 12-4a
METALS ABOVE BACKGROUND IN SURFACE SOIL STOCKPILE AREA

REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn111 FH8

CH2MHILL



SBLFC		
8-10	Sodium	60.5J
	Thallium	10.28J
14-15	Sodium	72J
	Thallium	10.15J
28-30	Sodium	30.3J

SBLFD		
8-10	Sodium	62.3J
	Thallium	0.19J
14-15	Sodium	54.5J
	Thallium	0.14J
28-30	Sodium	23.7J

SBLFE		
3-5	Arsenic	19
	Sodium	67.2J
	Thallium	0.48J

SBLFF		
3-5	Aluminum	25,100
	Copper	37.2
	Iron	40,000
	Manganese	1,610
	Potassium	1,910
	Sodium	134J
	Thallium	0.42J

SB-5		
1-3	Antimony	1.1J
	Calcium	8,680J
	Chromium	35.8
	Lead	143
5-7	Antimony	1.2J
	Selenium	1.2J
7-9	Antimony	1.3J
	Sodium	141
11-13	Antimony	1.3J
	Sodium	165
13-15	Antimony	1.3J
	Sodium	178

SB-6		
5-7	Antimony	1.2J
	Sodium	1.3J
9-11	Antimony	1.3J
	Calcium	2,530
	Sodium	150
11-13	Antimony	1.3J
	Sodium	129
13-15	Antimony	1.2J

FIGURE 12-4b
METALS ABOVE BACKGROUND IN SUBSURFACE SOIL STOCKPILE AREA
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

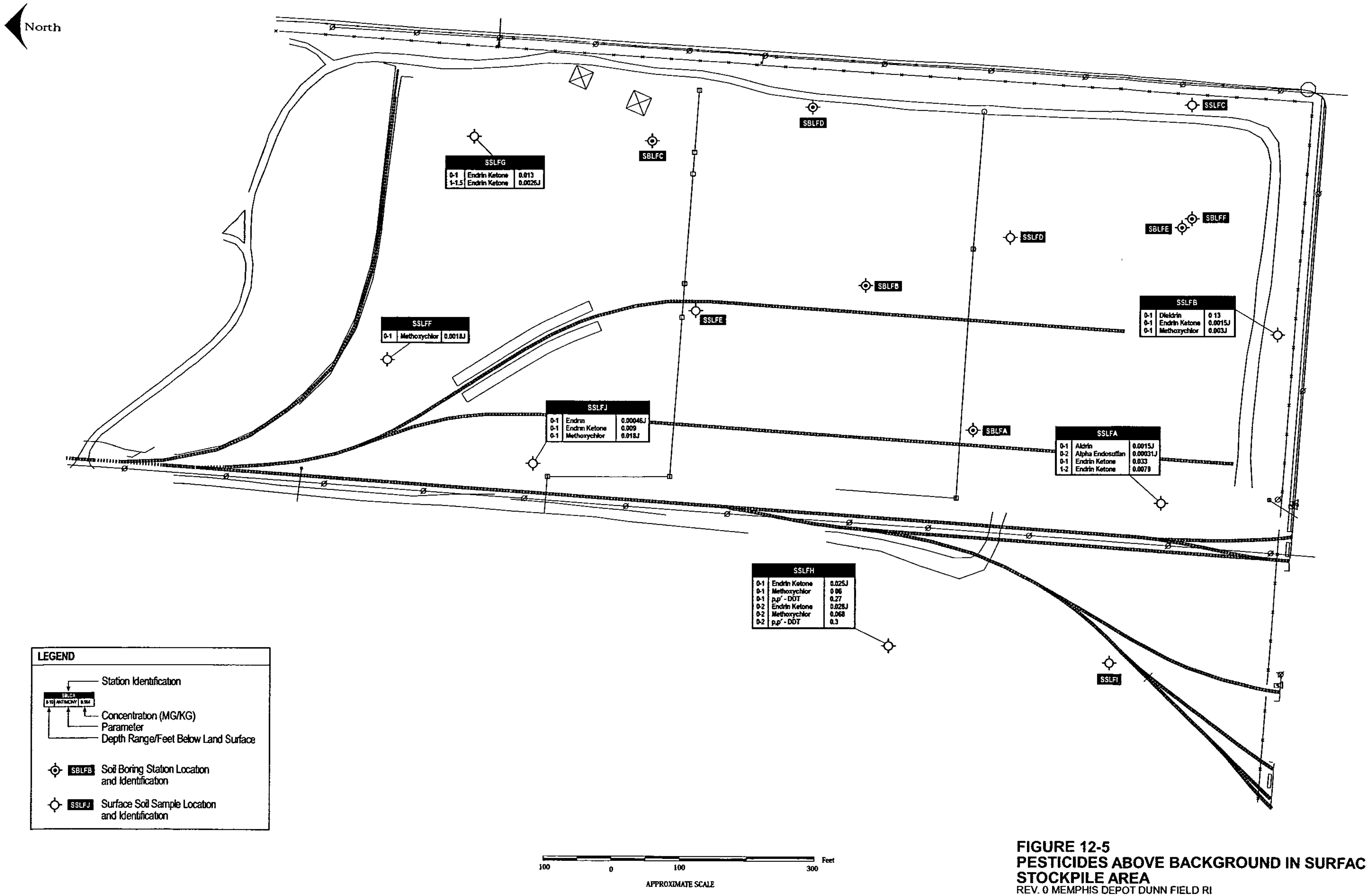


FIGURE 12-5
PESTICIDES ABOVE BACKGROUND IN SURFACE SOILS STOCKPILE AREA

REV. 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn112 FH8

CH2MHILL

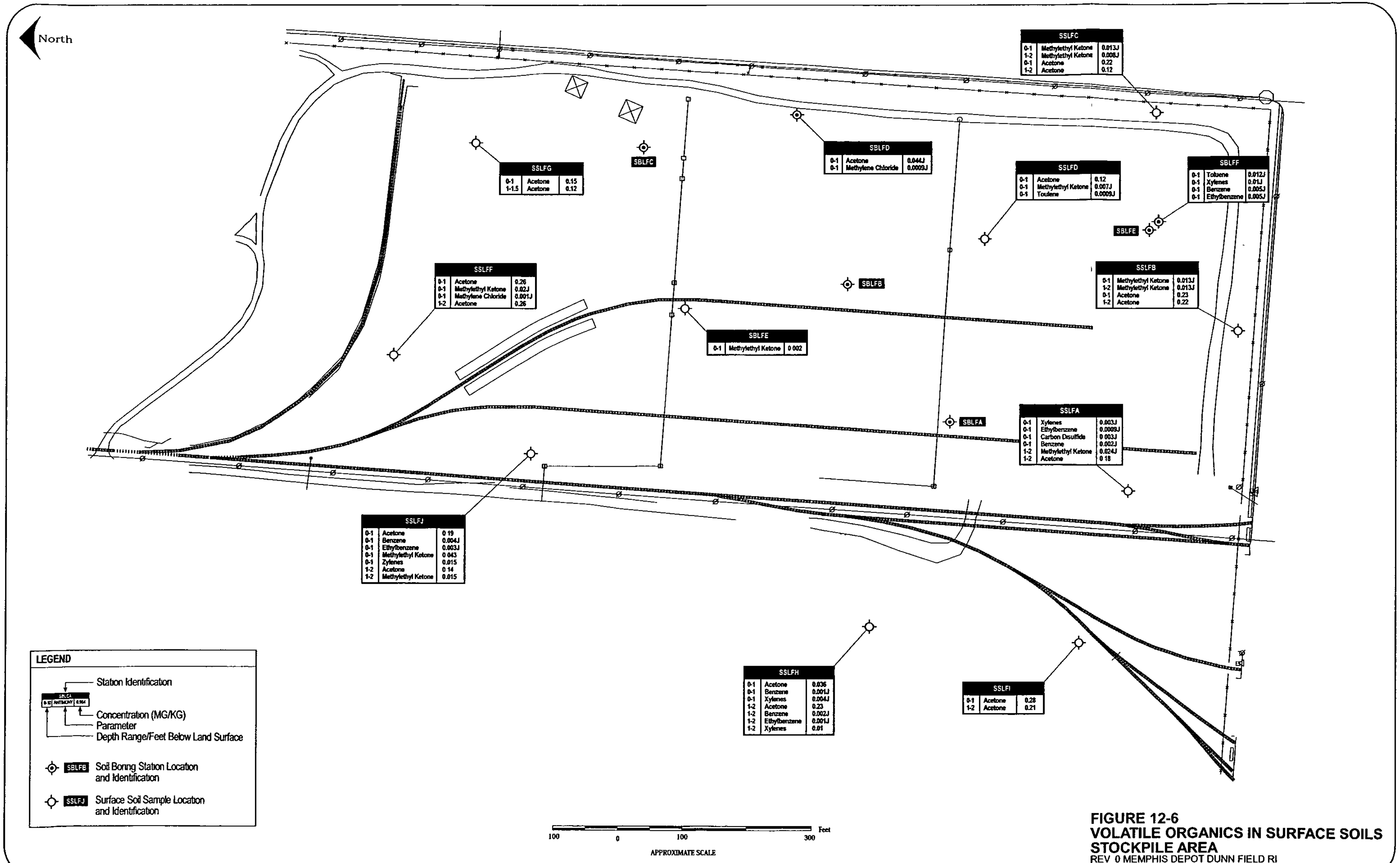


FIGURE 12-6
VOLATILE ORGANICS IN SURFACE SOILS STOCKPILE AREA

REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

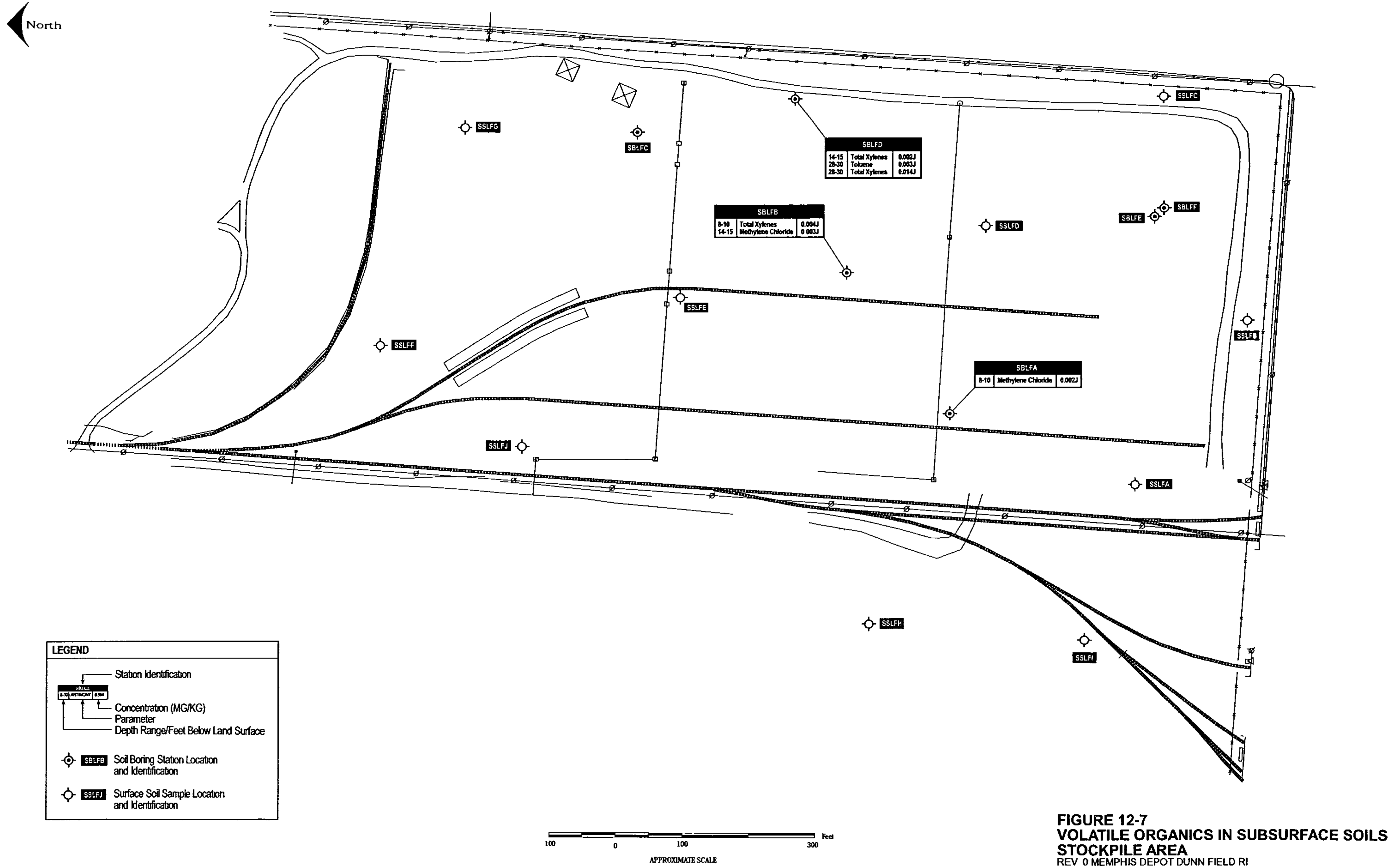
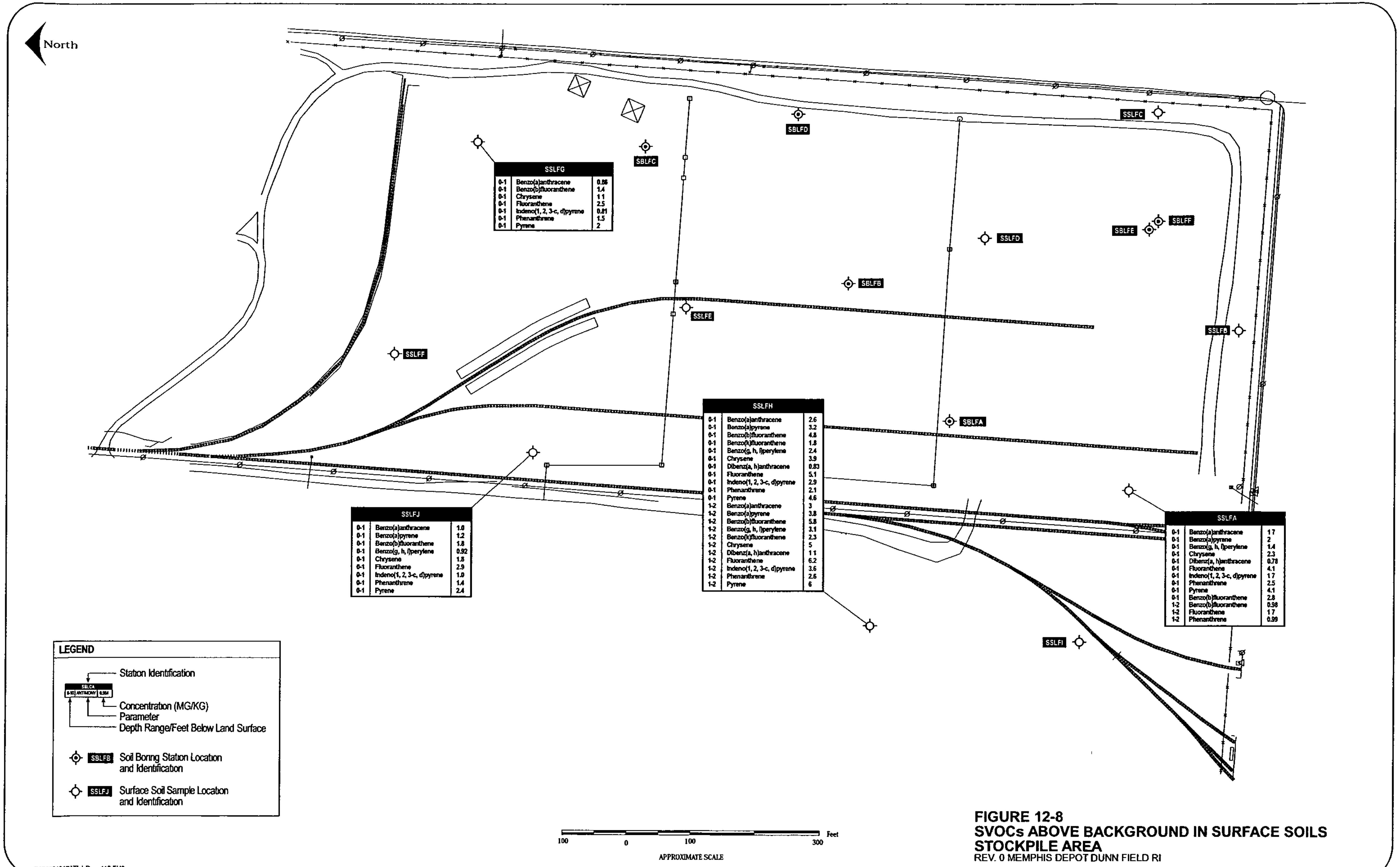


FIGURE 12-7
VOLATILE ORGANICS IN SUBSURFACE SOILS
STOCKPILE AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

E072001017ATL \ Dunn114 FH8

CH2MHILL



SSLFG		
0-1	Benzo(a)anthracene	0.86
0-1	Benzo(b)fluoranthene	1.4
0-1	Chrysene	1.1
0-1	Fluoranthene	2.5
0-1	Indeno(1, 2, 3-c, d)pyrene	0.81
0-1	Phenanthrene	1.5
0-1	Pyrene	2

SSLFJ		
0-1	Benzo(a)anthracene	1.0
0-1	Benzo(a)pyrene	1.2
0-1	Benzo(b)fluoranthene	1.8
0-1	Benzo(g, h, i)perylene	0.92
0-1	Chrysene	1.8
0-1	Fluoranthene	2.9
0-1	Indeno(1, 2, 3-c, d)pyrene	1.0
0-1	Phenanthrene	1.4
0-1	Pyrene	2.4

SSLFH		
0-1	Benzo(a)anthracene	2.6
0-1	Benzo(a)pyrene	3.2
0-1	Benzo(b)fluoranthene	4.8
0-1	Benzo(k)fluoranthene	1.8
0-1	Benzo(g, h, i)perylene	2.4
0-1	Chrysene	3.9
0-1	Dibenz(a, h)anthracene	0.83
0-1	Fluoranthene	5.1
0-1	Indeno(1, 2, 3-c, d)pyrene	2.9
0-1	Phenanthrene	2.1
0-1	Pyrene	4.6
1-2	Benzo(a)anthracene	3
1-2	Benzo(a)pyrene	3.8
1-2	Benzo(b)fluoranthene	5.8
1-2	Benzo(g, h, i)perylene	3.1
1-2	Benzo(k)fluoranthene	2.3
1-2	Chrysene	5
1-2	Dibenz(a, h)anthracene	1.1
1-2	Fluoranthene	6.2
1-2	Indeno(1, 2, 3-c, d)pyrene	3.6
1-2	Phenanthrene	2.6
1-2	Pyrene	6

SSLFA		
0-1	Benzo(a)anthracene	1.7
0-1	Benzo(a)pyrene	2
0-1	Benzo(g, h, i)perylene	1.4
0-1	Chrysene	2.3
0-1	Dibenz(a, h)anthracene	0.78
0-1	Fluoranthene	4.1
0-1	Indeno(1, 2, 3-c, d)pyrene	1.7
0-1	Phenanthrene	2.5
0-1	Pyrene	4.1
0-1	Benzo(b)fluoranthene	2.8
1-2	Benzo(b)fluoranthene	0.98
1-2	Fluoranthene	1.7
1-2	Phenanthrene	0.99

FIGURE 12-8
SVOCs ABOVE BACKGROUND IN SURFACE SOILS
STOCKPILE AREA
REV. 0 MEMPHIS DEPOT DUNN FIELD RI

TAB

Section 13

13.0 Baseline Risk Assessment for Stockpile Area

13.1 Human Health Evaluation for Stockpile Area

The Stockpile Area consists of the mowed grassy area north and west of the locations of the former stockpiles of bauxite and fluorspar in the southeastern area of Dunn Field. All the mineral stockpiles have been removed from the site. These areas have been covered with clean soils and seeded, and are currently covered by grass.

As discussed in Section 12, the Stockpile Area was investigated by CH2M HILL through collection of soil-gas measurements, followed by a second phase of soil sampling that included the entire Stockpile Area. Surface and subsurface soil samples were collected during this second phase in October 1999. Groundwater underneath the site is evaluated as one unit in Sections 14 through 15, following this site evaluation.

Additional investigation by Parsons ES in June 1999, included an EE/CA for the Removal of CWM within Dunn Field. Most of this investigation focused on sampling/analysis for CWM and metals in the western half of Dunn Field, which included the Stockpile Area and more than 2/3 of the Disposal Area where suspected CWM burial sites are reported. Analytical results indicated one surface soil CWM detection; all other detections were from subsurface soil samples (Parsons, June 1999, Table 2.6). Except for lead in one surface soil sample (SS-2), all metals detections were well below background/RBC levels. These samples with detected CWM and lead were located within the Disposal Area and no contaminated surface soil samples were identified within the Stockpile Area. A conservative risk evaluation conducted on the EE/CA investigation data indicated that risks and HI were well within the acceptable limits. These data collected as part of the EE/CA investigations were not included for quantitative risk in this section, as a separate risk evaluation was already performed on this data. Additionally, soils contaminated with CWM have been removed.

The general risk assessment approach and the exposure unit assumptions used are described in Section 7.0. Figure 13-1 shows the two exposure units within the Stockpile Area: (1) the Area-wide exposure unit, and (2) the surrogate site selected based on the highest PRE value at one sample point. This approach is consistent with that used for the Main Installation, as well as other areas within Dunn Field. The Area-wide exposure unit was evaluated for exposures to the current and future worker population. The surrogate site represented by data point SSLFF and one other data point located within one acre of this highest PRE data point were selected for evaluation as a high-end exposure representative of future industrial and utility workers and future hypothetical residential receptors.

The PRE results used as the basis for selecting the surrogate site are presented in Appendix C-2.

The Stockpile Area consists of the Former Flame Thrower Test Area, old stockpile areas, and the CC-2 burial pit. Grassy areas occupy a major portion of the Stockpile Area. As initially presented in Section 10 and described in Section 12, there is one former disposal site in the Stockpile Area that has had limited to no investigation and information is limited as to the materials that are buried in this site. This site has been given priority designation by the Memphis Depot BCT for future remedial action with some investigative action as well. The BCT has developed the following qualitative risks associated with this site:

- Buried containers of hazardous liquids could leak and discharge to the environment and impact groundwater and any selected groundwater remedy(s)
- Buried containerized hazardous liquids could be accessed through future intrusive activities and cause immediate injury to human health and release to the environment
- Buried hazardous solids/residuals that could leach contaminants to groundwater and/or cause immediate injury to human health if accessed through intrusive activities

Remedial action objectives for these sites are defined in Section 13.3.

This analysis includes the risk assessment conducted for all area-wide surface soils. The surrogate site is represented by two data points: the SSLFF data point and an additional sample for the Stockpile Area (see Table 7-2 and Appendix C). A separate human health risk assessment was conducted at SSLFF, which was chosen as the surrogate site and is discussed toward the end of this section. RGOs were calculated for COPCs presenting excessive risks for an industrial worker, if the calculated risks were above the upper limit of the acceptable range of 10^{-6} to 10^{-4} within the Stockpile Area and/or the SSLFF risk estimates.

13.1.1 Selection of COPCs for Stockpile Area

As previously noted, data collected from across the area were used for the Stockpile Area risk assessment. The medium of interest for the Stockpile Area was soil (surface and subsurface). Surface soil samples were collected from across the Stockpile Area as well as near the fence-line in the southeastern end; subsurface soil borings were located within the source areas or immediately adjacent to potential source areas (e.g., former ore stockpile locations). These surface and subsurface soils were included for COPC selection. There are no surface water bodies within the area, therefore, no sediment or surface water was collected from within this Area. Soil sample Locations A, B, C, D, E, F, G, H, I, and J were included for the COPC selection. Groundwater from Dunn Field is discussed in Section 15.

The concentrations of all detected chemicals in soils at each of the sampling points were compared against background values and health-based criteria (i.e., Region III RBC), as described in Section 7.0. The Stockpile Area-wide COPCs for surface soil and subsurface soil are presented in Tables 13-1 and 13-2, respectively. A more detailed table showing human health screening criteria by medium and the results of the COPC selection screening is provided in Appendix D.

Based on concentrations above background and screening criteria, the COPCs for the Stockpile Area surface soils are aluminum, arsenic, chromium, vanadium, dieldrin, and several PAHs. These COPCs are similar to those identified for the other areas within Dunn Field and the Main Installation, and no unique COPCs are identified specific to the Stockpile Area.

The COPCs for the Stockpile Area subsurface soils are aluminum, arsenic, chromium, copper, manganese, and vanadium. COPCs for soil column exposures/risk assessment are a combination of both surface and subsurface soil COPCs

13.1.2 Exposure Assessment for Stockpile Area

The regional land use within a 3-mile radius of the Depot is presented in Figure 2-17. The historical activities in the Stockpile Area can be generalized as various stockpiling, flame thrower testing, and routine facility maintenance operations. Additionally, roadways and railroad tracks are located within the property. The following discussion presents a CSM for the Stockpile Area and potentially exposed human receptors within the Stockpile Area under current and future land use scenarios.

13.1.2.1 Conceptual Site Model and Fate and Transport Overview

Figure 13-2 shows the conceptual site (exposure) model for the Stockpile Area. Each of the components of a CSM are discussed below, including the primary and secondary sources of contamination, primary and secondary release pathways, mechanisms, potential receptors, and routes of exposure.

The stockpiles of various mineral ores were stored either on a concrete pad (e.g., fluorspar piles) or directly on the ground (e.g. bauxite). The mineral ore piles have been in the Dunn Field area historically, and were covered with dust-limiting tarps. The Flame Thrower Test Area may have involved ignitable fluids such as petroleum constituents during its historical operation. These chemicals are not very persistent and may not have remained in the area, as indicated by the absence of petroleum hydrocarbons or related SVOCs near the Flame Thrower Test Area.

The COPCs identified for the Stockpile Area included some inorganic chemicals, dieldrin, and PAHs. The inorganic chemicals could be from the minerals stored, or naturally occurring in soils. The PAHs and dieldrin were detected at concentrations similar to those detected elsewhere across the Depot and are not specific to the Stockpile Area. Dieldrin is likely from historical maintenance applications across the Depot. PAHs are thought to be associated with vehicle exhausts, asphalt pavements, and the railroad tracks. Inorganic chemicals are COPCs for subsurface soils, and no organic chemicals were identified as COPCs.

Potential release pathways for the COPCs in the soils are infiltration, leaching, and migration to subsurface soils and groundwater. Another form of release is the surface run-off of pesticides from grassy areas into the ditches. There are no significant surface drainage features within the area. Since no VOCs have been detected in site media, volatilization and release to ambient air or buildings is not a pertinent pathway for this site. Another potential migration pathway for the COPCs identified in surface soil is generation of dust, resulting in air-borne emissions. Identified COPCs are from areas where stockpiles have been excavated and other non-excavated areas.

There are no exposure points at the present time, as the area is largely inactive and devoid of recurring human activity. Potential land use and associated activities onsite include areas where human activities and/or ecological receptor occurrences are likely within potentially contaminated areas. Most of the Area is inactive and the only current human activity in this area is assumed to include maintenance workers performing activities such as lawn mowing, and weed cutting in the former stockpile areas. The potential for direct human exposure depends on the presence of exposed contaminated soil and the types of activities within the contaminated areas.

Much of the surface area in the Stockpile Area is covered by grass. Exposures to soils could occur in the open areas during maintenance activities. This risk assessment assumes that all soil within the Stockpile Area is accessible for exposure. This renders a conservative risk analysis, as some of the areas are covered by asphalt and concrete pavement. Under a future land use scenario, a wide range of exposures was evaluated, including maintenance, industrial and utility workers, and future residential receptors (CH2M HILL, 1999). The utility worker scenario assumes they can work anywhere in the Stockpile Area and, therefore, can be exposed to the larger exposure unit, which is the entire area. The area surrounding sample Location SSLFF was used as a surrogate site to evaluate both the future industrial and residential exposures. These theoretical assumptions were included to evaluate the site under conservative exposure assumptions. A utility worker scenario was not applied to the surrogate site due to lack of subsurface soil data for the surrogate site.

Based on the planned reuse activities described in *The Memphis Depot Redevelopment Plan* (The Pathfinders *et al.*, 1997), the Stockpile Area is expected to remain light industrial. Thus, future exposed populations are expected to be workers. The Stockpile Area could be suitable for residential development if human health risks are considered insignificant. Therefore, such an unrestricted land use was included in the risk estimations.

Potential exposure routes for the maintenance worker include incidental ingestion and dermal contact with surface soil, as well as inhalation of particulate emissions via dust from surface soil. Due to the presence of grass cover over some of the Stockpile Area, dust generation is anticipated to be limited. However, according to one of the exposure assumptions, dust generation would occur at a rate similar to that of open space without grass cover. In the past, when materials were stored in the stockpiles, dust generation was limited by the thin asphalt shells painted on the stockpiles. With the removal of these stockpiles, dust from raw materials is no longer a concern. In the future, if the area is redeveloped, construction activities may also expose workers to subsurface soils. Direct exposure to subsurface soil is evaluated for ingestion, dermal contact, and inhalation.

The area groundwater is not likely to be used, as water use patterns are well established with City water supplied for potable and industrial uses in the area. For theoretical possibility assessments, groundwater is assumed to be used at a future time. Therefore, future exposures to surface and subsurface soils are evaluated in this risk assessment. Onsite future groundwater use and offsite migration and use by offsite residents was evaluated for direct exposures through potable or commercial use (Sections 15).

13.1.2.2 Potentially Exposed Population and Identification of Complete Exposure Pathways

As stated earlier, currently the Stockpile Area is not in use and the facility is inactive. Potentially exposed populations under current conditions could be maintenance workers occasionally cutting grass.

Under foreseeable future conditions, potentially exposed receptors could include maintenance workers, similar to those identified under current land use. Current and future potentially exposed populations are likely to be industrial workers. For conservative risk estimation purposes, future workers are assumed to contact soils routinely on a daily basis, throughout their entire exposure duration (25 years). A general description of activities to be performed by a maintenance worker within the Depot was provided in Section 7.0.

As noted above, future use for the Stockpile Area may include light industrial or municipal/commercial use. However, in the interest of conservatism, the assumption was made that the Stockpile Area would be converted to an industrial area. This would require workers to spend more time on the site, with a higher frequency of visits to the contaminated soil areas. This represents the RME scenario for industrial land use. Routes of exposure include incidental ingestion, dermal contact, and inhalation of dust from surface soils. Groundwater underneath Dunn Field is addressed in Section 15. Exposure factors used were default values for industrial workers from the *Exposure Factors Handbook* (EPA, 1997c) and other published sources as referenced in Appendix H. A summary of exposure factors is presented in Tables 7-4a-c.

Assuming certain factors allow, this area could be available for residential development. Therefore, unrestricted land use will be considered as a potential future condition. Evaluation of a residential scenario in the surrogate site will be considered protective of site conditions in the Stockpile Area and will be available for consideration when making site management decisions. If the risk assessment indicates no unacceptable risk in the surrogate site, the Stockpile Area will be considered for unrestricted land use.

Table 13-3 summarizes potential current and future exposure pathways for the Stockpile Area. Receptors were conservatively selected to be protective of the relatively lower exposure receptor population for quantitative risk evaluation for this Area. Appendix E compares each potential receptor to the selected representative exposure scenarios to ensure that selected exposure scenarios are protective against all potential current and future exposures. According to these assumed conditions for exposure under current and future land use, the receptor groups that were considered in deriving estimates of exposure and health risk for the Stockpile Area and the surrogate site (SSLFF) were as follows:

- Current onsite maintenance worker;
- Future onsite commercial/industrial worker
- Future onsite utility worker; and
- Future onsite residential adult and child (surrogate site - SSLFF).

13.1.2.3 Maintenance Worker

Routine grounds maintenance was evaluated for a current/future maintenance worker. A default future industrial worker assumption for soil ingestion rate was assumed for a maintenance worker, where the soil ingestion rate of 50 mg/day was used. The exposure frequency was assumed at 50 days per year (once a week maintenance throughout the year, assuming 2 weeks of vacation), with exposure duration of 25 years. Dermal contact with soils was estimated for the exposed skin area (2,679 cm^2/event) Dust exposure intake estimations were based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day Exposure factors and the rationale for their selection are included in tables in Appendix H.

13.1.2.4 Industrial Worker

Because the Stockpile Area could remain light industrial, default exposure scenarios were evaluated for a future industrial use. If a trespasser/recreational visitor were to be exposed to the site in the future, that receptor exposure is likely to be lower than a future industrial worker exposure. A recreational visitor is likely to have shorter and less frequent visits than those reflected in the industrial worker exposure frequency (EF) assumptions. Therefore, the future industrial worker scenario is a conservative representative of a future recreational trespasser scenario.

A default future industrial worker is assumed to have a soil ingestion rate of 50 mg/day, for 8 hours a day, for 250 days per year, with exposure duration of 25 years. Exposure factors and their source/justification are presented in Section 7 and included in Tables 7-4a,b,c. Dermal contact with soils was estimated for the exposed skin area (2,679 cm^2/event). Dust exposure intake estimations were based on an inhalation rate of 20 m^3/day for a workday of 8 hours/day.

13.1.2.5 Utility Worker

A utility worker exposure is evaluated in the Stockpile Area-wide risk assessment. Any given area could be used for future redevelopment. No subsurface data from the surrogate site location are available. In the future if the site is subject to redevelopment that requires building new structures, and/or installation of underground utilities, construction and utility workers involved in such activities could be exposed to surface and subsurface soils during excavation. The depth to which these workers have access is assumed to be up to 10 feet bgs. Since construction activities are similar to utility maintenance activities, except utility maintenance work could occur more often over a longer duration, this scenario was chosen for risk analysis. A utility worker is assumed to have a higher soil ingestion rate, 100 mg/day, once every other week (25 days/year) in a year, for 25 years working at the same facility. Since the entire area is not uniformly contaminated to the 10 feet or greater depth, about 50 percent of the exposures to soil are assumed to come from contaminated soils, at EPC levels. All other factors (e.g., body weight, averaging time) are similar to the corresponding factors for other worker populations.

13.1.2.6 Residential Scenarios

The default residential scenario in a risk assessment presents the high-end exposure scenario, regardless of its applicability at a site. Risk managers use this as a comparative risk scenario to assess the high-end risks to be used in the risk management decisions for a site. A residential scenario is often a hypothetical exposure scenario, and may not be applicable to the site for which it is evaluated. The residential scenario was evaluated for the surrogate site as presented in Section 13.5 below.

The future hypothetical residential scenario evaluated both adult and child receptors using EPA recommended default exposure factors. These include a soil ingestion rate of 100 mg/day for an adult and 200 mg/day for a child. For the carcinogenic RA, age-adjusted exposure factors were used to calculate a soil ingestion rate of 114.29 (mg-yr/kg-day), an inhalation rate of 12.86 (3-yr/kg-day), and a surface area for exposure of 2671 (cm^2-yr/kg). Inhalation rates for noncarcinogenic chemical-related intake estimates of 20 m^3/day and 15 m^3/day were assumed for an adult and a child, respectively. Further details of the exposure factors are included in Appendix H.

Additionally, conservative default exposure scenarios that were evaluated include a future residential use scenario and an industrial use scenario. Chemical-specific values adopted for the exposure factors used in the dose algorithms are also summarized in Appendix H. The results of the quantitative exposure analysis (dose estimates), along with the risk calculations, are included in Appendix G.

The EPCs were the estimated UCL 95 percent concentrations for surface soils and soil column samples at total depths. EPCs for the Stockpile Area-wide EPCs used in dose estimates for different workers identified for the site are the UCL 95 percent estimates. A general description of the UCL 95 percent calculation is provided in Appendix F.

The estimated EPCs for all media are listed in Tables 13-4 and 13-5. The dose (intake) was estimated for each of the complete exposure pathways (see Appendix G).

13.1.3 Toxicity Assessment for Stockpile Area

Table 13-6 presents the toxicity factors and adjustment factors for dermal permeability, and absorption for COPCs, and the WoE classifications for each. Detailed information on the basis of toxicity classification, and the uncertainty associated with the listed toxicity factors based on the EPA toxicity database, are presented in the master toxicity tables located in Section 7.0, Tables 7-7 and 7-8. All toxicity values used for the COPCs are chronic values. Acute and subchronic values are deemed inappropriate for use based on the long-term exposures assumed for dose estimations.

Toxicity factors for the Stockpile Area and the SSLFF soils are listed in Table 13-6. Oral CSFs are available for PAHs, arsenic, and dieldrin. Inhalation CSFs are available for the same compounds, as well as total chromium. The oral RfD values are available for aluminum, arsenic, total chromium, copper, manganese, vanadium, and dieldrin. Inhalation RfDs are available for aluminum, total chromium, and manganese only. Oral toxicity factors are adjusted by the gastrointestinal ABS_{GI} factors for comparisons with dermal intake estimates. These values were presented in Table 7-10. Nine carcinogenic and four noncarcinogenic inorganic and organic chemicals were identified as COPCs at the Stockpile Area. All of the chemicals were analyzed for their potential toxicity contribution to represent the combined effect of all site-related chemicals.

The TEFs for various carcinogenic PAHs were selected from EPA Region IV and EPA's provisional guidance (EPA/600/R-93/089) and can be found in Table 7-9. They were selected and applied to the toxicity factor for benzo(a)pyrene (B(a)P) to estimate risks from individual PAH compounds. Alternatively, TEFs may be applied to the concentration of individual PAH compounds to convert them to B(a)P concentration, a practice recommended by EPA Region IV. However, since other less toxic PAHs often occur at higher concentrations than B(a)P, to present individual contributions to the total risk, TEFs were applied to the toxicity factors.

EPA RAGS guidance recommends discussion of chemicals without toxicity factors. There are no COPCs without a toxicity factor within Stockpile Area.

13.1.4 Risk Characterization for Stockpile Area

The methodology used for risk and HI calculations is described in Section 7.0. The carcinogenic risks and noncarcinogenic HI results for the Stockpile Area are summarized in

Table 13-7. Detailed risk calculations by scenario are included in Appendix G. A set of histograms of the risks and HIs is presented in Figures 13-3 and 13-4. The Stockpile Area was evaluated as one exposure unit. A separate analysis for the surrogate site is included in Section 13.5. Workers and residents were assumed to have uniform exposures, and the EPCs were assumed to be present over the entire surface of the Stockpile Area.

The surface soil ELCR to an onsite maintenance worker at the Stockpile Area was estimated to be 9×10^{-7}, which is slightly below the acceptable range of 1 to 100 in one million (10^{-6} to 10^{-4}). The noncarcinogenic HI of 0.005 is well below the standard threshold of 1.0. Given the conservatism inherent in the assumptions and parameter values used in this analysis, these results suggest that no significant risks of adverse health impacts exist at this site for maintenance workers from exposure to surface soil.

The ELCR to a future onsite industrial worker from the surface soils at the Stockpile Area was estimated to be 7×10^{-6}, primarily due to arsenic and benzo(a)pyrene. The arsenic EPC, 13 mg/kg, in surface soil is below a background value of 20 mg/kg. The maximum arsenic concentration was 25 mg/kg, which is slightly above background, making arsenic a COPC. However, the range of arsenic detections is less than the background level. The PAH, benzo(a)pyrene was detected at concentrations similar to background and levels in other areas of the Depot. The estimated risk is within the 10^{-6} to 10^{-4} acceptable range typically considered adequately protective of public health. Total noncarcinogenic HI was estimated at 0.04, which is well below a value of 1.0.

The ELCR from exposures to the soil column for an industrial worker was estimated at 4×10^{-6}, and HI was estimated at 0.05, which are similar to estimates from surface soil exposures alone. Since the soil column includes surface and subsurface soils, the risks from surface soils and the soil column cannot be combined. Rather, the total risk is the higher of the two sets estimated for the industrial worker, which is, in this case, surface soil. Given the conservatism inherent in the assumptions and parameter values used in this analysis, these results suggest that no significant risks of adverse health impacts exist at this site for future industrial/commercial workers from exposure to soil.

The ELCR to a future onsite utility worker from exposures to the soil column at the Stockpile Area was estimated to be 4×10^{-7}. The estimated risk is below the 10^{-6} to 10^{-4} acceptable range typically considered adequately protective of public health. The HI was estimated at 0.005, which is well below a value of 1.0. Given the conservatism inherent in the assumptions and parameter values used in this analysis, these results suggest that no significant risks of adverse health impacts exist at this site for future industrial/commercial workers from exposure to soil.

13.1.5 Health-based Evaluation for Lead

The maximum observed lead concentration in surface soil at the Stockpile Area is 107 mg/kg, with an estimated arithmetic mean of 29.4 mg/kg. All concentrations (including the maximum) are below a residential exposure-based screening level of 400 mg/kg, and an industrial worker exposure-based target concentration of 1536 mg/kg. Thus, the observed lead levels at the site are not expected to pose health hazards.

13.1.5.1 Uncertainty Analysis

Section 7.0 presents the general concepts and sources of uncertainty at a given site. The following are major points contributing to uncertainty in the risk estimates for the Stockpile Area.

13.1.5.2 Contaminants of Potential Concern

Data were collected from 1998 to 1999. Many of the COPCs, such as PAHs and metals, were also detected in background soils Dieldrin was not used in the stockpile operations; however, pesticides were applied as part of routine maintenance of the gassy areas, which are not directly related to former site operations within Dunn Field. Likewise, site-wide data statistical evaluations indicated that the contaminants were similarly distributed in the background samples.

13.1.5.3 Exposure Assessment

There are no routine exposures under current conditions other than occasional maintenance activities. Most of the area within the Stockpile Area is paved or grass-covered. Some of the samples were collected adjacent to paved areas, which were assumed to be readily available for exposure. There are no human receptors in the Stockpile Area, as mentioned previously. Future land use for the Stockpile Area is expected to continue as light industrial. Future utility and industrial worker exposure to the subsurface soil becoming surface soil is a conservative risk estimation scenario that would apply to the entire site where compounds were detected in subsurface soil.

Most of the quantitative exposure values such as exposure frequency (EF) and duration (ED) are assumed values, and actual likely exposure of a receptor is not known. Most of the uncertainty within risk assessments is attributable to this exposure quantitation step.

13.2 Toxicity Assessment

The toxicity criteria used are those recommended by EPA through the toxicity databases; therefore, the uncertainty associated with toxicity assessment is pre-determined by the methods used and the studies selected by EPA in calculating these toxicity factors. The quantitative uncertainty factors (UF) associated with toxicity factors are included in the master toxicity factors tables (Tables 7-7 and 7-8). Some of the primary sources of uncertainty are listed here. Most of the toxicity factors are based on studies from animals extrapolated to humans using arbitrary assumptions (e.g. UF, or modification factor [MF]), which introduces a major uncertainty. In extrapolating from carcinogenic dose to estimate slope factor, no threshold for toxicity is assumed. Some of the metal toxicity factors are based on evidence of toxicity from occupational exposures (e.g., chromium) involving a high level of exposures to chromic acid fumes and air-borne particles. Bioavailability of the chemicals is lower in the soil than in the groundwater (dissolved form). Application of these data to environmental exposures introduced substantial uncertainty.

13.2.1.1 Risk Characterization

As noted previously, the risks and hazards estimated in this assessment are conservative. Several scenarios were evaluated to simulate possible alternative future land uses for the Stockpile Area.

13.3 Remedial Goal Options

RGOs are target concentration values selected or estimated to reduce risks to human health and ecological receptors, which will be carried into the remedial alternative analysis. Achieving these goals should achieve compliance with state and federal standards and satisfy NCP requirements to ensure protection of human health and the environment at hazardous waste sites. The RGOs are developed only for chemicals that are detected at the site at concentrations either above the applicable state or federal standards or present risks or HIs above the acceptable levels. "Acceptable" risks are defined as risk levels below 100 in one million (10^{-4}) or HI below 1.0, for either current or future industrial worker exposure pathways analyzed in the risk assessment. The risk evaluations under future land use conditions included potential exposures of maintenance, industrial, and utility workers within the Stockpile Area based on activities observed to be applicable to the site. Exposure of a maintenance worker to surface media under current land use conditions did not result in excessive risks associated with the soils. The estmations for a future industrial worker resulted in acceptable risk for direct exposures to soil. There are no human health protection-based applicable or relevant and appropriate regulations ARARs for soils. Groundwater is addressed in Section 15 and relevant groundwater RGO values are presented and discussed therein. The ARARs for groundwater are presented in Sections 7 (see Table 7-15) and 15.

Based on the results of this risk assessment, remedial action objectives were developed and are included in Table 13-11A. This table also includes the RGO for the one priority disposal site.

13.4 Human Health Evaluation for SSLFF

An acre area around SSLFF was selected as the surrogate site. The data collected within this 1-acre area were used to represent the risks and HIs from the surrogate site, SSLFF, for the Stockpile Area. SSLFF resulted in the highest human health risk ratio during the PRE (see Appendix C-2). The PRE risks are primarily due to arsenic in surface soils at this location at a concentration of 25.5 mg/kg. SSLFF is dealt with exclusively below as a surrogate site for the Stockpile Area.

13.4.1 Selection of COPCs for SSLFF

Two samples were collected from this area, which were analyzed for VOCs, SVOCs,PCBs, pesticides, herbicides and inorganic chemicals from surface soil (0- to 2-foot deep). The maximum detected chemical concentration within this data group was compared against background concentrations and the RBCs for direct exposure, as well as groundwater protection concentrations (SSLs) for COPC selection. The COPC selection indicated that surface soils at the site had aluminum and arsenic exceeding background levels and comparison criteria (see Table 13-8). The PRE indicates arsenic as the primary risk driver (Appendix C-2) in surface soil. However, the arsenic levels are within the range of concentrations detected in background.

13.4.2 Exposure Assessment for SSLFF

Figure 13-1 depicts the site and its relative location within the Stockpile Area. Figure 13-2 presents the conceptual site (exposure) model for the Stockpile Area, as well as the surrogate site.

13.4.3 Potentially Exposed Human Population and Identification of Potentially Complete Exposure Pathways

Dunn Field has been inactive since the closure of the Depot. There are no potentially exposed populations under current conditions specific to this site. Under assumed future use conditions, maintenance workers for the Depot involved in weed control and other maintenance-related activities could be present for limited periods of time within this sample location. Maintenance worker exposure was quantitated for the Stockpile Area-wide risk evaluation above and, therefore, was not evaluated for this smaller area, SSLFF.

Potentially exposed populations under future land use are unknown at this time. On the basis of *The Memphis Depot Redevelopment Plan* (The Pathfinders *et al.*, 1997), it is likely SSLFF could be used in the future for light industrial operations. Under such a scenario, likely future receptors are also site maintenance/industrial workers. For a conservative assessment, the default industrial worker exposure is assumed for this sample area. A future residential land use was also evaluated in this risk assessment for Stockpile Area to provide flexibility during future site risk management. Thus, if the risk results are at acceptable levels, such a use may be considered as a suitable future land for the area. Exposure assumptions for a residential scenario are included in Section 13.1.2. Hypothetical future residential exposures were evaluated for the worst-case exposure scenario for comparison purposes in risk management decisions. A detailed list of exposure factors and the rationale for their selection are included in tables in Appendix H.

Worker exposure to the soil column could not be evaluated in this surrogate site due to the lack of subsurface data. Therefore, hypothetical future receptors were limited to residents and industrial workers with direct contact to surface soils. A summary of applicable exposure pathways for SSLFF is included in Table 13-9.

The maximum detected concentration was used as the EPC for surface soil (0 to 2 feet) data for the COPCs identified. The EPC defaulted to the maximum detected concentrations for all COPCs in surface soils, possibly due to the relatively small sample size, and a variation in concentration levels between the samples. These values are listed in Table 13-10. The dose (intake) was estimated for each of the complete exposure pathways. The dose estimates are included in Appendix G.

Table 13-6 presents the toxicity factors for COPCs identified at SSLFF.

13.5 Risk Characterization for SSLFF

The carcinogenic risks and noncarcinogenic hazards are summarized in Table 13-11. A set of histograms is included in Figures 13-5 and 13-6. The ELCRs and HIs were estimated for a future industrial worker, and hypothetical residential adult and child scenarios.

The ELCR for industrial worker exposures to SSLFF surface soil resulted in estimated risks of 8 x 10^{-6} and an HI of 0.06, due to the presence of arsenic at 26 mg/kg. This maximum arsenic level within the Stockpile Area is within the range of background levels of 4 to 28 mg/kg as reported in the Background Sampling Program Report (CH2M HILL, May 1998). The resulting risks are within the acceptable limits for cancer risks of 1 to 100 in one million, and below the HI of 1.0. Given the conservatism inherent in the assumptions and parameter values used in this analysis, the overall SSLFF soils do not pose a health threat to future industrial workers outdoors.

The total ELCR to future hypothetical onsite adult and child residents at SSLFF was estimated using age-adjusted soil ingestion, dermal surface area, and inhalation rate factors. The estimated ELCR is 6 x 10^{-5}, which is within the acceptable range of 10^{-6} to 10^{-4}. A separate child cancer risk was not estimated because the adult risk represents a time-adjusted exposure. Total HI was estimated to be 0.2 for an adult and an HI of 2 was estimated for a child. The estimated risk and HI are also due to arsenic. These results suggest that site arsenic levels are unacceptable; however, arsenic levels within this sample location are similar to those detected elsewhere within Shelby County, as reported in the Background Sampling Program Report (CH2M HILL, May 1998). Thus observed risks are similar to those from background.

Uncertainties associated with this risk assessment are similar to those listed in the Stockpile Area risk assessment section (Section 13.1.4).

13.6 Environmental Evaluation for Stockpile Area

13.6.1 Introduction

An ERA was conducted at the Stockpile Area to evaluate whether contaminants detected in surface soil potentially pose adverse ecological effects to terrestrial receptors. The Stockpile Area consists of the former chlorinated lime pit (Site 24-B), concrete pads, and grassy areas in the southeast portion of Dunn Field where stockpiles of bauxite and fluorspar were stored. The Stockpile Area is completely open with a groundcover of routinely mowed grass and, therefore, provides poor quality habitat for terrestrial wildlife. The large maintained grassy areas however can provide foraging habitat for terrestrial avian species that feed on soil invertebrates. There are no aquatic habitats in this area. EPA ERA guidance (USEPA, 1997b) recommends a screening-level ERA for risk management decisions. Although the Stockpile Area does not provide significant terrestrial habitat, a screening-level ERA was initiated to aid in risk management decisions. This ERA was conducted in accordance with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (*Process Document*)(EPA, 1997b). Steps 1, 2, and 3 of the EPA ERA model were completed, as summarized in Section 7.8.

13.6.2 Step 1: Screening-Level Problem Formulation and Effects Evaluation

This is the initial step in the ERA and includes all the elements of a problem formulation and ecological effects analysis, but on a screening level. The results of this step support the exposure estimates and risk calculation in Step 2

13.6.2.1 Environmental Setting and Contaminants at the Site

The environmental setting at the Depot is described in Section 2. An ecological assessment checklist was completed as described in the *Process Document* (USEPA, 1997b) and is provided in Appendix J. Site characteristics most relevant to the ERA are discussed here.

The Stockpile Area is a currently inactive portion of Dunn Field that is completely covered by mowed grass, and some concrete and asphalt areas. The area is entirely open, with a relatively level terrain that is routinely maintained There are no water bodies onsite. Overall, the maintained terrestrial areas provide insignificant ecological habitat for plants or animals. This site is expected to be developed into a light industrial area; therefore, no future improvement in wildlife habitat quality is expected.

A few urban-adapted wildlife species have been observed at Dunn Field. Species observed at Dunn Field that may occur in the grassed Stockpile Area include red fox, northern mockingbird, American kestrel, boat-tailed grackle, European starling, mourning dove, common bobwhite, rock dove, and killdeer. It is possible that other small mammals (e.g., mice, shrews, rabbits), birds (e.g., American robin, sparrows), and reptiles (e.g., five-lined skink, eastern garter snake) may also occur at the site. The entire facility is fenced, which reduces use by large mammals (e.g., whitetail deer). Overall, the terrestrial habitat within the Stockpile Area is of poor quality and provides limited habitat value for terrestrial wildlife.

There are no wetlands onsite, and no state or federally listed or proposed endangered or threatened species are known to inhabit the area of the site (TDEC, 1996; USFWS, 1996-Appendix T).

Land use within a 1-mile radius of Dunn Field is highly developed and is primarily residential or industrial. A few undeveloped and isolated forested areas also occur in the general area. The largest is located to the north of Dunn Field at Person Avenue and Rozelle Street. Other areas are located south of Dunn Field along Ball Road and Ketchum Road in the vicinity of the Orchid Manor Apartments and east of Dunn Field on Dwight Street. Large undeveloped forested and grassed areas associated with the floodplains of Nonconnah Creek and its tributaries occur at least 1 mile to the south and west of the facility.

Surface soil sampled in the Stockpile Area is the medium to which terrestrial ecological receptors could be exposed and is, therefore, the only medium evaluated in this ERA. A list of COPCs at this site is provided in Section 6.2. These generally include many metals and organic compounds (pesticides, PAHs, and volatiles).

13.6.2.2 Contaminant Fate and Transport

An overview of contaminant fate and transport of chemicals detected at Dunn Field is provided in Section 6.0 and is not repeated here.

13.6.2.3 Complete Exposure Pathways

For a pathway to be complete, a contaminant must travel from the source medium or media to an ecological receptor and be taken up by the receptor via one or more exposure routes Although ecological habitats are minimal at the Stockpile Area, a conservative assumption was made that a potentially complete exposure pathway may exist for direct contact of terrestrial plants and invertebrates with contaminants detected in surface soil throughout the site.

13.6.2.4 Assessment and Measurement Endpoints

Assessment endpoints are expressions of the environmental value(s) to be protected. The assessment endpoint for the Stockpile Area is to sustain soil quality and achieve COPC concentrations that are below adverse effect thresholds for terrestrial plants and soil invertebrates. Measurement endpoints are measurable ecological characteristics of the assessment endpoint. In this screening-level evaluation, the measurement endpoint is the ratio of maximum surface soil concentrations for the entire area to conservative screening-level benchmarks for surface soil. An exceedance of COPC concentrations compared to the benchmarks would be a "measure" of a potential effect. If an exceedance occurs, it can be inferred that a possible adverse effect may occur to exposed ecological receptors.

13.6.2.5 Screening-Level Ecological Effects Evaluation

Conservative thresholds for adverse ecological effects, or screening ecotoxicity values, were used for contaminants detected in surface soil. These values were determined as follows:

- **Surface Soil.** The soil ecological screening values are those recommended by EPA Region IV (1998). The EPA values were obtained from a variety of sources, including the U.S. Fish and Wildlife Service (USFWS), the Oak Ridge National Laboratory (ORNL),the Canadian Council of Ministries of the Environment, the Netherlands Ministry of Housing, and the Netherlands National Institute of Public Health and Environment (RIVM).

The screening ecotoxicity values are presented in Section 7.8.

13.6.2.6 Uncertainty Assessment

Uncertainty is inherent in each step of the ERA. The following text presents major factors contributing to uncertainty in this assessment.

EPCs were assumed to be maximum media concentrations for the entire area. This is a highly conservative assumption that may overestimate risk. Under this assumption, the receptor spends 100 percent of its life cycle at the area with the highest concentration. Although this can be true for plants, most terrestrial wildlife receptors are mobile and are likely to be exposed to the complete range of soil concentrations.

The ecological screening values used were obtained from various sources in the literature and may not be representative of actual site conditions. Exposure pathways to terrestrial plants and animals were assumed to be potentially complete, even though the maintained grass areas provide low quality habitat in this generally disturbed and industrial setting.

The site ecology is also controlled to an unknown extent by physical stressors. The primary stressor includes routine mowing and other potential landscape maintenance activities.

13.6.3 Step 2: Screening-Level Exposure Estimate and Risk Calculation

This step includes estimating exposure levels and screening for ecological risks as the last two phases of the screening-level ERA. At the end of Step 2, an SMDP will be made to determine if ecological risks are negligible or if further evaluation is warranted.

13.6.3.1 Screening-Level Exposure Estimate

The maximum concentration of all chemicals detected in surface soil at the Stockpile Area was used as the EPC for estimating risk to directly exposed organisms.

13.6.3.2 Screening-Level Risk Characterization

The quantitative screening-level risk estimate was conducted using the hazard quotient (HQ) approach. This approach divides the EPC (maximum detected media value) by the EPA screening ecotoxicity value.

Table 13-12 summarizes the results of the surface soil screening-level risk calculations. These tables provide information on the FOD, range of detection, selected ecotoxicity values, and HQs based on comparison of the maximum concentration to the screening criteria. An HQ less than 1.0 indicates that the contaminant is unlikely to cause adverse effects and is therefore not considered further in the ERA (USEPA, 1997b). Contaminants with HQs greater than or equal to 1.0, or contaminants for which criteria were not available, were identified as COPCs and were carried forward to Step 3.

Surface Soil Screening Results - A total of 53 contaminants were detected in surface soil in the Stockpile Area, and, of these, 70 percent were identified as surface soil COPCs. The COPCs included 15 inorganic and 38 organic compounds. No screening criteria were available for six of the organic compounds; these compounds were therefore included in the COPC list.

13.6.3.3 Scientific Management Decision Point

The information indicates a potential for adverse ecological effects in surface soil, and a more thorough assessment is warranted. The COPCs identified in the screening process are to be carried forward to Step 3.

13.6.4 Step 3: Baseline Risk Assessment Problem Formulation

Step 3 refines the problem formulation developed in the screening-level assessment. In this step, the results of the screening-level assessment and additional site-specific information are used to determine the scope and goals of the baseline ERA.

13.6.4.1 Refinement of COPCs

In Steps 1 and 2, conservative assumptions were used As a result, some of the COPCs were retained for Step 3, although they may pose only negligible risk. Therefore, in this first phase of Step 3, the assumptions used were further evaluated, and other site-specific information was considered to refine the list of COPCs. In this refinement phase, the revised assumptions and site-specific considerations used were as follows:

- Arithmetic mean concentrations (for all samples) were considered along with maximum concentrations when a comparison to the benchmarks was conducted;

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- Background concentrations were compared to arithmetic mean and maximum values;
- FOD was considered;
- Essential nutrients (calcium, magnesium, potassium, and sodium) were eliminated; and
- Less conservative screening ecotoxicity values were considered in addition to the more conservative ecotoxicity screening values used in Step 2.

For soil, less conservative screening ecotoxicity values are termed "secondary benchmarks" in this report. The secondary benchmark selection process for soil focused on identifying the next highest benchmark value among the soil literature references used by EPA Region IV (1998). This was a stepwise process in which the first set of toxicological benchmarks considered was from two ORNL studies (Efroymson *et al.*, 1997). These studies established separate screening benchmarks for soil microorganisms, earthworms, and plants. A secondary screening value was chosen from these three data sets that was the next highest value above the primary EPA Region IV screening value. If no values were available, the selection process proceeded to the Netherlands values (MHSPE, 1994). In addition, if the selected value from ORNL was found to be greater than the highest Netherlands value, then the ORNL value was rejected and the process moved forward to the Netherlands value as a conservative measure.

The Netherlands values included optimum values and action values. When this set of data was considered, the next highest value above the primary EPA Region IV screening value was selected as a secondary benchmark. If a value was not available, the process proceeded to a final set of data as compiled by the USFWS (Beyer, 1990). The values in this data set represent Dutch background, moderate contamination, and cleanup values. As stated above, the next highest value above the primary EPA Region IV screening value was selected as a secondary benchmark.

In Step 3, the conservative ecological exposure pathways used in Step 2 were also reevaluated based on actual site conditions. All this information provides a WoE to determine which, if any, contaminants should be recommended for further evaluation in a baseline ERA.

The results of the Step 3 refinement of the COPC lists are summarized in Table 13-13. This table presents the maximum and average EPCs, background concentrations, conservative/primary and less conservative/secondary screening criteria, the range of HQs, background comparisons, and FOD.

Surface Soil COPC Refinement Results - Based on the WoE presented in Table 13-13, none of the inorganic or organic COPCs were determined to pose a potential for adverse effects to terrestrial organisms. This was based on an evaluation of the range of HQs, comparison to background, and FOD. In most cases, comparison of maximum and average concentrations to secondary criteria resulted in HQs less than 10, and many HQs were at or below 1. Also, average concentrations for most contaminants were below background concentrations. Surface soil criteria for 9 contaminants were not available for comparison, so HQs could not be determined; however, in a couple of instances the FOD was below 5 percent.

Another key consideration in this refinement step is the lack of ecological exposure pathways at the Stockpile Area. The Stockpile Area is an entirely grassed section in which the landscape is routinely mowed or maintained, and this land maintenance is expected to continue into the future if the site is developed for light industrial use The onsite terrestrial habitat is of poor ecological value and is generally supportive of maintained-planted grasses and some urbanized wildlife.

Given the poor quality of onsite habitat at the Stockpile Area and the lack of surface soil COPCs, ecological impacts are expected to be negligible and are not expected to change in the foreseeable future.

13.6.4.2 Scientific Management Decision Point

Refinement of surface soil COPCs indicated that, based on a WoE, as well as the poor quality of ecological habitat, current and future ecological impacts are negligible.

Based on this evaluation, no further assessment of ecological risk to contaminants at the Stockpile Area is warranted.

Tables

Table 13-1

Constituents of Potential Concern in Stockpile Area—Surface Soil

Rev 0 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC1?	COPC/BASIS
SS	MG/KG	ALUMINUM	28	28	1	1	2460	52600	19256	23810	7800		Yes	A
SS	MG/KG	ARSENIC	28	28	0.4	1	1	26	11	20	0.4	29	Yes	A
SS	MG/KG	BENZO(a)ANTHRACENE	28	5	0.7	0.9	0.9	3	2	0.7	0.9	2	Yes	A
SS	MG/KG	BENZO(a)PYRENE	28	5	0.7	0.9	0.9	4	2	1	0.1	8	Yes	A
SS	MG/KG	BENZO(b)FLUORANTHENE	28	6	0.7	0.9	1.0	6	3	0.9	0.9	5	Yes	A
SS	MG/KG	CHROMIUM, TOTAL	30	30	0.2	0.7	7	56	19	25	10800	38	Yes	A
SS	MG/KG	DIBENZ(a h)ANTHRACENE	28	3	0.7	0.9	0.8	1	0.9	0.3	0.09	2	Yes	A
SS	MG/KG	DIELDRIN	28	15	0.003	0.04	0.001	0.1	0.03	0.1	0.04	0.004	Yes	A
SS	MG/KG	INDENO(1 2 3-c,d)PYRENE	28	5	0.7	0.9	0.8	4	2	0.7	0.9	14	Yes	A
SS	MG/KG	VANADIUM	28	28	0.2	0.3	9	97	31	48	55	6000	Yes	A
SS	MG/KG	CHRYSENE	28	5	0.7	0.9	1	5	3	0.9	87	160	Yes	G
SS	MG/KG	ACETONE	28	19	8.0E-03	1.4E-02	2.3E-02	2.8E-01	1.6E-01		7.8E+02	1.6E+01	N/A	B
SS	MG/KG	ALDRIN	28	1	1.8E-03	2.3E-03	1.5E-03	1.5E-03	1.5E-03		3.8E-02	5.0E-01	N/A	B
SS	MG/KG	ALPHA ENDOSULFAN	28	1	1.8E-03	2.3E-03	3.1E-04	3.1E-04	3.1E-04		4.7E+01	1.8E+01	N/A	B
SS	MG/KG	BARIUM	28	28	1.0E-01	1.4E-01	2.2E+01	3.0E+02	1.2E+02	2.3E+02	5.5E+02	1.6E+03	Yes	B
SS	MG/KG	BENZENE	28	5	9.0E-03	1.4E-02	1.0E-03	5.0E-03	2.8E-03		2.2E+01	3.0E-02	N/A	B
SS	MG/KG	BENZO(g,h i)PERYLENE	28	4	6.9E-01	9.0E-01	9.2E-01	3.1E+00	2.0E+00	8.2E-01	2.3E+02	3.2E+04	Yes	B
SS	MG/KG	BENZO(k)FLUORANTHENE	28	2	6.9E-01	9.0E-01	1.8E+00	2.3E+00	2.1E+00	7.8E-01	8.7E+00	4.9E+01	Yes	B
SS	MG/KG	CARBON DISULFIDE	28	1	9.0E-03	1.4E-02	3.0E-03	3.0E-03	3.0E-03	2.0E-03	7.8E+02	3.2E+01	Yes	B
SS	MG/KG	COBALT	28	28	3.1E-01	4.1E-01	1.5E+00	2.0E+01	7.1E+00	1.8E+01	4.7E+02		Yes	B
SS	MG/KG	ENDRIN	28	1	3.4E-03	4.5E-03	4.6E-04	4.6E-04	4.6E-04		2.3E+00	1.0E+00	N/A	B
SS	MG/KG	ENDRIN KETONE	28	8	3.4E-03	4.5E-03	1.5E-03	3.3E-02	1.5E-02		2.3E+00	1.0E+00	N/A	B
SS	MG/KG	ETHYLBENZENE	28	4	9.0E-03	1.4E-02	9.0E-04	5.0E-03	2.5E-03		7.8E+02	1.3E+01	N/A	B
SS	MG/KG	FLUORANTHENE	28	7	6.9E-01	9.0E-01	1.1E+00	6.2E+00	3.4E+00	1.6E+00	3.1E+02	4.3E+03	Yes	B
SS	MG/KG	LEAD	28	28	4.5E-02	2.2E+00	2.8E+00	1.1E+02	3.0E+01	3.0E+01	4.0E+02		Yes	B
SS	MG/KG	METHOXYCHLOR	28	5	1.8E-02	2.0E-01	1.8E-03	6.8E-02	3.0E-02		3.9E+01	1.6E+02	N/A	B
SS	MG/KG	METHYL ETHYL KETONE (2	28	10	8.0E-03	1.4E-02	7.0E-03	4.3E-02	1.6E-02	2.0E-03	4.7E+03	1.7E+01	Yes	B
SS	MG/KG	METHYLENE CHLORIDE	28	2	8.0E-03	1.4E-02	9.0E-04	1.0E-03	9.5E-04		8.5E+01	2.0E-02	N/A	B
SS	MG/KG	p,p'-DDD	28	2	3.4E-03	4.5E-03	4.6E-03	6.5E-03	5.6E-03		2.7E+00		N/A	B
SS	MG/KG	p p'-DDE	28	14	3.4E-03	3.8E-02	3.9E-04	1.4E-01	2.5E-02		1.9E+00		N/A	B
SS	MG/KG	p,p'-DDT	28	12	3.4E-03	3.8E-02	6.5E-04	3.0E-01	5.4E-02		1.9E+00		N/A	B
SS	MG/KG	PHENANTHRENE	28	6	6.9E-01	9.0E-01	9.9E-01	2.6E+00	1.8E+00	6.1E-01	2.3E+02	2.5E+02	Yes	B
SS	MG/KG	PYRENE	28	7	6.9E-01	9.0E-01	8.9E-01	6.0E+00	3.0E+00	1.5E+00	2.3E+02	8.8E+02	Yes	B
SS	MG/KG	THALLIUM	28	19	8.4E-02	1.2E-01	1.5E-01	4.2E-01	3.1E-01		5.5E-01	7.0E-01	N/A	B
SS	MG/KG	TOLUENE	28	2	8.0E-03	1.4E-02	9.0E-04	1.2E-02	6.5E-03	2.0E-03	1.6E+03	1.2E+01	Yes	B
SS	MG/KG	Total Xylenes	28	5	9.0E-03	1.4E-02	3.0E-03	1.5E-02	8.4E-03	9.0E-03	1.6E+04	2.0E-01	Yes	B
SS	MG/KG	ALPHA-CHLORDANE	28	7	1.8E-03	2.3E-03	1.4E-03	6.7E-03	3.9E-03	2.9E-02	1.8E+00	1.0E+01	No	C
SS	MG/KG	ANTIMONY	28	3	1.0E+00	1.4E+00	1.6E+00	3.1E+00	2.1E+00	7.0E+00	3.1E+00	5.0E+00	No	C
SS	MG/KG	BERYLLIUM	28	28	1.0E-01	1.4E-01	1.3E-01	9.2E-01	5.1E-01	1.1E+00	1.6E+01	6.3E+01	No	C
SS	MG/KG	CADMIUM	28	27	1.0E-01	1.4E-01	1.6E-01	5.3E-01	2.9E-01	1.4E+00	7.8E+00	8.0E+00	No	C
SS	MG/KG	COPPER	28	28	1.0E-01	1.4E-01	2.7E+00	2.7E+01	1.5E+01	3.4E+01	3.1E+02		No	C
SS	MG/KG	GAMMA-CHLORDANE	28	1	1.8E-03	2.3E-03	3.0E-03	3.0E-03	3.0E-03	2.6E-02	1.8E+00	1.0E+01	No	C
SS	MG/KG	MANGANESE	28	28	1.0E-01	1.4E-01	3.2E+01	1.1E+03	4.9E+02	1.3E+03	1.1E+03		No	C
SS	MG/KG	MERCURY	30	21	2.0E-02	5.4E-02	3.6E-02	1.0E-01	6.5E-02	4.0E-01	2.3E+00	2.0E+00	No	C
SS	MG/KG	NICKEL	28	28	5.2E-01	6.8E-01	2.5E+00	2.6E+01	1.5E+01	3.0E+01	1.6E+02	1.3E+02	No	C
SS	MG/KG	SELENIUM	28	1	8.8E-02	5.4E-01	5.5E-01	5.5E-01	5.5E-01	8.0E-01	3.9E+01	5.0E+00	No	C
SS	MG/KG	SILVER	28	1	4.2E-01	5.4E-01	5.2E-01	5.2E-01	5.2E-01	2.0E+00	3.9E+01	3.4E+01	No	C
SS	MG/KG	ZINC	28	28	1.0E-01	1.4E-01	4.3E+00	9.0E+01	5.4E+01	1.3E+02	2.3E+03	1.2E+04	No	C
SS	MG/KG	CALCIUM	28	28	1.9E+01	2.1E+02	8.1E+02	1.6E+05	2.0E+04	5.8E+03			Yes	E
SS	MG/KG	IRON	28	28	1.0E+00	1.4E+00	6.4E+03	3.6E+04	2.1E+04	3.7E+04	2.3E+03		No	E
SS	MG/KG	MAGNESIUM	28	28	3.1E+00	4.1E+00	8.5E+01	1.0E+04	2.7E+03	4.6E+03			Yes	E
SS	MG/KG	POTASSIUM	28	26	4.8E+01	6.3E+01	3.1E+02	4.8E+03	1.3E+03	1.8E+03			Yes	E
SS	MG/KG	SODIUM	28	19	2.1E+01	2.7E+01	2.9E+01	2.4E+03	2.2E+02				N/A	E

Note Data evaluated includes field duplicates and normal samples (0-2 feet)

A Exceeds Criteria
B Does not exceed Criteria
C Does not exceed Background
D No Criteria available & exceeds Background; or no Criteria or Background available
E Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G Chemical is a member of a chemical class which contains other COPCs

SS = surface soil sample
MG/KG = milligrams per kilogram
COPC = Chemical of Potential Concern

Table 13-2

Constituents of Potential Concern in Stockpile Area—Subsurface Soil

Rev 0 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Subsurface Soil (Leachability)	COPC?	COPC/ BASIS
SB	MG/KG	ALUMINUM	9	9	1	1	4240	25100	11649	21829		N/A	D
SB	MG/KG	COPPER	9	9	0 1	0 1	4	37	16	33		N/A	D
SB	MG/KG	MANGANESE	9	9	0 1	0 1	16	1610	641	1540		N/A	D
SB	MG/KG	ARSENIC	9	9	0 5	0 5	0 8	19	9	17	29	No	H
SB	MG/KG	CHROMIUM, TOTAL	9	9	0 2	0 3	9	21	14	26	38	No	H
SB	MG/KG	VANADIUM	9	9	0 2	0 3	18	51	31	51	6000	No	H
SB	MG/KG	METHYLENE	15	2	1 2E-02	3 4E-02	2 0E-03	3.0E-03	2 5E-03		2 0E-02	No	B
SB	MG/KG	THALLIUM	9	7	9 9E-02	1 2E-01	1 4E-01	4 8E-01	3 0E-01		7 0E-01	No	B
SB	MG/KG	TOLUENE	15	1	1 2E-02	3 4E-02	3 0E-03	3 0E-03	3 0E-03		1 2E+01	No	B
SB	MG/KG	Total Xylenes	15	3	1 2E-02	3 4E-02	2 0E-03	1 4E-02	6 7E-03	2 0E-03	2 0E-01	No	B
SB	MG/KG	BARIUM	9	9	1 1E-01	1 3E-01	6 8E+00	2 5E+02	1 1E+02	3 0E+02	1 6E+03	No	C
SB	MG/KG	BERYLLIUM	9	9	1 1E-01	1 3E-01	2.0E-01	1 1E+00	5 6E-01	1 2E+00	6 3E+01	No	C
SB	MG/KG	CADMIUM	9	9	1 1E-01	1 3E-01	2 8E-01	8 9E-01	5 4E-01	1 4E+00	8 0E+00	No	C
SB	MG/KG	COBALT	9	9	3 4E-01	3 9E-01	8 4E-01	1 6E+01	8 1E+00	2 0E+01		No	C
SB	MG/KG	LEAD	9	9	2 3E-01	2 6E-01	5 7E+00	2 0E+01	1 2E+01	2 4E+01		No	C
SB	MG/KG	MERCURY	9	1	4 0E-02	5 0E-02	6 0E-02	6 0E-02	6 0E-02	2 0E-01	2 0E+00	No	C
SB	MG/KG	NICKEL	9	9	5 7E-01	6 4E-01	2 0E+00	3 5E+01	1 7E+01	3 7E+01	1 3E+02	No	C
SB	MG/KG	ZINC	9	9	1 1E-01	1 3E-01	3 9E+00	1 1E+02	4 5E+01	1 1E+02	1 2E+04	No	C
SB	MG/KG	CALCIUM	9	9	2 1E+01	2 3E+01	5 3E+02	1 8E+03	1 2E+03	2 4E+03		No	E
SB	MG/KG	IRON	9	9	1 1E+00	1 3E+00	1 3E+04	4 0E+04	2 1E+04	3 8E+04		N/A	E
SB	MG/KG	MAGNESIUM	9	9	3 4E+00	3 9E+00	2 3E+02	4 7E+03	2 2E+03	4 9E+03		No	E
SB	MG/KG	POTASSIUM	9	8	5 3E+01	5 9E+01	1 9E+02	1 9E+03	8 9E+02	1 8E+03		N/A	E
SB	MG/KG	SODIUM	9	9	2.3E+01	2.6E+01	2.4E+01	1.3E+02	6.5E+01			N/A	E

Note Data evaluated includes field duplicates and normal samples (2 feet and below)

A Exceeds Criteria
B Does not exceed Criteria
C Does not exceed Background
D No Criteria available & exceeds Background, or no Criteria or Background available
E Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G Chemical is a member of a chemical class which contains other COPCs
H Chemical is a surface soil COPC

SB = Subsurface soil sample
MG/KG = milligrams per kilogram
COPC = Chemical of Potential Concern

TABLE 13-3
Summary of Exposure Pathways to be Quantified at Stockpile Area
Rev 0 Memphis Depot Main Installation RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Use			
On-site Maintenance Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils.	Yes	Occasional maintenance work is assumed to involve a worker spending time in the contaminated soil.
Future Land Use			
On-site Industrial Worker	Incidental ingestion, dermal contact, and inhalation from the surface soils and from groundwater.	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
On-site Utility Worker	Incidental ingestion, dermal contact, and dust inhalation from the subsurface soils.	Yes	A hypothetical future utility worker installing or maintaining underground utilities is assumed to be exposed to contaminated subsurface soil. This should be evaluated as part of the surrogate site exposure unit, however no subsurface data exists there

Table 13-4

Exposure Point Concentrations for Stockpile Area Surface Soil

Rev 0 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL LOG	UCL NORMAL	EPC
MG/KG	ALUMINUM	26	26	19237	52600	26382	22878	26382
MG/KG	ARSENIC	26	26	11	26	15	13	13
MG/KG	BENZO(a)ANTHRACENE	26	5	0.7	3	0.8	0.9	0 8
MG/KG	BENZO(a)PYRENE	26	5	0 7	4	0 9	1	0.9
MG/KG	BENZO(b)FLUORANTHENE	26	6	1	6	1	1	1
MG/KG	CHROMIUM, TOTAL	28	28	19	56	22	22	22
MG/KG	DIBENZ(a,h)ANTHRACENE	26	3	0.4	1	0 5	0 5	0 5
MG/KG	DIELDRIN	26	14	0 02	0.1	0.03	0 02	0 03
MG/KG	INDENO(1,2,3-c,d)PYRENE	26	5	0 7	4	0 8	1	0 8
MG/KG	VANADIUM	26	26	31	97	37	36	37
MG/KG	CHRYSENE	26	5	0 9	5	1	1	1

UCL = Upper confidence limit

EPC = Exposure Point Concentration

MG/KG = milligrams per kilogram

Note EPC is referred to as RME in Appendix tables

Table 13-5

Exposure Point Concentrations for Stockpile Area Soil Column

Rev 0 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL LOG	UCL NORMAL	EPC
MG/KG	ALUMINUM	35	35	17286	52600	22381	20256	22381
MG/KG	COPPER	35	35	15	37	19	17	17
MG/KG	MANGANESE	35	35	497	1610	981	601	601
MG/KG	ARSENIC	35	35	11	26	15	12	12
MG/KG	CHROMIUM,	37	37	18	56	20	20	20
MG/KG	VANADIUM	35	35	31	97	36	35	36

UCL = Upper confidence limit

EPC = Exposure Point Concentration

MG/KG = milligrams per kilogram

Table 13-6
Toxicity Factors for Surface and Subsurface Soil - Stockpile Area
Rev 0 Memphis Depot Dunn Field RI

Name	Weight-of-Evidence Class	Oral SF kg-day/mg	Inhal SF kg-day/mg	C Oral RfD mg/kg-day	C Inhal RfD mg/kg-day
Aluminum				1.00E+00	1.00E+00
Arsenic	A	1.50E+00	1.51E+01	3.00E-04	
Benzo(a)anthracene	B2	7.30E-01	3.10E-01		
Benzo(a)pyrene	B2	7.30E+00	3.10E+00		
Benzo(b)fluoranthene	B2	7.30E-01	3.10E-01		
Chromium (total)	A		4.20E+01	3.00E-03	2.86E-05
Chrysene	B2	7.30E-03	3.10E-03		
Copper	D			3.70E-02	
Dibenz(a,h)anthracene	B2	7.30E+00	3.10E+00		
Dieldrin	B2	1.60E+01	1.60E+01	5.00E-05	
Indeno(1,2,3-c,d)pyrene	B2	7.30E-01	3.10E-01		
Manganese	D			1.40E-01	1.43E-05
Vanadium				7.00E-03	
1,1,2,2-Tetrachloroethane				6.00E-02	

SF = Slope factor
kg-day/mg = kilogram per day per milligram
mg/kg-day = milligram per kilogram per day
C = carcinogenic
RfD = reference dose
Inhal = inhalation

Table 13-7

Summary of Risks and Hazards - Stockpile Area

Rev. 0 Memphis Depot Dunn Field RI

Exposure Receptors	Ingestion	Dermal	Inhalation	Total ELCR	Ingestion	Dermal	Inhalation	Total HI	COPCs
Maintenance Worker									
Surface Soil	1.1E-06	3.4E-07	1.2E-08	**1E-06**	0.008	0.0007	0.00002	**0.009**	
Total Risks & Hazards				***1E-06***				***0.009***	***Arsenic*, benzo(a)pyrene****
Industrial Worker									
Surface Soil	5.6E-06	1.7E-06	6.0E-08	**7E-06**	0.04	0.004	0.0001	**0.04**	
Subsurface Soil	3.2E-06	3.8E-07	5.4E-08	**4E-06**	0.04	0.003	0.006	**0.05**	
Total Risks & Hazards				***7E-06***				***0.05***	***Arsenic, benzo(a)pyrene***
Utility Worker									
Subsurface Soil	3.1E-07	1.2E-07	5.2E-09	**4E-07**	0.004	0.001	0.0006	**0.005**	
Total Risks & Hazards				***4E-07***				***0.005***	***N/A***

* = individually these constituents do not exceed 1E-06, but accumulatively they contribute to this risk total

ELCR = Estimated Lifetime Cancer Risk

HI = Hazard Indices

COPCs = Chemicals of Potential Concern

Table 13-8

Constituents of Potential Concern in SSLFF Surface Soil

Rev 0 Memphis Depot Dunn Field RI

Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Surface Soil	Regulatory Criteria for Leachability	COPC1?	COPC/ BASIS
SS	MG/KG	ALUMINUM	2	2	N/A	N/A	23000	31300	27150	23810	7800		Yes	A
SS	MG/KG	ARSENIC	2	2	N/A	N/A	14	26	20	20	0 4	29	Yes	A

Note Data evaluated includes field duplicates and normal samples (0-2 feet)

A	Exceeds Cnteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Critena or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs
N/A	Not Applicable

SS = Surface soil sample
MG/KG = milligrams per kilogram
COPC = Chemical of Potential Concern

TABLE 13-9
Summary of Exposure Pathways to be Quantified at Surrogate Site SSLFF
Rev. 0 Memphis Depot Main Installation RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Use			
On-site Maintenance Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils.	No	Occasional maintenance work is assumed to involve a worker spending time in the contaminated soil
Future Land Use			
On-site Industrial Worker	Incidental ingestion, dermal contact, and dust inhalation from the surface soils	Yes	Hypothetical future reasonable maximum exposure scenario for future workers.
On-site Utility Worker	Incidental ingestion, dermal contact, and dust inhalation from soil column.	No	A hypothetical future utility worker installing or maintaining underground utilities is assumed to be exposed to contaminated subsurface soil. This would be evaluated if subsurface soil data was available
Hypothetical Future On-site Residential	Incidental ingestion, dermal contact, and dust inhalation from the surface soils.	Yes	Evaluated for comparison purposes only.

Table 13-10

Exposure Point Concentrations for SSLFF Surface Soil

Rev 0 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Arithmetic Mean Concentration	Maximum Detected Concentration	UCL LOG	UCL NORMAL	EPC
MG/KG	ALUMINUM	2	2	27150	31300	58076		31300
MG/KG	ARSENIC	2	2	20	26	194	56	26

UCL = Upper confidence limit

EPC = Exposure Point Concentration

MG/KG = milligrams per kilogram

Note EPC is referred to as RME in Appendix tables

Table 13-11

Summary of Risks and Hazards at SSLFF Soil

Rev. 0 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Ingestion	Dermal	Inhalation	Total ELCR	Ingestion	Dermal	Inhalation	Total HI	COPCs
Industrial Worker									
Surface Soil	6.7E-06	7.9E-07	2.0E-08	**8E-06**	0.06	0.005	0.00001	**0.06**	***Arsenic***
Residential Adult									
Surface Soil	6.4E-05	5.1E-07	8.6E-09	**6E-05**	0.1	0.0002	0.000001	**0.2**	***Arsenic***
Residential Child									
Surface Soil	N/A	N/A	N/A	**N/A**	1	0.02	0.000004	**2**	***Arsenic***

ELCR = Estimated Lifetime Cancer Risk

HI = Hazard Indices

COPCs= Chemicals of Potential Concern

Table 13-11A

Remedial Action Objectives for the Stockpile Area

Rev 2 Memphis Depot Dunn Field RI

Media	Land Use	Remedial Action Objectives (from RI)	General Response Actions
Surface Soil	Maintenance Worker	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Industrial Worker	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Residential Adult	Risks within acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
	Residential Child	Hazard index (HI) is greater than 1 0, for ingestion, dermal and inhalation exposures combined HI is primarily associated with Arsenic in soils which is similar to background concentrations (max = 26 mg/kg)	No Action
Soil Column	Utility Worker	Risks are below acceptable range of 1 in 10,000 to one million, and hazard index (HI) is less than 1 0, for ingestion, dermal and inhalation exposures combined	No Action
CC-2 Disposal Area		Section 12 describes the possible burial of 86,100 pounds of CC-2 (impregnite) in a 6- to 8-foot deep, 8-foot wide, and 40-foot long trench in the west-southwest portion of the Stockpile Area in 1947 This burial trench is suspected as being located adjacent/near to Site 24-B and was not directly investigated during the RI field activities due to the pending CWM removal action, which was completed in 2001	Document the location of this disposal area and determine the presence/absence of buried hazardous material Eliminate future unacceptable risk to groundwater from leaching and of direct contact with buried hazardous materials due to intrusive activities during future land use or site development

TABLE 13-12

Step 2 Surface Soil Screening Level Risk Calculations for the Stockpile Area

Rev. 0 Memphis Depot Dunn Field RI

Parameter Name	Frequency of Detection		Range of Detected Values				Surface Soil Screening Value^1 (mg/kg)	Hazard Quotient (based on Max. detect)	Retained as a COPC?
	Number Analyzed	Number Detected	Minimum (mg/kg)	Qual	Maximum (mg/kg)	Qual			
Inorganics									
ALUMINUM	28	28	2460		52600		50	1052	Yes
ANTIMONY	28	3	2		3		3 5	0 9	No
ARSENIC	28	28	1		26		10	3	Yes
BARIUM	28	28	22		297		165	2	Yes
BERYLLIUM	28	28	0.1		0 9		1 1	0 8	No
CADMIUM	28	27	0 2		0 5		1 6	0 3	No
CALCIUM	28	28	811		162000		NA	NA	Yes
CHROMIUM, TOTAL	30	30	7		56		0 4	139	Yes
COBALT	28	28	2		20		20	1 0	Yes
COPPER	28	28	3		27		40	0 7	No
IRON	28	28	6360		36400		200	182	Yes
LEAD	28	28	3		107		50	2	Yes
MAGNESIUM	28	28	85		10100		NA	NA	Yes
MANGANESE	28	28	32		1080		100	11	Yes
MERCURY	30	21	0 04		0 1		0.1	1 0	Yes
NICKEL	28	28	3		26		30	0 9	No
POTASSIUM	28	26	314		4810		NA	NA	Yes
SELENIUM	28	1	0 6		0 6		0 81	0 7	No
SILVER	28	1	0 5		0 5		2	0 3	No
SODIUM	28	19	29		2440		NA	NA	Yes
THALLIUM	28	19	0 2		0 4		1	0 4	No
VANADIUM	28	28	9		97		2	48	Yes
ZINC	28	28	4		90		50	2	Yes
Organics									
ACETONE	28	19	0 02		0.3		NA	NA	Yes
ALDRIN	28	1	0.002		0 002		0 003	0 6	No
ALPHA ENDOSULFAN	28	1	0 0003		0 0003		NA	NA	Yes
ALPHA-CHLORDANE	28	7	0 001		0 007		0 1	0 1	No
BENZENE	28	5	0.001		0 005		0 05	0 1	No
BENZO(a)ANTHRACENE	28	5	0.9		3		0 1	30	Yes
BENZO(a)PYRENE	28	5	0 9		4		0 1	38	Yes
BENZO(b)FLUORANTHENE	28	6	1		6		0 1	58	Yes
BENZO(g,h,i)PERYLENE	28	4	0 9		3		0 1	31	Yes

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TABLE 13-12

Step 2 Surface Soil Screening Level Risk Calculations for the Stockpile Area

Rev. 0 Memphis Depot Dunn Field RI

Parameter Name	Frequency of Detection		Range of Detected Values				Surface Soil Screening Value^1 (mg/kg)	Hazard Quotient (based on Max. detect)	Retained as a COPC?
	Number Analyzed	Number Detected	Minimum (mg/kg)	Qual	Maximum (mg/kg)	Qual			
BENZO(k)FLUORANTHENE	28	2	2		2		0.1	23	Yes
CARBON DISULFIDE	28	1	0.003		0.003		NA	NA	Yes
CHRYSENE	28	5	1		5		0.1	50	Yes
DIBENZ(a,h)ANTHRACENE	28	3	0.8		1		0.1	11	Yes
DIELDRIN	28	15	0.0008		0.1		0.0005	260	Yes
ENDRIN	28	1	0.0005		0.0005		0.001	0.5	No
ENDRIN KETONE	28	8	0.002		0.03		0.001	33	Yes
ETHYLBENZENE	28	4	0.0009		0.005		0.05	0.1	No
FLUORANTHENE	28	7	1		6		0.1	62	Yes
GAMMA-CHLORDANE	28	1	0.003		0.003		0.1	0.03	No
INDENO(1,2,3-c,d)PYRENE	28	5	0.8		4		0.1	36	Yes
METHOXYCHLOR	28	5	0.002		0.07		NA	NA	Yes
METHYL ETHYL KETONE (2-BUTANONE)	28	10	0.007		0.04		NA	NA	Yes
METHYLENE CHLORIDE	28	2	0.0009		0.001		0.1	0.01	No
p,p'-DDD	28	2	0.005		0.007		0.0025	3	Yes
p,p'-DDE	28	14	0.0004		0.1		0.0025	56	Yes
p,p'-DDT	28	12	0.0007		0.3		0.0025	120	Yes
PHENANTHRENE	28	6	1		3		0.1	26	Yes
PYRENE	28	7	0.9		6		0.1	60	Yes
TOLUENE	28	2	0.0009		0.01		0.05	0.2	No
Total Xylenes	28	5	0.003		0.02		NA	NA	Yes

1 = Memorandum, Ecological Risk Assessment at Military Bases Process Consideration, Timing, of Activities, and Inclusion of Stakeholders EPA Region 4, December 22, 1998.

mg/kg = milligram per kilogram

COPC = Chemical of Potential Concern

Qual = Qualifier

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TABLE 13-13
Step 3 Refinement of Surface Soil Contaminants of Concern for the Stockpile Area
Rev 0 Memphis Depot Dunn Field RI

COPCs	COPC Concentrations (mg/kg)			Comparison Criteria (mg/kg)				Hazard Quotients				Background Comparisons		Frequency of Detection (%)
	Maximum	Averagea	Background	Primary Soil Screening Criterion	Basis	Secondary Soil Screening Criterion	Basis	Max. Compared to Primary	Avg. Compared to Primary	Max. Compared to Secondary	Avg Compared to Secondary	Maximum Exceeds Background	Average Exceeds Background	
Inorganics														
ALUMINUM	52600	19256	23810	50	*2*	600	*3*	1052	385	88	32	Yes	No	100%
ARSENIC	26	11	20	10	*2*	29	*4*	3	1	0 9	0 4	Yes	No	100%
BARIUM	297	117	234	165	*6*	500	*2*	2	0 7	0 6	0 2	Yes	No	100%
CHROMIUM, TOTAL	56	19	25	0 4	*1*	1	*2*	139	48	56	19	Yes	No	100%
COBALT	20	7	18	20	*1,2,4,5*			1	0 4			Yes	No	100%
IRON	36400	20528	37040	200	*3*			182	103			No	No	100%
LEAD	107	30	30	50	*2,6*	500	*1*	2	0 6	0 2	0 1	Yes	No	100%
MANGANESE	1080	486	1304	100	*3*	500	*2*	11	5	2	1	No	No	100%
MERCURY	0 1	0 06	0 4	0 1	*1*	0 3	*2,4*	1	0 6	0 3	0 2	No	No	70%
VANADIUM	97	31	48	2	*2*	20	*3*	48	16	5	2	Yes	No	100%
ZINC	90	54	126	50	*2*	100	*3*	2	1	0 9	0 5	No	No	100%
Organics														
ACETONE	0 3	0 2												68%
ALPHA ENDOSULFAN	0 0003	0 0003	NA											4%
BENZO(a)ANTHRACENE	3	2	0 7	0 1	*6*	1	*7*	30	18	3	2	Yes	Yes	18%
BENZO(a)PYRENE	4	2	1	0 1	*6*	1	*7*	38	22	4	2	Yes	Yes	18%
BENZO(b)FLUORANTHENE	6	3	0 9	0 1	*6*	1	*7*	58	29	6	3	Yes	Yes	21%
BENZO(g,h,i)PERYLENE	3	2	0 8	0 1	*6*	1	*7*	31	20	3	2	Yes	Yes	14%
BENZO(k)FLUORANTHENE	2	2	0 8	0 1	*6*	1	*7*	23	21	2	2	Yes	Yes	7%
CARBON DISULFIDE	0 003	0 003	0 002									Yes	Yes	4%
CHRYSENE	5	3	0 9	0 1	*6*	1	*7*	50	28	5	2 8	Yes	Yes	18%
DIBENZ(a,h)ANTHRACENE	1	0 9	0 3	0 1	*6*	1	*7*	11	9	1	0 9	Yes	Yes	11%
DIELDRIN	0 1	0 03	0 09	0 0005	*4*			260	52			Yes	No	54%
ENDRIN KETONE	0 03	0 02		0 001	*4*			33	15			No	No	29%
FLUORANTHENE	6	3	2	0 1	*6*	10	*7*	62	34	0 6	0 3	Yes	Yes	25%
INDENO(1,2,3-c,d)PYRENE	4	2	0 7	0 1	*6*	1	*7*	36	20	4	2	Yes	Yes	18%
METHOXYCHLOR	0 07	0 03												18%
METHYL ETHYL KETONE (2-BUTANONE)	0 04	0 02	0 002									Yes	Yes	36%
p,p'-DDD	0 007	0 006		0 003	*4*	4	*5*	3	2	0 002	0 001	No	No	7%
p,p'-DDE	0.1	0 03		0 003	*4*	4	*5*	56	10	0 04	0 006	No	No	50%
p,p'-DDT	0 3	0 05		0 003	*4*	4	*5*	120	22	0 08	0 01	No	No	43%
PHENANTHRENE	3	2	0 6	0 1	*6*	5	*7*	26	18	1	0 4	Yes	Yes	21%
PYRENE	6	3	2	0 1	*6*	10	*7*	60	30	0 6	0 3	Yes	Yes	25%
Total Xylenes	0 02	0 008	0 009	0 05	*4,6*	25	*5*	0 3	0 2	0 0006	0 0003	Yes	No	18%

Notes
a Average of all sample data (includes non-detects)
Ca, Mg, K, Na were detected, however these parameters were not evaluated since they are commonly occurring elements
1 Efroymson, R A et al 1997a Oak Ridge National Laboratory, toxicological benchmarks for earthworms
2 Efroymson, R A et al 1997b Oak Ridge National Laboratory, toxicological benchmarks for plants
3 Efroymson, R A et al 1997a Oak Ridge National Laboratory, toxicological benchmarks for microorganisms
4 Ministry of Housing, Spatial Planning and Environment, 1994 optimum soil quality standards
5 Beyer, W N 1990 US Fish and Wildlife Service Dutch background
6 Crommentuijn, T et al, 1997 RIVM Report No 601501002
mg/kg = milligram per kilogram
COPC = Chemical of Potential Concern

Figures

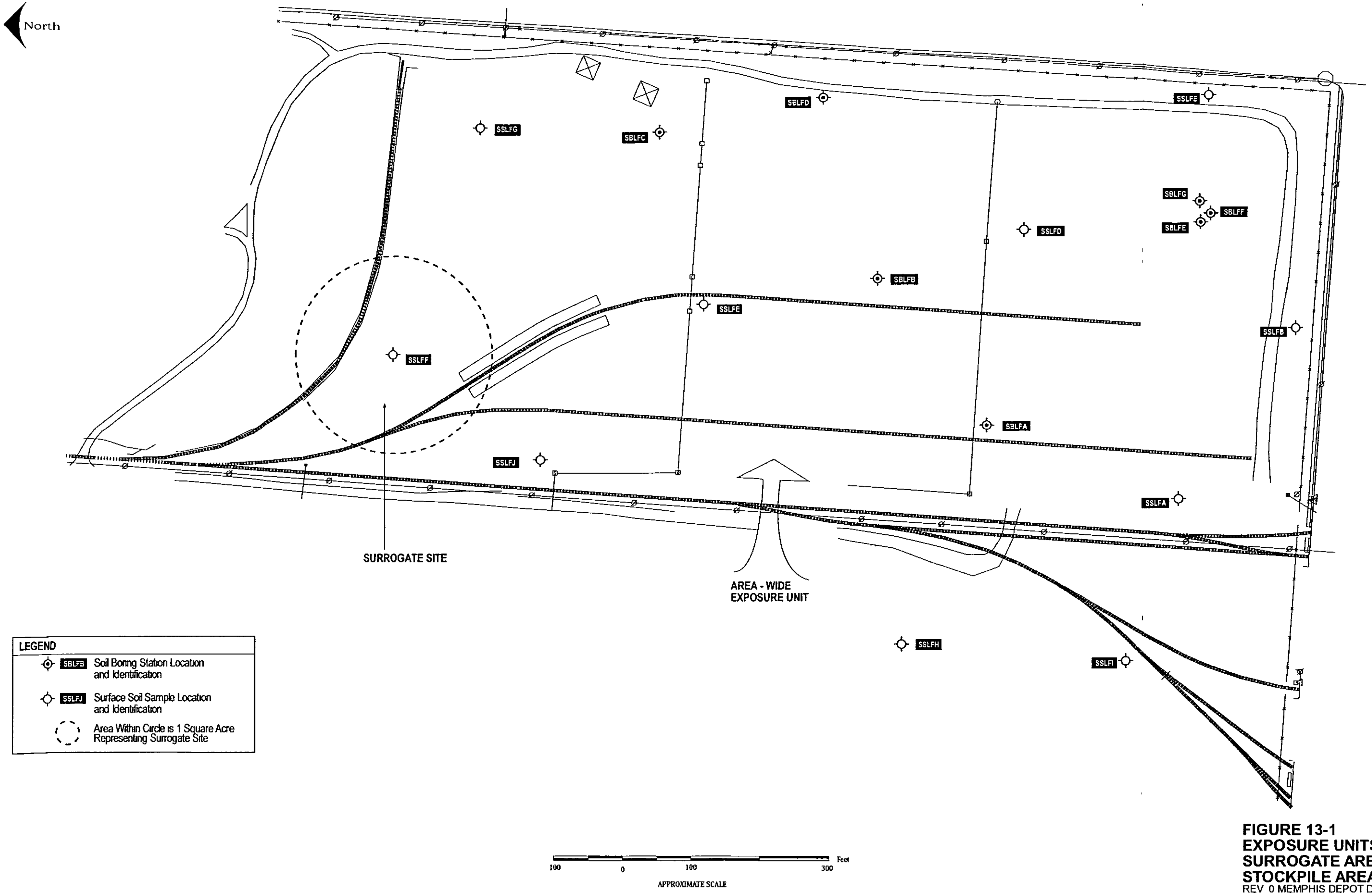
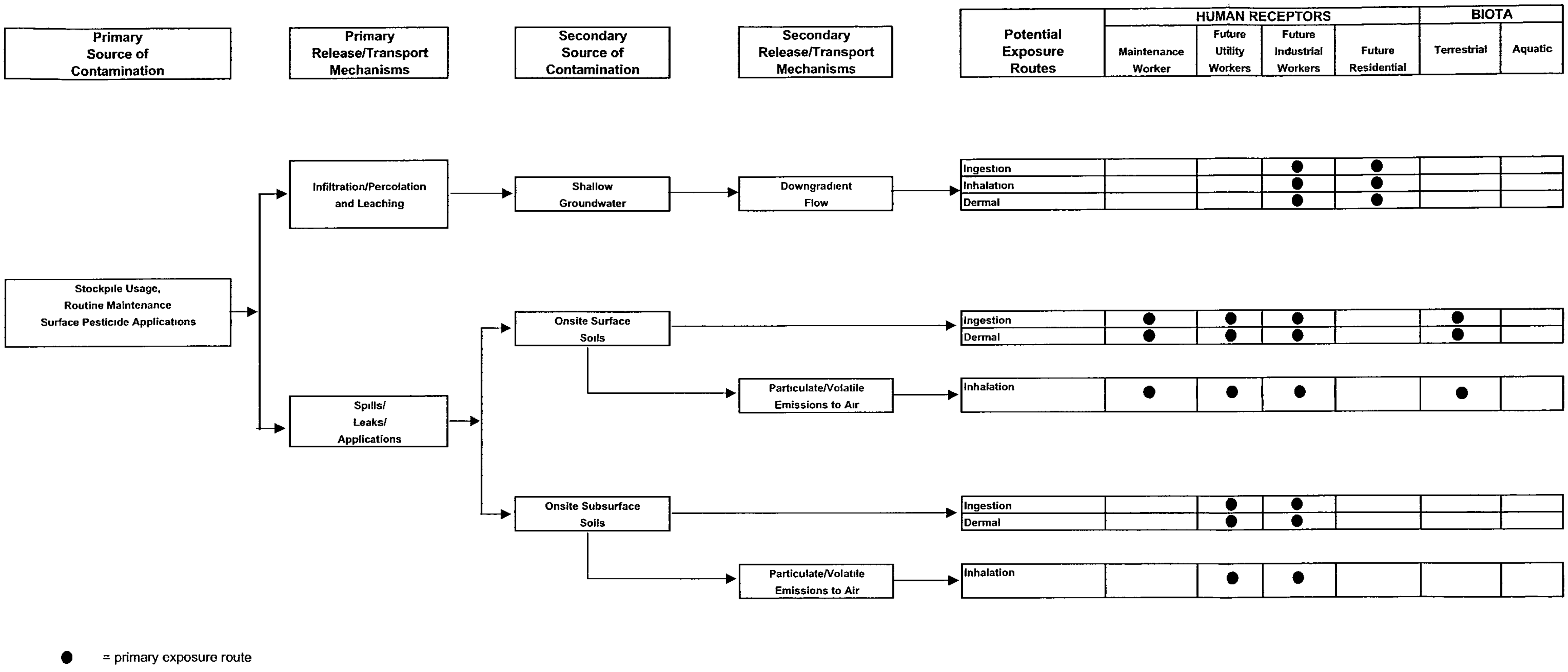


FIGURE 13-1
EXPOSURE UNITS
SURROGATE AREA
STOCKPILE AREA
REV 0 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

E072001017ATL \ Dunn116 FH8

Figure 13-2
Conceptual Site Model for Potential Human and Ecological Exposures - Stockpile Area
Rev 0 Memphis Depot Dunn Field RI



Secondary Source	Potential Exposure Routes	HUMAN RECEPTORS Maintenance Worker	Future Utility Workers	Future Industrial Workers	Future Residential	BIOTA Terrestrial	Aquatic
Shallow Groundwater (Downgradient Flow)	Ingestion			●	●		
	Inhalation			●	●		
	Dermal			●	●		
Onsite Surface Soils	Ingestion	●	●	●		●	
	Dermal	●	●	●		●	
Onsite Surface Soils (Particulate/Volatile Emissions to Air)	Inhalation	●	●	●		●	
Onsite Subsurface Soils	Ingestion		●	●			
	Dermal		●	●			
Onsite Subsurface Soils (Particulate/Volatile Emissions to Air)	Inhalation		●	●			

● = primary exposure route

Figure 13-3
Total Excess Lifetime Cancer Risks for Exposure to Soils in Stockpile Area
Rev. 0 Memphis Depot Dunn Field RI

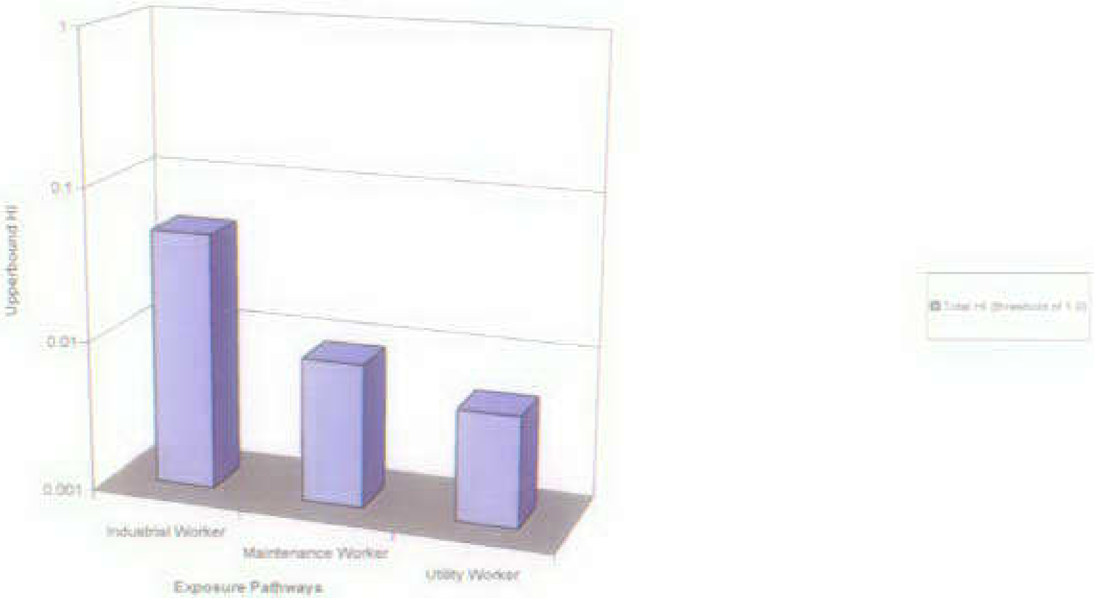


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Figure 13-4
Total Hazard Indices for Exposure to Soils in Stockpile Area
Rev. 0 Memphis Depot Dunn Field RI

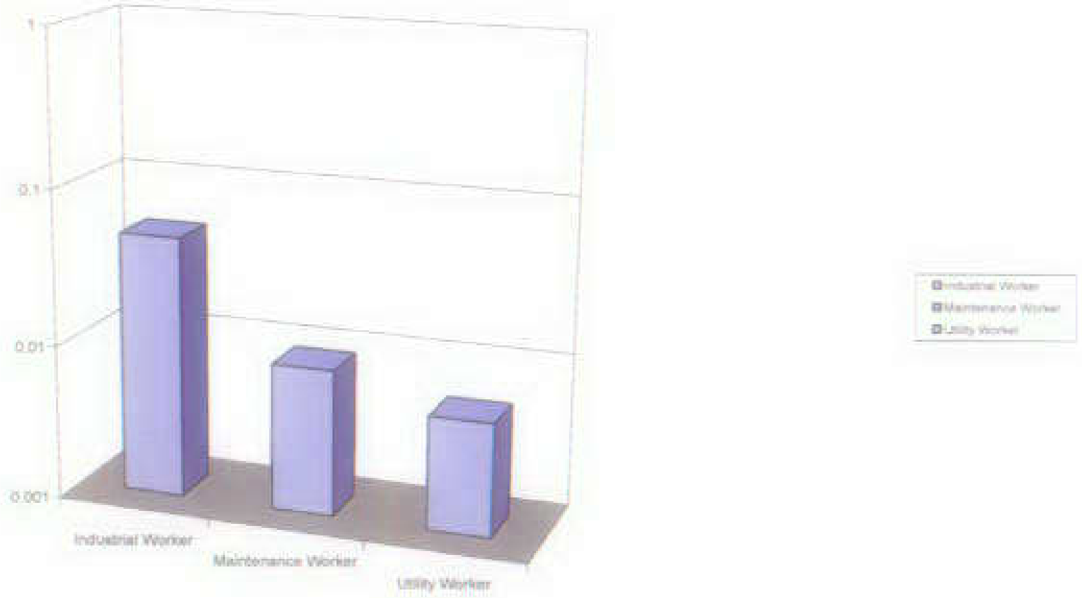


Figure 13-6
Total Excess Lifetime Cancer Risks for Exposure to Soils in Surrogate Site SSLFF
Rev. 0 Memphis Depot Dunn Field RI

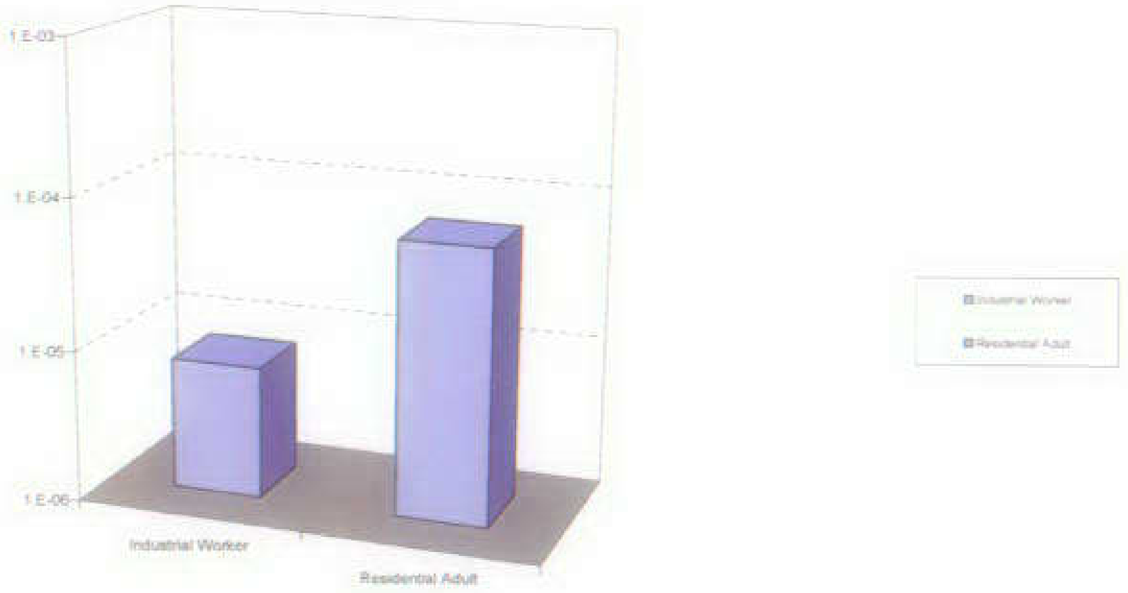
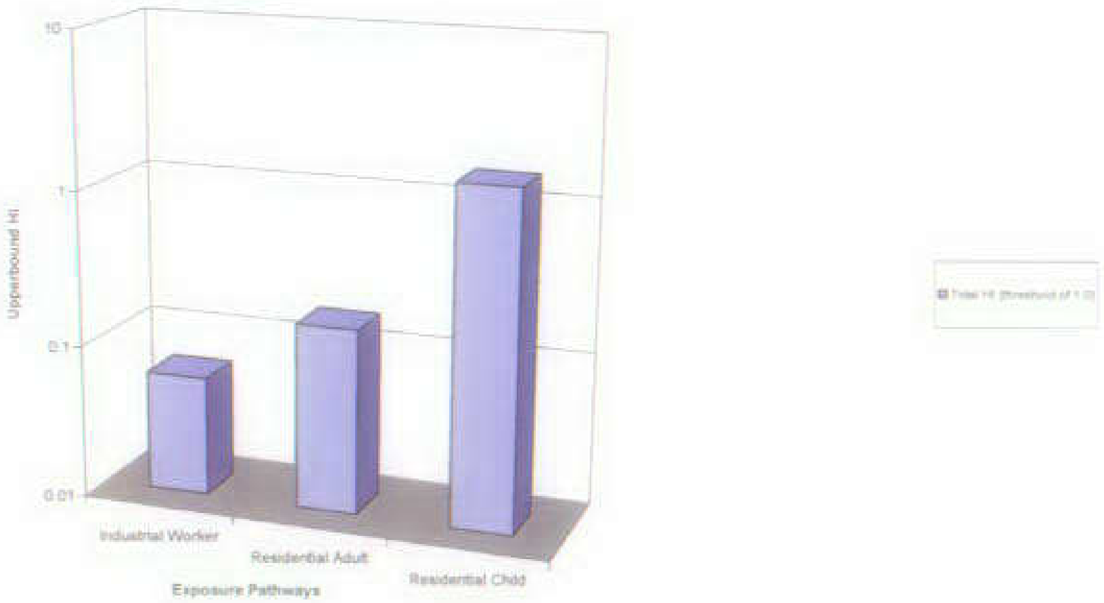


Figure 13-6
Total Hazard Indices Risks for Exposure to Soils in Surrogate Site SSLFF
Rev. 0 Memphis Depot Dunn Field RI



TAB

Section 14

14.0 Nature and Extent of Contamination in Groundwater

The nature and extent of contamination in groundwater underlying Dunn Field and areas to the west were assessed based on an evaluation of chemical data obtained from groundwater samples collected during 16 sampling events from January 1996 through February 2001 As shown in Table 14-1, groundwater samples were collected and analyzed during this time period for seven major types of contaminant parameters, including explosives, herbicides, metals (total), pesticides, PCBs, SVOCs, and VOCs. Groundwater samples were also analyzed for CWM breakdown products, including thiodiglycol, 1,4-oxathiane, and 1,4-dithiane. In addition, groundwater samples were collected and analyzed for various geochemical and geotechnical parameters, including tritium and gases, such as oxygen and hydrogen. Of all these parameters, VOCs, SVOCs, and total metals were the most frequently detected analytical constituents in groundwater samples

Groundwater samples were collected from monitoring wells installed by Law Environmental during initial RI activities at the Depot (Law Environmental, 1990a), monitoring wells installed by Parsons during EE/CA activities at Dunn Field (Parsons ES, 1999), and monitoring wells and piezometers installed by CH2M HILL. In addition, groundwater is currently being sampled on a semi-annual basis by Jacobs Engineering, Inc., as part of the Interim Remedial Action for Dunn Field. Only validated analytical data from monitoring wells and other groundwater sampling locations identified as related to Dunn Field are reported in this document. This includes data that have been obtained as a result of sampling and analysis of recovery wells in the Dunn Field groundwater extraction system

Groundwater underlying Dunn Field has been affected by past operations and has been contaminated by inorganic and organic materials. Table 14-2 presents the parameters that have been detected at least once within samples collected from groundwater associated with Dunn Field. Appendix B presents the raw analytical data with comprehensive tables of the laboratory analysis The nature and extent of chemical groups in Dunn Field groundwater are discussed in the following sections.

14.1 VOCs in Groundwater

As shown in Table 14-3, 30 VOCs have been detected in groundwater samples collected from February 1996 to February 2001. Of these 30 compounds, 9 chlorinated hydrocarbon compounds have been frequently detected in the 444 samples analyzed over the 5-year sampling period, including 1,1,1,2-PCA, CCl4, 1,1,2-TCA, chloroform, PCE, cis- and trans-1,2-DCE, total 1,2-DCE, and TCE. In addition, other chlorinated hydrocarbon compounds, including 1,1,1-TCA, 1,1-DCA, 1,1-DCE, and 1,2-DCA, have been detected at less frequent intervals. Seventeen other VOCs, including the aromatic hydrocarbon compounds benzene, toluene, ethylbenzene, and xylene, were detected at very low intervals. Concentrations of these VOCs have varied within all samples. The minimum and maximum values of all VOCs detected in groundwater samples are reported in Table 14-3

In the following subsections, figures showing groundwater contamination distribution from 1996 to 2001 are, in large part, a function of the number of monitoring wells available to be sampled at a specific time As new monitoring wells were installed (mostly after 1998), additional chemical data was collected which provided for a better understanding of the extent of the dissolved contaminant plumes. As the figures progress chronologically from 1996 to 2001 and results from new sample locations are added, changes in the geometries of the plume do not necessarily mean that offsite contamination has undergone significant migration during this period of study

14.1.1 Extent of Persistent VOCs

Temporal and spatial occurrence of VOCs has varied throughout the sampling period. Figures 14-1 through 14-40 present VOC concentration isopleth maps for PCE, TCE, total 1,2-DCE, 1,1-DCE, 1,1,2,2-PCA, CCL4, chloroform, and 1,1,2-TCA for sampling events in January/February 1996, October 1998, November 1999, November 2000, and January/February 2001. Each of the maps depicts typical spatial variations that VOC plumes have shown over time. A PCE plume (as depicted in Figures 14-1 through 14-5) was detected in groundwater underlying the north to northwestern portion of Dunn Field from 1996 through 1998. The PCE appears to have been centered around wells MW-04, MW-10, and MW-31 during that time, with concentrations as high as 120 µg/L in MW-04. Figures 14-3 and 14-4 also show a small outlier PCE plume underlying the southwest-central portion of Dunn Field. Figures 14-4 and 14-5 reveal that after 1999, there was a west-central component to the PCE plume, perhaps as a result of the commencement of groundwater extraction along the western perimeter of Dunn Field Figures 14-1 through 14-5 also display an offsite component to the PCE plume from 1996 to 2001. The offsite component has, as shown on Figures 14-1 through 14-3, been typically connected to the Northern Plume. However, after 1999, the PCE plume appears to have a greater offsite presence directly to the west-northwest of Dunn Field. The offsite PCE plume contaminant concentration has varied from 32.5 µg/L in MW-70 in November 2000 to 34 µg/L in MW-79 in January/February 2001 (Figures 14-4 and 14-5).

The detection of TCE in groundwater has shown a very similar spatial pattern to that of PCE, as shown in Figures 14-6 through 14-10, albeit with higher concentrations of TCE. From 1996 to 2001, the TCE plume was detected along the northern, northwestern, and west-central boundary of Dunn Field along with an offsite component to the plume. Concentrations of TCE have varied over time with the highest concentrations being detected in the west to northwestern portion of the plume, specifically at MW-6, MW-10, MW-12, MW-15, MW-31, MW-35, MW-70, MW-73, and MW-77 The northern portion of the plume has typically centered around offsite monitoring well MW-51, suggesting an offsite source, with the highest concentration being reported in November 2000 at 13 2 µg/L. For the data presented in Figures 14-6 through 14-10, the highest single concentration was reported in the November 2000 data in a sample from MW-70 (immediately adjacent to the western perimeter of Dunn Field) at 4,040 µg/L. The highest detection of TCE recorded to date was 11,700 µg/L from a sample collected from MW-70 in February 2000). The aqueous solubility of TCE is 1,100,000 µg/L at 25°C (Fetter, 1993). When concentrations of DNAPL chemicals (e.g., TCE) in groundwater are greater than 1% of the aqueous solubility limit, then the presence of DNAPL is inferred (EPA, 1996) The highest detected concentration of TCE in MW-70 is 1.06% of the aqueous solubility, which suggests the presence of DNAPL. Although the extraction system has been operating at Dunn Field since late 1998 and appears to be effectively removing TCE from the aquifer, there does appear to be a northwestern migration of the TCE plume west of the extraction system, as revealed by the detection of TCE in MW-79 at 26 µg/L in January/February 2001. Also, as depicted in Figures 14-6, 14-8, and 14-9, the TCE plume does appear to have a southerly component as well Concentrations of TCE, albeit close to detection limits, were detected in MW-34 and MW-56 (1.48 and 1.59 µg/L, respectively, in November 2000 samples).

Figures 14-11 through 14-15 depict the location and concentration of a 1,2-DCE plume from 1996 to 2001. The plume's configuration is very similar to that of the TCE plume except without the northern component. The plume has also appeared to decrease in size through the sampling period, perhaps as a result of the active groundwater extraction system at Dunn Field. The plume appears to have been centered around monitoring well MW-06 and offsite well MW-31, but in November 2000 and January/February 2001 the plume appears to have shifted towards monitoring wells MW-70 and MW-73. Highest concentrations in the plume have varied onsite from 270 µg/L in MW-06 in October 1998 to 304 µg/L in MW-73 in February 2001. Based on Figures 14-11 though 14-15, there appears to be an offsite component to the plume that has existed since the sampling period started. The offsite portion is typically oriented northwest of Dunn Field while being centered around either MW-31 (this portion of the plume has since been reduced) or MW-54, MW-70, and MW-76. Concentrations in the offsite portion of the plume have been detected as high as 304.3 µg/L in MW-70, which is located immediately adjacent to the western perimeter of Dunn Field.

A 1,1-DCE contaminant plume has also been detected in groundwater samples from the site; however, this compound is typically detected in monitoring wells along the northern perimeter of Dunn Field or offsite to the north and northwest of Dunn Field. As shown in Figures 14-16 and 14-17, 1,1-DCE was typically found in northern perimeter wells MW-07, MW-08, MW-10, and MW-29 at concentrations as high as 54 µg/L. In addition, the compound was detected in offsite wells MW-31 and MW-51 and piezometer PZ-02, with the highest offsite concentration being recorded in a sample from PZ02 at 170 µg/L. PZ-02 is located upgradient of Dunn Field However, based on Figure 14-18, the concentrations of 1,1-DCE appeared to have decreased, possibly as a result of the active groundwater extraction system at Dunn Field. Conversely, Figure 14-19 reveals that the concentrations in MW-31 and MW-51 increased from November 1999 to November 2000. There was no sampling in onsite monitoring wells from November 1999 to February 2001 to indicate whether the increase in 1,1-DCE concentrations in the offsite portion of the plume was a result of source material from Dunn Field or from another offsite source. Figure 14-20 indicates that the 1,1-DCE plume has also been detected in samples from MW-79 at 48 µg/L to the northwest of Dunn Field.

Intermixed with the TCE and 1,2-DCE plume is a plume of 1,1,2,2-PCA. The plume of 1,1,2,2-PCA, as shown in Figures 14-21 and 14-22, was located along the western perimeter of Dunn Field with on- and offsite components. Concentrations in January/February 1996 were reported as high as 420 µg/L in offsite well MW-31 and 200 µg/L in onsite well MW-35. However, as shown in Figure 14-22, concentrations in these wells had decreased significantly by October 1998, possibly as a result of the active groundwater extraction system at Dunn Field In fact, the plume apparently shifted to the south towards MW-06 and MW-15, as concentrations in these wells subsequently increased (see Figures 14-22 through 14-24) Also, offsite detection of the plume shifted from MW-31 to MW-54, where levels of 1,1,2,2-PCA have increased (Figures 14-23 and 14-24). Figures 14-24 and 14-25 depict the detection of significant concentrations of 1,1,2,2-PCA in wells MW-70, MW-73, and MW-75 (3,370, 33,000, and 2,900 µg/L, respectively).

For all data, the highest single concentration was reported in the January/February 2001 data in a sample from MW-73 at 33,000 µg/L. The aqueous solubility of 1,1,2,2-PCA is 29,000 µg/L at 25°C (Fetter, 1993). When concentrations of DNAPL chemicals (e.g., 1,1,2,2-PCA) in groundwater are greater than 1% of the aqueous solubility limit, then the presence of DNAPL is inferred (EPA, 1996). The detected concentrations of 1,1,2,2-PCA in MW-73 are 1.14% of the aqueous solubility, which suggests the presence of DNAPL. Since the detection of 1,1,2,2-PCA at such high levels occurred so recently and no additional disposal activities have occurred at the site, it is nearly certain that the 1,1,2,2-PCA existed in groundwater at high concentrations and was not detected until these monitoring wells were installed in 1999 and 2000.

CCl4 has been detected consistently in the south to central portion of Dunn Field, specifically in onsite wells MW-06, MW-15, and MW-57 and offsite wells MW-32 and MW-54 (Figures 14-26 through 14-30). The extent or shape of the plume in Figure 14-30 is an artifact of prior sampling events. CCl4 has also been detected in offsite well MW-31, northwest of Dunn Field. Concentrations of CCl4 were detected onsite as high as 48.3 µg/L in samples collected in November 2000 in well MW-57 and offsite at 61 3 µg/L in monitoring well MW-32 during the same sampling event.

Chloroform in groundwater samples (Figures 14-31 through 14-35) defines a plume that has a configuration very similar to the CCl4 plume. This similar configuration could be the result of the degradation of CCl4 into chloroform The chloroform plume appears to have a source near MW-15 and trends northwest away from the site perimeter, with detection in monitoring wells MW-32 and MW-54. Chloroform was also found in monitoring wells MW-10 and MW-31 in the northwestern portion of the site. Concentrations of chloroform during the sampling period were detected as high as 1,020 µg/L in well MW-15 (Figure 14-33). Based on analytical data collected in November 1999 and November 2000, the offsite concentrations of chloroform are increasing. The highest concentration detected offsite for the sampling period is 605 µg/L in monitoring well MW-71 in November 2000. During that same sampling period, chloroform was detected in a sample from MW-56, which is in the southern portion of Dunn Field, at 39.4 µg/L

Intermixed with the plumes of CCl4, chloroform, and 1,2-DCE is a plume of 1,1,2-TCA, as shown in Figures 14-36 through 14-40. Samples analyzed in 1996 indicated the presence of 1,1,2-TCA in onsite and offsite groundwater adjacent to MW-06 and MW-31. The concentration was as high as 11J µg/L Sampling events occurring in 1998 and 1999 did not detect 1,1,2-TCA in groundwater at MW-31 but through inference from previous and subsequent data, the plume appears to have remained around MW-06. In the November 2000 sampling event, 1,1,2-TCA was detected in MW-70, indicating that another, potentially separate, 1,1,2-TCA plume was present around MW-70 and that both plumes were located along the western side of Dunn Field (see Figure 14-39). Based on samples analyzed from the January 2001 sampling event, the overall plume configuration did not vary significantly but did have a stronger onsite component centered around MW-73. It should be noted that 1,1,2-TCA is a reductive dechlorination product of 1,1,2,2-PCA and the highest concentration of 1,1,2,2-PCA was found in MW-73 (see below).

In summary, there appears to be three major VOC plumes in the groundwater underlying Dunn Field, a northern, a west-northwest plume, and west-southwest plume, with much mixing and intermingling of the plumes, as expected from influence by the active groundwater extraction system, natural groundwater flow, and degradation processes. As stated in the previous paragraphs, all of the plumes have on- and offsite components. The plume along the northern boundary of the site appears to be composed of PCE, TCE, and 1,1-DCE. Since TCE and 1,1-DCE are both reductive dechlorination products of PCE, the contaminant plumes may be a result of the breakdown of PCE in the aquifer. However, since the PCE, TCE, and 1,1-DCE appear in monitoring well MW-51 and piezometer PZ-02, which are upgradient to Dunn Field, there appears to be another source of these contaminants north to northeast of Dunn Field. The west-northwest plume appears to be a mixture of PCE, TCE, 1,2-DCE, 1,1-DCE, 1,1,2,2-PCA, 1,1,2-TCA, CCl4, and chloroform. Portions of this plume underlying Dunn Field appear to have a source within the Disposal Area or possibly offsite as well. Offsite portions of this plume trend to the west and northwest. The west-southwest plume that underlies Dunn Field is a mixture of several different contaminants and the source of these plumes appears to be located at the southern end of the Disposal Area of Dunn Field. The west-southwest plume is principally composed of 1,1,2,2-PCA, CCl4, 1,1,2-TCA, and chloroform, but there are also portions of the plume made up of TCE, PCE, and 1,2-DCE.

Importantly, the configuration of the contaminant plumes, as perceived through sample analysis results, is dependent upon which wells are sampled. In many cases, the sample analysis results have shown that the configuration of many of these plumes is more extensive than originally detected.

14.1.2 Other Detected VOCs

As shown in Table 14-3, there were 17 other VOCs that were detected in groundwater samples during the investigation period. These compounds include: 1,2-Dichloropropane, acetone, benzene, bromodichloromethane, bromomethane, carbon disulfide, chlorobenzene, chloroethane, chloromethane, dibromochloromethane, ethylbenzene, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, toluene, vinyl chloride, and total xylenes. None of these compounds was detected in more than 14 of 444 total samples and only 6 were positively identified (i.e., a J-qualifier was not associated with at least one detection).

Each of these 17 compounds was compared to Maximum Contaminant Levels (MCLs), as established by EPA's National Primary Drinking Water Standards, and only vinyl chloride was detected above its MCL value of 2 µg/L. The maximum vinyl chloride value, 8 µg/L, was detected in samples from MW-70 collected in January 2001 (Table 14-2). Several VOCs persistent in groundwater underlying the western portion of Dunn Field, including TCE, 1,2-DCE, and 1,1,2,2-PCA, have also been detected in samples from MW-70.

In summary, the occurrences of these 17 compounds are temporally sporadic, indicate no significant impact through introduction of a large plume into the fluvial aquifer , and suggest no significant source area. Potential risks of these compounds to human and ecological health are reviewed within Section 15.

14.1.3 Relationship between VOCs in Groundwater and Soil

The relationship between potential VOC source areas in soil and VOC groundwater plumes is important for defining the extent of contamination in both matrices and for future selection of potential remedial actions. Figure 14-41 displays a comparison between soil and groundwater data for VOCs considered persistent in soil and groundwater samples collected during the Dunn Field RI. The VOCs include PCE, TCE, total 1,2-DCE, 1,1-DCE, vinyl chloride 1,1,2,2-PCA,

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1,1,1-PCA, 1,1,2-TCA, 1,1-DCA, CCl4, and chloroform. To differentiate between the levels of VOCs in soil or groundwater samples, a value of 500 was established as a comparison point Those soil and groundwater samples exceeding total VOC concentrations of 500 µg/L or 500 µg/kg, respectively, are highlighted to symbolize high concentration areas The information presented in this figure suggests the following:

- Both surface and subsurface soil is contaminated by VOCs from the surface down to the top of the water table in the fluvial aquifer.
- Both surface and subsurface soil in the western portion of Dunn Field is contaminated by VOCs.
- Groundwater in the fluvial aquifer underlying Dunn Field, particularly the western portion of Dunn Field, is contaminated by VOCs.
- Groundwater contamination by VOCs is present west of the Dunn Field boundary and, in particular, is at greater concentrations west of areas with high levels of soil contamination.
- Overall, the location of groundwater VOC contamination coincides with locations of VOC contamination in surface and subsurface soil at Dunn Field.

The presence of VOC plumes emanating from Dunn Field, as described in Section 14.1.1, supports the conclusion that VOCs are being transported through the soil column to the fluvial aquifer.

Based on the information presented above, Table 14-4 was developed to compare soil concentrations to soil screening levels (SSLs) for groundwater protection as established by USEPA-OSWER (March 2001). The soil screening levels are guidelines to protect potential potable groundwater resources that may be present beneath sites with industrial uses and to protect offsite residents who could ingest the contaminated groundwater. Table 14-4 presents minimum and maximum concentrations of 10 VOCs detected above background in surface and subsurface soils at Dunn Field in comparison to the SSLs. Of the VOCs in surface soils, 1,1,2,2-PCE, TCE, and vinyl chloride were found to exceed the SSLs in 2, 5, and 1 location(s), respectively. This indicates that these contaminants are at levels high enough to present a persistent risk to groundwater and subsequently human health and the environment.

For subsurface soils, the number of locations exceeding SSLs was found to be much higher. Except for two compounds, all of the VOCs were found to exceed SSLs. 1,1,2,2-PCA and TCE were found to exceed the criteria in 53 and 45 samples, respectively. Other VOCs exceeded SSLs in less than 10 samples. The maximum concentrations reported for all VOCs exceeding SSL criteria ranged from 46 ug/kg (1,2-DCA) to 460,000 ug/kg (TCE).

The subsections below present a comparison between soil and groundwater contaminant extents for VOCs detected above SSLs in five or more locations. This list includes· PCE, TCE, CCl4, 1,1,2,2-PCA, 1,1,2-TCA, chloroform, and vinyl chloride. Refer to Figures 8-6, 8-7, 10-10, 10-11A, 12-6, and 12-7 for locations and analytical results of the 1999 surface and subsurface soil samples, and Figure 10-11B for locations and analytical results of the 2000 subsurface soil borings.

14.1.3.1 Tetrachloroethene (PCE)

Results from the 1999 soil sampling events revealed that PCE in soil is generally more prevalent in the north to western portions of the Disposal Area (see Figure 10-10, 10-11A and -11B). PCE concentrations in soil exceeded SSLs or groundwater protection criteria at locations adjacent to monitoring wells MW-3, MW-35, and MW-15. Higher concentrations of PCE in groundwater were generally detected in samples collected underneath these same areas but were also detected in offsite locations (see Figures 14-1 through 14-5). The maximum groundwater PCE concentration, identified by the 100-µg/L isopleth in Figure 14-2, was detected upgradient of the highest soil concentration, indicating that additional elevated soil concentrations may be present.

PCE was also detected at relatively low concentrations in one boring (between MW-8 and MW-29) located in the northeast perimeter of Dunn Field, indicating that the extension of the PCE groundwater contaminant plume beneath the Northeast Open Area may result from releases to the soil. Isolated low levels of PCE were reported in groundwater samples from MW-51 and MW-49 upgradient of any known or suspected Dunn Field source.

Results from the 2000 soil sampling event did not show any concentrations above the SSL at 60 µg/kg; the highest detection was 15 µg/kg at SBLCA-SB2. This concentration, however, coincides with the location of elevated PCE from previous sampling events.

The distribution of PCE in groundwater is generally consistent with its distribution in soil and subsequent downgradient transport. Maximum soil concentrations do coincide with the centroid of the PCE groundwater plume.

14.1.3.2 Trichloroethene (TCE)

As demonstrated by soil and groundwater sample analytical results, TCE detection in soil is generally mirrored by the extent of the TCE groundwater plume. Concentrations from 1998 data exceeding the SSL criterion for TCE (60 µg/kg) are more prevalent in the northern portion of the Disposal Area. The maximum soil TCE concentration, 460 mg/kg at the 8 to 10 foot bgs interval of SBLEE, identifies a subsurface TCE source in the northwest corner of Dunn Field that is likely responsible for the elevated groundwater TCE observed in MW-31 and MW-10. Detections of TCE in borings throughout the southern portion of the Disposal Area suggest that TCE is distributed throughout the subsurface, resulting in the southern elongation of the groundwater plume to MW-57. TCE was also detected at low concentrations in an isolated discrete surface soil sample (between MW-8 and MW-29) located along the northwest perimeter of Dunn Field, however, TCE was not detected in the samples collected from deeper at that same location or the adjacent locations. Therefore, the source of the TCE groundwater contamination beneath the Northeast Open Area is inconclusive. In addition, concentrations of TCE were reported in MW-51 upgradient and sidegradient of any known or suspected Dunn Field source, suggesting a possible offsite source northeast of Dunn Field

TCE concentrations in soil exceeded SSL in 8 of 16 soil borings as indicated by soil samples collected in the 2000 expanded investigation The highest TCE concentrations from the 2000 expanded investigation were detected in soil samples collected from Borings SBLCA-SB5 and SBLCA-SB2 (179 and 176 µg/L, respectively); these borings were centered around MW-73 which had a concentration of 2,200 µg/L during the January/February sampling event. These high concentrations associated with soil contamination also correlate with soil samples collected in 1998.

Like PCE, the distribution of TCE in groundwater underlying Dunn Field and downgradient of the site mirrors the extent of TCE in soil. Maximum soil concentrations in the northwest corner are generally upgradient of the maximum groundwater concentrations, indicating that sources to groundwater contamination have been identified.

14.1.3.3 Carbon Tetrachloride (CCl4)

The two locations (soil Borings SBLFG and SBLAB) where carbon tetrachloride exceeded the SSL criteria are the only locations where this VOC was found in significant concentration in subsurface soils. The maximum concentration of CCl4 (6.8 mg/kg in the 8- to 10-foot bgs zone) was reported in a boring (SBLFG) in the northern portion of Dunn Field. This concentration coincides with relatively low estimated concentrations (<5 µg/L) in groundwater downgradient of the boring location.

The CCl4 concentration at Boring SBLFG decreases to 0.36 mg/kg and then non-detect in the underlying 14- to 16- and 28- to 30-foot bgs intervals, respectively, suggesting that most of the soil contamination may be confined to a low-permeability upper soil stratum. In the southern portion of the Disposal Area, carbon tetrachloride exceeds SSL criteria throughout borehole SBLAB: 0.13 mg/kg in the 8- to 10-foot bgs interval, 0.57 mg/kg in the 14- to 16-foot bgs interval, and 0.35 in the lowermost 28- to 30-foot bgs interval. At SBLAB, deeper penetration of CCl4 in the soil may be indicative of transport to the water table resulting in the CCl4 plume outlined by the 5- and 10-µg/L isopleths (Figures 14-26 through 14-28). Other relatively low (0.01 to 0.001J mg/kg) detections of CCl4 in soil within the groundwater plume suggests that the distribution of carbon tetrachloride in soil located between MW-6 and -MW-57 may be a controlling factor for the configuration of the groundwater plume.

During the 2000 expanded investigation, no CCl4 was detected within 16 soil borings centered around MW-73.

14.1.3.4 1,1,2,2-Tetrachloroethane (1,1,2,2-PCA)

Nearly all of the detected 1,1,2,2-PCA soil concentrations during the 1999 and 2000 sampling events exceeded the SSL criteria (Table 14-4). Overall, detections of 1,1,2,2-PCA in soil are upgradient of groundwater detections, although the correlation between these media is not as direct as that for TCE. The maximum 1,1,2,2-PCA concentrations in the northwest corner of the Disposal Area exceed the SSL criterion (0 003 mg/kg) throughout borehole SBLEE to a depth of 30 feet bgs: 160 mg/kg in the 8- to10-foot bgs interval, 46 mg/kg in the 14- to 16-foot bgs interval, and 0 009 mg/kg in the lowermost 28- to 30-foot bgs interval. The 1,1,2,2-PCA concentration in downgradient monitoring well MW-31 is moderate, at 33 µg/L. Likewise, during the 1999 sampling event, 1,1,2,2-PCA in subsurface soils south of MW-35 exceeded the SSL to a depth of 28 to 30 feet bgs (33 mg/kg at SBLCA), downgradient groundwater concentrations were found to be moderate (i.e.; 20 µg/L at MW-12 [October 1998] and 23 µg/L at MW-35 [March 2000]).

During the 2000 sampling event, additional soil samples were collected at the former SBLEE location from ground surface to the top of the water table in the fluvial aquifer. 1,1,2,2-PCA was not detected in samples from shallower depths, but was detected at the 67-foot bgs zone at

0 153 mg/kg. As with soil Boring SBLEE, SBLCA was re-sampled during the 2000 expanded investigation using a continuous soil sampler. The analytical results indicate a decreasing concentration trend with increased depth; this trend possibly suggests a source area within the soil around SBLCA. Downgradient groundwater samples collected on January 8, 2001 from MW-74 and MW-75 had 1,1,2,2-PCA concentrations of 180 and 2,900 µg/L, respectively.

Conversely, groundwater concentrations of 220 (October 1998) and 140 (March 1998) µg/L were detected at MW-6 and MW-32, respectively, downgradient of areas with low soil concentrations; these data suggest that additional sources of 1,1,2,2-PCA may be present in the subsurface in the area between MW-6 and MW-15 in the west-central portion Dunn Field.

14.1.3.5 1,1,2-Trichloroethane (1,1,2-TCA)

Six concentrations of 1,1,2-TCA exceeded the SSL criteria, all within the Disposal Area. The soil samples with these concentrations were collected from Borings SBLCA at 28 to 30 feet bgs, SBLCD at 8to 10, 14 to 16, and 28 to 30 feet bgs, and SBLEE at 8 to 10 and 14 to 16 feet bgs The highest concentration of 1,1,2-TCA in soil was detected in the 14- to 16-foot bgs sample of SBLEE at 2,200 ug/kg. As shown on Figures 14-36 through 14-40, plumes of 1,1,2-TCA do not correlate well with these reported soil concentrations. The most prominent and persistent plume is present around MW-06 trending northwest towards MW-32. No direct soil sampling has occurred in the MW-06 location. However, soil samples were collected upgradient of the plume at SBLAC and SBLAD, and 1,1,2-TCA was not detected at either of these locations.

There does appear to be some limited correlation between soil contamination detected in Boring SBLEE with an offsite plume centered around monitoring well MW-31; however, this plume was only detected in the 1996 sampling effort. In 2000, a second 1,1,2-TCA plume was discovered centered around the offsite monitoring well MW-70, but that plume appears to have origins in the soil contamination discovered within the SBLCA boring. In 2001, the correlation between contamination found in the soil at the SBLCA boring and that in groundwater around monitoring wells MW-70 and MW-73 was reinforced again with the detection of 1,1,2-TCA in these wells.

14.1.3.6 Chloroform

Chloroform was detected in many soil samples during the RI. Six of these samples contained concentrations greater than the SSL of 0.6 mg/kg. Chloroform was detected in surface and subsurface soil samples at each consolidated location throughout each of the study areas, but especially in the Disposal Area. The soil samples where chloroform exceeded the SSLs in the Disposal Area show excellent correlation with plumes of chloroform in the groundwater. As Figures 14-31 through 14-35 show, plumes of chloroform are present below or immediately downgradient of the soil contaminant locations The only exception to this is around MW-56; however, few soil samples have been collected from this area, so direct comparison is limited

14.1.3.7 Vinyl Chloride

Vinyl chloride was detected above SSLs in one surface soil sample, SBLCB, and in nine subsurface samples, including SBLBC at 8 to 10 feet bgs, 14 to 16 feet bgs, and 28 to 30 feet bgs, SBLCA at 28 to 30 feet bgs, and SBLEE at 5 feet bgs, 8 to 10 feet bgs, 14 to 16 feet bgs, 28 to 30 feet bgs, and 34 feet bgs The maximum concentration of vinyl chloride reported was 7,000 ug/kg from the 14- to 16-foot bgs zone of Boring SBLEE.

Vinyl chloride was only recently detected (2000 and 2001 sampling events) in groundwater samples, principally as a result of the installation of additional monitoring wells Vinyl chloride was detected in samples from MW-70, 73, 76, 77, and 87. The detection of vinyl chloride in samples from these wells coincide with contamination detected in soil samples from Borings SBLBC, SBLCA, and SBLCB, as all of these wells are immediately downgradient of the boring locations.

14.1.3.8 Overall Evaluation

VOCs were detected throughout surface and subsurface soil in the Disposal Area and along the southwest to northeast perimeter of the Northeast Open Area. Locations of PCE, TCE, carbon tetrachloride, 1,1,2,2-PCA, 1,1,2-TCA, chloroform, and vinyl chloride detections in soil are within or upgradient of groundwater contamination, indicating that the configurations of the groundwater plumes are directly related to the distribution of VOCs throughout the soil. This correlation applies to all of the Disposal Area and most of the Northeast Open Area. Some of the groundwater contamination north of the Northeast Open Area may be attributable to an offsite source. Maximum VOC concentrations in soil were not always located within or upgradient of the centroids of the groundwater plumes, indicating additional soil sources are likely present. However, given the widespread nature of the VOC soil contamination across the Disposal Area, additional subsurface characterization to identify specific sources and other heterogeneity of the subsurface VOC distribution is not warranted. The distributed nature of the soil sources will be taken into account in the soil remediation for the purpose of reducing groundwater contamination.

14.2 Other Compounds in Groundwater

Eleven PAHs and 13 other SVOCs were detected in groundwater samples collected during the RI activities. The most frequently detected PAHs were pyrene (6 detections among 166 samples) and fluoranthene (5 detections among 166 samples). These two compounds and all other PAHs had J-qualifiers associated with all detections. Most of the PAHs detected in groundwater are likely attributable to waste disposal activities in the Disposal and Stockpile Areas.

The most frequently detected SVOCs through 1998 were bis(2-ethylhexyl)phthalate (6 detections among 166 samples), di-n-octylphthalate (6 detections among 166 samples), and di-n-butyl phthalate (12 detections among 158 samples). The maximum detected SVOC concentration was below 0 007 mg/L The phthalate compounds discussed above are common plasticizers in latex gloves and other common plastic materials used in the sampling and analysis process. In addition, their mobility through the soil column to groundwater is limited. Their presence in groundwater samples at the Depot is not attributable to waste management practices at Dunn Field.

Seven pesticides were detected in groundwater samples collected during the RI activities through 1998. These include alpha-chlordane, DDD, DDT, dieldrin, endrin ketone, gamma-chlordane, heptachlor epoxide. The most frequently detected pesticides were heptachlor epoxide and dieldrin. Among the 37 samples, this compound heptachlor epoxide was detected in 4 samples at concentrations ranging from 0.0000086 mg/L to 0.000014 mg/L. Dieldrin was also detected in 4 samples, ranging from 0.000036 to 0.000086 mg/L. The other five pesticides were detected not more than twice and never exceeded an estimated value of 0.00001 mg/L All seven pesticides are associated with monitoring wells installed by Parsons in 1998: MW-56, MW-57, MW-58, and MW-59. These wells were installed using hollow-stem auger methods rather than the rotasonic method used for other wells installed at Dunn Field since 1997. Use of the auger method in unconsolidated materials may have introduced surface soils containing pesticides to the well completion interval Since pesticides are ubiquitous in surface soil at Dunn Field and were not detected in other wells identified in Table 14-1, the pesticides detected in these wells most likely result from waste management operations or surficial application

Groundwater samples were also collected for explosives content. Of the 10 samples collected and analyzed, 11 explosive compounds were detected and all with a J-qualifier.

14.3 Metals and Other Inorganics in Groundwater

Twenty-three metals and other inorganics were detected in groundwater samples collected from 30 wells located within Dunn Field and offsite. A total of 248 samples were collected during 5 quarterly sampling periods including: (1) first quarter (January/February) 1996; (2) second quarter (June) 1997; (3) third quarter (September) 1997; (4) first quarter (March) 1998; and (5) fourth quarter (October/November) 1998. Groundwater samples collected for the RI during 1998 were collected using the most up-to-date methods; therefore, discussions of metals and other inorganics will be limited to data collected during the 1998 sampling events. All reported metal results are total concentrations–no samples were filtered.

During quarterly sampling, metals concentrations were compared with groundwater turbidity measurements to evaluate whether a statistically significant relationship between these two parameters exists. Such an analysis of the first quarter 1996 data produced ambiguous results, with correlation coefficients for each metal analyzed ranging from 0.47 for aluminum to -0.81 for silicon Turbidity ranged from 6 NTUs to 999 NTUs (off the scale of the instrument). The correlation coefficients of subsequent quarterly data for turbidity and metals suggested moderate (0.32 for second quarter 1997) to very weak positive correlations (0.13 and 0.14 for third quarter 1997 and first quarter 1998, respectively).

The second quarter 1998 metals concentrations were compared to groundwater turbidity measurements and the results of this comparison are shown in Figure 14-42. This trend is also supported by graphs developed for the third quarter 1997 and first quarter 1998 sampling events. At lower turbidity levels, no correlation is expected between turbidity and metal concentrations. Again, in general, elevated metal concentrations are associated with higher turbidity samples Results indicate that if sample turbidity is relatively low, metals data reflect more realistically the true aqueous chemistry, these data establish an important data quality objective (DQO) of the RI and any additional sampling performed at the Depot. Elevated metals concentrations were considered suspect if the turbidity of the groundwater sample exceeded 30 NTU As discussed in Section 3 2 3 of the Main Installation RI (CH2M HILL, 1999), results of this turbidity evaluation are similar to the relationship observed at Main Installation wells where there was a moderate correlation between metal concentration and turbidity (>10 NTU).

Causes of turbidity typically are associated with small suspended particles within the monitoring well due to disturbances of the water column during sampling During RI sampling, care was taken to minimize disturbances to the water column, however, at some locations,

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turbid samples were unavoidable due to well conditions and poor well yield that prevented continuous pumping. There are several occurrences of elevated metals concentrations associated with low turbidity values (10 NTUs or less). These occurrences may reflect the natural variation in the geochemical properties of the aquifer. On the other hand, there are numerous occurrences of high turbidity with non-elevated concentrations of metals. Turbidity in this case may be attributable to some factor other than suspended clay and finer material, perhaps organic material in suspension Due to the high turbidity of some of the samples collected during the first quarter 1996, these data will not be used to establish the nature and extent of metals contamination.

The concentrations of metals detected in groundwater samples from the Dunn Field area and adjacent off-site locations were compared with background concentrations. Tables 14-5 and 14-6 present a statistical summary of the onsite and offsite metals data, respectively. The FOD and the frequency of detected values that exceed background were calculated for each metal and compared for the onsite and offsite groundwater samples. As shown in Table 14-7, 13 of 23 metals had FOD higher for onsite monitoring wells; five metals had onsite/offsite FOD less than 1.0. Considering that turbidity effects are not dependent on location, these results suggest that site-related activities have contributed to the elevated concentrations of metals within the fenced area of Dunn Field.

The detection frequencies of metals exceeding background levels are higher in onsite wells. The magnitude of the difference is highest for lead, nickel, and chromium, suggesting some input of these metals to groundwater from Dunn Field operations. Other metals were found to occur at frequencies and locations suggesting that their occurrences could also be related to waste management practices at the Depot These frequencies and locations were based on temporal distribution in groundwater samples from each well and on spatial distribution. These metals include (from highest to lowest FOD above background) aluminum, vanadium, iron, lead, beryllium, and manganese. In contrast to VOC plumes that underlie a large portion of Dunn Field, locations where metals exceeded background concentrations are limited to smaller geographic areas, primarily in the north and northwest portion of Dunn Field Occurrences elsewhere were scattered and isolated.

The following discussion focuses on the six most widespread, persistent and frequently detected metals and is augmented by a discussion of spatial and temporal distribution.

14.3.1 Frequent and Widespread Metals and Inorganics

Aluminum was the most frequently detected metal above background in groundwater at Dunn Field. Figure 14-43 shows the spatial distribution of aluminum detected during the fourth quarter 1998 and also the three previous sampling events. Onsite, aluminum was analyzed for in 112 samples, was detected in 90 samples, and exceeded background in 33 samples. Offsite, aluminum was analyzed for in 51 samples and was detected in 10 samples above the background value of 1.79 mg/L. Significant concentrations of aluminum were reported in groundwater samples from wells in the northern part of the site (MW-2, MW-3, MW-4, MW-7, MW-8, and MW-29) These locations are in the general vicinity of the northern portion of the Disposal Area, which has been associated with disposal of various materials. The maximum concentration of aluminum was 105 J mg/L, detected in a groundwater sample from MW-4 during the second quarter of 1997. However, subsequent samples showed an order-of-magnitude reduction in contamination.

Aluminum was most persistent in groundwater samples collected from MW-2, as concentrations exceeding 15 mg/L were recorded in 3 of the 4 sampling events. During the second quarter 1998 sampling event, aluminum was reported at a concentration above background in one well, MW-2. In comparison to the highest concentration detected at MW-2 (15 6 mg/L), the aluminum concentration of 55.7 mg/L (fourth quarter 1998) appears to be anomalous, as the average value for all three previous events was only 10.6 mg/L. Boring logs indicate that the screened interval of MW-2 is located within a perched aquifer and not the lower fluvial aquifer As a result, sampling the well was problematic; the well yield was impacted, as was the quality of the sample collected at MW-2. The sample was bailed and visibly turbid; the turbidity was not measured due to the low volume of water produced by the well. These circumstances are the likely causes of the anomalous concentration.

Similarly, only two wells (MW-8 and MW-13) sampled during the first quarter 1998 had an aluminum concentrations above background. Overall, the data collected during the two quarters of 1998 indicate a steady and significant decrease in aluminum concentrations in groundwater. These results are attributable to improved sampling techniques and possibly dilution of source material that may have been present in the northern portion of the Disposal Area.

Aluminum was also analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. Only one sample had aluminum reported at a concentration (0.07 mg/L) above the MDL, which was below the background concentration of 1.79 mg/L

Metals data (1998 and 1999 sampling events and groundwater extraction system performance monitoring) indicate that aluminum in groundwater is not widely distributed or present at concentrations significantly greater than background (1.79 mg/L). Aluminum in the fluvial aquifer at Dunn Field does not form a plume but is sporadically distributed. The FOD of aluminum in groundwater suggests transient conditions with insignificant effects on groundwater quality.

Vanadium was also frequently detected above background in groundwater at Dunn Field. Figure 14-44 shows the spatial distribution of vanadium detected during the fourth quarter 1998 sampling event and also the maximum detected concentration. Onsite vanadium was analyzed for in 102 samples, was detected in 72 samples, and exceeded background in 32 samples. Offsite it was analyzed for in 47 samples and detected in 11 samples above the background value of 0 006 mg/L Similar to aluminum, significant concentrations of vanadium were detected in groundwater samples from wells (MW-2, MW-3, MW-4, MW-7, MW-8, and MW-29) located in the northern part of the site (POL disposal area). The maximum concentration of vanadium, 0.298 mg/L, was detected in a groundwater sample from MW-4 during the second quarter 1997. Vanadium was most persistent in the groundwater samples collected from MW-2, as concentrations exceeding background were detected in three of the four sampling events.

During the last two quarterly sampling events in March 1998 and October/November 1998, vanadium concentrations have decreased, with maximum values reported in MW-2 (perched), MW-8, and MW-13. The elevated concentration above background in MW-2 may also be related to the high turbidity of the sample. Similarly, only two wells (MW-8 and MW-13) sampled during the first quarter 1998 had vanadium concentrations above background. Overall, the data collected during the two quarters in 1998 indicate a steady decrease in the vanadium concentrations in groundwater; these data are attributable to improved sampling techniques and possibly dilution of source material that may have been present in the area.

Metals data (first and fourth quarters 1998) indicate that the distribution of vanadium in groundwater at concentrations above background (0.006 mg/L) is not widespread and is in fact confined to MW-2, MW-8, and MW-13. Vanadium in the fluvial aquifer at Dunn Field does not form a plume but is sporadically distributed. The variability in vanadium concentrations and groundwater FOD suggests transient conditions and little overall impact on the quality of groundwater in the fluvial aquifer.

Iron was analyzed for in 156 samples and was detected in 136 of the total onsite and offsite samples at concentrations that exceeded the MDL Figure 14-45 shows the spatial distribution of iron detected during the RI sampling event. Onsite iron was analyzed for in 106 samples and was detected in 28 samples above background; offsite iron was analyzed for in 50 samples and was detected above background in 13 samples.

Significant concentrations of iron were detected in groundwater samples from wells located in the northern (MW-2, MW-3, MW-4, MW-7, MW-8, and MW-29) and western (MW-5 and MW-15) parts of the site in the general vicinity of the landfill disposal areas. The maximum concentration of iron was 432 mg/L, and was detected in a groundwater sample from MW-4 during the second quarter of 1997. Iron was most persistent in the groundwater samples collected from MW-2 (perched), as three of the four sampling events reported concentrations exceeding the background level of 6.73 mg/L. Iron was also analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. Iron was detected in 30 samples, although no concentrations exceeded the background value of 6 73 mg/L.

During the October/November 1998 sampling event, iron was reported above background in onsite well MW-2 and offsite well MW-43. The elevated concentrations in MW-2 are thought to be related to the high turbidity of the sample Similarly, only one well (MW-13) sampled during the first quarter 1998 had iron concentrations reported above background. Overall, the data collected during the two quarters in 1998 indicate a steady decrease in iron concentrations in groundwater. These results are due in part to the improved sampling techniques and also to the dilution of source material or attenuation of VOCs that may have contributed to elevated iron concentrations at Dunn Field. The variability in iron concentration and groundwater FOD suggests transient conditions. The most recent metals groundwater data indicate little overall impact on the quality of groundwater in the fluvial aquifer.

Lead was reported in groundwater at concentrations that exceeded background concentrations. Figure 14-46 shows the spatial distribution of lead detected during the fourth quarter 1998 and also the three previous sampling events. Onsite, lead was analyzed for in 112 samples, detected in 60 samples, and exceeded background in 25 samples. In offsite wells, lead was detected in 26 of 69 samples; only one concentration exceeded the background value of 0.0094 mg/L.

Significant concentrations of lead were reported in groundwater samples collected from wells (MW-2, MW-3, MW-4, MW-7, MW-8, and MW-29) in the vicinity of the northern portion of the Disposal Area, which has been associated with the disposal of POL. Lead concentrations exceeded background levels in wells MW-13 (onsite) and MW-32 (offsite), which are centrally located in respect to Dunn Field, and MW-14, within the southern portion of the site. MW-32 is located in an adjacent neighborhood to the west and the presence of lead could be a result of the runoff from cars and trucks that are typically parked along the street.

The maximum concentration of lead was 0 124 J mg/L, detected in a groundwater sample from MW-4 during the second quarter of 1997. Lead was most persistent in groundwater samples collected from MW-2 (perched), as three of the four sampling events reported concentrations exceeding background–a trend that has been observed for many of the other metals at this well During the fourth quarter 1998 sampling event, lead was reported at a concentration above background in one well, MW-2 Similarly, only MW-2 sampled during the first quarter 1998 had lead concentration reported above background Overall, the data collected during the third and fourth 1998 quarters indicate a steady and significant decrease in lead concentrations in groundwater compared to previous sampling events. However, the decreasing trend is not uniform. Some wells (e.g., MW-09) showed no detectable lead concentrations during the first quarter 1998 sampling event but had detectable lead concentrations during the fourth quarter 1998 sampling event.

Lead was also analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. None of the samples analyzed had lead concentrations that exceeded the MDL

Metals data from 1998 and 1999 sampling events indicate that lead in groundwater is not widely distributed nor present at concentrations significantly greater than background levels. Furthermore, the variability in lead concentrations and FOD in groundwater suggests transient conditions and indicates little overall impact on groundwater quality in the fluvial aquifer.

Beryllium was analyzed for in 181 samples, and was detected in 18 samples at concentrations exceeding the background level All background exceedances were from onsite samples. The distribution of beryllium in groundwater is shown in Figure 14-47. Over the course of the four sampling events (2Q97, 3Q97, 1Q98, and 4Q98), the highest concentration of beryllium (0.149 mg/L) was detected in MW-04 during the second quarter 1997 sampling event.

Data for beryllium are consistent with the overall trends showing the highest concentrations of metals frequently occurring in samples collected from MW-4 during second quarter 1997 and third quarter 1997. Turbidity levels during the four quarterly sampling events, in chronological order, were > 200 NTU, 71,6 NTU, 18 NTU, and 3.5 NTU. Samples collected during the second quarter 1997 and third quarter 1997 had turbidity levels greater than 30 NTU and also the highest metals concentrations at Dunn Field. More importantly, when the turbidity was less than 30 NTU, the same metals did not exceed the MDLs. Therefore, it has been concluded that elevated metals concentrations in MW-4 are directly linked to the elevated turbidity.

Beryllium was detected above background in 10 of 33 wells. The wells are located on the northern portion of the site and monitor the downgradient portion of the landfill disposal areas. During the 1998 sampling events, beryllium was detected in only one well, MW-2, during the fourth quarter 1998. None of the first quarter 1998 beryllium concentrations exceeded background levels. Overall, the beryllium data collected during the two most recent quarters indicate a steady and significant decrease in beryllium concentrations in groundwater.

Manganese was analyzed for in 149 samples and was detected in 21 samples at concentrations greater than background (0 56 mg/L). The distribution of manganese in groundwater is shown on Figure 14-48 The highest concentration was 6.25 mg/L in the fourth quarter 1998 groundwater sample collected from MW-6. Results for the three previous sampling events showed consistently elevated concentrations. The turbidity of the three samples was equal to or less than 22 NTU, which meets the DQO for turbidity

Manganese was detected above background in 8 of 33 samples over the 2-year monitoring period (1997 and 1998). However, during the first and fourth quarter 1998 sampling events, manganese was detected in only four wells above background: MW-2 (perched), MW-6, MW-32 and MW-43. Manganese concentrations exceeded background in two wells during the first quarter and in three wells during the fourth quarter sampling. Manganese was most consistently detected above background in onsite wells MW-2 and MW-6 and offsite well MW-32. The elevated detections are randomly dispersed and do not show an apparent trend other than the association with other elevated metals at MW-2 (which is considered part of a perched zone above the fluvial aquifer). Overall, manganese data collected during the first and fourth quarters (1998) indicate a decrease in manganese concentration and FOD in groundwater.

Manganese was also analyzed for in 31 samples collected from the groundwater extraction system effluent between October 1998 and December 2000. Twenty-three of the 31 samples had manganese concentrations that exceeded the MDL, although none exceeded the background concentration of 0.56 mg/L.

With the possible exception of consistently elevated manganese levels at MW-02 and MW-06 and the one-time elevated value at MW-43, the distribution of manganese in groundwater at Dunn Field likely results from natural variation or temporal changes rather than disposal activities at Dunn Field

Metals without a Site-Specific Background Concentration: Several metals were detected at concentrations that exceeded the MDLs but do not have corresponding background values. These metals include arsenic, cadmium, mercury, silver, thallium, and zinc. Because background levels could not be established using site-specific groundwater data, the default background value was set at zero. Therefore, any concentration exceeding the MDL would be considered significant. The following summaries describe the extent of the aforementioned metals:

- During five quarterly sampling events (first quarter 1996, second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998), arsenic was detected in groundwater samples at concentrations above the MDLs in 3, 15, 4, 1, and 2 samples, respectively. The second quarter 1997 sampling event was anomalously high since in the preceding first quarter 1996 (February) sampling event, arsenic was detected in only 3 samples. During the 1998 quarterly sampling events, exceedances were reported in samples collected from only three wells, MW-2 (perched), MW-3 and MW-13. In addition, arsenic was analyzed in 31 samples collected from the groundwater extraction system effluent between October 1998 and December 2000. Of the 31 samples analyzed, none had arsenic concentrations that exceeded the MDL Therefore, arsenic does not appear to be a groundwater contaminant in the fluvial aquifer at Dunn Field.
- During the second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998 sampling events, cadmium was detected at concentrations above the MDLs in 13, 24, 19, and 21 samples, respectively. Over the four sampling events, the number of detections that exceeded the MDL has remained fairly constant. During the first and fourth quarterly

sampling events (1998), maximum exceedances (0.0029 and 0.0028 mg/L) were reported in samples collected from MW-2 (perched) and MW-42. In the absence of a site-specific background concentration, cadmium concentrations were screened against the most conservative regulatory criterion, 0.002 mg/L (see Section 9). Cadmium concentrations reported in the samples collected from MW-2 and MW-42 represent the only exceedances during the two 1998 sampling events. Furthermore, cadmium was analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. Of the 31 samples analyzed, none had cadmium concentrations that exceeded the MDL. Therefore, cadmium does not appear to be a groundwater contaminant in the fluvial aquifer at Dunn Field.

- Mercury was detected above the MDL in 20, 2, 2, and 2 samples during the second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998 sampling events, respectively. Among these sampling events, the number of detections that exceeded the MDL has remained fairly constant. During the two most recent quarterly sampling events (first quarter 1998, and fourth quarter 1998), the maximum concentrations were reported in samples collected from MW-2 (perched), MW-6, and MW-32. In the absence of a site-specific background concentration, mercury concentrations were screened against the most conservative regulatory criteria of 0 001 mg/L None of the mercury concentrations reported in the samples collected during the RI represent exceedances. Furthermore, mercury was analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. Of the 31 samples analyzed, none had mercury concentrations that exceeded the MDL. Therefore, mercury does not appear to be a groundwater contaminant in the fluvial aquifer at Dunn Field
- Silver was detected in 3 samples during the second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998 sampling events It was detected during the fourth quarter (1998) in MW-2 (perched) at a concentration of 0.00072 J mg/L. The trend of high metals concentrations reported in MW-2 during the fourth quarter is a direct result of elevated turbidity, and therefore this result is considered anomalous. Therefore, silver does not appear to be a groundwater contaminant in the fluvial aquifer at Dunn Field.
- Zinc was detected above the MDL in 3, 21, 5, 9, and 16 samples, during the first quarter 1996, second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998 sampling events, respectively Over these five sampling events, the number of detections that exceeded the MDL has remained fairly constant. During the first quarter 1998, and fourth quarter 1998 sampling events, maximum exceedances were reported in samples collected from MW-2 (0.0808 mg/L) and MW-13 (0 0914 mg/L). In the absence of site-specific background concentrations, zinc concentrations were screened against the most conservative regulatory criterion of 1 mg/L. None of the zinc concentrations reported in the samples collected during the RI represent exceedances. Furthermore, zinc was analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. Of the 31 samples analyzed, no samples had zinc concentrations that exceeded the MDL. Since zinc concentrations did not exceed 1 mg/L, zinc does not appear to be a groundwater contaminant in the fluvial aquifer at Dunn Field.

14.3.2 Infrequently Occurring Metals and Other Inorganics

Several metals were detected infrequently within the Dunn Field site. Their low FOD and the sparse geographic distribution indicate an occasional exceedance of background for some metals is not generally related to waste management practices at the facility, but rather to statistical outliers in the concentration distribution for that metal when compared to background concentrations. The metals in this category include antimony, barium, calcium, chromium, cobalt, copper, magnesium, nickel, selenium, and sodium. These metals were detected at concentrations exceeding background in 12 samples or less during the RI sampling events.

During the second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998 sampling events, concentrations of antimony, copper, selenium, and sodium were not reported at concentrations above the MDL.

During the 3 quarterly sampling events (third quarter 1997, first quarter 1998 and fourth quarter 1998), two or fewer concentrations of chromium, cobalt, magnesium, and nickel exceeded background levels. In addition, one of the exceedances for each of these metals was reported in the sample collected from MW-2, which is considered zoned in a perched zone above the fluvial aquifer. Because the turbidity of the samples collected from MW-2 (for all events) was never less than 60 NTU, these data are considered anomalous. Magnesium and nickel were also analyzed for in 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000. Of the 31 samples analyzed, no chromium, cobalt, magnesium, and nickel concentrations exceeded background levels. These data indicate are not groundwater contaminants in the fluvial aquifer at Dunn Field

Barium was detected above background in 10 samples during the second quarter 1997, third quarter 1997, first quarter 1998, and fourth quarter 1998 sampling events. During first quarter 1998, barium concentrations did not exceed the MDLs and during fourth quarter 1998 the levels exceeded background in four wells· MW-2 (perched), MW-6, MW-43, and upgradient well MW-65. Barium was also reported in the 31 samples collected from the groundwater extraction effluent between October 1998 and December 2000, and no concentrations exceeded the background level of 0.22 mg/L. Barium concentrations were sporadic and do not form a definitive contaminant plume. Barium was detected in offsite well MW-43 where manganese and iron concentrations also exceeded background levels as well as upgradient at MW-65. Onsite wells (MW-2 and MW-6), where barium concentrations exceeded background levels, are distantly spaced but are associated with the many landfill disposal areas at Dunn Field However, detections of barium above background in upgradient and distant locations indicate that variations in barium concentration result from natural processes.

14.3.3 Temporal Trends in Metals Concentrations

The concentrations of metals in wells sampled more than once were plotted over time to evaluate whether any trends were discernible. Groundwater elevations for the same time period also were plotted to observe their relationship, if any, with metals concentrations (Figures 14-49a through 14-49k).

Water levels plotted with metals concentrations over time were evaluated for trends that project changes in the metals chemistry within the fluvial aquifer. The most significant observation since the third quarter 1997 sampling event is that both the groundwater elevations and metals concentrations at Dunn Field have declined.

During the third quarter 1997 sampling event, 13 of the 31 gauged monitoring wells had water levels at the highest elevation during the RI. Six monitoring wells were at the highest elevation during the second quarter 1997 sampling event. Very few groundwater elevations were at their highest levels during the 1998 sampling events.

Since September 1997, 29 of the 31 wells evaluated in Figures 14-49a through 14-49k have shown a steady decrease in metals concentrations. With the exception of ten monitoring wells (MW-2, -12, -14, -35, -40, -42, -43, -44, -51, and –54), all wells showed their maximum metals concentrations during either the second or third quarter sampling events (1997). Interestingly, the metals concentrations in MW-2, MW-6, MW-28, MW-31, and MW-46 indicated increasing trends during the fourth quarter sampling event (1998).

Although both groundwater elevations and metals concentrations generally declined after the third quarter 1997 sampling event, the metals concentrations may not be linked to water level decline. For example, the use of improved sampling procedures, with strict attention to the turbidity levels of samples to be analyzed for metals, has probably had a profound impact on reducing metals concentrations in the samples collected from the fluvial aquifer. Metals data collected from the effluent of the groundwater extraction system have low turbidity values and, therefore, support this conclusion. Metals that were thought to be contaminants in the fluvial aquifer at Dunn Field are not exceeding the MDLs in samples collected from the extraction wells.

14.4 Evaluation of Fluvial/Intermediate Aquifer Connectivity

The hypothesis that the fluvial aquifer and intermediate aquifer are in direct hydraulic connection has been raised during the course of investigations at the Memphis Depot. Evidence for these so-called "windows" has been cited at other locations in the Memphis area (Graham and Parks, 1986). Data from several sources indicate that the fluvial aquifer and intermediate aquifer are separated by confining clay and that a "windows" scenario does not exist directly beneath most of Dunn Field. These data include lithologic logs, thickness maps, structure contour maps, and water quality data from the two aquifers and the adjoining Allen Well Field. Based on lithologic logs, the clay confining layer below Dunn Field is absent in the vicinity of monitoring wells MW-40 (northwest of Dunn Field), MW-43 (west of Dunn Field), MW-34 (on the southern edge of Dunn Field), and nested wells MW-18/MW-38 (south of Dunn Field, on the MI).

This section presents additional hydrogeologic interpretation derived from tritium analysis of Depot wells conducted since publication of the *Final Groundwater Characterization Report*. Nuclear weapons testing resulted in significantly increased levels of tritium, a radioactive isotope of water, in rainwater since 1954. The magnitude of tritium activity in groundwater is directly related to the degree of mixing of post-1954 precipitation recharge with pre-1954 groundwater. Tritium values below about one TU indicate groundwater has not been significantly recharged since 1954 (IEPA, 1997)

Four classes of wells at the Depot were selected for tritium analysis:

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1. Memphis aquifer monitoring well - MW-67,
2. Intermediate aquifer monitoring wells in areas where the upper confining clay is continuous and does not allow direct contact between the fluvial and intermediate aquifer - MW-36, and MW-37;
3. Intermediate aquifer monitoring wells in areas where the clay confining unit is thin or absent, allowing contact between the fluvial and intermediate aquifer - MW-34, MW-38 MW-40, and MW-43, and
4. Shallow fluvial aquifer monitoring wells - MW-32, MW-55, and MW-63.

Table 14-8 presents tritium activity from these Depot wells together with published results from groundwater supply and monitoring wells within a 10-mile radius of the Depot (Graham and Parks, 1986). Because of the short half-life of tritium (12.43 years) and the range in sample dates of the published data and data collected at the Depot, the tritium activity reported for each sample was adjusted to the activity on a common date (November 1, 1999) so the data could be compared.

According to Graham and Parks (1986), the relatively high tritium activity at the Memphis aquifer wells SH:K-73 and SH:K-74 are anomalous, possibly resulting from vertical leakage from the overlying unconfined aquifer. Excluding these outliers, tritium activity within the Memphis aquifer is less than 1 TU (0 14 to 0.56 TU) indicating, as expected, that it has not received recent recharge Tritium activity values from the intermediate aquifer well MW-37 (0.00 and 0.38 TU) are comparable to values from the regional Memphis aquifer wells, which established that limited mixing with fluvial aquifer groundwater is occurring at this location. Likewise, tritium activity from MW-67, completed in the upper portion of the Memphis aquifer at a depth of 275 feet, is equivalent to activity in other Memphis aquifer wells (0 03 TU)–indicating little or no mixing with fluvial water at this location.

Tritium activity is consistently elevated for both the intermediate aquifer well MW-34 (5.92 to 6.63 TU) where the confining unit is discontinuous, and shallow fluvial aquifer wells MW-32, MW-55, and MW-63 (6.44 to 8.04 TU); elevated tritium values within MW-34 suggest recent recharge. These values demonstrate connectivity between the fluvial aquifer and the lower intermediate aquifer in the vicinity of MW-34 A single tritium sample was obtained from MW-43T, a temporary well screened between 91 7 and 81 7 feet msl, to obtain a water quality sample below a suspected clay confining unit observed between 112 5 and 107.5 feet msl The tritium activity of 3.94 TU is also intermediate, indicating mixing with recent groundwater below this 5 foot-thick clay. Boring logs indicate the upper confining unit is also absent in this area

Tritium activity at the intermediate aquifer well MW-36, located in the southeast corner of Dunn Field, is consistently elevated (1 1 to 5 4 TU) above that of MW-37 (0.0 and 0.38 TU), but below the activity in other fluvial wells This suggests some mixing of recent water in this area, possibly from the lack of clay confining unit at MW-34 or upgradient (east) of MW-36

Tritium data support the previous conclusion that little to no groundwater in the fluvial aquifer is mixing with the groundwater in the intermediate aquifer at MW-37. However, based on the previous analysis, the tritium data suggest mixing of fluvial aquifer groundwater with the intermediate aquifer at MW-36, possibly due to the absence of the confining clay layer southwest of MW-36 around MW-34 The low tritium activity at MW 67 indicates the Memphis aquifer in this area has received little if any recharge from the fluvial aquifer in the past 50 years.

14.5 Changes in Nature and Extent of Groundwater Contamination Due to Groundwater Extraction

As discussed in Section 2.5.6, in 1995 an interim ROD was signed for an interim remedial action requiring removal of contaminated groundwater at Dunn Field. A 13-well groundwater extraction system was designed, and the first seven of these wells (RW-3, RW-4, RW-5, RW-6, RW-7, RW-8, and RW-9) were installed. The extraction system became operational in early November 1998, with the remaining recovery wells RW-1, RW-1A, RW-1B, and RW-2 becoming operational on March 1, 2001. This section provides an analysis of the system performance, its impact on groundwater flow, and the distribution of VOCs within the fluvial aquifer. Additional details of the extraction system, contaminant levels in the effluent discharge water, pumping data, and water levels can be found in the 2001 series Monthly Discharge Reports (Year Three), Groundwater Extraction System, Dunn Field, Memphis Depot, Tennessee.

The original May 1998 O&M Plan for the groundwater extraction system outlined activities that would allow evaluation of the groundwater extraction system performance. The plan was amended in 1999, again in 2000, and a third time in August 2001. The performance activities that are conducted now include effluent sampling and semi-annual sampling of groundwater at 26 specific monitoring wells and 11 recovery wells. Other activities are also included as part of the O&M of the system. For example, water levels are routinely measured on a biweekly basis from 53 monitoring wells on and surrounding Dunn Field and in another 17 wells on a monthly basis. Analytical sampling frequency and types of analyses are summarized in Table 14-9. The configuration of the groundwater extraction system and associated monitoring wells is shown in Figure 14-50.

14.5.1 Changes in Groundwater Flow and Saturated Thickness

Figure 14-51 shows the configuration of the potentiometric surface for Dunn Field and the MI as determined from measurements taken in November 01, 2001, 3 years after the initial startup of the groundwater extraction system. Across most of Dunn Field, the groundwater flow direction is westward with some minor variation to the southwest and northwest.

Figure 14-52 shows the configuration of the potentiometric surface located along the groundwater extraction system as of November 01, 2001; all recovery wells were operational. Potentiometric surface contours suggest groundwater is captured in the immediate vicinity of each recovery well. Recovery wells were installed at intervals, which would create a hydraulic barrier against contaminant migration offsite From Figure 14-52, capture zones are not completely connected between RW-01 to RW-1A, RW-02 to RW-03, RW-03 to RW-04, RW-04 to RW-05, and RW-06 to RW-07, therefore, areas between these recovery wells could allow contaminates to pass through the recovery system

Groundwater within Dunn Field ranges in elevation from a high of 233 feet msl (MW-28) in the northeast section to a low of approximately 220 feet msl (RW-08) in the northwest section The groundwater gradient varies from approximately 0.003 ft/ft to 0 02 ft/ft, with the steepest gradient present in the west-central portion of Dunn Field.

Figure 14-53 shows the changes in water level elevation between November 3, 1998, prior to the start of the extraction system, and January 10, 2001. Water level elevations decreased in all wells associated with Dunn Field; water level changes ranged from -1.34 feet (MW-41) to -7.13 feet (MW-54). Prior to startup of the extraction system, groundwater fluctuations between June 1997 and November 1998 within monitoring wells 31, 44, and 54 were 1.78, 0.6, and 0.5 feet, respectively (see Figures 14-49a through k). When compared to the decrease in water level elevation per well since system startup, these pre-system fluctuations are less. But, a conclusion cannot be substantiated as to the effect of the recovery system on fluvial aquifer de-watering because of rainfall amounts pre- and post-system activation (Figure 2-2) Rainfall amounts were 11.23 inches above the total rainfall average estimated for the period of April 1997 through November 1998 (time estimated for pre-system fluctuations). With the addition of precipitation above the estimated monthly average, conditions could be created which cause minimal groundwater fluctuations. Conversely, rainfall amounts occurring from December 1998 and January 2001, were 23.30 inches below the total estimated rainfall average. Estimated monthly averages are based on historical data from 1961 through 1990. With approximately 2 years of below average rainfall events, fluvial groundwater elevations would naturally decrease, which explains water level changes that exceed the pre-system fluctuations. Therefore, decreases in fluvial aquifer water levels cannot be separated into recharge by precipitation and recovery system activation. To understand the influence of the recovery system on the fluvial aquifer, a shorter time period would have to be used in order to negate groundwater fluctuations based on precipitation.

The effects of a declining water table and the groundwater recovery system on the saturated thickness were investigated to assess whether any area of Dunn Field may be subject to complete dewatering. The saturated thickness was calculated, using the January 2001 potentiometric surface map as a basis (see Figure 14-51), by defining the difference in elevation of the water table within the fluvial aquifer from the elevation of the top of clay located below.

Saturated thickness varies from approximately 2.6 feet (MW-56) to more than 19 feet (MW-28) on Dunn Field; offsite the saturated thickness ranged from 1.4 feet (MW-41) to 36 8 feet (MW-65). Within Dunn Field, the saturated thickness was least in the southwestern-most area near MW-56 and greatest in the northeastern area near MW-29. An area of relatively low saturated thickness oriented in a northeastern-southwestern direction is thought to exist offsite along the western boundary of Dunn Field. However, fewer wells are located in this area and, therefore, the relatively low saturated thickness in the southwestern portion of Dunn Field cannot be confirmed. The reduced water column may be caused by an extension of a clay topographic high present in the area near MW-67 and continuing toward MW-78. Along the western boundary of Dunn Field within the recovery system, saturated thickness varied from approximately 7.2 feet at RW-04 and RW-07 to 10.1 feet at RW-08. Based on the information from 1998 through 2001, current recovery system discharge rates do not appear large enough to completely dewater any area within Dunn Field.

14.5.2 Changes in Nature and Extent of VOCs from Groundwater Extraction

In determining the effectiveness of the groundwater extraction system, Figures 14-54 through 14-59 were developed to illustrate contaminant concentrations revealed in extraction well samples from November 1998 to December 2000 To further illustrate the removal of VOCs from groundwater via the extraction system, Figure 14-60 presents graphs of concentration changes from October 1998 (before operation of the recovery system) to November 2000 (a full 2 years of groundwater extraction system operation). Groundwater analytical data are located in Table 14-2.

Extraction wells were sampled eight times· February 5th 1999, May 24th 1999, August 27th 1999, November 1st 1999, February 15th 2000, May 19th 2000, August 25th 2000, and November 20th 2000. The mass of VOCs removed from extraction wells was calculated by assuming the reported concentrations applied to eight distinct pumping periods and then multiplying the concentration by the daily and cumulative flow to calculate mass extraction trends and total VOC mass removed. VOC mass removal is summarized in Table 14-10. VOC removal trends from groundwater are discussed in the following paragraphs.

Tetrachloroethene. The distribution of PCE in November 2000 is shown in Figure 14-4. Figure 14-60 presents the changes in TCE concentrations between October 1998 and November 2000 sampling events within performance monitoring wells. The most significant difference between the distribution of PCE in October 1998 and the distribution observed in November 2000 is the reduction of offsite concentrations. Concentrations in MW-31 have decreased more than 41 µg/L to an estimated (J) concentration below 1 µg/L Concentrations of PCE increased slightly in monitoring wells MW-15, MW-51, and MW-54 between October 1998 and November 2000.

The greatest mass of PCE (7.38 pounds) has been removed from RW-9, located near the northwest corner of Dunn Field and upgradient of MW-31 (see Figure 14-54). PCE concentrations at RW-9 are relatively constant (32.1 to 61.2 µg/L), indicating sustained concentrations in groundwater. Concentrations at RW-6 decreased by a factor of 5 between the February 5th 1999 and May 24th 1999 samples, and remained low. Concentrations at RW-5 show an increasing trend between the August 27th 1999 (12 2 µg/L) and November 1st 1999 (45.1 µg/L) samples, followed by a decreasing trend through November 20th 2000 (not detected). Concentration trends in extraction wells suggest a continued source of PCE in the northwest area of Dunn Field and transient movement of a plume between RW-6 and RW-5.

Trichloroethene. The distribution of TCE in groundwater is presented in Figures 14-6 through 14-10. Prior to the extraction system's operation, the highest concentrations of TCE were at MW-31, which is located offsite west of the Dunn Field northwest corner. A concentration shift to the southeast toward RW-05 within Dunn Field boundaries has occurred over the period of operation of the recovery system Significant reductions in offsite concentrations of TCE are observed west of the recovery system in MW-31 and MW-54. South of the recovery wells near MW-15 (western boundary of Dunn Field), TCE concentrations have increased almost 53 µg/L in groundwater samples Based on the location of MW-15, the potential source appears to be in the southern portion of the Disposal Area, in the area of soil boring SBLAB (see Figure 10-11A).

The most significant decrease in TCE concentration is at well MW-31 (November 2000: 18.5 µg/L), where pre-pumping concentrations (January/February 1996: 1,100 µg/L and October 1998: 380 µg/L) were consistently high. Pre-pumping TCE concentrations decreased from 79 µg/L (October 1998) to 22 6 µg/L (November 2000) at MW-54. Similar to MW-31, MW-54 is downgradient but more distant from the extraction system. Concentrations at MW-54 have consistently shown a decreasing trend

As presented in Figure 14-55, TCE concentrations in recovery wells RW-4 and RW-5 increased during 1999 and showed a decreasing trend during 2000. High concentrations of TCE ranging from 433 to 1,290 µg/L at RW-5 are elevated enough that a relatively high mass (22 97 pounds) of TCE has been removed despite the well's low groundwater yield (currently about 3 to 5 gpm). TCE concentrations in extraction wells RW-8 and RW-9, which are closest to MW-31, range from 56 9 to 273 µg/L and 35 5 to 52 µg/L, respectively; these two recovery wells had the greatest groundwater yield (approximately 15 gpm each) As of December 31, 2000 about 23.38 lbs of TCE had been removed from RW-8 and 7 81 lbs from RW-9.

1,2-Dichloroethene. The distribution of total 1,2-DCE in November 2000 is shown in Figure 14-13 The most significant difference between the distribution of 1,2-DCE in November 2000 and the distribution observed in October 1998 (Figure 14-12) is the reduction in offsite concentrations. Figure 14-60 shows the highest 1,2-DCE decrease in concentration (271.23 µg/L) occurring in well MW-31 Two offsite wells, MW-51 and MW-54, show a slight increasing trend, as does onsite well MW-15, located south of the recovery system near the western boundary of Dunn Field.

Total 1,2-DCE concentrations in recovery wells are variable, as evident in Figure 14-56. Recovery wells RW-5 and RW-8 show oscillating concentrations An increasing trend is evident in the southernmost wells RW-3 and RW-7, while RW-5 shows an overall decreasing trend This variation suggests individual plumes of 1,2-DCE, possibly from TCE degradation, are passing through the extraction system RW-3 and RW-7 have removed similar masses (2.98 and 3 40 pounds, respectively) of total 1,2-DCE

The vicinity of MW-15 is a likely area for potential offsite migration of 1,2-DCE because of constant concentrations observed at this well, averaging approximately 15 µg/L from February 4, 1999 to November 8, 2000.

1,1,2,2-Tetrachloroethane. The distribution of 1,1,2,2-PCA in November 2000 is shown in Figure 14-24. Compared with the distribution observed in January/February 1996 and October 1998, not only has the distribution changed, but also the magnitude of concentration levels has significantly increased (see Figures 14-21 and 14-22, respectively). Within offsite monitoring well MW-31, 1,1,2,2-PCA was detected at 33 µg/L during the October 1998 sampling event, but declined to non-detect levels during the May 1999 sampling event and continued non-detect through November 2000 In contrast to this decline, MW-54, which is downgradient of the extraction well RW-5, had an increase from non-detect (October 1998) to 22.7 µg/L (November 2000) Figure 14-57 shows that the most significant removal of 1,1,2,2-PCA is occurring at RW-5 (> 29 pounds), despite its historically low yield, and RW-8 (>16 pounds) 1,1,2,2-PCA concentrations in RW-05 increased more than 3,120 µg/L from the 4th quarter 1998 to the 1st quarter 2000 sampling events; since February 2000, the concentrations have decreased to non-detect during the November 2000 sampling event Lower recovery of 1,1,2,2-PCA is occurring at RW-3 (2 4 pounds), RW-4 (3 16 pounds), and RW-7 (1.68 pounds), concentration trends for these extraction wells exhibit minor oscillations These data suggest a source of 1,1,2,2-PCA near RW-5, as evidenced in the newly installed well MW-73

Carbon Tetrachloride. The distribution of carbon tetrachloride in the 4th quarter 2000 is shown in Figure 14-29. Most carbon tetrachloride remains present in the southern section of Dunn Field near MW-15 and extends offsite toward the northwest to MW-54. Offsite wells MW-44 and MW-54 have increased by 2 1 and 12.8 µg/L, respectively, from October 1998 to November 2000 (Figure 14-60). Onsite monitoring well MW-15 showed the largest concentration increase of 79.6 µg/L during the May 1999 sampling event and has steadily decreased to a 12.8-µg/L concentration (November 2000).

As shown in Figure 14-58, concentration trends in recovery wells RW-3, RW-4, RW-8, and RW-9 are generally consistent. Based on the pounds recovered per recovery well, there appear to be two separate plumes with one reaching the recovery system at RW-3 and -4 and the other entering the system at RW-8 and -9. Most carbon tetrachloride has been removed from RW-3.

Recovery of carbon tetrachloride in RW-3 suggests partial capture of the carbon tetrachloride plume intersecting MW-15. However, moderately increasing concentrations offsite suggest the capture is not complete and continued offsite migration of carbon tetrachloride is occurring.

Chloroform. The distribution of chloroform in the 4th quarter 2000 is shown in Figure 14-34. Because chloroform is a degradation product of carbon tetrachloride, its distribution is expected to be similar to that of carbon tetrachloride. Figure 14-32 shows carbon tetrachloride predominantly in the central section of the western side of Dunn Field. The distribution is somewhat elongated to the northwest along the groundwater flow pathways. The 4th quarter 2000 distribution of chloroform is similar, with highest concentrations in the south-central section of Dunn Field along the western boundary.

The chloroform concentration at MW-15 increased almost 193 µg/L between October 1998 and November 2000; the largest increase (approximately 1,240 µg/L) occurred during the August 27, 1999 sampling event (Figure 14-60) Downgradient increases of 365 µg/L (March 1998/November 2000) at MW-32 and 14.1 µg/L (October 1998/November 2000) at MW-54 are also significant. These data suggest offsite movement of a chloroform groundwater plume.

Figure 14-59 shows that the extraction system is not intercepting a significant mass of chloroform relative to other VOCs (excluding carbon tetrachloride). Maximum concentrations of chloroform in the northwestern extraction wells (RW-8 and RW-9) do not exceed 16 µg/L. Concentrations in the southernmost extraction well, RW-3, closest to the increasing concentrations at MW-15, are below 6 µg/L and are generally constant. The recovery system is not yet intercepting chloroform that has mobilized in the southern portion of Dunn Field.

14.5.3 Overview of Groundwater Extraction System Performance–Years 1 and 2

Evaluation of groundwater quality and flow parameters after the first 2 years of groundwater extraction led to the following regarding the system's performance and impact on the nature and extent of groundwater contamination at Dunn Field

- Water level elevations decreased in all wells associated with Dunn Field; water level changes ranged from -1.34 feet (MW-41) to -7.13 feet (MW-54). Prior to startup of the extraction system, groundwater fluctuations between June 1997 and November 1998 within monitoring wells 31, 44, and 54 were 1.78, 0.6, and 0.5 feet, respectively. When compared to the decrease in water level elevation per well since system startup, these pre-system fluctuations are less But, a conclusion cannot be substantiated as to the effect of the recovery system on fluvial aquifer de-watering because of rainfall amounts pre- and post-system activation. To understand the influence of the recovery system on the fluvial aquifer, a shorter time period would have to be used in order to negate groundwater fluctuations based on precipitation.

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- Potentiometric surface contours suggest groundwater is captured in the immediate vicinity of each recovery well. However, capture zones are not completely connected between RW-01 to RW-1A, RW-02 to RW-03, RW-03 to RW-04, RW-04 to RW-05, and RW-06 to RW-07. Therefore, areas between these recovery wells could allow contaminates to pass through the recovery system.

- PCE, TCE, and 1,1,2,2-PCA concentrations in offsite monitoring wells near the northwest corner of the extraction system have dropped by factors of 7 to 10 from pre-extraction concentrations. This demonstrates significant reductions in offsite flux of VOCs in the northwest portion of Dunn Field Although concentrations have decreased in the northwest portion, concentrations of TCE and 1,1,2,2-PCA have increased near the west-central part of Dunn Field. These concentration increases in downgradient monitoring wells indicate significant portions of the west-central plumes are beyond the influence of the capture zone from the extraction system.

Tables

Table 14-1
Analyses Performed on Groundwater
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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
HY10	HY105B	11/04/1998												X	
HY10	HY105BFD	11/04/1998												X	
MW-02	MW021	02/12/1996					X							X	
MW-02	MW022	06/21/1997					X							X	
MW-02	MW022DUP	06/21/1997												X	
MW-02	MW023	09/26/1997					X							X	
MW-02	MW023DUP	09/26/1997												X	
MW-02	MW024	03/27/1998					X							X	
MW-02	MW024D	03/27/1998												X	
MW-02	MW025	10/15/1998					X							X	
MW-02	MW025FD	10/15/1998												X	
MW-03	MW032	06/21/1997			X		X							X	
MW-03	MW033	09/27/1997			X		X							X	
MW-03	MW034	03/27/1998			X		X							X	
MW-03	MW035	10/15/1998			X		X							X	
MW-04	MW041	02/12/1996					X							X	
MW-04	MW042	06/20/1997					X							X	
MW-04	MW043	09/25/1997			X		X							X	
MW-04	MW044	03/28/1998					X							X	
MW-04	MW045	10/15/1998					X							X	
MW-05	MW051	02/12/1996			X	X	X		X		X			X	
MW-05	MW052	06/21/1997			X		X				X			X	
MW-05	MW053	09/27/1997			X		X				X			X	
MW-05	MW054	03/28/1998			X		X				X			X	
MW-05	MW055	10/15/1998			X		X				X			X	
MW-06	MW062	06/21/1997			X		X				X			X	
MW-06	MW063	09/27/1997			X		X				X			X	
MW-06	MW064	03/30/1998					X							X	
MW-06	MW065	10/15/1998					X				X			X	
MW-06	MW61	02/12/1996			X		X				X			X	
MW-07	MW072	06/21/1997					X				X			X	
MW-07	MW073	09/27/1997					X				X			X	
MW-07	MW074	04/02/1998					X				X			X	
MW-07	MW075	10/14/1998					X				X			X	
MW-07	MW71	02/12/1996				X	X		X		X			X	
MW-08	MW081	02/13/1996			X		X							X	
MW-08	MW082	06/21/1997			X		X				X			X	
MW-08	MW083	09/26/1997			X		X				X			X	
MW-08	MW084	03/30/1998			X		X				X			X	

Table 14-1
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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-08	MW085	10/13/1998			X		X				X			X	
MW-09	MT-082698-MW9	08/26/1998	X				X					X			X
MW-09	MW092	06/20/1997					X							X	
MW-09	MW093	09/26/1997					X							X	
MW-09	MW094	03/26/1998					X							X	
MW-09	MW095	10/14/1998					X							X	
MW-09	MW91	02/11/1996					X							X	
MW-10	MW101	02/13/1996				X	X		X		X			X	
MW-10	MW102	06/21/1997					X							X	
MW-10	MW103	09/26/1997			X		X							X	
MW-10	MW104	03/28/1998			X		X							X	
MW-10	MW105	10/14/1998			X		X							X	
MW-11	MW111	02/12/1996			X		X							X	
MW-11	MW112	06/21/1997			X		X							X	
MW-11	MW113	09/27/1997			X		X							X	
MW-11	MW114	03/28/1998			X		X							X	
MW-11	MW115	10/15/1998			X		X							X	
MW-12	MW121	02/13/1996					X							X	
MW-12	MW122	06/21/1997					X							X	
MW-12	MW123	09/27/1997					X							X	
MW-12	MW124	03/30/1998					X							X	
MW-12	MW124B	03/30/1998												X	
MW-12	MW125	10/14/1998					X							X	
MW-12	MW125-B	10/14/1998												X	
MW-13	13-77.3FT	01/08/2001												X	
MW-13	MW13-79.5FT	01/08/2001												X	
MW-13	MW131	02/12/1996			X		X				X			X	
MW-13	MW132	06/20/1997			X		X				X			X	
MW-13	MW132DUP	06/20/1997									X				
MW-13	MW133	09/26/1997			X		X				X			X	
MW-13	MW133DUP	09/26/1997									X				
MW-13	MW134	03/26/1998			X		X				X			X	
MW-13	MW134D	03/26/1998									X				
MW-13	MW135	10/15/1998			X		X				X			X	
MW-13	MW135FD	10/15/1998									X				
MW-14	MT-082698-MW1	08/26/1998	X				X					X			X
MW-14	MW-14	05/18/2000												X	
MW-14	MW-14-Y2Q1	02/16/2000												X	
MW-14	MW-14-Y2Q3	08/24/2000												X	

Table 14-1
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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-14	MW-14-Y2Q4	11/06/2000			X		X				X			X	
MW-14	MW141	02/11/1996			X	X	X		X		X			X	
MW-14	MW142	06/18/1997			X		X				X			X	
MW-14	MW142DUP	06/18/1997					X								
MW-14	MW143	09/24/1997			X		X				X			X	
MW-14	MW143DUP	09/24/1997					X								
MW-14	MW144	03/25/1998			X		X				X			X	
MW-14	MW144D	03/25/1998					X								
MW-14	MW145	10/15/1998			X		X				X			X	
MW-14	MW145FD	10/15/1998					X								
MW-15	MW-15	05/17/2000												X	
MW-15	MW-15-Y1Q1	02/03/1999												X	
MW-15	MW-15-Y1Q2	05/25/1999									X			X	
MW-15	MW-15-Y1Q3	08/27/1999												X	
MW-15	MW-15-Y1Q4	11/03/1999					X				X			X	
MW-15	MW-15-Y2Q1	02/15/2000												X	
MW-15	MW-15-Y2Q3	08/22/2000												X	
MW-15	MW-15-Y2Q4	11/07/2000			X		X				X			X	
MW-15	MW151	02/07/1996					X							X	
MW-15	MW152	06/20/1997					X							X	
MW-15	MW153	09/26/1997					X							X	
MW-15	MW154	03/28/1998					X							X	
MW-15	MW155	10/15/1998					X							X	
MW-15	MW15NA	03/24/2000			X									X	
MW-28	MW281	02/07/1996				X	X		X		X			X	
MW-28	MW282	06/17/1997					X				X				
MW-28	MW283	09/23/1997									X				
MW-28	MW283ADD	09/23/1997					X								
MW-28	MW284	03/24/1998					X				X				
MW-28	MW285	10/14/1998					X				X				
MW-29	MW291	02/11/1996					X							X	
MW-29	MW292	06/20/1997					X				X			X	
MW-29	MW293	09/26/1997					X				X			X	
MW-29	MW294	03/28/1998					X				X			X	
MW-29	MW295	10/14/1998					X				X			X	
MW-30	MW-30	05/16/2000												X	
MW-30	MW-30-Y1Q1	02/02/1999												X	
MW-30	MW-30-Y1Q2	05/24/1999									X			X	
MW-30	MW-30-Y1Q3	08/26/1999												X	

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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-30	MW-30-Y1Q4	11/02/1999					X				X			X	
MW-30	MW-30-Y2Q1	02/15/2000												X	
MW-30	MW-30-Y2Q3	08/22/2000												X	
MW-30	MW-30-Y2Q4	11/07/2000			X		X				X			X	
MW-30	MW301	02/07/1996				X	X		X		X			X	
MW-30	MW302	06/17/1997					X				X			X	
MW-30	MW303	09/24/1997			X		X				X			X	
MW-30	MW304	03/24/1998		X	X		X				X			X	
MW-30	MW305	10/16/1998		X	X		X				X			X	
MW-31	MW-31	05/17/2000												X	
MW-31	MW-31-Y1Q1	02/03/1999												X	
MW-31	MW-31-Y1Q2	05/25/1999									X			X	
MW-31	MW-31-Y1Q3	08/27/1999												X	
MW-31	MW-31-Y1Q4	11/03/1999					X				X			X	
MW-31	MW-31-Y2Q1	02/15/2000												X	
MW-31	MW-31-Y2Q3	08/23/2000												X	
MW-31	MW-31-Y2Q4	11/07/2000			X		X				X			X	
MW-31	MW311	02/12/1996					X				X			X	
MW-31	MW311A	02/12/1996					X				X			X	
MW-31	MW312	06/20/1997					X				X			X	
MW-31	MW313	09/23/1997			X		X				X				
MW-31	MW313ADD	09/24/1997			X									X	
MW-31	MW314	03/24/1998		X	X		X				X			X	
MW-31	MW315	10/15/1998		X	X		X				X			X	
MW-31	MW31NA	03/23/2000			X									X	
MW-32	MW-32	05/16/2000												X	
MW-32	MW-32-Y1Q1	02/03/1999												X	
MW-32	MW-32-Y1Q2	05/25/1999									X			X	
MW-32	MW-32-Y1Q3	08/26/1999												X	
MW-32	MW-32-Y1Q4	11/03/1999					X				X			X	
MW-32	MW-32-Y2Q1	02/15/2000												X	
MW-32	MW-32-Y2Q3	08/24/2000												X	
MW-32	MW-32-Y2Q4	11/09/2000			X		X				X			X	
MW-32	MW321	02/06/1996			X		X						X	X	
MW-32	MW322	06/21/1997			X		X							X	
MW-32	MW323	09/29/1997			X		X							X	
MW-32	MW324	03/27/1998		X	X		X							X	
MW-33	MW-33	05/16/2000												X	
MW-33	MW-33-Y1Q1	02/02/1999												X	

Table 14-1
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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-33	MW-33-Y1Q2	05/25/1999									X			X	
MW-33	MW-33-Y1Q3	08/26/1999												X	
MW-33	MW-33-Y1Q4	11/02/1999					X				X			X	
MW-33	MW-33-Y2Q1	02/15/2000												X	
MW-33	MW-33-Y2Q3	08/22/2000												X	
MW-33	MW-33-Y2Q4	11/08/2000			X		X				X			X	
MW-33	MW331	02/08/1996					X							X	
MW-33	MW332	06/18/1997					X							X	
MW-33	MW333	09/25/1997					X							X	
MW-33	MW334	03/25/1998		X			X							X	
MW-33	MW335	10/16/1998		X			X							X	
MW-33A	MW-33A-Y2Q1	02/15/2000												X	
MW-34	MW-34	05/18/2000												X	
MW-34	MW-34-Y1Q1	02/04/1999												X	
MW-34	MW-34-Y1Q2	05/25/1999									X			X	
MW-34	MW-34-Y1Q3	08/27/1999												X	
MW-34	MW-34-Y1Q4	11/03/1999					X				X			X	
MW-34	MW-34-Y2Q1	02/16/2000												X	
MW-34	MW-34-Y2Q3	08/24/2000												X	
MW-34	MW-34-Y2Q4	11/07/2000			X		X				X			X	
MW-34	MW341	02/09/1996			X	X	X		X		X			X	
MW-34	MW342	06/19/1997			X		X				X			X	
MW-34	MW342DUP	06/19/1997												X	
MW-34	MW343	09/26/1997			X		X				X			X	
MW-34	MW343DUP	09/26/1997												X	
MW-34	MW344	03/27/1998			X		X				X			X	
MW-34	MW344D	03/27/1998												X	
MW-35	MW351	02/13/1996				X	X		X		X			X	
MW-35	MW352	06/21/1997					X				X			X	
MW-35	MW352DUP	06/21/1997					X				X			X	
MW-35	MW353	09/27/1997			X		X				X			X	
MW-35	MW353DUP	09/27/1997					X				X			X	
MW-35	MW354	03/30/1998			X		X				X			X	
MW-35	MW354D	03/30/1998					X				X			X	
MW-35	MW355	10/14/1998			X		X				X			X	
MW-35	MW355-B	10/14/1998												X	
MW-35	MW355FD	10/14/1998					X				X			X	
MW-35	MW35NA	03/24/2000			X									X	
MW-36	MW361	02/09/1996			X		X								

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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-36	MW362	06/19/1997			X		X				X			X	
MW-36	MW362DUP	06/19/1997					X								
MW-36	MW363	09/24/1997					X				X			X	
MW-36	MW365	10/13/1998					X				X			X	
MW-36	MW365FD	10/13/1998					X								
MW-37	MW371	02/09/1996			X		X						X		
MW-37	MW372	06/18/1997			X		X				X			X	
MW-37	MW373	09/29/1996			X		X				X			X	
MW-37	MW374	03/27/1998			X		X				X			X	
MW-40	MW-40	05/16/2000												X	
MW-40	MW-40-Y1Q1	02/02/1999												X	
MW-40	MW-40-Y1Q2	05/24/1999									X			X	
MW-40	MW-40-Y1Q3	08/26/1999												X	
MW-40	MW-40-Y1Q4	11/02/1999					X				X			X	
MW-40	MW-40-Y2Q1	02/15/2000												X	
MW-40	MW-40-Y2Q3	08/23/2000												X	
MW-40	MW-40-Y2Q4	11/08/2000			X		X				X			X	
MW-40	MW40	01/15/1996					X							X	
MW-40	MW40011596	01/15/1996					X							X	
MW-40	MW402	06/19/1997					X							X	
MW-40	MW403	09/26/1997			X		X							X	
MW-40	MW404	03/28/1998		X	X		X							X	
MW-40	MW405	10/19/1998		X	X		X							X	
MW-40	MW40A	01/15/1996					X							X	
MW-40	MW40NA	03/22/2000			X									X	
MW-41	MW41011796	01/17/1996												X	
MW-41	MW412	06/17/1997					X							X	
MW-41	MW413	09/27/1997					X							X	
MW-41	MW414	03/25/1998		X			X							X	
MW-41	MW415	10/16/1998		X			X							X	
MW-42	MW42-59FEET	02/15/2001												X	
MW-42	MW42011996	01/19/1996					X							X	
MW-42	MW422	06/21/1997					X							X	
MW-42	MW422DUP	06/21/1997					X								
MW-42	MW423	09/27/1997					X							X	
MW-42	MW423DUP	09/27/1997					X								
MW-42	MW424	03/27/1998		X			X							X	
MW-42	MW424D	03/27/1998					X								
MW-42	MW425	10/17/1998		X			X							X	

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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-42	MW425FD	10/17/1998					X								
MW-43	MW431_45	10/21/1998												X	
MW-43	MW435	10/23/1998			X		X							X	
MW-43	MW435B	10/24/1998												X	
MW-43	MW435U	11/08/1998		X			X				X			X	
MW-44	MW-44	05/16/2000												X	
MW-44	MW-44-Y1Q1	02/02/1999												X	
MW-44	MW-44-Y1Q2	05/25/1999									X			X	
MW-44	MW-44-Y1Q3	08/26/1999												X	
MW-44	MW-44-Y1Q4	11/02/1999					X				X			X	
MW-44	MW-44-Y2Q1	02/15/2000												X	
MW-44	MW-44-Y2Q3	08/24/2000												X	
MW-44	MW-44-Y2Q4	11/08/2000			X		X				X			X	
MW-44	MW44011996	01/19/1996					X							X	
MW-44	MW442	06/20/1997					X				X			X	
MW-44	MW442DUP	06/20/1997												X	
MW-44	MW443	09/25/1997					X				X			X	
MW-44	MW443DUP	09/25/1997												X	
MW-44	MW444	03/27/1998		X			X				X			X	
MW-44	MW444D	03/27/1998												X	
MW-44	MW445	10/17/1998		X			X				X			X	
MW-44	MW445FD	10/17/1998												X	
MW-45	MW451	02/08/1996				X	X		X		X			X	
MW-45	MW452	06/20/1997					X				X			X	
MW-45	MW452DUP	06/20/1997												X	
MW-45	MW453	09/25/1997					X				X			X	
MW-45	MW453DUP	09/25/1997												X	
MW-45	MW454	03/27/1998					X				X			X	
MW-45	MW454D	03/27/1998												X	
MW-45	MW455	10/16/1998					X				X			X	
MW-45	MW455FD	10/16/1998												X	
MW-46	MW461	02/09/1996				X	X		X		X			X	
MW-46	MW462	06/17/1997					X				X			X	
MW-46	MW463	09/23/1997					X				X			X	
MW-46	MW464	03/25/1998					X				X			X	
MW-46	MW465	10/13/1998					X				X			X	
MW-46	MW46NA	03/23/2000			X									X	
MW-49	MW491	02/09/1996				X	X		X		X			X	
MW-49	MW492	06/17/1997					X				X			X	

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Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-49	MW493	09/24/1997					X				X			X	
MW-49	MW494	03/25/1998					X				X			X	
MW-49	MW495	10/15/1998					X				X			X	
MW-51	MW-51	05/16/2000												X	
MW-51	MW-51-Y1Q1	02/02/1999												X	
MW-51	MW-51-Y1Q2	05/24/1999									X			X	
MW-51	MW-51-Y1Q3	08/26/1999												X	
MW-51	MW-51-Y1Q4	11/03/1999					X				X			X	
MW-51	MW-51-Y2Q1	02/15/2000												X	
MW-51	MW-51-Y2Q3	08/24/2000												X	
MW-51	MW-51-Y2Q4	11/08/2000			X		X				X			X	
MW-51	MW511	02/08/1996				X	X		X		X			X	
MW-51	MW511A	02/08/1996				X	X		X		X			X	
MW-51	MW512	06/20/1997					X				X			X	
MW-51	MW513	09/27/1997					X				X			X	
MW-51	MW514	03/28/1998		X			X				X			X	
MW-51	MW515	10/19/1998		X			X				X			X	
MW-54	MW-54	05/17/2000												X	
MW-54	MW-54-Y1Q1	02/03/1999												X	
MW-54	MW-54-Y1Q2	05/25/1999									X			X	
MW-54	MW-54-Y1Q3	08/26/1999												X	
MW-54	MW-54-Y1Q4	11/03/1999					X				X			X	
MW-54	MW-54-Y2Q1	02/15/2000												X	
MW-54	MW-54-Y2Q3	08/22/2000												X	
MW-54	MW-54-Y2Q4	11/07/2000			X		X				X			X	
MW-54	MW-54A-Y2Q4	11/07/2000			X		X				X			X	
MW-54	MW541	02/13/1996				X	X		X		X			X	
MW-54	MW541A	02/13/1996				X	X		X		X			X	
MW-54	MW542	06/20/1997					X				X			X	
MW-54	MW542DUP	06/20/1997									X				
MW-54	MW543	09/25/1997					X				X			X	
MW-54	MW543DUP	09/25/1997									X				
MW-54	MW544	03/28/1998		X			X				X			X	
MW-54	MW544D	03/28/1998									X				
MW-54	MW545	10/16/1998		X			X				X			X	
MW-54	MW545FD	10/16/1998									X				
MW-54	MW54NA	03/23/2000			X									X	
MW-56	IT-082698-MW5	08/26/1998	X				X					X		X	X
MW-56	DJA223	03/15/1999					X	X		X	X			X	

Table 14-1
Analyses Performed on Groundwater
Rev. 1 Memphis Depot Dunn Field RI

Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-56	MW-56	05/17/2000												X	
MW-56	MW-56-Y2Q1	02/16/2000												X	
MW-56	MW-56-Y2Q3	08/22/2000												X	
MW-56	MW-56-Y2Q4	11/07/2000			X		X				X			X	
MW-57	IT-082798-MW5	08/27/1998	X				X					X			X
MW-57	IT-082798-MW7	08/27/1998	X				X					X			X
MW-57	DJA224	03/15/1999					X	X		X	X			X	
MW-57	MW-57	05/17/2000												X	
MW-57	MW-57-Y2Q1	02/16/2000												X	
MW-57	MW-57-Y2Q3	08/22/2000												X	
MW-57	MW-57-Y2Q4	11/07/2000			X		X				X			X	
MW-58	IT-082698-MW5	08/26/1998	X				X					X			X
MW-58	DJA225	03/15/1999					X	X		X	X			X	
MW-58	MW-58	05/17/2000												X	
MW-58	MW-58-Y2Q1	02/16/2000												X	
MW-58	MW-58-Y2Q3	08/22/2000												X	
MW-58	MW-58-Y2Q4	11/07/2000			X		X				X			X	
MW-58A	MW-58A-Y2Q1	02/16/2000												X	
MW-59	IT-082798-MW5	08/27/1998	X				X					X			X
MW-59	DJA226	03/15/1999					X	X		X	X			X	
MW-59	MW-59	05/17/2000												X	
MW-59	MW-59-Y2Q1	02/16/2000												X	
MW-59	MW-59-Y2Q3	08/22/2000												X	
MW-59	MW-59-Y2Q4	11/08/2000			X		X				X			X	
MW-60	IT-082798-MW6	08/27/1998	X				X					X			X
MW-60	IT-082798-MW7	08/27/1998	X				X					X			X
MW-60	DJA227	03/15/1999					X	X		X	X			X	
MW-61	IT-082798-MW6	08/27/1998	X				X					X			X
MW-61	DJA048FD	03/15/1999					X	X		X	X			X	
MW-61	DJA228	03/15/1999					X	X		X	X			X	
MW-62	MW62NA	03/23/2000			X									X	
MW-65	MW655	11/11/1998			X		X				X			X	
MW-67	MW-67-Y2Q1	02/16/2000												X	
MW-68	MW-68-Y2Q3	08/23/2000												X	
MW-68	MW-68-Y2Q4	11/08/2000			X		X				X			X	
MW-68	MW-68B	05/18/2000												X	
MW-69	MW-69	05/18/2000												X	
MW-69	MW-69-Y2Q1	02/16/2000												X	
MW-69	MW-69-Y2Q3	08/24/2000												X	

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Table 14-1
Analyses Performed on Groundwater
Rev 1 Memphis Depot Dunn Field RI

Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-69	MW-69-Y2Q4	11/09/2000			X		X				X			X	
MW-69	MW69-88.2FT	01/08/2001												X	
MW-69	MW69-94.2FT	01/08/2001												X	
MW-70	MW-70 Bottom	05/18/2000												X	
MW-70	MW-70-Top	05/18/2000												X	
MW-70	MW-70-Y2Q1	02/15/2000												X	
MW-70	MW-70-Y2Q3	08/24/2000												X	
MW-70	MW-70-Y2Q4	11/10/2000			X		X				X			X	
MW-70	MW70-86.3FT	01/08/2001												X	
MW-70	MW70-89.5FT	01/08/2001												X	
MW-70	MW70-93FT	01/08/2001												X	
MW-70	MW70NA	03/24/2000			X									X	
MW-70	RW20-80FT	01/08/2001												X	
MW-71	MW-71	05/18/2000												X	
MW-71	MW-71-Y2Q1	02/15/2000												X	
MW-71	MW-71-Y2Q3	08/23/2000												X	
MW-71	MW-71-Y2Q4	11/09/2000			X		X				X			X	
MW-71	MW71NA	03/24/2000			X									X	
MW-72	MW-72	10/07/1999												X	
MW-72	MW-72NA	03/21/2000			X									X	
MW-73	MW73-80.6FT	01/08/2001												X	
MW-73	MW73-84.5FT	01/08/2001												X	
MW-73	MW73-88FT	01/08/2001												X	
MW-73	MW73-92FT	01/08/2001												X	
MW-73	RW69-69 5FT	01/08/2001												X	
MW-74	MW74-83.3FT	01/08/2001												X	
MW-74	MW74-86.5FT	01/08/2001												X	
MW-74	MW74-90FT	01/08/2001												X	
MW-75	MW75-83.3FT	01/08/2001												X	
MW-75	MW75-87FT	01/08/2001												X	
MW-75	MW75-91FT	01/08/2001												X	
MW-75	RW11-60FT	01/08/2001												X	
MW-76	MW76-88.7FT	01/08/2001												X	
MW-76	MW76-91.7FT	01/08/2001												X	
MW-77	MW77-85FT	01/08/2001												X	
MW-77	MW77-87.5FT	01/08/2001												X	
MW-79	MW201-64FEET	02/15/2001												X	
MW-79	MW79-100 5FT	02/15/2001												X	
MW-79	MW79-86.1FT	02/15/2001												X	

Table 14-1
Analyses Performed on Groundwater
Rev 1 Memphis Depot Dunn Field RI

Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
MW-79	MW79-91.3FT	02/15/2001												X	
MW-79	MW79-96FEET	02/15/2001												X	
MW-80	MW80-65.3FT	02/15/2001												X	
MW-80	MW80-68.5FT	02/15/2001												X	
MW-80	MW80-71.5FT	02/15/2001												X	
MW-87	MW87-73.6FT	01/08/2001												X	
MW-87	MW87-76 8FT	01/08/2001												X	
MW-87	MW87-80.3FT	01/08/2001												X	
PT92997	PT92997	09/29/1997					X				X			X	
PZ02	HY125B	10/28/1998												X	
RW-01	RW-01	05/17/2000												X	
RW-01	RW-01-Y2Q1	02/16/2000												X	
RW-01	RW-01-Y2Q3	08/23/2000												X	
RW-01	RW-01-Y2Q4	11/09/2000			X		X				X			X	
RW-02	RW-02	05/17/2000												X	
RW-02	RW-02-Y2Q1	02/16/2000												X	
RW-02	RW-02-Y2Q4	11/10/2000			X		X				X			X	
RW-02	RW-2-Y2Q3	08/23/2000												X	
RW-03	RW-03	05/18/2000												X	
RW-03	RW-03-Y1Q2	05/24/1999												X	
RW-03	RW-03-Y2Q3	08/24/2000												X	
RW-03	RW-03-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-03	RW-3-Y1Q3	08/27/1999												X	
RW-03	RW-3-Y1Q4	11/01/1999					X	X			X			X	
RW-03	RW-3-Y2Q1	02/14/2000												X	
RW-03P	RW-3P-Y1Q1	02/05/1999												X	
RW-04	RW-04	05/15/2000												X	
RW-04	RW-04-Y1Q2	05/24/1999												X	
RW-04	RW-04-Y2Q3	08/24/2000												X	
RW-04	RW-04-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-04	RW-4-Y1Q3	08/27/1999												X	
RW-04	RW-4-Y1Q4	11/01/1999					X	X			X			X	
RW-04	RW-4-Y2Q1	02/14/2000												X	
RW-04P	RW-4P-Y1Q1	02/05/1999												X	
RW-05	RW-05-Y1Q2	05/24/1999												X	
RW-05	RW-05-Y2Q3	08/24/2000												X	
RW-05	RW-05-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-05	RW-5-Y1Q3	08/27/1999												X	
RW-05	RW-5-Y1Q4	11/01/1999					X	X			X			X	

Table 14-1
Analyses Performed on Groundwater
Rev. 1 Memphis Depot Dunn Field RI

Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
RW-05	RW-5-Y2Q1	02/14/2000												X	
RW-05	RW5-Y1Q1	02/01/1999												X	
RW-05P	RW-5P-Y1Q1	02/05/1999												X	
RW-06	RW-06	05/15/2000												X	
RW-06	RW-06-Y1Q2	05/24/1999												X	
RW-06	RW-06-Y2Q3	08/24/2000												X	
RW-06	RW-06-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-06	RW-6-Y1Q1	02/04/1999												X	
RW-06	RW-6-Y1Q3	08/27/1999												X	
RW-06	RW-6-Y1Q4	11/01/1999					X	X			X			X	
RW-06	RW-6-Y2Q1	02/14/2000												X	
RW-06P	RW-6P-Y1Q1	02/05/1999												X	
RW-07	RW-07	05/15/2000												X	
RW-07	RW-07-Y1Q2	05/24/1999												X	
RW-07	RW-07-Y2Q3	08/24/2000												X	
RW-07	RW-07-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-07	RW-7-Y1Q1	02/04/1999												X	
RW-07	RW-7-Y1Q3	08/27/1999												X	
RW-07	RW-7-Y1Q4	11/01/1999					X	X			X			X	
RW-07	RW-7-Y2Q1	02/14/2000												X	
RW-07P	RW-7P-Y1Q1	02/05/1999												X	
RW-08	RW-08	05/15/2000												X	
RW-08	RW-08-Y1Q2	05/24/1999												X	
RW-08	RW-08-Y2Q3	08/24/2000												X	
RW-08	RW-08-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-08	RW-8-Y1Q1	02/04/1999												X	
RW-08	RW-8-Y1Q3	08/27/1999												X	
RW-08	RW-8-Y1Q4	11/01/1999					X	X			X			X	
RW-08	RW-8-Y2Q1	02/14/2000												X	
RW-08A	RW-8A-Y2Q1	02/14/2000												X	
RW-08P	RW-8P-Y1Q1	02/05/1999												X	
RW-09	RW-09	05/15/2000												X	
RW-09	RW-09-Y1Q2	05/24/1999												X	
RW-09	RW-09-Y2Q3	08/24/2000												X	
RW-09	RW-09-Y2Q4	11/20/2000			X	X	X	X			X			X	
RW-09	RW-9-Y1Q3	08/27/1999												X	
RW-09	RW-9-Y1Q4	11/01/1999					X	X			X			X	
RW-09	RW-9-Y2Q1	02/14/2000												X	
RW-09P	RW-9P-Y1Q1	02/05/1999												X	

Table 14-1
Analyses Performed on Groundwater
Rev. 1 Memphis Depot Dunn Field RI

Well/ Hydropunch/ Piezometer	Sample Number	Date Collected	Explosives	Gases	General Chemistry	Herbicides	Metals, Total	OC Pesticides	OC Pesticides/PCBs	PCBs	Semivolatiles	Thiodiglycol	Tritium	Volatiles	1,4-Oxathiane & 1,4-Dithiane
RW-1A	RW-1A	05/17/2000												X	
RW-1A	RW-1A-Y1Q2	05/24/1999												X	
RW-1A	RW-1A-Y1Q3	08/27/1999												X	
RW-1A	RW-1A-Y1Q4	11/01/1999					X	X			X			X	
RW-1A	RW-1A-Y2Q1	02/15/2000												X	
RW-1A	RW-1A-Y2Q3	08/23/2000												X	
RW-1A	RW-1A-Y2Q4	11/09/2000			X		X				X			X	
RW-1B	RW-1B	05/17/2000												X	
RW-1B	RW-1B-Y2Q1	02/16/2000												X	
RW-1B	RW-1B-Y2Q3	08/23/2000												X	
RW-1B	RW-1B-Y2Q4	11/09/2000			X		X				X			X	
RW-22	RW-22	05/15/2000												X	

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		FIELDQC	FIELDQC	FIELDQC	FIELDQC	FIELDQC	HY10	HY10	MW-02
Sample Number ==>		ST-EFF-026	ST-EFF-027	ST-EFF-029	ST-EFF-030	ST-EFF-031	HY105B	HY105BFD	MW021
Date Collected ==>		7/13/2000	8/11/2000	10/18/2000	11/21/2000	12/20/2000	11/4/1998	11/4/1998	2/12/1996
Time Collected ==>		12 50	11 10	14 45	15 00	15 00	10.30	10-30	0 00
Sample Type ==>		N	N	N	N	N	N	FD	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>									
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.00052 J	0.01 U	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.052 =	0.0427 =	0.0613 U	0.0297 =	0.001 U	0.01 U	0.01 U	0.01 U
1,1,2-TRICHLOROETHANE	MG/L	0.000699 J	0.00086 J	0.001 U	0.00105 =	0.001 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.00051 J	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.015 =	0.0132 =	0.0188 U	0.0167 =	0.0146 =	0.01 U	0.01 U	0.007 J
1,2-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U
ACETONE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.01 UJ	0.01 UJ	0.01 U
BENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
BROMOFORM	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
BROMOMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CARBON DISULFIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.0012 =	0.00182 =	0.00157 U	0.00182 =	0.001 U	0.01 U	0.01 U	0.01 U
CHLOROBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.00892 =	0.00796 =	0.00969 U	0.00788 =	0.00715 =	0.01 U	0.01 U	0.008 J
CHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.0544 =	0.0445 =	0.0557 U	0.0437 =	0.0146 =			
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L				0.001 U	0.001 U			
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U					
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U
METHYLENE CHLORIDE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U					
STYRENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.0138 =	0.0138 =	0.0159 U	0.0183 =	0.0207 =	0.01 U	0.01 U	0.022 =
TOLUENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L						0.01 U	0.01 U	0.01 =
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L	0.0159 =	0.0116 =	0.016 U	0.0111 =	0.00361 =			
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	0.123 =	0.148 =	0.101 U	0.0993 =	0.0576 =	0.01 U	0.01 U	0.026 =
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U			
VINYL CHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
XYLENES, TOTAL	MG/L						0.01 U	0.01 U	0.01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02
Sample Number ==>		MW022	MW022DUP	MW023	MW023DUP	MW024	MW024D	MW025	MW025FD
Date Collected ==>		6/21/1997	6/21/1997	9/26/1997	9/26/1997	3/27/1998	3/27/1998	10/15/1998	10/15/1998
Time Collected ==>		10 15	10 15	14 10	14 10	14 40	14.40	8 15	8 15
Sample Type ==>		N	FD	N	FD	N	FD	N	FD
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>									
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.002 J	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0.01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0.01 U	0.01 U	0 01 U
ACETONE	MG/L	0 01 U	0 013 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 UJ	0 01 UJ
BENZENE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOMETHANE	MG/L	0 01 U	0.01 U	0 01 U	0.01 U	0 01 UJ	0 01 U	0 01 U	0.01 U
CARBON DISULFIDE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
CHLOROMETHANE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L								
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0 01 U	0 002 J	0.01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0.043 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L								
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
TOLUENE	MG/L	0 01 U	0 002 J	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L								
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L	0 01 U	0 009 J	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-03	MW-03	MW-03	MW-03	MW-04	MW-04	MW-04	MW-04	MW-04
Sample Number ==>		MW032	MW033	MW034	MW035	MW041	MW042	MW043	MW044	MW045
Date Collected ==>		6/21/1997	9/27/1997	3/27/1998	10/15/1998	2/12/1996	6/20/1997	9/25/1997	3/28/1998	10/15/1998
Time Collected ==>		9.30	11.45	15.47	13.30	0.00	10.40	9.55	16.30	11.50
Sample Type ==>		N	N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23	23
Parameter Name	**Units**									
1,1,1-TRICHLOROETHANE	MG/L	0.001 J	0.001 J	0.001 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.033 =	0.01 U	0.01 U	0.001 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.015 =	0.017 =	0.025 =	0.01 =	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
2-CHLOROETHYL VINYL ETHER	MG/L									
2-HEXANONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
ACETONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 UJ
BENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.002 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.017 =	0.002 J	0.009 J	0.002 J	0.01 U	0.001 J	0.01 U	0.01 U	0.001 J
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L									
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
DICHLORODIFLUOROMETHANE	MG/L									
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L									
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L									
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L									
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L									
STYRENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.033 =	0.04 =	0.038 =	0.029 =	0.012 =	0.074 =	0.078 =	0.072 =	0.12 =
TOLUENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.012 =	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TOTAL DICHLOROBENZENES	MG/L									
trans-1,2-DICHLOROETHENE	MG/L									
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	0.033 =	0.017 =	0.018 =	0.016 =	0.01 U	0.002 J	0.003 J	0.003 J	0.004 J
TRICHLOROFLUOROMETHANE	MG/L									
VINYL ACETATE	MG/L									
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 669

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-05	MW-05	MW-05	MW-05	MW-05	MW-06	MW-06	MW-06	MW-06
Sample Number ==>		MW051	MW052	MW053	MW054	MW055	MW062	MW063	MW064	MW065
Date Collected ==>		2/12/1996	6/21/1997	9/27/1997	3/28/1998	10/15/1998	6/21/1997	9/27/1997	3/30/1998	10/15/1998
Time Collected ==>		0:00	11:25	13:25	12:10	11:30	14:30	13:15	11:00	11:20
Sample Type ==>		N	N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23	23
Parameter Name	Units									
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.11 =	0.22 =	0.13 =	0.22 =
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.007 J	0.009 J	0.005 J	0.008 J
1,1-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
2-CHLOROETHYL VINYL ETHER	MG/L									
2-HEXANONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
ACETONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 UJ	0.02 U	0.02 U	0.01 UJ	0.02 UJ
BENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.045 =	0.037 =	0.015 =	0.023 =
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
CHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
CHLOROFORM	MG/L	0.005 J	0.005 J	0.005 J	0.003 J	0.003 J	0.016 J	0.014 J	0.006 J	0.01 J
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
cis-1,2-DICHLOROETHYLENE	MG/L									
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
DICHLORODIFLUOROMETHANE	MG/L									
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L									
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L									
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 UJ	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L									
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L									
STYRENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.096 =	0.048 =	0.089 =	0.065 =	0.07 =	0.004 J	0.003 J	0.001 J	0.002 J
TOLUENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.002 J	0.002 J	0.002 J	0.01 U	0.001 J	0.41 =	0.38 =	0.15 =	0.27 =
TOTAL DICHLOROBENZENES	MG/L									
trans-1,2-DICHLOROETHENE	MG/L									
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
TRICHLOROETHYLENE (TCE)	MG/L	0.014 =	0.008 J	0.014 =	0.005 J	0.008 J	0.26 =	0.24 =	0.094 =	0.16 =
TRICHLOROFLUOROMETHANE	MG/L									
VINYL ACETATE	MG/L									
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.01 U	0.02 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-06	MW-07	MW-07	MW-07	MW-07	MW-07	MW-08	MW-08	MW-08
Sample Number ==>		MW61	MW072	MW073	MW074	MW075	MW71	MW081	MW082	MW083
Date Collected ==>		2/12/1996	6/21/1997	9/27/1997	4/2/1998	10/14/1998	2/12/1996	2/13/1996	6/21/1997	9/26/1997
Time Collected ==>		0 00	10 30	10 30	7 32	16 20	0 00	0 00	11 10	13 30
Sample Type ==>		N	N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23	23
Parameter Name	Units									
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 002 J	0 002 J	0 01 U	0 002 J	0 002 J	0.01 U	0 002 J
1,1,2,2-TETRACHLOROETHANE	MG/L	0 16 =	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 007 J	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 001 J	0 002 J	0 002 J	0 001 J	0 002 J	0 002 J	0 01 U	0 001 J
1,1-DICHLOROETHENE	MG/L	0 01 U	0 026 =	0 05 =	0 047 =	0 025 =	0 054 =	0 026 =	0 012 =	0.02 =
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L									
2-HEXANONE	MG/L	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ACETONE	MG/L	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 UJ	0 01 U	0 01 U	0.01 U	0 01 U
BENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
CARBON DISULFIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 027 =	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0 01 =	0 008 J	0 009 J	0 002 J	0 007 J	0 008 J	0 01 U	0 01 U	0 01 U
CHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0 01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L									
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L									
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L									
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L									
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L									
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L									
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 032 =	0 082 =	0 078 =	0 047 =	0 051 =	0 026 =	0 016 =	0 027 =
TOLUENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 2 =	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL DICHLOROBENZENES	MG/L									
trans-1,2-DICHLOROETHENE	MG/L									
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 13 =	0 016 =	0 032 =	0 031 =	0 021 =	0 026 =	0 014 =	0 009 J	0 013 =
TRICHLOROFLUOROMETHANE	MG/L									
VINYL ACETATE	MG/L									
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-08	MW-08	MW-09	MW-09	MW-09	MW-09	MW-09	MW-10	MW-10
Sample Number ==>		MW084	MW085	MW092	MW093	MW094	MW095	MW91	MW101	MW102
Date Collected ==>		3/30/1998	10/13/1998	6/20/1997	9/26/1997	3/26/1998	10/14/1998	2/11/1996	2/13/1996	6/21/1997
Time Collected ==>		9 50	11 55	10 30	10 50	13 45	15 02	0 00	0 00	9 05
Sample Type ==>		N	N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23	23
Parameter Name	Units									
1,1,1-TRICHLOROETHANE	MG/L	0 001 J	0 002 J	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 003 J	0 04 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 002 J	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.012 =	0 024 J
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 04 U
1,1-DICHLOROETHANE	MG/L	0 001 J	0 001 J	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 002 J	0 04 U
1,1-DICHLOROETHENE	MG/L	0 019 =	0 022 =	0.002 J	0 001 J	0 001 J	0 01 U	0 001 J	0 048 =	0 048 =
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 J	0 04 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.04 U
2-CHLOROETHYL VINYL ETHER	MG/L									
2-HEXANONE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.04 U
ACETONE	MG/L	0 01 UJ	0.01 UJ	0 01 U	0.01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0.04 U
BENZENE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 04 U
BROMOFORM	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 04 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 04 U
CARBON DISULFIDE	MG/L	0 001 J	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 04 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0 01 U	0 008 J	0 001 J	0 003 J	0 005 J	0 002 J	0.003 J	0 008 J
CHLOROBENZENE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
CHLOROETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 04 U
CHLOROFORM	MG/L	0 01 U	0 01 U	0 005 J	0 01 U	0 002 J	0 004 J	0 002 J	0 014 =	0 06 =
CHLOROMETHANE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0 04 U
cis-1,2-DICHLOROETHYLENE	MG/L									
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 04 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
DICHLORODIFLUOROMETHANE	MG/L									
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 04 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L									
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L									
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 UJ	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 04 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.04 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L									
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L									
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.04 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 024 =	0 033 =	0 007 J	0 004 J	0.003 J	0 006 J	0 01 U	0 1 =	0 11 =
TOLUENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 11 =	0 28 =
TOTAL DICHLOROBENZENES	MG/L									
trans-1,2-DICHLOROETHENE	MG/L									
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
TRICHLOROETHYLENE (TCE)	MG/L	0 012 =	0 016 =	0.006 J	0 002 J	0 002 J	0 004 J	0 002 J	0 25 =	0 45 =
TRICHLOROFLUOROMETHANE	MG/L									
VINYL ACETATE	MG/L									
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 04 U
XYLENES, TOTAL	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 04 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection.
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-10	MW-10	MW-10	MW-11	MW-11	MW-11	MW-11	MW-11	MW-12
Sample Number ==>		MW103	MW104	MW105	MW111	MW112	MW113	MW114	MW115	MW121
Date Collected ==>		9/26/1997	3/28/1998	10/14/1998	2/12/1996	6/21/1997	9/27/1997	3/28/1998	10/15/1998	2/13/1996
Time Collected ==>		15 30	13 46	16 30	0 00	12 35	15 20	9 30	15 00	0 00
Sample Type ==>		N	N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23	23
Parameter Name	**Units**									
1,1,1-TRICHLOROETHANE	MG/L	0 004 J	0 002 J	0 001 J	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 002 J	0 01 U	0 002 J	0 004 J	0 009 J	0 049 =	0 002 J	0 016 =	0 13 =
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 001 J	0 05 U
1,1-DICHLOROETHANE	MG/L	0 003 J	0 002 J	0 01 U	0 01 U	0 01 U	0.02 U	0 01 U	0 01 U	0 05 U
1,1-DICHLOROETHENE	MG/L	0 072 =	0 041 =	0 019 =	0 01 U	0 01 U	0 02 U	0.01 U	0.01 U	0 05 U
1,2-DICHLOROETHANE	MG/L	0 002 J	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
2-CHLOROETHYL VINYL ETHER	MG/L									
2-HEXANONE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0.01 U	0 05 U
ACETONE	MG/L	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0 02 U	0 01 U	0.01 UJ	0.05 U
BENZENE	MG/L	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
BROMOFORM	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
CARBON DISULFIDE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0.01 U	0 01 U	0 05 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0 01 U	0 003 J	0.001 J	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 02 U	0 01 U	0 01 U	0 05 U
CHLOROFORM	MG/L	0 01 U	0 001 J	0 017 =	0 002 J	0 002 J	0 004 J	0 002 J	0 003 J	0 05 U
CHLOROMETHANE	MG/L	0.01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
cis-1,2-DICHLOROETHYLENE	MG/L									
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0.05 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
DICHLORODIFLUOROMETHANE	MG/L									
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L									
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L									
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 002 J	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L									
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L									
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 18 =	0 1 =	0 064 =	0 016 =	0 01 =	0 019 J	0 005 J	0 015 =	0 012 J
TOLUENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 =	0 005 J	0 12 =	0 041 =	0 034 =	0 2 =	0 008 J	0 084 =	0 055 =
TOTAL DICHLOROBENZENES	MG/L									
trans-1,2-DICHLOROETHENE	MG/L									
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
TRICHLOROETHYLENE (TCE)	MG/L	0 1 =	0 063 =	0.19 =	0 046 =	0 038 =	0 24 =	0 01 =	0 11 =	0 65 =
TRICHLOROFLUOROMETHANE	MG/L									
VINYL ACETATE	MG/L									
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 01 U	0 01 U	0 05 U

Report Grouping ==> 23-Groundwater 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
RI Groundwater Analytical Data
Sampling Penod 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-13	MW-13
Sample Number ==>		MW122	MW123	MW124	MW124B	MW125-B	MW125	13-77_3FT	MW13-79_5FT
Date Collected ==>		6/21/1997	9/27/1997	3/30/1998	3/30/1998	10/14/1998	10/14/1998	1/8/2001	1/8/2001
Time Collected ==>		13.30	10 30	10 25	0 00	12 30	12 25	10 05	10 00
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23			23	23	23
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 4 U	0 25 U	0 1 U	0.17 U	0 01 U	0 01 U	0.001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.54 =	0 48 =	0.22 =	0 54 =	0 027 =	0 02 =	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0.4 U	0 25 U	0.1 U	0.17 U	0 01 U	0 01 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0.4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 4 U	0.25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 4 U	0.25 U	0 1 U	0 17 U	0.01 U	0 01 U	0.001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0.01 U	0 01 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0 4 U	0 25 U	0.1 U	0.17 U	0 01 U	0 01 U	0 005 U	0 005 U
ACETONE	MG/L	0 4 U	0.25 U	0 1 UJ	0 17 UJ	0.01 U	0 01 U	0 005 U	0.005 U
BENZENE	MG/L	0.4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0 4 U	0 25 U	0.1 U	0 17 U	0 01 U	0.01 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0 01 U	0.01 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 0004 J	0 001 U
CARBON DISULFIDE	MG/L	0 4 U	0.25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0.01 U	0 01 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0.4 U	0.25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0.01 U	0 01 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 4 U	0 25 U	0.1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
CHLOROMETHANE	MG/L	0.4 U	0 25 U	0 1 U	0.17 U	0 01 U	0 01 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L							0 001 U	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 4 U	0 25 U	0.1 U	0.17 U	0 01 U	0 01 U	0 001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0 4 U	0 25 U	0.1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							0 002 U	0 002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 41 U	0 25 U	0 1 UJ	0.17 UJ	0 01 U	0 01 U	0 005 U	0 005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0.4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0 001 U	0 001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L							0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0 4 U	0 25 U	0 1 U	0.17 U	0 01 U	0 01 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 074 J	0 044 J	0.022 J	0.051 J	0 002 J	0 002 J	0 001 U	0 001 U
TOLUENE	MG/L	0 4 U	0 25 U	0 1 U	0.17 U	0 01 U	0 01 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 35 J	0 22 J	0.087 J	0.2 =	0 009 J	0 008 J		
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L							0.001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0.001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	5 9 =	3 8 =	1.3 =	3 2 =	0 16 =	0.14 =	0 001 UJ	0 001 UJ
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0.4 U	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L	0 054 J	0 25 U	0 1 U	0 17 U	0 01 U	0 01 U		

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-13	MW-13	MW-13	MW-13	MW-13	MW-14	MW-14	MW-14
Sample Number ==>		MW131	MW132	MW133	MW134	MW135	MW-14-Y2Q1	MW-14-Y2Q3	MW-14-Y2Q4
Date Collected ==>		2/12/1996	6/20/1997	9/26/1997	3/26/1998	10/15/1998	2/16/2000	8/24/2000	11/6/2000
Time Collected ==>		0 00	12 20	15 35	16 10	16 15	13 00	10 45	14 20
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23
Analyte/Parameter Name	Units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.001 U	0.001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 J	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 UJ	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 UJ	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0.001 U
CARBON DISULFIDE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
CHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L						0 001 U	0 001 U	0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L						0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L						0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L						0 001 U	0 001 U	
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 005 J	0 007 J	0 008 J	0 002 J	0 003 J	0 001 U	0 001 U	0 001 U
TOLUENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U			
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L						0 001 U	0 001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0.001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 002 J	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 UJ	0 001 U
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L						0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U			

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW 14	MW-14	MW 14	MW-14	MW-14	MW-14	MW-14	MW-14
Sample Number ==>		MW-14	MW14-ESE	MW14	MW141	MW142	MW143	MW144	MW145
Date Collected ==>		5/18/2000	11/17/1993	11/17/1993	2/11/1996	6/18/1997	9/24/1997	3/25/1998	10/15/1998
Time Collected ==>		9 25	0 00	0 00	0 00	14 45	15 00	14 39	10 00
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23		23	23	23	23	23	23
[illegible]	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2 2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L		0 001 U						
2-HEXANONE	MG/L	0 005 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ACETONE	MG/L	0 02 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 UJ
BENZENE	MG/L	0 001 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 001 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 001 J	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U							
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L		0 001 U						
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
M P-XYLENE (SUM OF ISOMERS)	MG/L		0 001 U						
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U							
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U		0 01 U	0 01 U	0 01 U	0 002 J	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U						
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U							
STYRENE	MG/L	0 001 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOLUENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L			0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL DICHLOROBENZENES	MG/L		0 001 U						
trans-1 2-DICHLOROETHENE	MG/L	0 001 U	0 001 U						
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 001 J	0 01 U	0 001 J
TRICHLOROFLUOROMETHANE	MG/L		0 001 U						
VINYL ACETATE	MG/L	0 02 U							
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L			0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-15	MW-15	MW-15	MW-15	MW-15	MW-15	MW-15
Sample Number ==>		MW-15-Y1Q1	MW-15-Y1Q2	MW-15-Y1Q3	MW-15-Y1Q4	MW-15-Y2Q1	MW-15-Y2Q3	MW-15-Y2Q4
Date Collected ==>		2/3/1999	5/25/1999	8/27/1999	11/3/1999	2/15/2000	8/22/2000	11/7/2000
Time Collected ==>		17 30	15 30	11 05	16 30	17 30	17 00	11 15
Sample Type ==>		N	N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 0282 =	0 165 =	0 291 =	0 522 =	0 389 =	0 147 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0.00266 =	0 00418 =	0 00572 =	0 0102 =	0 0057 =	0 0026 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L							
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 05 U	0.05 U	0 05 U	0 05 U	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0.00135 =	0 00112 =	0 001 U	0 00142 =	0 001 U	0 001 U
BROMOFORM	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0279 =	0 0796 =	0 0392 =	0 0352 =	0 029 =	0 0247 =	0 0128 =
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
CHLOROFORM	MG/L	0 308 =	1 61 =	1 27 =	1 02 =	1 06 =	0 848 =	0 224 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00596 =	0.0226 =	0 0124 =	0 0108 =	0 0143 =	0 012 =	0 00475 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L							
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0.02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L		0 005 U	0 005 U	0.005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00475 =	0 0188 =	0 01 =	0 00846 =	0.00691 =	0 00718 =	0 00284 =
TOLUENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
TOTAL DICHLOROBENZENES	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 00213 =	0 00826 =	0 00429 =	0 00408 =	0 00454 =	0 00417 =	0 00173 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 115 =	0 518 =	0 331 =	0 299 =	0 299 =	0 234 =	0 0659 =
TRICHLOROFLUOROMETHANE	MG/L							
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 677

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-15	MW-15	MW-15	MW-15	MW-15	MW-15	MW-15	MW-1A
Sample Number ==>		MW-15	MW151	MW152	MW153	MW154	MW155	MW15NA	MW-1A-Y1Q1
Date Collected ==>		5/17/2000	2/7/1996	6/20/1997	9/26/1997	3/28/1998	10/15/1998	3/24/2000	2/2/1999
Time Collected ==>		8 20	0 00	15 45	13 45	14·45	15 30	8 35	16 00
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 00111 =
1,1,2,2-TETRACHLOROETHANE	MG/L	0 343 =	0.01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 6 =	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 00469 =	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 011 =	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 0001 J	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 0305 =
1,2-DICHLOROETHANE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 0003 J	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0 005 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 01 U	0.02 U	0 025 U	0 01 U	0.01 UJ	0 005 U	0.05 U
BENZENE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 01 U	0.02 U	0 025 U	0 01 U	0 01 U	0.004 =	0 001 U
BROMOFORM	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0.001 U	0.01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0.01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0163 =	0 007 J	0 031 =	0 046 =	0 003 J	0 005 J	0.027 =	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0.001 U
CHLOROETHANE	MG/L	0 001 U	0 01 U	0.02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0.704 =	0 025 =	0 3 =	0.38 =	0 013 =	0 031 =	1 4 =	0.001 U
CHLOROMETHANE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0.0001 J	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00696 =						0 014 =	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 01 U	0 02 U	0.025 U	0 01 U	0 01 U	0 001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0.001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							0 002 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U							0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0.01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 005 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 01 U	0.02 U	0 025 U	0 01 U	0.01 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U						0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U							0 001 U
STYRENE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0.01 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00396 =	0 002 J	0 007 J	0 012 J	0 01 U	0 01 U	0 012 =	0 00157 =
TOLUENE	MG/L	0 001 U	0 01 U	0 02 U	0 025 U	0 01 U	0 01 U	0.001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L		0 01 U	0 008 J	0 012 J	0 01 U	0 001 J		
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L	0 00229 =						0 005 =	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0 01 U	0 02 U	0.025 U	0 01 U	0 01 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 154 =	0 011 =	0 099 =	0 14 =	0 006 J	0 013 =	0 36 =	0 00917 =
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L	0 02 U							0 02 U
VINYL CHLORIDE	MG/L	0.001 U	0.01 U	0 02 U	0 025 U	0 01 U	0 01 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L		0 01 U	0 02 U	0 025 U	0 01 U	0 01 U		

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-1A	MW-1A	MW-1A	MW-20	MW-21	MW-22	MW-23	MW-24
Sample Number ==>		MW-1A-Y1Q2	MW-1A-Y1Q3	MW-1A-Y1Q4	MW20NA	MW21NA	MW22NA	MW23NA	MW24NA
Date Collected ==>		5/25/1999	8/26/1999	11/2/1999	3/22/2000	3/24/2000	3/23/2000	3/23/2000	3/22/2000
Time Collected ==>		10 20	12 50	16 50	11 26	13 45	12 40	12 08	14 45
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>									
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.004 =	0.001 U	0.001 U	0.001 U
1,1,2-TRICHLOROETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.0002 J	0.001 U	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0.25 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ACETONE	MG/L	2.5 U	0.05 U	0.05 U	0.005 U	0.003 J	0.005 U	0.005 U	0.005 U
BENZENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0003 J	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.0004 J	0.001 U	0.001 U	0.001 U
CHLOROBENZENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.05 U	0.001 U	0.001 U	0.0002 J	0.006 =	0.001 U	0.001 U	0.001 U
CHLOROMETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 =	0.0005 J	0.001 U	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L				0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0.05 U	0.001 U	0.001 U					
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	1 U	0.02 U	0.02 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.25 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.25 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0.05 U	0.001 U	0.001 U					
STYRENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.078 =	0.0009 J	0.001 U	0.001 U
TOLUENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L								
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.0002 J	0.001 U	0.001 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.05 U	0.001 U	0.001 U	0.0001 J	0.039 =	0.001 =	0.001 U	0.001 U
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L	1 U	0.02 U	0.02 U					
VINYL CHLORIDE	MG/L	0.05 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L								

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-28	MW-29	MW-29	MW-29	MW-29	MW-29	MW-30	MW-30
Sample Number ==>		MW281	MW291	MW292	MW293	MW294	MW295	MW-30-Y1Q1	MW-30-Y1Q2
Date Collected ==>		2/7/1996	2/11/1996	6/20/1997	9/26/1997	3/28/1998	10/14/1998	2/2/1999	5/24/1999
Time Collected ==>		0.00	0.00	17.10	14.00	15.00	11.05	11.45	18.00
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.004 J	0.008 J	0.007 J	0.005 J	0.005 J	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.027 U	0.032 =	0.029 =	0.028 =	0.021 =	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U
ACETONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.05 U
BENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L							0.001 U	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L							0.001 U	0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L							0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L							0.001 U	0.001 U
STYRENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.01 U	0.032 =	0.038 =	0.029 =	0.037 =	0.029 =	0.001 U	0.001 U
TOLUENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U		
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L							0.001 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.01 U	0.013 =	0.018 =	0.018 =	0.017 =	0.017 =	0.001 U	0.001 U
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L							0.02 U	0.02 U
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U		

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-30	MW-30	MW-30	MW-30	MW-30	MW-30	MW-30
Sample Number ==>		MW-30-Y1Q3	MW-30-Y1Q4	MW-30-Y2Q1	MW-30-Y2Q3	MW-30-Y2Q4	MW-30	MW301
Date Collected ==>		8/26/1999	11/2/1999	2/15/2000	8/22/2000	11/7/2000	5/16/2000	2/7/1996
Time Collected ==>		12 45	14 05	9 15	14 00	15 15	11 40	13 50
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0.001 U	0.001 U	0 001 U	0 001 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L							
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 01 U
ACETONE	MG/L	0 05 U	0 05 U	0 02 U	0 02 U	0 02 U	0 02 U	0 01 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0.01 U
BROMOFORM	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 01 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.01 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 01 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 01 U
CHLOROFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L							
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L					0 001 U		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L							0 01 U
TOTAL DICHLOROBENZENES	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TRICHLOROFLUOROMETHANE	MG/L							
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
XYLENES, TOTAL	MG/L							0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Penod 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-30	MW-30	MW-30	MW-30	MW-31	MW-31	MW-31	MW-31
Sample Number ==>		MW302	MW303	MW304	MW305	MW-31-Y1Q1	MW-31-Y1Q2	MW-31-Y1Q3	MW-31-Y1Q4
Date Collected ==>		6/17/1997	9/24/1997	3/24/1998	10/16/1998	2/3/1999	5/25/1999	8/27/1999	11/3/1999
Time Collected ==>		15 15	14 15	12.37	11.23	13 25	13 15	9.15	10 35
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 00126 =	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 00322 =	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0.001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U	0 001 U	0.001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 00786 =	0 0333 =	0.0079 =	0 00598 =
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 UJ	0 01 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.001 U	0 001 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.005 U	0.005 U	0 005 U	0 005 U
ACETONE	MG/L	0 01 U	0 01 U	0 01 UJ	0 01 UJ	0 05 U	0 05 U	0 05 U	0 05 U
BENZENE	MG/L	0 01 U	0 01 U	0.01 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0.01 U	0.01 U	0 001 U	0 001 U	0.001 U	0 001 U
BROMOFORM	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 01 U	0.01 U	0 01 U	0.01 U	0 001 U	0 001 U	0.001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0.01 U	0.01 U	0.01 U	0 00151 =	0 001 U	0.00059 J	0.001 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0.01 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 00722 =	0 001 U	0 00166 =	0 00092 J
CHLOROMETHANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L					0 0589 =	0 00478 =	0 00434 =	0 00509 =
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U	0 001 U	0.001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L					0 001 U	0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U	0 01 UJ	0.01 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0.005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0.01 U	0.01 U		0.005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L					0 001 U	0.001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L					0 001 U	0.001 U	0 001 U	0 001 U
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 00425 =	0 00755 =	0 00131 =	0 0009 J
TOLUENE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0.001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0 01 U	0 01 U				
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L					0 0222 =	0 00214 =	0 00466 =	0 00252 =
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.14 =	0 0239 =	0 0337 =	0 018 =
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L					0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U	0 01 U				

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-31	MW-31	MW-31	MW-31	MW-31	MW-31	MW-31	MW-31
Sample Number ==>		MW-31-Y2Q1	MW-31-Y2Q3	MW-31-Y2Q4	MW-31	MW2BNA	MW31-ESE	MW31	MW311
Date Collected ==>		2/15/2000	8/23/2000	11/7/2000	5/17/2000	3/23/2000	11/19/1993	11/19/1993	2/12/1996
Time Collected ==>		16 45	16 30	14.45	17 12	17.00	0 00	0 00	0 00
Sample Type ==>		N	N	N	N	FD	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25				25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 00042 J	0 001 U	0 001 U	0 0002 J	0 00277 =	0 01 U	0 05 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 096 =	0 001 J	0 42 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 00648 =	0 01 U	0 011 J
1,1-DICHLOROETHANE	MG/L	0 001 U	0 0189 =	0 001 U	0.001 U	0 0002 J	0 00166 =	0 01 U	0 05 U
1,1-DICHLOROETHENE	MG/L	0 00989 =	0 001 U	0 0315 =	0 0223 =	0 009 =	0 0524 =	0 014 =	0 023 J
1,2-DICHLOROETHANE	MG/L	0 001 U	0 00958 =	0.001 U	0 001 U	0 001 U	0 0015 =	0 01 U	0 05 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U	0 01 U	0 05 U
2-CHLOROETHYL VINYL ETHER	MG/L						0.001 U		
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U		0 01 U	0 05 U
ACETONE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 005 U		0 01 U	0 05 U
BENZENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
BROMOFORM	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
CARBON DISULFIDE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U		0 01 U	0 05 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0.0004 J	0 001 U	0 001 U	0 001 U	0.00481 =	0.001 J	0.006 J
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
CHLOROETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
CHLOROFORM	MG/L	0 00119 =	0 001 U	0 001 U	0 00129 =	0 0004 J	0 0211 =	0 007 J	0 035 J
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00689 =	0 0123 =	0 00424 =	0 0155 =	0 0004 J			
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
DICHLORODIFLUOROMETHANE	MG/L						0 001 U		
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L			0 001 U		0 002 U	0 001 U		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U		0.001 U				
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 005 U		0 01 U	0 05 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U		0 01 U	0 05 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 001 U	0 001 U	0 01 U	0 05 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U		0 001 U				
STYRENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U		0 01 U	0 05 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00064 J	0 00208 =	0 00092 J	0 00116 =	0 001 =	0 0954 =	0 024 =	0 064 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
TOTAL 1,2-DICHLOROETHENE	MG/L							0 002 J	0 76 =
TOTAL DICHLOROBENZENES	MG/L						0 001 U		
trans-1,2-DICHLOROETHENE	MG/L	0 00337 =	0 001 U	0 00453 =	0 00778 =	0 0002 J	0 164 =		
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0256 =	0 0681 =	0 0185 =	0 0495 =	0 004 =	1 11 =	0 013 =	1 1 =
TRICHLOROFLUOROMETHANE	MG/L						0 001 U		
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U				
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U	0 05 U
XYLENES, TOTAL	MG/L							0 01 U	0 05 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-31	MW-31	MW-31	MW-31	MW-31	MW-31	MW-32	MW-32
Sample Number ==>		MW311A	MW312	MW313ADD	MW314	MW315	MW31NA	MW-32-Y1Q1	MW-32-Y1Q2
Date Collected ==>		2/12/1996	6/20/1997	9/24/1997	3/24/1998	10/15/1998	3/23/2000	2/3/1999	5/25/1999
Time Collected ==>		0 00	15 30	8 00	16 08	16.20	14 45	11 50	12 00
Sample Type ==>		FD	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 05 U	0 002 J	0 002 J	0 025 U	0.025 U	0 0002 J	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 28 =	0 01 U	0 01 J	0 097 =	0 033 =	0 001 U	0.00567 =	0 00442 =
1,1,2-TRICHLOROETHANE	MG/L	0 008 J	0 01 U	0.02 U	0 004 J	0 025 U	0 001 U	0.00154 =	0 001 U
1,1-DICHLOROETHANE	MG/L	0 05 U	0 002 J	0 02 U	0.025 U	0 025 U	0 0002 J	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0 03 J	0 029 =	0 047 =	0 026 =	0.014 J	0 008 =	0 001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0 05 U	0.01 U	0 02 UJ	0.025 U	0 025 U	0 001 U	0.001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 05 U	0 01 U	0.02 U	0 025 U	0 025 U	0.001 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0.05 U	0 01 U	0 02 U	0 025 U	0.025 U	0.005 U	0 005 U	0 005 U
ACETONE	MG/L	0 05 U	0 01 U	0 02 U	0.025 UJ	0 025 UJ	0 009 U	0 05 U	0 05 U
BENZENE	MG/L	0 05 U	0.01 U	0 02 U	0.025 U	0 025 U	0 0001 J	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 05 U	0 01 U	0 02 U	0.025 U	0 025 U	0 001 U	0.001 U	0 001 U
BROMOFORM	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U	0.001 U	0 001 U
CARBON DISULFIDE	MG/L	0.05 U	0 01 U	0.02 U	0 025 U	0 025 U	0.001 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.05 U	0 001 J	0.008 J	0 003 J	0 025 U	0.001 U	0.0252 =	0 0142 =
CHLOROBENZENE	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U	0.001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 05 U	0.01 U	0 02 U	0 025 U	0.025 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 023 J	0 01 =	0 049 =	0 021 J	0 016 J	0 0005 J	0 00789 =	0 0322 =
CHLOROMETHANE	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L						0 0006 J	0.0305 =	0 0167 =
cis-1,3-DICHLOROPROPENE	MG/L	0.05 U	0 01 U	0.02 U	0 025 U	0 025 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 05 U	0 01 U	0.02 U	0 025 U	0 025 U	0 001 U	0.001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0 05 U	0 01 U	0 02 U	0.025 U	0 025 U	0 001 U	0 001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L						0 002 U		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L							0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.05 U	0 01 U	0 02 U	0 025 UJ	0 025 U	0 005 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0.05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U		0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L						0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L							0.001 U	0 001 U
STYRENE	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 068 =	0.067 =	0.11 =	0 066 =	0 042 =	0 001 J	0.00116 =	0 00128 =
TOLUENE	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0.025 U	0 001 U	0.001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 48 =	0 038 =	0 14 =	0 28 =	0 28 =			
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L						0 0003 J	0 00382 =	0.00176 =
trans-1,3-DICHLOROPROPENE	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 68 =	0 078 =	0 22 =	0.4 =	0.38 =	0 004 =	0 0319 =	0 0281 =
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L							0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0.05 U	0 01 U	0 02 U	0 025 U	0 025 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 05 U	0 01 U	0 02 U	0 025 U	0 025 U			

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-32	MW-32	MW-32	MW-32	MW-32	MW-32	MW-32
Sample Number ==>		MW-32-Y1Q3	MW-32-Y1Q4	MW-32-Y2Q1	MW-32-Y2Q3	MW-32-Y2Q4	MW-32	MW321
Date Collected ==>		8/26/1999	11/3/1999	2/15/2000	8/24/2000	11/9/2000	5/16/2000	2/6/1996
Time Collected ==>		17 30	11 55	12 15	11.30	11 50	17 30	0 00
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 00092 J	0 001 U	0 001 U	0 00212 =	0 0215 =	0 001 U	0 066 =
1,1,2-TRICHLOROETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 00061 J	0.001 U	0 004 J
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L							
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 01 U
ACETONE	MG/L	0.05 U	0 05 U	0 02 U	0 02 U	0 02 U	0 02 U	0 01 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 01 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 0173 =	0 0252 =	0 0255 =	0 0472 =	0 0613 =	0 037 =	0 022 =
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 01 U
CHLOROFORM	MG/L	0 0769 =	0 073 =	0 0772 =	0.171 =	0 372 J	0.117 =	0.007 J
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00464 =	0 00459 =	0 00507 =	0 00566 =	0 00855 =	0 00661 =	
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L							
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L					0 001 U		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0.001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0.02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0.001 U		0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00222 =	0 00263 =	0 00234 =	0 0059 =	0 00639 J	0 00394 =	0 001 J
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L							0 087 =
TOTAL DICHLOROBENZENES	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 00099 J	0 00101 =	0 00112 =	0.00268 =	0 00453 =	0 002 =	
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0346 =	0 0368 =	0 0418 =	0 0892 =	0 0948 =	0 0582 =	0.068 =
TRICHLOROFLUOROMETHANE	MG/L							
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 01 U
XYLENES, TOTAL	MG/L							0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

	Station Location ==>	MW-32	MW-32	MW-32	MW-33	MW-33	MW-33	MW-33
	Sample Number ==>	MW322	MW323	MW324	MW-33-Y1Q1	MW-33-Y1Q2	MW-33-Y1Q3	MW-33-Y1Q4
	Date Collected ==>	6/21/1997	9/29/1997	3/27/1998	2/2/1999	5/25/1999	8/26/1999	11/2/1999
	Time Collected ==>	12.10	14 45	10 35	17 30	11 25	17 05	16 45
	Sample Type ==>	N	N	N	N	N	N	N
	Sample Matnx ==>	WG	WG	WG	WG	WG	WG	WG
	Report Grouping ==>	25	25	25	25	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0.001 U	0.001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 091 =	0 11 =	0 14 =	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0.005 J	0 005 J	0 006 J	0 001 U	0.001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0.01 U	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0.001 U	0 001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L							
2-HEXANONE	MG/L	0 01 U	0 01 U	0 01 U	0 005 U	0.005 U	0 005 U	0 005 U
ACETONE	MG/L	0 01 U	0.01 U	0 01 U	0.05 U	0 05 U	0 05 U	0 05 U
BENZENE	MG/L	0.01 U	0 01 U	0.01 U	0 001 U	0 001 U	0.001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 001 U	0.001 U	0 001 U
BROMOFORM	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0.001 U	0.001 U	0 001 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0 001 U	0.001 U	0 001 U
CARBON DISULFIDE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0 001 U	0 001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0 025 =	0 016 =	0 02 =	0.001 U	0.001 U	0 001 U	0.001 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 008 J	0.006 J	0.007 J	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROMETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L				0 001 U	0 001 U	0 001 U	0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0.001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0.001 U	0 001 U	0 001 U
DICHLORODIFLUOROMETHANE	MG/L							
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L				0 001 U	0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0.01 U	0.01 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U		0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L				0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L				0 001 U	0 001 U	0.001 U	0 001 U
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 002 J	0 001 J	0 001 J	0 001 U	0.001 U	0.001 U	0 001 U
TOLUENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0.001 U	0 001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 12 =	0 088 =	0 14 =				
TOTAL DICHLOROBENZENES	MG/L							
trans-1,2-DICHLOROETHENE	MG/L				0 001 U	0 001 U	0 001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 093 =	0 076 =	0 1 =	0.001 U	0 001 U	0 001 U	0 001 U
TRICHLOROFLUOROMETHANE	MG/L							
VINYL ACETATE	MG/L				0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U				

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-33	MW-33	MW-33	MW-33	MW-33	MW-33	MW-33	MW-33
Sample Number ==>		MW-33-Y2Q1	MW-33-Y2Q3	MW-33-Y2Q4	MW-33	MW331	MW332	MW333	MW334
Date Collected ==>		2/15/2000	8/22/2000	11/8/2000	5/16/2000	2/8/1996	6/18/1997	9/25/1997	3/25/1998
Time Collected ==>		11 25	15 30	13 50	17 00	0.00	14 10	10 50	12 05
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	25
Parameter Name	**Units**								
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U
ACETONE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U
BENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOFORM	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 UJ	0.01 U	0.01 U	0.01 U
CARBON DISULFIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 UJ	0.01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U				
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L			0.001 U					
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U		0.001 U				
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYLENE CHLORIDE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U				
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U		0.001 U				
STYRENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
TOLUENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L					0.01 U	0.01 U	0.01 U	0.01 U
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U				
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U				
VINYL CHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U
XYLENES, TOTAL	MG/L					0.01 U	0.01 U	0.01 U	0.01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-33	MW-33A	MW-34	MW-34	MW-34	MW-34	MW-34
Sample Number ==>		MW335	MW-33A-Y2Q1	MW-34-Y1Q1	MW-34-Y1Q2	MW-34-Y1Q3	MW-34-Y1Q4	MW-34-Y2Q1
Date Collected ==>		10/16/1998	2/15/2000	2/4/1999	5/25/1999	8/27/1999	11/3/1999	2/16/2000
Time Collected ==>		15 06	11 30	13 45	14 55	10 05	9 00	12 35
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	23	23	23	23	23
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0 001 U	0.001 U	0.001 U	0 001 U	0.001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U
2-CHLOROETHYL VINYL ETHER	MG/L							
2-HEXANONE	MG/L	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 01 UJ	0 02 U	0 05 U	0 05 U	0 05 U	0 05 U	0 02 U
BENZENE	MG/L	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0.001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
CARBON DISULFIDE	MG/L	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0 001 U	0 00101 =	0 00123 =	0 00051 J	0 001 U	0.00104 =
CHLOROBENZENE	MG/L	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
CHLOROETHANE	MG/L	0.01 U	0 001 U	0.001 U	0 001 U	0 001 U	0.001 U	0 001 U
CHLOROFORM	MG/L	0 01 U	0 001 U	0 00434 =	0 001 U	0 00066 J	0.001 U	0 00198 =
CHLOROMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L		0.001 U	0 00103 =	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0.001 U	0.001 U	0 001 U	0.001 U	0 001 U	0.001 U
DICHLORODIFLUOROMETHANE	MG/L							
ETHYLBENZENE	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 005 U	0 005 U	0.005 U	0 005 U	0.005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
STYRENE	MG/L	0 01 U	0.001 U	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOLUENE	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0 00053 J	0 001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U						
TOTAL DICHLOROBENZENES	MG/L							
trans-1,2-DICHLOROETHENE	MG/L		0.001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0.001 U	0 00439 =	0 001 U	0 00064 J	0 001 U	0 00085 J
TRICHLOROFLUOROMETHANE	MG/L							
VINYL ACETATE	MG/L		0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0.02 U
VINYL CHLORIDE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 01 U						

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-34	MW-34	MW-34	MW-34	MW-34	MW-34	MW-34	MW-34
Sample Number ==>		MW-34-Y2Q3	MW-34-Y2Q4	MW-34	MW341	MW342	MW342DUP	MW343	MW343DUP
Date Collected ==>		8/24/2000	11/7/2000	5/18/2000	2/9/1996	6/19/1997	6/19/1997	9/26/1997	9/26/1997
Time Collected ==>		10 00	15 30	15 50	0 00	15 30	15 32	16 42	16 42
Sample Type ==>		N	N	N	N	N	FD	N	FD
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L								
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
ACETONE	MG/L	0.02 U	0 02 U	0 02 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 00086 J	0 001 U	0 00103 =	0 001 J	0 01 U	0.01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0 001 U	0 001 U	0 00349 =	0.005 J	0 002 J	0 002 J	0.001 J	0 01 U
CHLOROMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 002 J
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0 001 U	0 001 U					
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L								
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L		0 001 U						
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U					
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0.005 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U					
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U					
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 J	0 01 U	0 01 U	0.01 U	0 01 U
TOLUENE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L				0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL DICHLOROBENZENES	MG/L								
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U					
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 00255 =	0 00143 =	0 00215 =	0 001 J	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROFLUOROMETHANE	MG/L								
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U					
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L				0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-34	MW-34
Sample Number ==>		MW344	MW344D
Date Collected ==>		3/27/1998	3/27/1998
Time Collected ==>		10 09	10 09
Sample Type ==>		N	FD
Sample Matrix ==>		WG	WG
Report Grouping ==>		23	23
Parameter Name	**Units**		
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 002 J	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0 01 U
2-CHLOROETHYL VINYL ETHER	MG/L		
2-HEXANONE	MG/L	0 01 U	0 01 U
ACETONE	MG/L	0 01 U	0 01 U
BENZENE	MG/L	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U
BROMOFORM	MG/L	0 01 U	0.01 U
BROMOMETHANE	MG/L	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.01 U	0 01 U
CHLOROFORM	MG/L	0 01 U	0 01 U
CHLOROMETHANE	MG/L	0 01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L		
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U
DICHLORODIFLUOROMETHANE	MG/L		
ETHYLBENZENE	MG/L	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L		
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		
STYRENE	MG/L	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0.01 U
TOLUENE	MG/L	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0.01 U
TOTAL DICHLOROBENZENES	MG/L		
trans-1,2-DICHLOROETHENE	MG/L		
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0 01 U
TRICHLOROFLUOROMETHANE	MG/L		
VINYL ACETATE	MG/L		
VINYL CHLORIDE	MG/L	0 01 U	0 01 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-35	MW-35	MW-35	MW-35	MW-35	MW-35	MW-35	MW-35
Sample Number ==>		MW351	MW352	MW352DUP	MW353	MW353DUP	MW354	MW354D	MW355-B
Date Collected ==>		2/13/1996	6/21/1997	6/21/1997	9/27/1997	9/27/1997	3/30/1998	3/30/1998	10/14/1998
Time Collected ==>		0.00	11.10	11.10	9.55	9.50	12.05	12.05	11.20
Sample Type ==>		N	N	FD	N	FD	N	FD	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	
Parameter Name	Units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,1,1-TRICHLOROETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.2 =	0.011 =	0.014 J	0.005 J	0.005 J	0.006 J	0.004 J	0.004 J
1,1,2-TRICHLOROETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
2-HEXANONE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
ACETONE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 UJ	0.01 UJ	0.01 U
BENZENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOFORM	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOMETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON DISULFIDE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROBENZENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROMETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L								
cis-1,3-DICHLOROPROPENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
ETHYLBENZENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 UJ	0.01 UJ	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYLENE CHLORIDE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L								
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.026 J	0.002 J	0.002 J	0.001 J	0.001 J	0.002 J	0.001 J	0.01 U
TOLUENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.16 J	0.011 =	0.014 J	0.004 J	0.004 J	0.006 J	0.005 J	0.003 J
trans-1,2-DICHLOROETHENE	MG/L								
trans-1,3-DICHLOROPROPENE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	1.9 =	0.16 =	0.2 =	0.093 =	0.082 =	0.1 =	0.088 =	0.062 =
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
XYLENES, TOTAL	MG/L	0.2 U	0.01 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-35	MW-35	MW-35	MW-36	MW-36	MW-36	MW-37	MW-37
Sample Number ==>		MW355	MW355FD	MW35NA	MW362	MW363	MW365	MW372	MW373
Date Collected ==>		10/14/1998	10/14/1998	3/24/2000	6/19/1997	9/24/1997	10/13/1998	6/18/1997	9/29/1996
Time Collected ==>		11.15	11.15	8.10	12.00	10.15	15.30	0.00	11.12
Sample Type ==>		N	FD	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.001 J	0.01 U	0.023 =	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 UJ	0.01 U	0.01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
2-HEXANONE	MG/L	0.01 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
ACETONE	MG/L	0.01 U	0.01 U	0.004 J	0.01 U	0.01 U	0.01 UJ	0.01 U	0.01 U
BENZENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.01 U	0.01 U	0.0001 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L			0.002 =					
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L			0.002 U					
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L			0.001 U					
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.01 U	0.01 U	0.0006 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TOLUENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
trans-1,2-DICHLOROETHENE	MG/L			0.0006 J					
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	0.01 =	0.01 =	0.042 =	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.001 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection.
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-37	MW-39	MW-40	MW-40	MW-40	MW-40	MW-40
Sample Number ==>		MW374	MW39NA	MW-40-Y1Q1	MW-40-Y1Q2	MW-40-Y1Q3	MW-40-Y1Q4	MW-40-Y2Q1
Date Collected ==>		3/27/1998	3/23/2000	2/2/1999	5/24/1999	8/26/1999	11/2/1999	2/15/2000
Time Collected ==>		11.53	18.15	9.45	17.20	11.30	12.00	8.30
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25		25	25	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.001 U	0.00139 =	0.00123 =	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.001 U	0.00135 =	0.00107 =	0.001 U	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.0004 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-HEXANONE	MG/L	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ACETONE	MG/L	0.01 U	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.02 U
BENZENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROBENZENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.00094 J	0.00106 =	0.001 U
CHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L		0.0004 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
ETHYLBENZENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L		0.002 U					
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L			0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.005 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.001 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L			0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
STYRENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.01 U	0.012 =	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TOLUENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U						
trans-1,2-DICHLOROETHENE	MG/L		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.01 U	0.005 =	0.00155 =	0.001 U	0.001 U	0.001 U	0.001 U
VINYL ACETATE	MG/L			0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
VINYL CHLORIDE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L	0.01 U						

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Samplıng Penod 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-40	MW-40	MW-40	MW-40	MW-40	MW-40	MW-40	MW-40
Sample Number ==>		MW-40-Y2Q3	MW-40-Y2Q4	MW-40	MW40	MW40011596	MW402	MW403	MW404
Date Collected ==>		8/23/2000	11/8/2000	5/16/2000	1/15/1996	1/15/1996	6/19/1997	9/26/1997	3/28/1998
Time Collected ==>		14 15	10 50	10 15	0 00	0 00	16.10	13 05	11.29
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Groupıng ==>		25	25	25	25	25	25	25	25
Parameter Name	**Units**								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 002 J	0 01 U	0 002 J
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.002 J
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0.001 U	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U
ACETONE	MG/L	0 02 U	0.02 U	0 02 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
BROMOFORM	MG/L	0.001 U	0 001 U	0 001 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U
BROMOMETHANE	MG/L	0.001 U	0 001 U	0.001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 001 U	0.001 U	0 00099 J	0 001 J	0.01 U	0.001 J	0 01 U	0 01 U
CHLOROETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U
CHLOROMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0 001 U	0.001 U					
cıs-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L		0.001 U						
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U					
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 01 U	0.01 U	0.01 U	0.01 U	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0.002 J	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0.001 U					
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U					
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOLUENE	MG/L	0.001 U	0.001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L				0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U					
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U					
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
XYLENES, TOTAL	MG/L				0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Groupıng ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monıtor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-40	MW-40	MW-40	MW-41	MW-41	MW-41	MW-41	MW-41
Sample Number ==>		MW405	MW40A	MW40NA	MW41011796	MW412	MW413	MW414	MW415
Date Collected ==>		10/19/1998	1/15/1996	3/22/2000	1/17/1996	6/17/1997	9/27/1997	3/25/1998	10/16/1998
Time Collected ==>		11 33	0 00	15.22	0 00	15 50	8 55	11 45	15 00
Sample Type ==>		N	FD	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 J	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0 01 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 002 J	0 01 U	0 0002 J	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-HEXANONE	MG/L	0 01 U	0 01 U	0 005 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
ACETONE	MG/L	0 01 U	0 01 U	0 005 U	0 19 =	0 01 U	0 01 U	0 01 U	0 01 UJ
BENZENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 001 J	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0 01 U	0 01 U	0 001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROMETHANE	MG/L	0 01 U	0 01 U	0 001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L			0 0002 J					
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L			0 002 U					
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U	0 005 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 005 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L			0 001 U					
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOLUENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0 01 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
trans-1,2-DICHLOROETHENE	MG/L			0 001 U					
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L	0.01 U	0 01 U		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 695

Table 14-2
Groundwater Analytical Data
Sampling Penod 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-42	MW-42	MW-42	MW-42	MW-42	MW-42	MW-43
Sample Number ==>		MW42-59FEET	MW42011996	MW422	MW423	MW424	MW425	MW431_45
Date Collected ==>		2/15/2001	1/19/1996	6/21/1997	9/27/1997	3/27/1998	10/17/1998	10/21/1998
Time Collected ==>		10 25	0 00	14 05	10 35	15 05	10.40	8 30
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHENE	MG/L	0.001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-HEXANONE	MG/L	0 005 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
ACETONE	MG/L	0 0072 U	0 015 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 UJ
BENZENE	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
BROMOMETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
CHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0 001 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 002 J
CHLOROMETHANE	MG/L	0 001 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U						
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 001 J
ETHYLBENZENE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0.002 U						
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L							
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 0007 J	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U						
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L							
STYRENE	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOLUENE	MG/L	0 0053 =	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
trans-1,2-DICHLOROETHENE	MG/L	0.001 U						
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
VINYL ACETATE	MG/L							
VINYL CHLORIDE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L		0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-43	MW-43	MW-43	MW-44	MW-44	MW-44	MW-44
Sample Number ==>		MW435	MW435B	MW435U	MW-44-Y1Q1	MW-44-Y1Q2	MW-44-Y1Q3	MW-44-Y1Q4
Date Collected ==>		10/23/1998	10/24/1998	11/8/1998	2/2/1999	5/25/1999	8/26/1999	11/2/1999
Time Collected ==>		17 40	17 00	12 30	16 30	10 10	15 40	15 00
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25		25	25	25	25	25
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0.001 J	0.014 =	0.002 J	0.001 U	0.001 U	0.01 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
2-HEXANONE	MG/L	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.05 U	0.005 U
ACETONE	MG/L	0.01 UJ	0.014 =	0.01 U	0.05 U	0.05 U	0.5 U	0.05 U
BENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.001 J	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
CHLOROETHANE	MG/L	0.01 U	0.001 J	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
CHLOROFORM	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L				0.001 U	0.001 U	0.01 U	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.001 J	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L				0.001 U	0.001 U	0.01 U	0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.006 J	0.01 U	0.02 U	0.02 U	0.2 U	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.05 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U		0.005 U	0.05 U	0.005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L				0.001 U	0.001 U	0.01 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L				0.001 U	0.001 U	0.01 U	0.001 U
STYRENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
TOLUENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U				
trans-1,2-DICHLOROETHENE	MG/L				0.001 U	0.001 U	0.01 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
VINYL ACETATE	MG/L				0.02 U	0.02 U	0.2 U	0.02 U
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.01 U	0.001 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U	0.01 U				

Report Grouping ==> 23-Groundwater; 25-Offsite

Field QC = Quality Control Sample

HY = Hydropunch

MW = Monitor Well

N = Normal sample

FD = Field Duplicate/Quality Control Sample

D, DUP = Duplicate

WG = Groundwater

MG/L = milligram per liter

U = non-detect, = = definite detection, J = estimated detection

Contaminant detected at or below laboratory detection limit.

702 697

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

	Station Location ==>	MW-44	MW-44	MW-44	MW-44	MW-44	MW-44	MW-44
	Sample Number ==>	MW-44-Y2Q1	MW-44-Y2Q3	MW-44-Y2Q4	MW-44	MW44011996	MW442	MW442DUP
	Date Collected ==>	2/15/2000	8/24/2000	11/8/2000	5/16/2000	1/19/1996	6/20/1997	6/20/1997
	Time Collected ==>	10 45	15 30	13 15	15 15	0 00	11 20	11 20
	Sample Type ==>	N	N	N	N	N	N	FD
	Sample Matrix ==>	WG	WG	WG	WG	WG	WG	WG
	Report Grouping ==>	25	25	25	25	25	25	25
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.003 J	0.01 U	0.01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
1,1,2-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
2-HEXANONE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U
ACETONE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.016 U	0.01 U	0.01 U
BENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0.001 U	0.00166 =	0.001 U	0.01 U	0.01 U	0.01 U
BROMOFORM	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
BROMOMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CARBON DISULFIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.001 U	0.0053 =	0.0021 =	0.0023 =	0.01 U	0.006 J	0.006 J
CHLOROBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
CHLOROFORM	MG/L	0.001 U	0.00362 =	0.00123 =	0.00188 =	0.01 U	0.006 J	0.007 J
CHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.001 U	0.00135 =	0.000622 J	0.00065 J			
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
ETHYLBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L			0.001 U				
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U		0.001 U			
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.003 J	0.004 J
METHYLENE CHLORIDE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U			
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U		0.001 U			
STYRENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TOLUENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TOTAL 1,2-DICHLOROETHENE	MG/L					0.01 U	0.002 J	0.002 J
trans-1,2-DICHLOROETHENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U			
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
TRICHLOROETHYLENE (TCE)	MG/L	0.001 U	0.00492 =	0.00079 J	0.00136 =	0.01 U	0.004 J	0.004 J
VINYL ACETATE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U			
VINYL CHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.01 U
XYLENES, TOTAL	MG/L					0.01 U	0.01 U	0.01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-44	MW-44	MW-44	MW-44	MW-44	MW-44	MW-45	MW-45
Sample Number ==>		MW443	MW443DUP	MW444	MW444D	MW445	MW445FD	MW451	MW452
Date Collected ==>		9/25/1997	9/25/1997	3/27/1998	3/27/1998	10/17/1998	10/17/1998	2/8/1996	6/20/1997
Time Collected ==>		11 40	11 40	16 25	16 25	11 54	11 54	0 00	13 25
Sample Type ==>		N	FD	N	FD	N	FD	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	25
Parameter Name	Units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.001 J	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 002 J	0 01 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
2-HEXANONE	MG/L	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U
ACETONE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
BENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 UJ	0 01 UJ	0 01 U	0 01 U	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0.01 U	0 01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0 006 J	0 007 J	0 004 J	0 005 J	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROFORM	MG/L	0.01 U	0 01 U	0 004 J	0.005 J	0 01 U	0 01 U	0 01 U	0 01 U
CHLOROMETHANE	MG/L	0 001 J	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
cis-1,2-DICHLOROETHYLENE	MG/L								
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L								
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 001 J	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOLUENE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 002 J	0 002 J	0 001 J	0 001 J	0 01 U	0 01 U	0 01 U	0 01 U
trans-1,2-DICHLOROETHENE	MG/L								
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 005 J	0 006 J	0 003 J	0 004 J	0 01 U	0 01 U	0 01 U	0 01 U
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-45	MW-45	MW-45	MW-45	MW-45	MW-45	MW-45	MW-46
Sample Number ==>		MW452DUP	MW453	MW453DUP	MW454	MW454D	MW455	MW455FD	MW461
Date Collected ==>		6/20/1997	9/25/1997	9/25/1997	3/27/1998	3/27/1998	10/16/1998	10/16/1998	2/9/1996
Time Collected ==>		13 25	12.45	12 45	15 45	15 45	9.20	9 20	0 00
Sample Type ==>		FD	N	FD	N	FD	N	FD	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	23
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0 001 J	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
2-HEXANONE	MG/L	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ACETONE	MG/L	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 UJ	0 01 UJ	0 01 U
BENZENE	MG/L	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
BROMOFORM	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 UJ	0 01 UJ	0 01 U	0 01 U	0 01 U
CARBON DISULFIDE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U
CHLOROBENZENE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U
CHLOROETHANE	MG/L	0 01 U	0.01 U	0.01 U	0.01 U	0.01 U	0 01 U	0 01 U	0.01 U
CHLOROFORM	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U
CHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U
cis-1,2-DICHLOROETHYLENE	MG/L								
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
ETHYLBENZENE	MG/L	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 01 U	0.01 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L								
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOLUENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
trans-1,2-DICHLOROETHENE	MG/L								
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-46	MW-46	MW-46	MW-46	MW-46	MW-47	MW-47	MW-47
Sample Number ==>		MW462	MW463	MW464	MW465	MW46NA	MW1ANA	MW47-113_3	MW47-116_5FT
Date Collected ==>		6/17/1997	9/23/1997	3/25/1998	10/13/1998	3/23/2000	3/23/2000	3/9/2001	3/9/2001
Time Collected ==>		13 40	9 30	9 47	14 35	9 40	17 30	13 30	13 15
Sample Type ==>		N	N	N	N	N	FD	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23			
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.00034 J	0.00017 J
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 UJ	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
2-HEXANONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U
ACETONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 UJ	0.005 U	0.005 U	0.003 J	0.0024 J
BENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 UJ	0.001 UJ
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.0002 J	0.001 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.0002 J	0.001 U	0.001 U	0.001 U
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L					0.001 U	0.004 =	0.001 U	0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L					0.002 U	0.002 U	0.002 U	0.002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L					0.001 U	0.001 U	0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.15 =	0.00057 J	0.001 U
TOLUENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U				
trans-1,2-DICHLOROETHENE	MG/L					0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.002 =	0.001 U	0.001 U
VINYL ACETATE	MG/L								
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U	0.01 U	0.01 U				

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-47	MW-47	MW-49	MW-49	MW-49	MW-49	MW-49	MW-51
Sample Number ==>		MW47-120FEET	MW47NA	MW491	MW492	MW493	MW494	MW495	MW-51-Y1Q1
Date Collected ==>		3/9/2001	3/23/2000	2/9/1996	6/17/1997	9/24/1997	3/25/1998	10/15/1998	2/2/1999
Time Collected ==>		13 00	15 45	0 00	17.12	16.00	10.00	9 53	15 30
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>				23	23	23	23	23	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 0013 =	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 0234 =
1,2-DICHLOROETHANE	MG/L	0 001 U	0.001 U	0 01 U	0 01 U	0 01 UJ	0 01 U	0 01 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0.001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
2-HEXANONE	MG/L	0.005 U	0 005 U	0 01 UJ	0 01 U	0.01 U	0 01 U	0.01 U	0 005 U
ACETONE	MG/L	0.0026 J	0.005 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 UJ	0 05 U
BENZENE	MG/L	0 001 U	0 001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
BROMOMETHANE	MG/L	0.001 UJ	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
CHLOROFORM	MG/L	0.001 U	0 001 U	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 001 U
CHLOROMETHANE	MG/L	0.001 U	0 001 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0.004 =						0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U	0 002 U						
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.005 U	0 005 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 005 U
METHYLENE CHLORIDE	MG/L	0.001 U	0 001 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0 001 U						0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0.2 =	0 01 U	0 01 U	0 01 U	0 01 U	0 001 J	0 0015 =
TOLUENE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L			0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 001 U						0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 001 U	0 002 =	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 00844 =
VINYL ACETATE	MG/L								0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
XYLENES, TOTAL	MG/L			0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	

Report Grouping ==> 23-Groundwater; 25-Offsite

Field QC = Quality Control Sample

HY = Hydropunch

MW = Monitor Well

N = Normal sample

FD = Field Duplicate/Quality Control Sample

D, DUP = Duplicate

WG = Groundwater

MG/L = milligram per liter

U = non-detect, = = definite detection, J = estimated detection.

Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-51	MW-51	MW-51	MW-51	MW-51	MW-51	MW-51
Sample Number ==>		MW-51-Y1Q2	MW-51-Y1Q3	MW-51-Y1Q4	MW-51-Y2Q1	MW-51-Y2Q3	MW-51-Y2Q4	MW-51
Date Collected ==>		5/24/1999	8/26/1999	11/3/1999	2/15/2000	8/24/2000	11/8/2000	5/16/2000
Time Collected ==>		18 50	13 30	9 50	10 15	15 00	9 50	12 15
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 00179 =	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 0169 =	0 0152 =	0 00819 =	0 00108 =	0 0129 =	0 0579 =	0 00823 =
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U	0 005 U
ACETONE	MG/L	0 05 U	0 05 U	0 05 U	0 02 U	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0.001 U	0.001 U	0 001 U	0 001 U	0.001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L						0 001 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0.005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.001 U	0 00054 J	0 00083 J	0 001 U	0 00149 =	0 00351 =	0 001 U
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 00464 =	0 00371 =	0 00293 =	0 0007 J	0 00633 =	0 0132 =	0 00463 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 703

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-51	MW-51	MW-51	MW-51	MW-51	MW-51	MW-54	MW-54
Sample Number ==>		MW511	MW511A	MW512	MW513	MW514	MW515	MW-54-Y1Q1	MW-54-Y1Q2
Date Collected ==>		2/8/1996	2/8/1996	6/20/1997	9/27/1997	3/28/1998	10/19/1998	2/3/1999	5/25/1999
Time Collected ==>		0 00	0 00	9 00	0 00	11 30	14 50	12 15	12 50
Sample Type ==>		N	FD	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.002 J	0.002 J	0.01 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.004 J	0.004 J	0.006 J	0.023 =	0.03 =	0.01 =	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
2-HEXANONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U
ACETONE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.05 U
BENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.00353 =
CHLOROBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L							0.0036 =	0.0039 =
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
ETHYLBENZENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L								
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L							0.001 U	0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U		0.005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L							0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L							0.001 U	0.001 U
STYRENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.002 J	0.002 J	0.001 J	0.004 J	0.004 J	0.002 J	0.001 U	0.001 U
TOLUENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U		
trans-1,2-DICHLOROETHENE	MG/L							0.001 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.005 J	0.005 J	0.005 J	0.013 =	0.015 =	0.007 J	0.0606 =	0.061 =
VINYL ACETATE	MG/L							0.02 U	0.02 U
VINYL CHLORIDE	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U		

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-54	MW-54	MW-54	MW-54	MW-54	MW-54
Sample Number ==>		MW-54-Y1Q3	MW-54-Y1Q4	MW-54-Y2Q1	MW-54-Y2Q3	MW-54-Y2Q4	MW-54
Date Collected ==>		8/26/1999	11/3/1999	2/15/2000	8/22/2000	11/7/2000	5/17/2000
Time Collected ==>		18.20	15 45	15 50	15 45	13 15	16 00
Sample Type ==>		N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25
Parameter Name	Units						
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0 0401 =	0 0236 =	0 0049 =	0 0227 =	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 00115 =	0 0009 J	0 00056 J	0 00124 =	0 001 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 05 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 5 U	0 05 U	0 02 U	0 02 U	0 02 U	0.02 U
BENZENE	MG/L	0 01 U	0 001 U	0 001 U	0 00033 J	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0128 =	0 00502 =	0 0147 =	0 00797 =	0 0128 =	0 00446 =
CHLOROBENZENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 00504 =	0 00254 =	0 0124 =	0 0138 =	0 0198 =	0 00554 =
CHLOROMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0103 =	0 0241 =	0 0225 =	0 0149 =	0 0346 =	0 00708 =
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L					0 001 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 01 U	0 001 U	0 001 U	0 001 U		0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 2 U	0 02 U	0 02 U	0.02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 05 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 05 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 01 U	0 001 U	0 001 U	0 001 U		0 001 U
STYRENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 01 U	0 00068 J	0 00094 J	0 00074 J	0 00091 J	0 001 U
TOLUENE	MG/L	0 01 U	0 001 U	0.001 U	0.001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L						
trans-1,2-DICHLOROETHENE	MG/L	0 01 U	0 0014 =	0 00201 =	0 00139 =	0 00258 =	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0.001 U	0 001 U	0 001 U	0 001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 05 =	0 0306 =	0 0433 =	0 0281 =	0 0292 =	0 0116 =
VINYL ACETATE	MG/L	0 2 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L						

Report Grouping ==> 23-Groundwater; 25-Offsite
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HY = Hydropunch
MW = Monitor Well
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D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-54	MW-54	MW-54	MW-54	MW-54	MW-54	MW-54	MW-54
Sample Number ==>		MW-54A-Y2Q4	MW541	MW541A	MW542	MW543	MW544	MW545	MW54NA
Date Collected ==>		11/7/2000	2/13/1996	2/13/1996	6/20/1997	9/25/1997	3/28/1998	10/16/1998	3/23/2000
Time Collected ==>		13 15	0 00	0 00	11 25	16 25	15 25	10 10	18 25
Sample Type ==>		N	N	FD	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25		25	25	25	25	25
Parameter Name	Units								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 0204 =	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.019 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 =	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 0002 J
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 005 U
ACETONE	MG/L	0 02 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 UJ	0 005 U
BENZENE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0.0198 =	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 00865 =	0 01 U	0 01 U	0 01 U	0 001 J	0 002 J	0 01 U	0 019 =
CHLOROBENZENE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0.001 U
CHLOROFORM	MG/L	0 0141 =	0 01 U	0 01 U	0.01 U	0 01 U	0.001 J	0 01 U	0.018 =
CHLOROMETHANE	MG/L	0.001 U	0 01 U	0 01 U	0.01 U	0 01 U	0.01 U	0 01 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0238 =							0 03 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0.01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0.01 U	0.01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 001 U							0 002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L								
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 01 U	0 01 U	0 01 U	0.01 U	0.01 U	0 01 U	0 005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 01 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 01 U	0 01 U	0 01 U	0 01 U	0 002 J	0 01 U	0 001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U							0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L								
STYRENE	MG/L	0.001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00063 J	0 01 U	0 01 U	0 01 U	0 002 J	0 002 J	0 01 U	0 005 =
TOLUENE	MG/L	0.001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L		0 001 J	0 001 J	0 004 J	0 01 =	0.012 =	0 004 J	
trans-1,2-DICHLOROETHENE	MG/L	0 00183 =							0.004 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 01 U	0 01 U	0.01 U	0 01 U	0 01 U	0 01 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.0226 =	0 017 =	0 022 =	0 058 =	0 15 =	0.18 =	0 079 =	0 05 =
VINYL ACETATE	MG/L	0.02 U							
VINYL CHLORIDE	MG/L	0 001 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 0001 J
XYLENES, TOTAL	MG/L		0.01 U	0 01 U	0 01 U	0 01 U	0 01 U	0 01 U	

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection.
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-56	MW-56	MW-56	MW-56	MW-56	MW-57	MW-57
Sample Number ==>		DJA223	MW-56-Y2Q1	MW-56-Y2Q3	MW-56-Y2Q4	MW-56	DJA224	MW-57-Y2Q1
Date Collected ==>		3/15/1999	2/16/2000	8/22/2000	11/7/2000	5/17/2000	3/15/1999	2/16/2000
Time Collected ==>		0 00	16 13	16 15	11 30	9 40	0 00	11 30
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
2-HEXANONE	MG/L	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.005 U
ACETONE	MG/L	0.01 U	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.02 U
BENZENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
BROMOFORM	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
BROMOMETHANE	MG/L	0.01 UJ	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
CARBON DISULFIDE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.01 U	0.00057 J	0.001 U	0.001 U	0.001 U	0.014 =	0.0399 =
CHLOROBENZENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
CHLOROETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
CHLOROFORM	MG/L	0.022 =	0.0382 =	0.00167 =	0.0394 =	0.0434 =	0.006 J	0.0132 =
CHLOROMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L		0.001 U	0.001 U	0.001 U	0.001 U		0.001 U
cis-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
ETHYLBENZENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L				0.001 U			
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		0.001 U	0.001 U		0.001 U		0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.01 U	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L		0.001 U	0.001 U	0.001 U	0.001 U		0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		0.001 U	0.001 U		0.001 U		0.001 U
STYRENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.01 U	0.001 U	0.00041 J	0.001 U	0.001 U	0.002 J	0.00538 =
TOLUENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0.01 U					0.01 U	
trans-1,2-DICHLOROETHENE	MG/L		0.001 U	0.001 U	0.001 U	0.001 U		0.00155 =
trans-1,3-DICHLOROPROPENE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.01 U	0.0017 =	0.00074 J	0.00154 =	0.00182 =	0.022 =	0.0508 =
VINYL ACETATE	MG/L		0.02 U	0.02 U	0.02 U	0.02 U		0.02 U
VINYL CHLORIDE	MG/L	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.01 U	0.001 U
XYLENES, TOTAL	MG/L	0.01 U					0.01 U	

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 707

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-57	MW-57	MW-57	MW-58	MW-58	MW-58	MW-58
Sample Number ==>		MW-57-Y2Q3	MW-57-Y2Q4	MW-57	DJA225	MW-58-Y2Q1	MW-58-Y2Q3	MW-58-Y2Q4
Date Collected ==>		8/22/2000	11/7/2000	5/17/2000	3/15/1999	2/16/2000	8/22/2000	11/7/2000
Time Collected ==>		16 30	9 40	8 00	0 00	16 30	12.15	11 10
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 01 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0.001 U	0 001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0.005 U	0.005 U	0 005 U	0 01 U	0 005 U	0 005 U	0.005 U
ACETONE	MG/L	0 02 U	0.02 U	0 02 U	0 01 U	0 02 U	0 02 U	0.02 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0.001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 0124 =	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0.001 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0457 =	0 0483 =	0.0506 =	0 01 U	0 001 U	0 00026 J	0 001 U
CHLOROBENZENE	MG/L	0.001 U	0 001 U	0 001 U	0 01 U	0 001 U	0.001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0.001 U	0 001 U
CHLOROFORM	MG/L	0 0113 =	0 00893 =	0 0103 =	0 01 U	0.00368 =	0 00242 =	0 00191 =
CHLOROMETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00053 J	0 000411 J	0 001 U		0 001 U	0 001 U	0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L		0 001 U					0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U		0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0.01 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0 005 U	0 005 U	0 01 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0.005 U	0 005 U	0 005 U	0 01 U	0.005 U	0.005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0.001 U	0 001 U		0.001 U	0.001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U		0 001 U	0.001 U	
STYRENE	MG/L	0 001 U	0.001 U	0 001 U	0 01 U	0.001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00586 =	0.00507 =	0 0051 =	0 01 U	0.001 U	0 00041 J	0 001 U
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0.001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L				0 01 U			
trans-1,2-DICHLOROETHENE	MG/L	0 00183 =	0 0015 =	0 00151 =		0 001 U	0 001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0492 =	0 0309 =	0 0465 =	0 01 U	0 00436 =	0 00144 =	0 00272 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U		0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L				0 01 U			

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-58	MW-58A	MW-59	MW-59	MW-59	MW-59	MW-59
Sample Number ==>		MW-58	MW-58A-Y2Q1	DJA226	MW-59-Y2Q1	MW-59-Y2Q3	MW-59-Y2Q4	MW-59
Date Collected ==>		5/17/2000	2/16/2000	3/15/1999	2/16/2000	8/22/2000	11/8/2000	5/17/2000
Time Collected ==>		10 00	16 30	0 00	12 00	12 45	10.10	17 40
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
[illegible] Parameter Name	Units	[illegible]	[illegible]					
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 02 U	0 01 U	0 02 U	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0.001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 00182 =
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 00588 =	0 00288 =	0 01 U	0 001 U	0 001 U	0 00104 =	0 001 U
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0 001 U		0 001 U	0.00038 J	0 001 U	0 00238 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L						0 001 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U		0 001 U	0 001 U		0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.02 U	0 02 U	0 01 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U		0 001 U	0.001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0.001 U		0 001 U	0 001 U		0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 001 U	0 005 J	0 035 =	0 022 =	0 0461 =	0 0241 =
TOLUENE	MG/L	0.001 U	0 001 U	0 001 J	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L			0 01 U				
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 001 U		0 001 U	0 001 U	0 0014 =	0 00082 J
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 00422 =	0 00384 =	0 01 U	0 00149 =	0 00088 J	0 00117 =	0 00494 =
VINYL ACETATE	MG/L	0 02 U	0 02 U		0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L			0 01 U				

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 709

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-60	MW-61	MW-61	MW-62	MW-65	MW-67	MW-68
Sample Number ==>		DJA227	DJA048FD	DJA228	MW62NA	MW655	MW-67-Y2Q1	MW-68-Y2Q3
Date Collected ==>		3/15/1999	3/15/1999	3/15/1999	3/23/2000	11/11/1998	2/16/2000	8/23/2000
Time Collected ==>		0.00	0 00	0.00	8.25	18 00	14.15	15 00
Sample Type ==>		N	FD	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0.002 J	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0 01 U	0 001 U	0 00655 =
1,1,2-TRICHLOROETHANE	MG/L	0 01 U	0 01 U	0.01 U	0.001 U	0 01 U	0 001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0.01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 01 U	0 01 U	0 01 U	0 005 U	0.01 U	0 005 U	0 005 U
ACETONE	MG/L	0 01 U	0 01 U	0 01 U	0 047 U	0 01 U	0.02 U	0.02 U
BENZENE	MG/L	0.01 U	0 01 U	0 01 U	0 0001 J	0 01 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
BROMOFORM	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 01 U	0 01 U	0 01 UJ	0.001 U	0 01 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 01 U	0 01 U	0 01 U	0.00008 J	0 01 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0 01 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0.01 U	0 01 U	0 01 U	0.001 U	0 01 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 01 U	0 01 U	0.01 U	0.001 U	0 01 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0.01 U	0 01 U	0.01 U	0 0002 J	0.01 U	0 001 U	0 001 U
CHLOROMETHANE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0.01 U	0 001 U	0 00181 =
cis-1,2-DICHLOROETHYLENE	MG/L				0 001 U		0 001 U	0 031 =
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L				0 002 U			
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L						0 001 U	0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 005 U	0 01 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 01 U	0 01 U	0 005 U	0 01 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0.01 U	0 01 U	0 01 U	0.001 U	0 01 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L				0 001 U		0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L						0.001 U	0 001 U
STYRENE	MG/L	0.01 U	0.01 U	0 01 U	0 001 U	0 01 U	0.001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 004 J	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 00835 =
TOLUENE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 01 U	0.001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U	0 01 U	0 01 U		0 01 U		
trans-1,2-DICHLOROETHENE	MG/L				0 001 U		0.001 U	0 00936 =
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 01 U	0 01 U	0.001 U	0 01 U	0.001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 01 U	0 01 U	0 01 U	0 032 =	0 01 U	0 00126 =	0 0489 =
VINYL ACETATE	MG/L						0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0.01 U	0 01 U	0 01 U	0 001 U	0 01 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 01 U	0 01 U	0 01 U		0 01 U		

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-68	MW-68	MW-69	MW-69	MW-69	MW-69	MW-69
Sample Number ==>		MW-68-Y2Q4	MW-68B	MW-69-Y2Q1	MW-69-Y2Q3	MW-69-Y2Q4	MW-69	MW69-88_2FT
Date Collected ==>		11/8/2000	5/18/2000	2/16/2000	8/24/2000	11/9/2000	5/18/2000	1/8/2001
Time Collected ==>		14.10	8 00	8.35	14 00	9 40	8 50	15 50
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 00436 =	0 001 U	0 001 U	0 0006 J
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 005 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 002 =
BROMODICHLOROMETHANE	MG/L	0 00047 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0.001 U	0 00089 J	0 001 U	0 001 U	0 001 U	0 00073 J	0 0003 J
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 001 U	0 00644 =	0 001 U	0 001 U	0 00212 =	0 00356 =	0 001 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0019 =	0 0137 =	0 00411 =	0 00226 =	0 0231 =	0 0312 =	0 011 =
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 001 U				0 001 U		0 002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		0.001 U	0 001 U	0 001 U		0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U	0 001 U		0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 0004 J	0 00207 =	0 00176 =	0 00068 J	0 00639 J	0 00487 =	0 004 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 0014 =	0 0131 =	0 00226 =	0 00086 J	0 0123 =	0 0191 =	0 005 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 00321 =	0 0445 =	0 0992 =	0 0504 =	0 464 =	0 642 =	0 35 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 711

Table 14-2
Groundwater Analytical Data
Sampling Penod 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-69	MW-70	MW-70	MW-70	MW-70	MW-70
Sample Number ==>		MW69-94_2FT	MW-70 Bottom	MW-70-Top	MW-70-Y2Q1	MW-70-Y2Q3	MW-70-Y2Q4
Date Collected ==>		1/8/2001	5/18/2000	5/18/2000	2/15/2000	8/24/2000	11/10/2000
Time Collected ==>		15 45	14 15	14 00	14 50	12 15	11.10
Sample Type ==>		N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG
Report Groupıng ==>		25	25	25	25	25	25
Parameter Name	**Units**						
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 342 =	0.284 =	4 83 =	0 93 =	3 37 =
1,1,2-TRICHLOROETHANE	MG/L	0.001 U	0 00393 =	0 00264 =	0 0394 =	0 0152 =	0 016 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 =
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0.001 U	0 00061 J	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 00177 =	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 005 U	0.02 U	0 02 U	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 U	0.001 U	0.001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0.001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 0004 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0.00064 J	0 001 U	0 00348 =	0 00246 =	0 00181 =
CHLOROBENZENE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 0001 J	0 00518 =	0.00436 =	0.0182 =	0.00846 =	0 00937 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 001 U	0 0548 =	0 0388 =	0.522 =	0.211 =	0 292 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
ETHYLBENZENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U					0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U	0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 005 U	0 02 U	0 02 U	0.02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0.005 U	0 005 U	0.005 U	0.005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 001 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		0 001 U	0.001 U	0 001 U	0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.001 U	0 00535 =	0 00292 =	0 0897 =	0 0358 =	0 0325 J
TOLUENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L						
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0.012 =	0 0101 =	0 149 =	0 0504 =	0.0573 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 001 U	0.72 =	0 538 =	11 7 =	4 24 =	4 04 =
VINYL ACETATE	MG/L		0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 00188 =	0 00062 J	0 00169 =
XYLENES, TOTAL	MG/L						

Report Groupıng ==> 23-Groundwater; 25-Offsite
Field QC = Qualıty Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-70	MW-70	MW-70	MW-70	MW-70	MW-71	MW-71
Sample Number ==>		MW70-86_3FT	MW70-89_5FT	MW70-93FT	MW70NA	RW20-80FT	MW-71-Y2Q1	MW-71-Y2Q3
Date Collected ==>		1/8/2001	1/8/2001	1/8/2001	3/24/2000	1/8/2001	2/15/2000	8/23/2000
Time Collected ==>		14 45	14 40	14.30	10 55	14 35	15 30	15.30
Sample Type ==>		N	N	N	N	FD	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25	25
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 39 =	0 13 J	0 014 =	0 31 =	0.018 =	0 0977 =	0 168 =
1,1,2-TRICHLOROETHANE	MG/L	0 002 =	0 001 =	0 0006 J	0 004 =	0 0006 J	0 00321 =	0 00404 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 0008 J	0 0002 J	0 0008 J	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U
ACETONE	MG/L	0 005 U	0 005 U	0 005 U	0 003 J	0 005 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 =	0 0007 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 0005 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0004 J	0 0003 J	0 001 U	0 0004 J	0 001 U	0 0539 =	0 0329 =
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 0006 J	0 001 U	0 0005 J	0 001 U	0 001 U
CHLOROFORM	MG/L	0 001 J	0 0005 J	0 0001 J	0.002 =	0 0001 J	0 996 =	0 989 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 021 =	0 009 =	0 012 =	0.046 =	0 011 =	0 0115 =	0 00894 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0,001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U	0 002 U	0 002 U	0 002 U	0 002 U		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L						0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L						0 001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 002 =	0 0008 J	0 001 U	0 013 =	0 001 U	0 01 =	0 00702 =
TOLUENE	MG/L	0 0004 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 005 =	0 002 =	0 0006 J	0 014 =	0 0006 J	0 0047 =	0 00294 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 59 =	0.14 J	0 018 =	1 1 =	0 027 =	0 33 =	0 247 =
VINYL ACETATE	MG/L						0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 008 =	0 0002 J	0 008 =	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

702 713

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-71	MW-71	MW-71	MW-71	MW-72	MW-72	MW-73
Sample Number ==>		MW-71-Y2Q4	MW-71	MW-71B-Y2Q4	MW71NA	MW-72	MW-72NA	MW73-80_6FT
Date Collected ==>		11/9/2000	5/18/2000	11/9/2000	3/24/2000	10/7/1999	3/21/2000	1/8/2001
Time Collected ==>		11:00	10.50	11 00	11.15	17 22	17 21	12.35
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25		25	25	25	23
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.106 =	0.181 =	0.0784 =	0.18 =	0.01 U	0.001 U	2 =
1,1,2-TRICHLOROETHANE	MG/L	0.00299 =	0.00454 =	0.00203 =	0.005 J	0.01 U	0.001 U	0.002 =
1,1-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
2-HEXANONE	MG/L	0.005 U	0.005 U	0.005 U	0.05 U	0.01 U	0.005 U	0.005 U
ACETONE	MG/L	0.02 U	0.02 U	0.02 U	0.05 U	0.01 U	0.005 U	0.005 U
BENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 J	0.01 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.0265 =	0.034 =	0.0197 =	0.047 =	0.01 U	0.001 U	0.001 U
CHLOROBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.605 J	1.08 =	0.554 =	1.6 =	0.0004 J	0.0002 J	0.0007 J
CHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.002 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.00649 =	0.00998 =	0.00471 =	0.014 =		0.001 U	0.024 =
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.0002 J	0.001 U	0.001 U
ETHYLBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0.001 U		0.001 U	0.02 U		0.002 U	0.002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		0.001 U					
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.02 U	0.02 U	0.02 U	0.05 U	0.01 U	0.005 U	0.005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0.005 U	0.005 U	0.05 U	0.01 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.005 U	0.005 U	0.005 U	0.01 U	0.01 U	0.001 U	0.001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.01 U		0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		0.001 U					
STYRENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.00409 J	0.00735 =	0.00315 J	0.015 =	0.0003 J	0.0002 J	0.006 =
TOLUENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.0001 J	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L					0.01 U		
trans-1,2-DICHLOROETHENE	MG/L	0.00229 =	0.00372 =	0.00158 =	0.005 J		0.001 U	0.008 =
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.0956 =	0.239 =	0.0753 =	0.39 =	0.01 U	0.001 U	0.72 =
VINYL ACETATE	MG/L	0.02 U	0.02 U	0.02 U				
VINYL CHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.01 U	0.01 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L					0.01 U		

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-73	MW-73	MW-73	MW-73
Sample Number ==>		MW73-84_5FT	MW73-88FT	MW73-92FT	RW69-69_5FT
Date Collected ==>		1/8/2001	1/8/2001	1/8/2001	1/8/2001
Time Collected ==>		12 30	12 25	12 20	12 45
Sample Type ==>		N	N	N	FD
Sample Matnx ==>		WG	WG	WG	WG
Report Grouping ==>		23	23	23	23
Parameter Name	Units	[illegible]	[illegible]	[illegible]	[illegible]
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	33 J	0 58 J	0 25 J	0 73 =
1,1,2-TRICHLOROETHANE	MG/L	0 02 J	0 0004 J	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 =	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 0002 J	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 005 U	0.005 U	0 005 U	0 005 U
BENZENE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0004 J	0.001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 008 =	0 0002 J	0 001 U	0 0001 J
CHLOROMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 25 J	0 009 =	0 0009 J	0 002 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U	0 002 U	0 002 U	0 002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L				
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.005 U	0 005 U	0 005 U	0 005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L				
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 016 J	0 002 =	0 002 =	0 002 =
TOLUENE	MG/L	0.001 U	0 001 U	0 001 U	0 0002 J
TOTAL 1,2-DICHLOROETHENE	MG/L				
trans-1,2-DICHLOROETHENE	MG/L	0 054 J	0 003 =	0 0002 J	0 0009 J
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	2 2 J	0 25 J	0 1 J	0 37 =
VINYL ACETATE	MG/L				
VINYL CHLORIDE	MG/L	0 001 =	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L				

Report Grouping ==> 23-Groundwater, 25-Offsite

Field QC = Quality Control Sample

HY = Hydropunch

MW = Monitor Well

N = Normal sample

FD = Field Duplicate/Quality Control Sample

D DUP = Duplicate

WG = Groundwater

MG/L = milligram per liter

U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

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Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-74	MW-74	MW-74	MW-75	MW-75	MW-75	MW-75
Sample Number ==>		MW74-83_3FT	MW74-86_5FT	MW74-90FT	MW75-83_3FT	MW75-87FT	MW75-91FT	RW11-60FT
Date Collected ==>		1/8/2001	1/8/2001	1/8/2001	1/8/2001	1/8/2001	1/8/2001	1/8/2001
Time Collected ==>		11 40	11.35	11 30	12 00	11 55	11 50	12 05
Sample Type ==>		N	N	N	N	N	N	FD
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.13 =	0.18 =	0.13 =	2.9 =	0.002 =	0.004 =	0.004 =
1,1,2-TRICHLOROETHANE	MG/L	0.001 =	0.002 =	0.002 J	0.002 =	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.0002 J	0.001 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
2-HEXANONE	MG/L	0.005 U	0.005 U	0.005 UJ	0.005 U	0.005 U	0.005 U	0.005 U
ACETONE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
BENZENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.0003 J	0.0005 J	0.0004 J	0.0001 J	0.001 U	0.001 U	0.001 U
CHLOROBENZENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.0008 J	0.002 =	0.0009 J	0.001 =	0.001 U	0.001 U	0.001 U
CHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.016 =	0.02 =	0.016 J	0.034 =	0.001 U	0.0002 J	0.0002 J
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
ETHYLBENZENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0.002 U	0.002 U	0.002 UJ	0.002 U	0.002 U	0.002 U	0.002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L							
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.005 U	0.005 U	0.005 UJ	0.005 U	0.005 U	0.005 U	0.005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0.005 U	0.005 UJ	0.005 U	0.005 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L							
STYRENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.004 =	0.008 =	0.004 J	0.002 =	0.001 U	0.001 U	0.001 U
TOLUENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0.004 =	0.01 =	0.004 J	0.005 =	0.001 U	0.001 U	0.001 U
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.49 =	0.75 =	0.44 =	0.28 J	0.003 =	0.008 =	0.008 =
VINYL ACETATE	MG/L							
VINYL CHLORIDE	MG/L	0.001 U	0.0002 J	0.001 UJ	0.001 U	0.001 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
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Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

	Station Location ==>	MW-76	MW-76	MW-77	MW-77	MW-79	MW-79
	Sample Number ==>	MW76-88_7FT	MW76-91_7FT	MW77-85FT	MW77-87_5FT	MW201-64FEET	MW79-100_5FT
	Date Collected ==>	1/8/2001	1/8/2001	1/8/2001	1/8/2001	2/15/2001	2/15/2001
	Time Collected ==>	15 35	15 30	15 15	15 10	9 50	9 30
	Sample Type ==>	N	N	N	N	FD	N
	Sample Matrix ==>	WG	WG	WG	WG	WG	WG
	Report Grouping ==>	25	25	25	25	25	25
Parameter Name	Units						
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 0012 =	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	2 =	2 3 =	2 4 =	2 9 =	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 002 =	0 002 =	0 007 J	0 008 =	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 0016 =	0 0015 =
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 047 =	0 046 =
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 0004 J	0 00055 J	0 00056 J
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 05 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 005 U	0 005 U	0 05 U	0 005 U	0 005 U	0 005 U
BENZENE	MG/L	0 0009 J	0 004 =	0 01 U	0 0002 J	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 0004 J	0 0006 J	0 01 U	0 0006 J	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 01 U	0.0006 J	0 0001 J	0 000099 J
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 UJ
CHLOROFORM	MG/L	0 0009 J	0 001 =	0 004 J	0 004 =	0 00075 J	0 0008 J
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 034 =	0 058 =	0 13 =	0 13 =	0 0005 J	0 00089 J
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U	0 002 U	0 02 U	0 002 U	0 002 U	0 002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L						
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 005 U	0 005 U	0 05 U	0 005 U	0 005 U	0 00079 J
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 05 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L						
STYRENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 005 =	0 001 =	0 011 =	0 006 =	0 033 =	0 034 =
TOLUENE	MG/L	0 001 U	0 0009 J	0 01 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L						
trans-1,2-DICHLOROETHENE	MG/L	0 011 =	0 019 =	0 033 =	0 03 =	0 00052 J	0 00055 J
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 01 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 84 =	0 69 =	2 4 =	2 5 =	0 02 =	0 026 =
VINYL ACETATE	MG/L						
VINYL CHLORIDE	MG/L	0 001 U	0.0003 J	0 01 U	0 0004 J	0 001 U	0 001 U
XYLENES, TOTAL	MG/L						

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-79	MW-79	MW-79	MW-80	MW-80	MW-80
Sample Number ==>		MW79-86_1FT	MW79-91_3FT	MW79-96FEET	MW80-65_3FT	MW80-68_5FT	MW80-71_5FT
Date Collected ==>		2/15/2001	2/15/2001	2/15/2001	2/15/2001	2/15/2001	2/15/2001
Time Collected ==>		9 45	9 40	9 35	10 15	10 10	10 05
Sample Type ==>		N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25	25	25	25
Parameter Name	**Units**						
1,1,1-TRICHLOROETHANE	MG/L	0 0008 J	0 0012 =	0 0012 =	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 0038 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 =	0 0016 =	0 0015 =	0 001 U	0.001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 022 =	0 048 =	0 048 =	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 00042 J	0 00054 J	0 00055 J	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U	0 005 U
BENZENE	MG/L	0 0043 =	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 0001 J	0 001 U	0.001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
CHLOROETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
CHLOROFORM	MG/L	0.0017 =	0 00076 J	0 00076 J	0 001 U	0 001 U	0 001 U
CHLOROMETHANE	MG/L	0 00019 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0061 =	0 00051 J	0 00053 J	0 001 U	0 001 U	0 001 U
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U	0 002 U	0 002 U	0 002 U	0 002 U	0 002 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L						
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 005 U	0 00064 J	0 00062 J	0 005 U	0 005 U	0 005 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 00012 J	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L						
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 0032 =	0 031 =	0 033 =	0 001 U	0 001 U	0 001 U
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L						
trans-1,2-DICHLOROETHENE	MG/L	0 0022 =	0 00049 J	0 0005 J	0 001 U	0 001 U	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 018 =	0 02 =	0 02 =	0 001 U	0 001 U	0.001 U
VINYL ACETATE	MG/L						
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L						

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		MW-87	MW-87	MW-87	MW-A	MW-AA	MW-B	MW-BB	PT92997
Sample Number ==>		MW87-73_6FT	MW87-76_8FT	MW87-80_3FT	MW-A	MW-AA	MW-B	MW-BB	PT92997
Date Collected ==>		1/8/2001	1/8/2001	1/8/2001	8/22/2000	5/18/2000	8/24/2000	5/16/2000	9/29/1997
Time Collected ==>		11 10	11 05	11 00	14 00	8 55	12 15	12 20	0 00
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	25	25					25
Parameter Name	**Units**								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 12 =	0 14 =	0 14 =	0 001 U	0 001 U	0 807 =	0 001 U	1 2 U
1,1,2-TRICHLOROETHANE	MG/L	0 004 =	0 006 =	0 006 =	0 001 U	0 001 U	0 0148 =	0 001 U	1 2 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 0002 J	0 0002 J	0 001 U	0 001 U	0 001 U	0 00811 =	1 2 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 0004 J	0 0004 J	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	1 2 U
ACETONE	MG/L	0 005 U	0 005 U	0 005 U	0 02 U	0 02 U	0 02 U	0 02 U	18 =
BENZENE	MG/L	0 0001 J	0 0001 J	0 0002 J	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
BROMOFORM	MG/L	0 001 UJ	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	1 2 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
CARBON TETRACHLORIDE	MG/L	0 018 =	0 031 =	0 032 =	0 001 U	0 00062 J	0 00225 =	0 001 U	1 2 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
CHLOROETHANE	MG/L	0 001 UJ	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
CHLOROFORM	MG/L	0 006 =	0 01 =	0 01 =	0 001 U	0 00326 =	0 00809 =	0 001 U	1 2 U
CHLOROMETHANE	MG/L	0 0002 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 17 =	0 21 =	0 2 =	0 001 U	0 0281 =	0 168 =	0 001 U	
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L	0 002 U	0 002 U	0 002 U					
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L				0 001 U	0 001 U	0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 02 U	0 02 U	0 02 U	0 02 U	1 2 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	1 2 U
METHYLENE CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 005 U	0 005 U	0 005 U	0 005 U	0 28 J
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L				0 001 U	0 001 U	0 001 U	0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 =	0 002 =	0 002 =	0 001 U	0 00449 =	0 0337 =	0 00086 J	1 2 U
TOLUENE	MG/L	0 001 U	0 001 U	0 0002 J	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
TOTAL 1,2-DICHLOROETHENE	MG/L								1 2 U
trans-1,2-DICHLOROETHENE	MG/L	0 01 =	0 016 =	0 017 =	0 001 U	0 0168 =	0 0468 =	0 001 U	
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
TRICHLOROETHYLENE (TCE)	MG/L	0 13 =	0 15 =	0 15 =	0 001 U	0 441 =	3 62 =	0 00454 =	1 2 U
VINYL ACETATE	MG/L				0 02 U	0 02 U	0 02 U	0 02 U	
VINYL CHLORIDE	MG/L	0 0005 J	0 0008 J	0 0009 J	0 001 U	0 001 U	0 001 U	0 001 U	1 2 U
XYLENES, TOTAL	MG/L								1 2 U

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		PZ02	RW-01	RW-01	RW-01	RW-01	RW-02	RW-02
Sample Number ==>		HY125B	RW-01-Y2Q1	RW-01-Y2Q3	RW-01-Y2Q4	RW-01	RW-02-Y2Q1	RW-02-Y2Q4
Date Collected ==>		10/28/1998	2/16/2000	8/23/2000	11/9/2000	5/17/2000	2/16/2000	11/10/2000
Time Collected ==>		14 45	11 00	9.30	14 15	19 45	9 15	9 15
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		25	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 011 =	0 00095 J	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 00404 =	0 00218 =
1,1,2-TRICHLOROETHANE	MG/L	0.01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 00061 J	0 001 U
1,1-DICHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0.17 =	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 01 U	0 005 U	0.005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 01 UJ	0 02 U	0.02 U	0 02 U	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U	0.001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 01 UJ	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 01 U	0 0424 =	0 0415 =	0 0461 J	0 0454 =	0 0157 =	0 0238 =
CHLOROBENZENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
CHLOROFORM	MG/L	0 01 U	0 0157 =	0 0155 =	0.0131 J	0 0228 =	0 0142 =	0 0202 =
CHLOROMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L		0 001 U	0 001 U	0 001 U	0 001 U	0 0174 =	0 0121 =
cis-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L				0 001 U			0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U		0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 01 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 01 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L		0 001 U	0 001 U		0 001 U	0.001 U	
STYRENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 002 J	0 00466 =	0 00399 =	0 00377 J	0 00428 =	0 00125 =	0 00136 J
TOLUENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L	0 01 U						
trans-1,2-DICHLOROETHENE	MG/L		0 00093 J	0 0008 J	0 00118 J	0 00118 =	0 00169 =	0 00193 =
trans-1,3-DICHLOROPROPENE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 021 =	0 0352 =	0 0402 =	0 028 J	0 0455 =	0 0214 =	0 0172 =
VINYL ACETATE	MG/L		0 02 U	0 02 U	0 02 U	0.02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 01 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L	0 01 U						

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-02	RW-02	RW-03	RW-03	RW-03	RW-03	RW-03	RW-03
Sample Number ==>		RW-02	RW-2-Y2Q3	RW-03-Y1Q2	RW-03-Y2Q3	RW-03-Y2Q4	RW-03	RW-3-Y1Q3	RW-3-Y1Q4
Date Collected ==>		5/17/2000	8/23/2000	5/24/1999	8/24/2000	11/20/2000	5/18/2000	8/27/1999	11/1/1999
Time Collected ==>		18 20	11 45	11 45	15 40	12 45	16 45	12 15	16 55
Sample Type ==>		N	N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23	23
Parameter Name	**Units**								
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 0425 =	0 0596 =	0 0975 =	0 0855 =	0 0408 =	0 0423 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 00051 J	0 00273 =	0 00239 =	0 001 U	0 00323 =	0 00198 =	0 00185 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 02 U	0 05 U	0 02 U	0 02 U	0 02 U	0 05 U	0 05 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0164 =	0 0168 =	0 0133 =	0 0138 =	0 016 =	0 0163 =	0 0105 =	0 0132 =
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 0115 =	0 0154 =	0 00136 =	0 00477 =	0 00536 =	0 00551 =	0 00566 =	0 00524 =
CHLOROMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0107 =	0 0136 =	0 056 =	0 0708 =	0 16 =	0 138 =	0 047 =	0 044 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L					0 001 U			
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U	0 001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00106 =	0 00129 =	0 001 U	0 00084 J	0 001 U	0 00073 J	0 00073 J	0 00101 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L								
trans-1,2-DICHLOROETHENE	MG/L	0 0013 =	0 00177 =	0 00394 =	0 00478 =	0 00753 =	0 00742 =	0 00297 =	0 00331 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0169 =	0 0206 =	0 0543 =	0 0574 =	0 0621 =	0 0788 =	0 0421 =	0 055 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L								

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

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Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-03	RW-03P	RW-04	RW-04	RW-04	RW-04	RW-04
Sample Number ==>		RW-3-Y2Q1	RW-3P-Y1Q1	RW-04-Y1Q2	RW-04-Y2Q3	RW-04-Y2Q4	RW-04	RW-4-Y1Q3
Date Collected ==>		2/14/2000	2/5/1999	5/24/1999	8/24/2000	11/20/2000	5/15/2000	8/27/1999
Time Collected ==>		17 30	9 35	12 05	15 45	12 30	16 40	12 35
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 0619 =	0 08 =	0 0219 =	0 0202 =	0.0149 =	0 0129 =	0 0192 =
1,1,2-TRICHLOROETHANE	MG/L	0 0028 =	0 00323 =	0 0015 =	0 00141 =	0 001 U	0 0007 J	0 0014 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U
ACETONE	MG/L	0 02 U	0 05 U	0 05 U	0 02 U	0 18 =	0 02 U	0.05 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0109 =	0 0164 =	0 00351 =	0 00583 =	0 001 U	0 00426 =	0 00323 =
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 00457 =	0.00589 =	0 001 U	0 00282 =	0 001 U	0.00227 =	0 0023 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.101 =	0 0793 =	0 0154 =	0 0296 =	0 0178 =	0 016 =	0 0176 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L					0 001 U		
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0.02 U	0 02 U	2 76 J	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U		0.001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00065 J	0 001 U	0 0024 =	0 00514 =	0 001 U	0 00197 =	0 00292 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0.00452 =	0 00551 =	0 00274 =	0 00472 =	0 00308 =	0 00265 =	0 00303 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0578 =	0 0782 =	0.294 =	0 438 =	0 204 J	0 316 =	0 368 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-04	RW-04	RW-04P	RW-05	RW-05	RW-05	RW-05
Sample Number ==>		RW-4-Y1Q4	RW-4-Y2Q1	RW-4P-Y1Q1	RW-05-Y1Q2	RW-05-Y2Q3	RW-05-Y2Q4	RW-5-Y1Q3
Date Collected ==>		11/1/1999	2/14/2000	2/5/1999	5/24/1999	8/24/2000	11/20/2000	8/27/1999
Time Collected ==>		16 50	17.40	9 45	14 00	15 50	12 15	12 50
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 0123 =	0 219 =	0 582 =	0 167 =	0 001 U	1 38 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 00076 J	0 00132 =	0 001 U	0 0006 J	0 001 U	0 00115 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0.005 U
ACETONE	MG/L	0 05 U	0 02 U	0 05 U	0 05 U	0 02 U	0 02 U	0 05 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 00697 =	0 00304 =	0 001 U	0 00265 =	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 001 U	0 0028 =	0 00184 =	0 001 U	0 00129 =	0 001 U	0 00162 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0266 J	0 015 =	0 0182 =	0 0501 =	0 0179 =	0 001 U	0 0496 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L						0 001 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 0764 =	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		0.001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 001 U	0 00203 =	0 00243 =	0 0129 =	0 00145 =	0 001 U	0 0122 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 00215 =	0 00358 =	0 0157 =	0 00228 =	0 001 U	0 0143 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 649 =	0 252 =	0 382 =	1 18 =	0 132 =	0 00189 =	1 27 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater, 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Penod 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-05	RW-05	RW-05	RW-05P	RW-06	RW-06	RW-06
Sample Number ==>		RW-5-Y1Q4	RW-5-Y2Q1	RW5-Y1Q1	RW-5P-Y1Q1	RW-06-Y1Q2	RW-06-Y2Q3	RW-06-Y2Q4
Date Collected ==>		11/1/1999	2/14/2000	2/1/1999	2/5/1999	5/24/1999	8/24/2000	11/20/2000
Time Collected ==>		16 25	17 55	16 30	10 15	12 15	15 55	12 00
Sample Type ==>		N	N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG
Report Groupıng ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	2 26 =	3 12 =	0 00313 =	0 0114 =	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 00193 =	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 05 U	0.02 U	0 05 U	0 05 U	0.05 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 001 U	0 00136 =	0 001 U	0.001 U	0 001 U	0 00198 =	0 00238 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cıs-1,2-DICHLOROETHYLENE	MG/L	0.0484 J	0 0502 =	0 00734 =	0.0179 =	0 00453 =	0 00596 =	0.00314 =
cıs-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 0479 =
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0.005 U	0 005 U	0 005 U	0 005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U		0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 0451 J	0 0108 =	0 00216 =	0.00587 =	0 00493 =	0 0059 =	0.00218 J
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 0123 =	0 0024 =	0 00645 =	0 00149 =	0 00228 =	0.00125 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	1 29 =	1 17 =	0 171 =	0 433 =	0 022 =	0 034 =	0 0113 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Groupıng ==> 23-Groundwater; 25-Offsıte
Fıeld QC = Qualıty Control Sample
HY = Hydropunch
MW = Monıtor Well
N = Normal sample
FD = Field Duplıcate/Qualıty Control Sample
D DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect; = = definite detection J = estimated detection
Contamınant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-06	RW-06	RW-06	RW-06	RW-06	RW-06P	RW-07
Sample Number ==>		RW-06	RW-6-Y1Q1	RW-6-Y1Q3	RW-6-Y1Q4	RW-6-Y2Q1	RW-6P-Y1Q1	RW-07-Y1Q2
Date Collected ==>		5/15/2000	2/4/1999	8/27/1999	11/1/1999	2/14/2000	2/5/1999	5/24/1999
Time Collected ==>		16 30	15 25	13 05	17 20	18 40	10 25	12 35
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 0288 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 05 U	0 05 U	0 05 U	0 02 U	0 05 U	0 05 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 00226 =	0 00156 =	0 00309 =	0 00248 =	0 0032 =	0 00211 =	0 001 U
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00512 =	0 00326 =	0 0051 =	0 00234 =	0 00118 =	0 00367 =	0 0546 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00552 =	0 0191 =	0 0101 =	0 0058 =	0 00648 =	0 0242 =	0 00794 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 00203 =	0 00103 =	0 00189 =	0 00159 =	0 00069 J	0 00139 =	0 0171 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0379 =	0 0196 =	0 0327 =	0 0242 =	0 017 =	0 0276 =	0 0895 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater, 25-Offsite

Field QC = Quality Control Sample

HY = Hydropunch

MW = Monitor Well

N = Normal sample

FD = Field Duplicate/Quality Control Sample

D, DUP = Duplicate

WG = Groundwater

MG/L = milligram per liter

U = non-detect, = = definite detection, J = estimated detection

Contaminant detected at or below laboratory detection limit

702 725

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-07	RW-07	RW-07	RW-07	RW-07	RW-07	RW-07
Sample Number ==>		RW-07-Y2Q3	RW-07-Y2Q4	RW-07	RW-7-Y1Q1	RW-7-Y1Q3	RW-7-Y1Q4	RW-7-Y2Q1
Date Collected ==>		8/24/2000	11/20/2000	5/15/2000	2/4/1999	8/27/1999	11/1/1999	2/14/2000
Time Collected ==>		16 00	11 50	16 10	16.00	13 25	16 00	18 10
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 0658 =	0 0498 =	0 0522 =	0 014 =	0 0432 =	0 0607 =	0 0499 =
1,1,2-TRICHLOROETHANE	MG/L	0 00144 =	0 00188 =	0 00095 J	0 001 U	0 00085 J	0 00108 =	0 00103 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0.02 U	0 02 U	0 02 U	0 05 U	0 05 U	0 05 U	0 02 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0.001 U
CARBON DISULFIDE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 00043 J	0 001 U	0.001 U	0 00054 J	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0.00159 =	0 00308 =	0 00127 =	0 00179 =	0.00339 =	0 00228 =	0.00184 =
CHLOROMETHANE	MG/L	0.001 U	0 001 U	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0706 =	0 0866 =	0 0596 =	0 035 =	0.0591 =	0 0747 =	0 0703 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L		0 001 U					
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0.001 U		0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U		0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 0107 =	0 0093 J	0 00776 =	0 00884 =	0 00981 =	0 0122 =	0 00933 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 0197 =	0 0229 =	0 0174 =	0 0118 =	0 0173 =	0 0236 =	0 0192 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0989 =	0 101 =	0 0972 =	0 0642 =	0 094 =	0 145 =	0 102 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-07P	RW-08	RW-08	RW-08	RW-08	RW-08	RW-08
Sample Number ==>		RW-7P-Y1Q1	RW-08-Y1Q2	RW-08-Y2Q3	RW-08-Y2Q4	RW-08	RW-8-Y1Q1	RW-8-Y1Q3
Date Collected ==>		2/5/1999	5/24/1999	8/24/2000	11/20/2000	5/15/2000	2/4/1999	8/27/1999
Time Collected ==>		10 35	12 50	16 10	11 40	16 00	16 40	13 45
Sample Type ==>		N	N	N	N	N	N	N
Sample Matnx ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 0195 =	0 0748 =	0 109 =	0 001 U	0 121 =	0 0114 =	0 108 =
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 00166 =	0 00197 =	0 001 U	0 00174 =	0 001 U	0 00132 =
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 0122 =	0 0051 =	0 001 U	0 00498 =	0 00854 =	0 00979 =
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 05 U	0 05 U	0 02 U	0 02 U	0 02 U	0.05 U	0 05 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 001 U	0 00138 =	0 00094 J	0 001 U	0 00089 J	0 001 U	0 0013 =
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 00191 =	0 0103 =	0 00872 =	0 00653 =	0 00841 =	0 00249 =	0 0141 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0453 =	0 104 =	0 128 =	0 0401 =	0 12 =	0 0119 =	0 093 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L				0 001 U			
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U		0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 0434 =	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U		0 001 U	0 001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 0112 =	0 00596 =	0 00566 =	0 00202 J	0 00519 =	0 0035 =	0 0055 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 0156 =	0 0354 =	0 0397 =	0 0119 =	0 0376 =	0 00296 =	0 027 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0866 =	0 273 =	0 19 =	0 0569 =	0 268 =	0 0264 =	0 173 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-08	RW-08	RW-08A	RW-08P	RW-09	RW-09	RW-09
Sample Number ==>		RW-8-Y1Q4	RW-8-Y2Q1	RW-8A-Y2Q1	RW-8P-Y1Q1	RW-09-Y1Q2	RW-09-Y2Q3	RW-09-Y2Q4
Date Collected ==>		11/1/1999	2/14/2000	2/14/2000	2/5/1999	5/24/1999	8/24/2000	11/20/2000
Time Collected ==>		15 40	18 15	18 20	10 40	13 10	16 15	11 30
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 00201 =	0 00125 =	0 00192 =
1,1,2,2-TETRACHLOROETHANE	MG/L	0.119 =	0 121 =	0 118 =	0 0459 =	0 00121 =	0 00255 =	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 00128 =	0 00158 =	0 002 =	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 00784 =	0 001 U	0 001 U	0 016 =	0 00145 =	0 00118 =	0 00182 =
1,1-DICHLOROETHENE	MG/L	0 001 U	0 00682 =	0 00597 =	0 001 U	0 0492 =	0 0454 =	0 0525 =
1,2-DICHLOROETHANE	MG/L	0 0278 =	0 001 U	0 001 U	0 001 =	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 05 U	0 02 U	0 02 U	0 05 U	0 05 U	0 02 U	0.02 U
BENZENE	MG/L	0 001 U	0 001 U	0.001 U	0.001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 00111 =	0 00103 =	0 00093 J	0 00121 =	0 00143 =	0 00117 =	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 0103 =	0 0105 =	0 0111 =	0 0131 =	0 0102 =	0 0125 =	0.0133 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 0891 =	0 115 =	0 114 =	0 0647 =	0 00847 =	0 00768 =	0 00202 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L							0 001 U
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0.02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 131 =
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00614 =	0 00667 =	0 00646 =	0 00535 =	0 0415 =	0 0329 =	0 0543 J
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 001 U	0 0308 =	0 0366 =	0 0201 U	0 00318 =	0 00253 =	0 001 U
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 261 =	0 19 =	0 186 =	0 14 =	0 052 =	0 0355 =	0 0363 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0.001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-09	RW-09	RW-09	RW-09	RW-09P	RW-10	RW-10P
Sample Number ==>		RW-09	RW-9-Y1Q3	RW-9-Y1Q4	RW-9-Y2Q1	RW-9P-Y1Q1	RW-10-Y2Q4	RW-10P-Y1Q1
Date Collected ==>		5/15/2000	8/27/1999	11/1/1999	2/14/2000	2/5/1999	11/20/2000	2/5/1999
Time Collected ==>		15 40	14 05	15 10	18 30	10 50	12 15	10 55
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23		
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0 0014 =	0 00167 =	0 00173 =	0 00156 =	0 00158 =	0 001 U	0 00164 =
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 00152 =	0 001 U	0 00298 =	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1-DICHLOROETHANE	MG/L	0 00115 =	0 00135 =	0 00124 =	0 00188 =	0 00117 =	0 001 U	0 00134 =
1,1-DICHLOROETHENE	MG/L	0 0359 =	0 0451 =	0 0444 =	0 0529 =	0 0404 =	0 001 U	0 0451 =
1,2-DICHLOROETHANE	MG/L	0 001 U	0 00063 J	0 00053 J	0 0007 J	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 05 U	0 05 U	0 02 U	0 05 U	0 02 U	0 05 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0009 J	0 00121 =	0 00112 =	0 00079 J	0 001 U	0 001 U	0 001 U
CHLOROBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 0108 =	0 0154 =	0 0118 =	0 0125 =	0 0101 =	0 001 U	0 0109 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00603 =	0 00565 =	0 00495 =	0 00545 =	0 0052 =	0 001 U	0 00594 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L						0 001 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 0512 =	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U		0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 0321 =	0 0377 =	0 0388 =	0 0612 =	0 0354 =	0 001 U	0 0375 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 00224 =	0 00194 =	0 00186 =	0 00223 =	0 00228 =	0.001 U	0 00235 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0377 =	0 0411 =	0 0433 =	0 0514 =	0 0391 =	0 00161 =	0 0441 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

702 723

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-1A	RW-1A	RW-1A	RW-1A	RW-1A	RW-1A	RW-1A
Sample Number ==>		RW-1A-Y1Q2	RW-1A-Y1Q3	RW-1A-Y1Q4	RW-1A-Y2Q1	RW-1A-Y2Q3	RW-1A-Y2Q4	RW-1A
Date Collected ==>		5/24/1999	8/27/1999	11/1/1999	2/15/2000	8/23/2000	11/9/2000	5/17/2000
Time Collected ==>		13 05	13 10	17 15	17 50	10 15	14 40	19 30
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23	23	23
Parameter Name	**Units**							
1,1,1-TRICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0.0726 =	0.001 U	0.0465 =	0.0498 =	0.0353 =	0.0439 =	0.0258 =
1,1,2-TRICHLOROETHANE	MG/L	0.0016 =	0.001 U	0.00212 =	0.00154 =	0.00108 =	0.00139 =	0.00082 J
1,1-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-DICHLOROETHENE	MG/L	0.0129 =	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-DICHLOROPROPANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-HEXANONE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ACETONE	MG/L	0.05 U	0.05 U	0.05 U	0.02 U	0.02 U	0.02 U	0.02 U
BENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMODICHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOFORM	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
BROMOMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CARBON DISULFIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CARBON TETRACHLORIDE	MG/L	0.00129 =	0.001 U	0.016 =	0.0152 =	0.00947 =	0.0156 =	0.0106 =
CHLOROBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
CHLOROFORM	MG/L	0.01 =	0.00317 =	0.00627 =	0.397 =	0.292 =	0.42 J	0.339 =
CHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0.104 =	0.005 =	0.0521 =	0.00363 =	0.00275 =	0.00329 =	0.00249 =
cis-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
DIBROMOCHLOROMETHANE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
ETHYLBENZENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L						0.001 U	
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
METHYLENE CHLORIDE	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U
STYRENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0.00552 =	0.01 =	0.00118 =	0.00314 =	0.0022 =	0.00262 J	0.00231 =
TOLUENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0.0354 =	0.00188 =	0.00403 =	0.0014 =	0.00096 J	0.00159 =	0.00096 J
trans-1,3-DICHLOROPROPENE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
TRICHLOROETHYLENE (TCE)	MG/L	0.198 =	0.0331 =	0.0643 =	0.119 =	0.0739 =	0.0664 =	0.073 =
VINYL ACETATE	MG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
VINYL CHLORIDE	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit.

Table 14-2
RI Groundwater Analytical Data
Sampling Period 1996 to 2001
Rev 0 Memphis Depot Dunn Field RI

Station Location ==>		RW-1B	RW-1B	RW-1B	RW-1B	RW-22	RW-AA	RW-B
Sample Number ==>		RW-1B-Y2Q1	RW-1B-Y2Q3	RW-1B-Y2Q4	RW-1B	RW-22	RW-AA	RW-B
Date Collected ==>		2/16/2000	8/23/2000	11/9/2000	5/17/2000	5/15/2000	5/17/2000	8/23/2000
Time Collected ==>		9 40	11 15	15 15	19 00	15 50	18 10	11 45
Sample Type ==>		N	N	N	N	N	N	N
Sample Matrix ==>		WG	WG	WG	WG	WG	WG	WG
Report Grouping ==>		23	23	23	23	23		
Parameter Name	Units							
1,1,1-TRICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 00136 =	0 001 U	0 001 U
1,1,2,2-TETRACHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,1,2-TRICHLOROETHANE	MG/L	0 001 U	0 00032 J	0 001 U	0 001 U	0 001 U	0 001 U	0 00062 J
1,1-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 00119 =	0 001 U	0 001 U
1,1-DICHLOROETHENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 0367 =	0 001 U	0 001 U
1,2-DICHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
1,2-DICHLOROPROPANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
2-HEXANONE	MG/L	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U	0 005 U	0 005 U
ACETONE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
BENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMODICHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOFORM	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
BROMOMETHANE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON DISULFIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CARBON TETRACHLORIDE	MG/L	0 0206 =	0 0261 =	0 0201 =	0 0123 =	0 00097 J	0.015 =	0 017 =
CHLOROBENZENE	MG/L	0.001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
CHLOROFORM	MG/L	0 0207 =	0 0494 =	0 037 =	0 0153 =	0 011 =	0 0106 =	0 0155 =
CHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
cis-1,2-DICHLOROETHYLENE	MG/L	0 00332 =	0 00557 =	0 00366 =	0 00218 =	0 0062 =	0 00977 =	0 014 =
cis-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
DIBROMOCHLOROMETHANE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
ETHYLBENZENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
M,P-XYLENE (SUM OF ISOMERS)	MG/L			0 001 U				
M-XYLENE (1,3-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U		0 001 U	0 001 U	0 001 U	0 001 U
METHYL ETHYL KETONE (2-BUTANONE)	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0.005 U	0 005 U
METHYLENE CHLORIDE	MG/L	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U	0 005 U
O-XYLENE (1,2-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
P-XYLENE (1,4-DIMETHYLBENZENE)	MG/L	0 001 U	0 001 U		0 001 U	0 001 U	0 001 U	0 001 U
STYRENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TETRACHLOROETHYLENE(PCE)	MG/L	0 00237 =	0 00284 =	0 00193 J	0 00108 =	0 0322 =	0 00093 J	0 00131 =
TOLUENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TOTAL 1,2-DICHLOROETHENE	MG/L							
trans-1,2-DICHLOROETHENE	MG/L	0 00123 =	0 0017 =	0 00122 =	0 0008 J	0 00224 =	0 00117 =	0 00176 =
trans-1,3-DICHLOROPROPENE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
TRICHLOROETHYLENE (TCE)	MG/L	0 0219 =	0 0357 =	0 0211 =	0 0136 =	0 0382 =	0 0158 =	0 021 =
VINYL ACETATE	MG/L	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U	0 02 U
VINYL CHLORIDE	MG/L	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U	0 001 U
XYLENES, TOTAL	MG/L							

Report Grouping ==> 23-Groundwater; 25-Offsite
Field QC = Quality Control Sample
HY = Hydropunch
MW = Monitor Well
N = Normal sample
FD = Field Duplicate/Quality Control Sample
D, DUP = Duplicate
WG = Groundwater
MG/L = milligram per liter
U = non-detect, = = definite detection, J = estimated detection
Contaminant detected at or below laboratory detection limit

Table 14-3
Frequency of Detection for Dunn Field Groundwater*
Rev 0 Memphis Depot Dunn Field RI

Parameter Name	Number Analyzed	Number Detected	Minimum Detection	Minimum Detection Qualifier	Maximum Detection	Maximum Detection Qualifier	Units	Background Values	Number Background Exceedances
Explosives									
1,3 5-TRINITROBENZENE	10	1	0.0012	J	0.0012	J	MG/L		
1,3-DINITROBENZENE	10	1	0.0012	J	0.0012	J	MG/L		
2,4,6-TRINITROTOLUENE	10	1	0.0012	J	0.0012	J	MG/L		
2-AMINO-4,6-DINITROTOLUENE	10	1	0.0012	J	0.0012	J	MG/L		
2-NITROTOLUENE	10	1	0.0026	J	0.0026	J	MG/L		
3-NITROTOLUENE	10	1	0.0026	J	0.0026	J	MG/L		
4-AMINO-2 6-DINITROTOLUENE	10	1	0.0012	J	0.0012	J	MG/L		
4-NITROTOLUENE	10	1	0.0026	J	0.0026	J	MG/L		
HEXAHYDRO-1 3,5-TRINITRO-1 3 5,7-TETRAZOCINE	10	1	0.0026	J	0.0026	J	MG/L		
OCTAHYDRO-1,3 5,7-TETRANITRO-1,3 5,7-TETRAZOCINE	10	1	0.0026	J	0.0026	J	MG/L		
TETRYL	10	1	0.0026	J	0.0026	J	MG/L		
Gases									
METHANE	20	4	0.00261	=	0.0127	=	MG/L		
General Chemistry									
BICARBONATE	11	11	9	=	229	=	MG/L		
CHLORIDE (AS CL)	51	51	1.7	=	305	=	MG/L		
FLUORIDE	10	4	0.08	=	0.35	=	MG/L		
HARDNESS (AS CaCO3)	14	14	72	=	804	=	MG/L		
NITROGEN, AMMONIA (AS N)	46	4	0.4	=	3.2	=	MG/L		
NITROGEN, NITRATE (AS N)	11	7	0.16	=	4.29	=	MG/L		
NITROGEN, NITRATE-NITRITE	47	43	0.38	=	6.15	=	MG/L		
pH	4	4	5.9	=	6.4	J	PH UNITS		
SULFATE (AS SO4)	51	51	1.8	=	55.5	=	MG/L		
TOTAL DISSOLVED SOLIDS (RESIDUE FILTERABLE)	10	10	172	=	709	=	MG/L		
TOTAL ORGANIC CARBON	57	30	1.3	=	36.4	=	MG/L		
OC Pesticides									
ALPHA-CHLORDANE	37	2	0.0000068	J	0.00001	J	MG/L		
DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROETHANE)	22	2	0.0000039	J	0.0000046	J	MG/L		
DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOROETHANE)	22	1	0.0000067	J	0.0000067	J	MG/L		
DIELDRIN	37	4	0.000036	J	0.000086	J	MG/L		
ENDRIN KETONE	37	2	0.0000081	J	0.0000082	J	MG/L		
GAMMA-CHLORDANE	37	1	0.000007	J	0.000007	J	MG/L		
HEPTACHLOR EPOXIDE	37	4	0.0000086	J	0.000014	J	MG/L		
Organics									
Total Polynuclear Aromatic Hydrocarbons	117	3	0.00021	J	0.024	J	MG/L		
Polynuclear Aromatic Hydrocarbons									
BENZO(a)ANTHRACENE	166	4	0.00046	J	0.002	J	MG/L		
BENZO(a)PYRENE	166	3	0.001	J	0.002	J	MG/L		
BENZO(b)FLUORANTHENE	166	3	0.00174	J	0.003	J	MG/L		
BENZO(g,h i)PERYLENE	166	1	0.00124	J	0.00124	J	MG/L		
BENZO(k)FLUORANTHENE	166	3	0.00057	J	0.003	J	MG/L		
CHRYSENE	166	3	0.0013	J	0.003	J	MG/L		
FLUORANTHENE	166	5	0.00021	J	0.005	J	MG/L		
INDENO(1,2,3-c d)PYRENE	166	1	0.00181	J	0.00181	J	MG/L		
NAPHTHALENE	166	1	0.00032	J	0.00032	J	MG/L		
PHENANTHRENE	166	3	0.00092	J	0.002	J	MG/L		
PYRENE	166	6	0.00153	J	0.004	J	MG/L		
Semivolatile Organics									
1 2 4-TRICHLOROBENZENE	145	1	0.0011	J	0.0011	J	MG/L		
2,4 DINITROTOLUENE	176	2	0.0012	J	0.00144	J	MG/L		
2,6-DINITROTOLUENE	176	2	0.0012	J	0.00209	J	MG/L		
2-CHLOROPHENOL	166	1	0.001	J	0.001	J	MG/L		
4-METHYLPHENOL (p-CRESOL)	166	1	0.002	J	0.002	J	MG/L		
BaP Equivalents	117	2	0.001312	=	0.002533	=	MG/L		
BENZYL BUTYL PHTHALATE	166	3	0.001	J	0.004	J	MG/L	4.00E-03	0
bis(2-ETHYLHEXYL) PHTHALATE	166	6	0.001	J	0.003	J	MG/L		
DI-n-BUTYL PHTHALATE	158	12	0.001	J	0.00729	J	MG/L		
DI-n-OCTYL PHTHALATE	166	6	0.002	J	0.007	J	MG/L		
DIETHYL PHTHALATE	166	1	0.00029	J	0.00029	J	MG/L		
NITROBENZENE	176	1	0.0012	J	0.0012	J	MG/L		
PENTACHLOROPHENOL	166	1	0.003	J	0.003	J	MG/L		

Table 14-3
Frequency of Detection for Dunn Field Groundwater*
Rev 0 Memphis Depot Dunn Field RI

Parameter Name	Number Analyzed	Number Detected	Minimum Detection	Minimum Detection Qualifier	Maximum Detection	Maximum Detection Qualifier	Units	Background Values	Number Background Exceedances
Volatile Organics									
1,1,1-TRICHLOROETHANE	444	49	0 0002	J	0 014	=	MG/L	1 00E-03	37
1,1,2,2-TETRACHLOROETHANE	444	155	0 0006	J	33	J	MG/L		
1,1,2-TRICHLOROETHANE	444	96	0 00032	J	0 0394	=	MG/L		
1,1-DICHLOROETHANE	444	44	0 0001	J	0 0189	=	MG/L		
1 1-DICHLOROETHENE	444	87	0 0002	J	0 17	=	MG/L	2 00E-03	74
1 2-DICHLOROETHANE	444	24	0 0002	J	0 0278	=	MG/L		
1,2-DICHLOROPROPANE	444	1	0 0002	J	0 0002	J	MG/L		
ACETONE	444	6	0 003	J	18	=	MG/L		
BENZENE	444	13	0 0001	J	0 0043	=	MG/L		
BROMODICHLOROMETHANE	444	10	0 00047	J	0 0198	=	MG/L		
BROMOMETHANE	444	6	0 0004	J	0 0006	J	MG/L		
CARBON DISULFIDE	444	3	0 00008	J	0 001	J	MG/L		
CARBON TETRACHLORIDE	444	160	0 000099	J	0 0796	=	MG/L		
CHLOROBENZENE	444	7	0 00094	J	0 00182	=	MG/L		
CHLOROETHANE	444	3	0 0005	J	0 001	J	MG/L		
CHLOROFORM	444	229	0 0001	J	1 61	=	MG/L		
CHLOROMETHANE	444	6	0 0001	J	0 002	J	MG/L		
cis-1,2-DICHLOROETHYLENE	246	167	0 0002	J	0 522	=	MG/L		
DIBROMOCHLOROMETHANE	444	3	0 0002	J	0 001	J	MG/L		
ETHYLBENZENE	444	1	0 002	J	0 002	J	MG/L		
METHYL ETHYL KETONE (2-BUTANONE)	444	12	0 00062	J	2 76	J	MG/L		
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	444	2	0 003	J	0 004	J	MG/L		
METHYLENE CHLORIDE	437	4	0 00012	J	0 28	J	MG/L		
TETRACHLOROETHYLENE(PCE)	444	261	0 0002	J	0 18	=	MG/L	1 00E-03	225
TOLUENE	444	9	0 0001	J	0 0053	=	MG/L		
TOTAL 1 2-DICHLOROETHENE	198	61	0 001	J	0 76	=	MG/L		
trans-1,2-DICHLOROETHENE	246	156	0 0002	J	0 149	=	MG/L		
TRICHLOROETHYLENE (TCE)	444	306	0 00064	J	11 7	=	MG/L		
VINYL CHLORIDE	444	14	0 0001	J	0 008	=	MG/L		
XYLENES TOTAL	198	2	0 009	J	0 054	J	MG/L		

Note Data evaluated includes field duplicates and normal samples

J = Estimated detection, Contaminant detected at or below laboratory detection limit.

(=) Contaminant detected

MG/L = milligrams per liter

*Metals are not included in this table

Table 14-4

Comparison of Soil Concentrations to Soil Screening Levels/Groundwater Protection Criteria

Rev. 0 Memphis Depot Dunn Field RI

SOIL TYPE	STATISTIC	1,1,2,2-TETRACHLOROETHANE	1,1,2-TRICHLOROETHANE	1,1-DICHLOROETHENE	1,2-DICHLOROETHANE	CARBON TETRACHLORIDE	CHLOROFORM	TETRACHLOROETHYLENE(PCE)	TOTAL 1,2-DICHLOROETHENE	TRICHLOROETHYLENE (TCE)	VINYL CHLORIDE
Soil Screening Level/Groundwater Protection Criteria Value (mg/kg) [1]		0 003	0 02	0 06	0 02	0 07	0 6	0 06	NA	0 06	0 01
Surface Soil	Number Detected Above Background	2	1	1	0	2	7	9	7	11	1
	Minimum Concentration (mg/kg)	0 007	0 002	0 002	- -	0 001	0 001	0 0003	0 001	0 001	0 11
	Maximum Concentration (mg/kg)	0 083	0 002	0 002	- -	0.039	0 089	0.049	0 87	0 85	0 11
	Average Concentration (mg/kg)	0 045	0 002	0 002	- -	0 02	0 016	0 013	0 160	0 160	0 11
	Number Exceeding GWP Criteria	2	0	0	- -	0	0	0	NA	5	1
Subsurface Soil	Number Detected Above Background	56	25	8	5	16	37	56	42	92	15
	Minimum Concentration (mg/kg)	0 003	0 0003	0 0004	0 001	0 0005	0 0008	0 0004	0 0006	0 0005	0 002
	Maximum Concentration (mg/kg)	160	2 2	0 06	0 046	6 8	14	4 4	190	460	7
	Average Concentration (mg/kg)	6 180	0 17898	0 014	0 016	0 516	0 942	0 160	7 900	7 890	0 640
	Number Exceeding GWP Criteria	53	6	0	2	5	6	7	NA	45	9

Notes [1] SSLs/GWP values from *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites Peer Review Draft* USEPA, OSWER March 2001 Generic SSLs for Residential Scenario with Dilution-Attenuation Factor (DAF) of 20 used due to depth (>50 ft) to groundwater

mg/kg = milligram per kilogram

Table 14-5

Frequency of Detection for Dunn Field Groundwater Inorganics from Onsite Wells

Rev 0 Memphis Depot Dunn Field RI

Parameter Name	Number Analyzed	Number Detected	Minimum Detection	Minimum Detection Qualifier	Maximum Detection	Maximum Detection Qualifier	Units	Background Values	Number Background Exceedances	Percent Detected	Percent Detected Above Background
ALUMINUM	157	119	0 0241	J	110	=	MG/L	1 80E+00	53	76%	45%
ANTIMONY	157	10	0 0018	J	0 0298	J	MG/L	3 44E-02	0	6%	0%
ARSENIC	157	30	0 0009	J	0 155	=	MG/L		NA	19%	NA
BARIUM	147	139	0 0376	J	2 51	=	MG/L	2 24E-01	20	95%	14%
BERYLLIUM	157	29	0 00002	J	0 022	=	MG/L	6 00E-04	24	18%	83%
CADMIUM	157	52	0 00011	J	0 0227	=	MG/L		NA	33%	NA
CALCIUM	148	138	5 93	=	192	=	MG/L	5 29E+01	8	93%	6%
CHROMIUM TOTAL	157	86	0 0014	J	0 541	=	MG/L	5 44E-02	13	55%	15%
COBALT	147	61	0 00052	J	0 624	=	MG/L	2 48E-02	13	41%	21%
COPPER	157	60	0 00077	J	0 185	=	MG/L	1 63E-01	2	38%	3%
IRON	151	130	0 015	=	724	=	MG/L	6 73E+00	44	86%	34%
LEAD	157	71	0 0011	J	0 557	=	MG/L	9 40E-03	31	45%	44%
MAGNESIUM	148	138	1 03	=	34 5	=	MG/L	2 60E+01	6	93%	4%
MANGANESE	147	123	0 00089	J	13 4	=	MG/L	5 60E-01	18	84%	15%
MERCURY	157	33	0 00006	J	0 0019	=	MG/L		NA	21%	NA
NICKEL	157	65	0 00032	J	0 162	=	MG/L	3 14E-02	14	41%	22%
POTASSIUM	148	113	0 361	J	22.5	=	MG/L	3 50E+00	26	76%	23%
SELENIUM	157	4	0 0021	J	0 004	J	MG/L	5 80E-03	0	3%	0%
SILICON	1	1	15 4	=	15 4	=	MG/L		NA	100%	NA
SILVER	153	2	0 00072	J	0 0038	J	MG/L		NA	1%	NA
SODIUM	148	129	1 01	J	48 3	J	MG/L	1 07E+02	0	87%	0%
THALLIUM	157	2	0 00086	J	0 0022	J	MG/L		NA	1%	NA
VANADIUM	146	87	0 00034	J	0 642	=	MG/L	6 00E-03	45	60%	52%
ZINC	157	62	0 0062	J	1 63	=	MG/L		NA	39%	NA

Note Data evaluated includes field duplicates and normal samples

J = Estimated detection, Contaminant detected at or below laboratory detection limit

(=) Contaminant detected

MG/L = milligrams per liter

Table 14-6

Frequency of Detection for Dunn Field Groundwater Inorganics from Off Site Wells

Rev 0 Memphis Depot Dunn Field RI

Parameter Name	Number Analyzed	Number Detected	Minimum Detection	Minimum Detection Qualifier	Maximum Detection	Maximum Detection Qualifier	Units	Background Values	Number Background Exceedances	Percent Detected	Percent Detected Above Background
ALUMINUM	73	52	0 0113	J	194	=	MG/L	1 80E+00	19	71%	37%
ANTIMONY	91	5	0 0018	J	0 0172	J	MG/L	3 44E-02	0	5%	0%
ARSENIC	91	15	0 00081	J	0 171	=	MG/L		NA	16%	NA
BARIUM	69	69	0 036	=	1 23	=	MG/L	2 24E-01	15	100%	22%
BERYLLIUM	91	8	0 00003	J	0 026	=	MG/L	6 00E-04	5	9%	63%
CADMIUM	91	31	0 0001	J	0 0139	=	MG/L		NA	34%	NA
CALCIUM	71	71	7 8	=	76 5	=	MG/L	5 29E+01	6	100%	8%
CHROMIUM, TOTAL	91	30	0 0011	J	0 443	=	MG/L	5 44E-02	3	33%	10%
COBALT	69	21	0 00066	J	0 254	=	MG/L	2 48E-02	5	30%	24%
COPPER	91	26	0 00083	J	0 16	=	MG/L	1 63E-01	0	29%	0%
IRON	72	62	0 0988	J	1050	=	MG/L	6 73E+00	21	86%	34%
LEAD	91	29	0 001	J	0 18	=	MG/L	9 40E-03	2	32%	7%
MAGNESIUM	71	71	3 88	J	34 6	=	MG/L	2 60E+01	4	100%	6%
MANGANESE	69	58	0 00053	J	4 75	=	MG/L	5 60E-01	14	84%	24%
MERCURY	91	10	0 00006	J	0 00065	=	MG/L		NA	11%	NA
NICKEL	91	21	0 00098	J	0 262	=	MG/L	3 14E-02	3	23%	14%
POTASSIUM	71	58	0 502	=	16 5	=	MG/L	3 50E+00	19	82%	33%
SELENIUM	91	1	0 0024	J	0 0024	J	MG/L	5 80E-03	0	1%	0%
SILICON	2	2	9 12	=	19 5	=	MG/L		NA	100%	NA
SILVER	87	2	0 0024	J	0 0028	J	MG/L		NA	2%	NA
SODIUM	71	63	6 89	=	843	=	MG/L	1 07E+02	1	89%	2%
VANADIUM	69	34	0 00031	J	0 776	=	MG/L	6 00E-03	19	49%	56%
ZINC	91	29	0 01	=	0 905	=	MG/L		NA	32%	NA

Note Data evaluated includes field duplicates and normal samples

J = Estimated detection, Contaminant detected at or below laboratory detection limit

(=) Contaminant detected

MG/L = milligrams per liter

Table 14-7
Comparison of Onsite and Offsite Groundwater Inorganic Frequency of Detection
Rev 0 Memphis Depot Dunn Field RI

Parameter Name	Percent Detected			Percent Detected > Background		
	Onsite	Offsite	Onsite/Offsite1	Onsite	Offsite	Onsite/Offsite2
ALUMINUM	76%	71%	**1.1**	45%	37%	**1.2**
ANTIMONY	6%	5%	**1.2**	0%	0%	1.0
ARSENIC	19%	16%	**1 2**	NA	NA	
BARIUM	95%	100%	0 9	14%	22%	0.7
BERYLLIUM	18%	9%	**2.1**	83%	63%	**1.3**
CADMIUM	33%	34%	1.0	NA	NA	
CALCIUM	93%	100%	0 9	6%	8%	0.7
CHROMIUM, TOTAL	55%	33%	**1.7**	15%	10%	**1.5**
COBALT	41%	30%	**1.4**	21%	24%	0.9
COPPER	38%	29%	**1.3**	3%	0%	–
IRON	86%	86%	1.0	34%	34%	1.0
LEAD	45%	32%	**1.4**	44%	7%	**6.3**
MAGNESIUM	93%	100%	0 9	4%	6%	0 8
MANGANESE	84%	84%	1 0	15%	24%	0.6
MERCURY	21%	11%	**1.9**	NA	NA	
NICKEL	41%	23%	**1.8**	22%	14%	**1.5**
POTASSIUM	76%	82%	0 9	23%	33%	0.7
SELENIUM	3%	1%	**2.3**	0%	0%	1.0
SILICON	100%	100%	1 0	NA	NA	
SILVER	1%	2%	0 6	NA	NA	
SODIUM	87%	89%	1 0	0%	2%	0 0
VANADIUM	60%	49%	**1.2**	52%	56%	0.9
ZINC	39%	32%	**1.2**	NA	NA	

(1) Bold data indicate frequency of detection for onsite wells exceeds offsite wells

(2) Bold data indicate frequency of background exceedance for onsite wells exceeds offsite wells

Table 14-8

Groundwater Tritium Activity at the Depot and Memphis Area

Rev 0 Memphis Depot Dunn Field RI

Well Number	Well Depth (ft bgs)	Aquifer	Reported Tritium (TU)	One Standard Deviation Counting Error (TU)	Date of Sample[1]	Source	Activity on 1-Nov-99 (TU)[2]
Sh:K-73	273	Memphis Sand	*18 6*		01-Jan-86	USGS[3]	***8.69***
Sh.K-74	273	Memphis Sand	*11.9*		01-Jan-86		***5.56***
Sh'L-36	485	Memphis Sand	0.3		01-Jan-86		**0.14**
Sh.L-37	382	Memphis Sand	0 8		01-Jan-86		**0.37**
Sh:O-231	518	Memphis Sand	0.6	NA	01-Jan-86		**0.28**
Sh:P-99	59	Fluvial	3.7		01-Jan-86		1.73
Sh:Q-40	441	Memphis Sand	0 6		01-Jan-86		**0.28**
Sh:T-16	584	Memphis Sand	1.2		01-Jan-86		**0.56**
Sh:W-15	338	Memphis Sand	0.9		01-Jan-86		**0.42**
MW67	275	Memphis Sand	0.03	0.09	19-Aug-99	CH2MHILL	**0.03**
MW36	209	Confined Sand	1.18	0 09	13-Oct-98		**1.11**
MW36	209	Confined Sand	2.5	0.09	24-Mar-98		**2.29**
MW36	209	Confined Sand	6.04	0 2	24-Sep-97		**5.38**
MW37	183	Confined Sand	-0.04	0 09	29-Sep-97		**0.00**
MW37	183	Confined Sand	0 41	0 09	27-Mar-98		**0.38**
MW43T	172	Confined Sand	4.17	0.14	23-Oct-98		**3.94**
MW32	68	Fluvial	8 33	0 28	29-Sep-97		7.43
MW32	68	Fluvial	8.3	0.27	27-Mar-98		7 60
MW34	157	Fluvial (deep)	6.64	0 22	26-Sep-97		5 92
MW34	157	Fluvial (deep)	7 24	0.24	27-Mar-98		6.63
MW55	74	Fluvial	7 03	0.23	25-Mar-98		6 44
MW55	74	Fluvial	8.42	0 28	25-Sep-97		7 50
MW63	135	Fluvial (deep)	8.04	0.27	21-Oct-98		8.04

Notes 1) Specific sampling dates for USGS data not available - date estimated based on publication date

2) Activity calculated based on $\log \frac{[A_0]}{[A]} = \frac{Kt}{2.3}$ where $K = \frac{0.693}{T_{1/2}}$, $T_{1/2}$ = 12 43 years;

t = years from sample date to 1-Nov-99, $[A_0]$ = initial activity, and [A] = activity at time t

3) Data from Table 2 of Graham and Parks (1986)

Bold values indicate Memphis Sand or Lower Confined aquifers

Italicized data anomalously high for the Memphis Sand and in areas of suspected leakage from the fluvial aquifer (Graham and Parks, 1986)

NA = Not available

ft bgs = feet below ground surface

Table 14-9

Dunn Field Groundwater Extraction System Sampling Program (August 2001)

Rev 0 Memphis Depot Dunn Field RI

Groundwater Monitoring Well Sampling and Analysis

Well Type	Well No.		Frequency/Analyses/Method at Each Well
Downgradient Groundwater Monitoring Wells	MW-30	MW-57	Semi-Annual: Volatile Organics/SW8260B (using Diffusion Bags)
	MW-31	MW-58	
	MW-32	MW-67	
	MW-33	MW-68	
	MW-34	MW-69	
	MW-37	MW-70	
	MW-40	MW-71	
	MW-42	MW-76	
	MW-43	MW-77	
	MW-44	MW-78	
	MW-51	MW-79	
	MW-54	MW-80	
	MW-56	MW-95	
Recovery Wells	RW-01	RW-05	Semi-Annual PH/Field Probe Conductivity/Field Probe Volatile Organics/SW8260B
	RW-01A	RW-06	
	RW-01B	RW-07	
	RW-02	RW-08	
	RW-03	RW-09	
	RW-04		

Extraction System Effluent Sampling

Analysis	Method
pH, conductivity, turbidity*	Field Measurements
Volatile Organics (VOCs)*	SW-846 Method 8260B
TAL Metals**	SW-846 Method 200.7
Arsenic**	SW-846 Method 206 2
Mercury**	SW-846 Method 245 1
Semi-Volatile Organics (SVOCs)**	SW-846 Method 8270C

*Quarterly sampling

**Semi-annual sampling (in May & November of each Year)

TABLE 14-10
Summary of Extraction Well Performance
Rev. 0 Memphis Depot Dunn Field RI

VOCs Removed (lbs)	Extraction Wells							Total
	RW-3	RW-4	RW-5	RW-6	RW-7	RW-8	RW-9	
Carbon Tetrachloride	0.55	0.13	0.0105		0.0036	0.19	0.15	1.03
Chloroform	0.19	0.05	0.0161	0.15	0.081	1.87	2.17	4.53
1,1-Dichloroethane						0.19	0.25	0.44
1,2-Dichloroethane						0.68	0.04	0.72
1,1-Dichloroethene						1.50	8.25	9.75
Total 1,2-Dichloroethene	2.98	0.93	1.19	0.41	3.40	21.27	1.51	31.69
1,1,2,2-Tetrachloroethane	2.40	3.16	29.23		1.68	16.04	0.18	52.68
Tetrachloroethene	0.0142	0.09	0.38	0.81	0.45	0.96	7.38	10.09
1,1,1-Trichloroethane							0.30	0.30
1,1,2-Trichloroethane	0.10	0.04	0.0134		0.0242	0.20	0.30	0.68
Trichloroethene	2.44	14.81	22.97	2.00	4.39	23.38	7.81	77.79
Total	**8.68**	**19.20**	**53.81**	**3.37**	**10.03**	**66.27**	**28.34**	**189.70**
Total Extracted Groundwater (gallons)	4,661,650	4,732,089	3,536,863	8,711,410	5,390,585	20,430,215	22,194,316	69,657,128

Note Totals are based on system operation beginning November 4th, 1998 through December 31, 2000

Total 1,2-Dichloroethene equals the sum of cis 1,2-DCE and trans 1,2-DCE

lbs = pounds

Figures

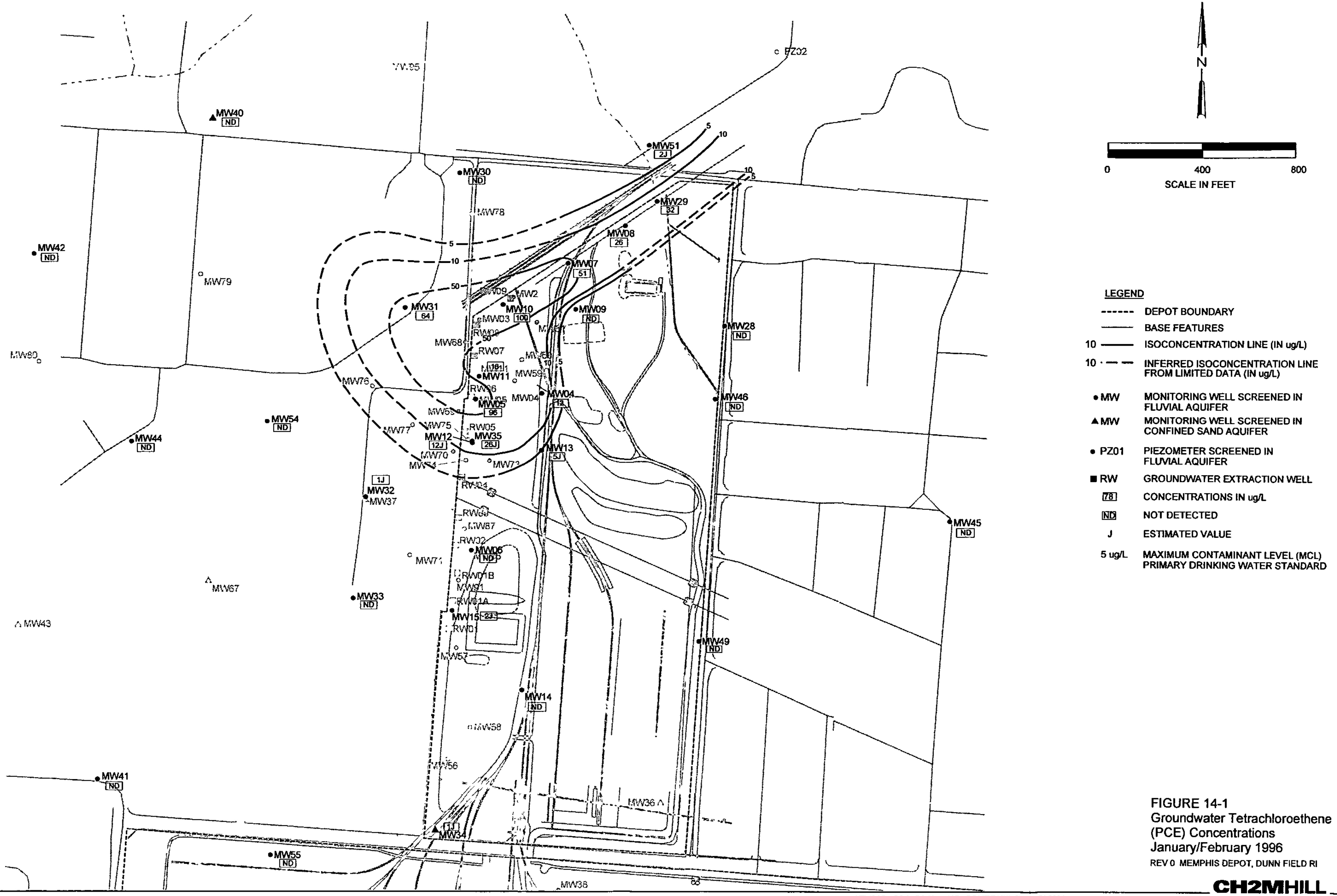

FIGURE 14-1
Groundwater Tetrachloroethene (PCE) Concentrations
January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-1 dgn

FIGURE 14-2
Groundwater Tetrachloroethene(PCE)
Concentrations - October 1998
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

FIGURE 14-3
Groundwater Tetrachloroethene (PCE)
Concentrations - November 1999
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

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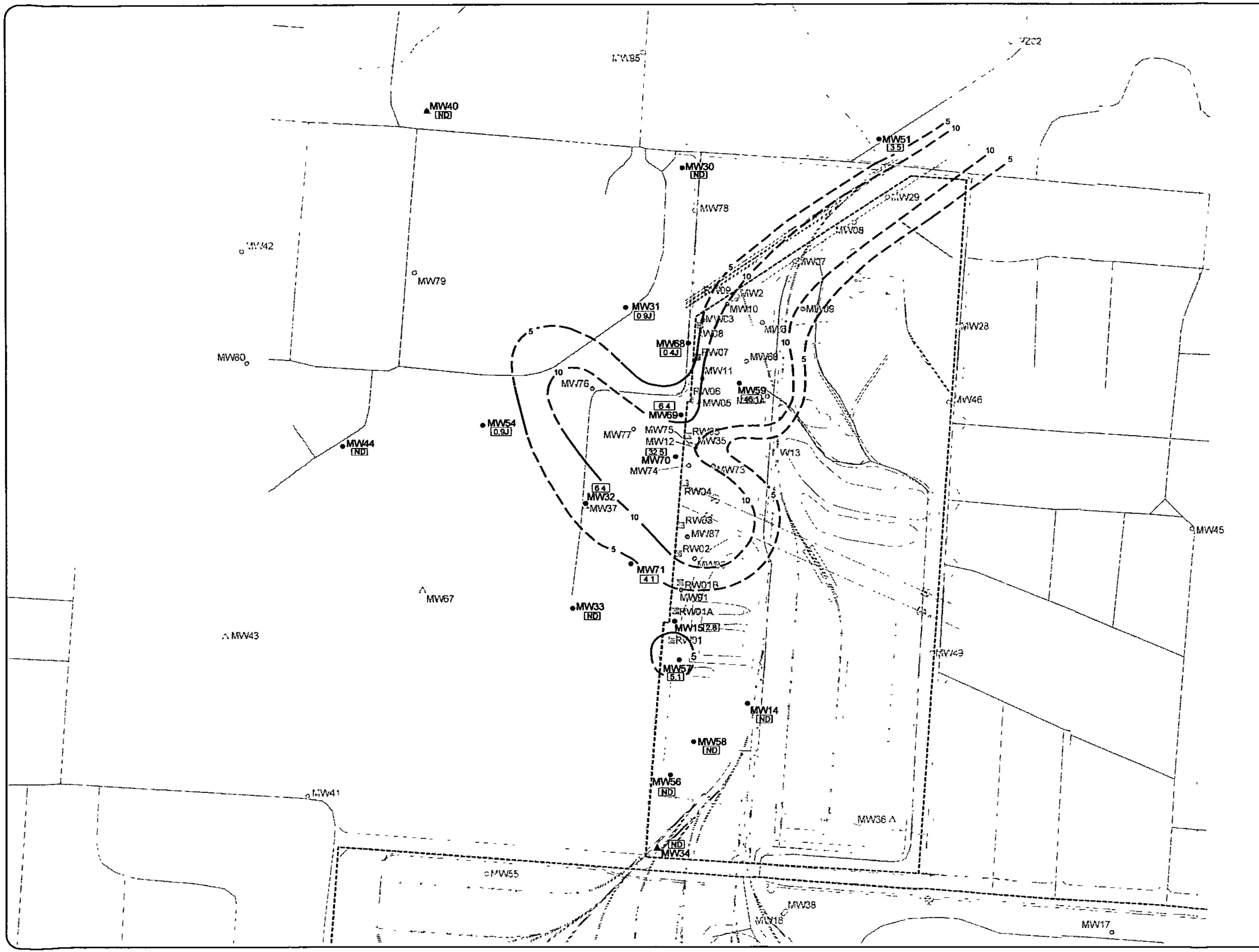

FIGURE 14-4
Groundwater Tetrachloroethene (PCE)
Concentrations - November 2000
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfm01-14-4.dgn

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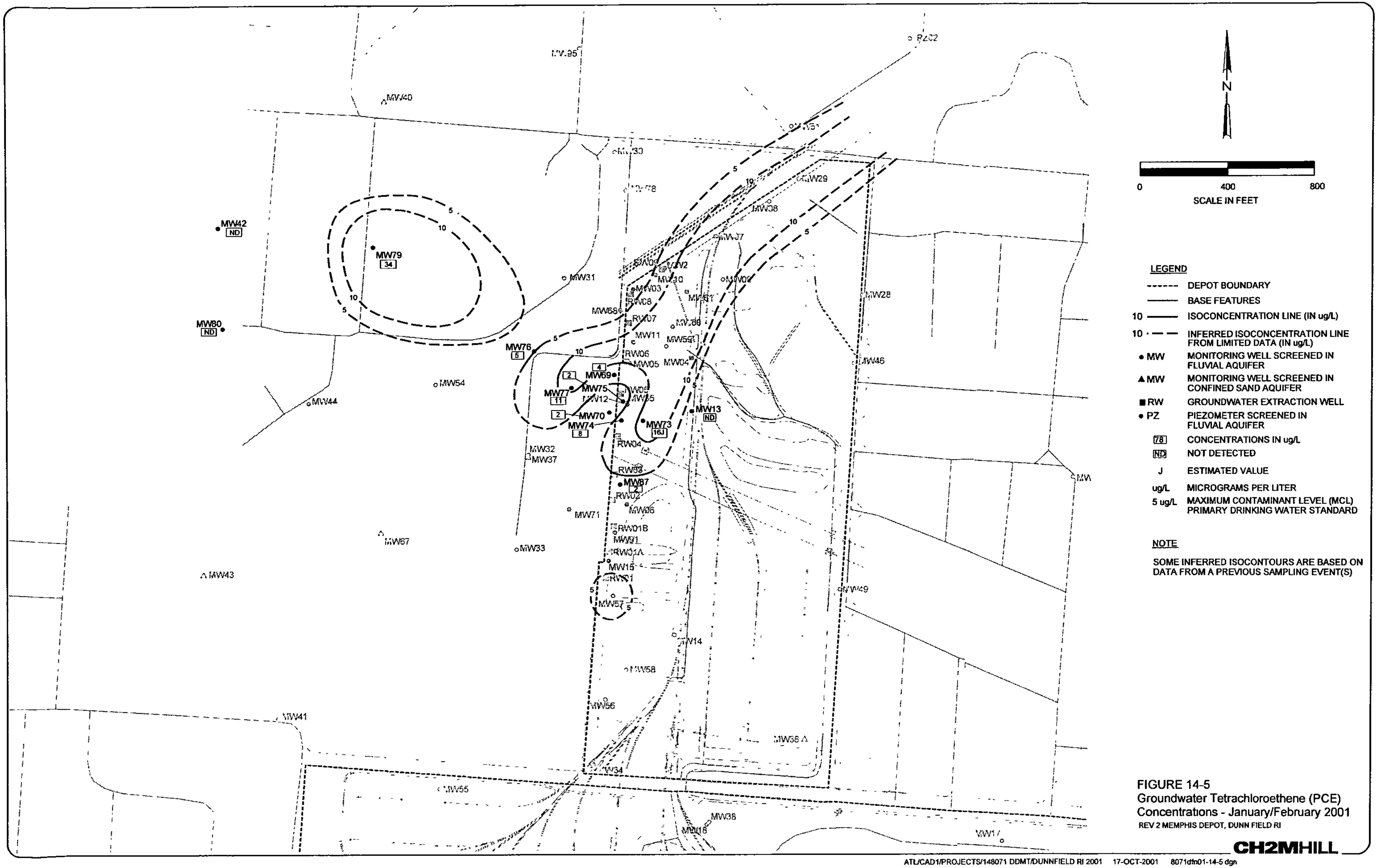


LEGEND

- DEPOT BOUNDARY
- BASE FEATURES
- 10 ISOCONCENTRATION LINE (IN ug/L)
- 10 INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ■ RW GROUNDWATER EXTRACTION WELL
- ● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- ug/L MICROGRAMS PER LITER
- 5 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

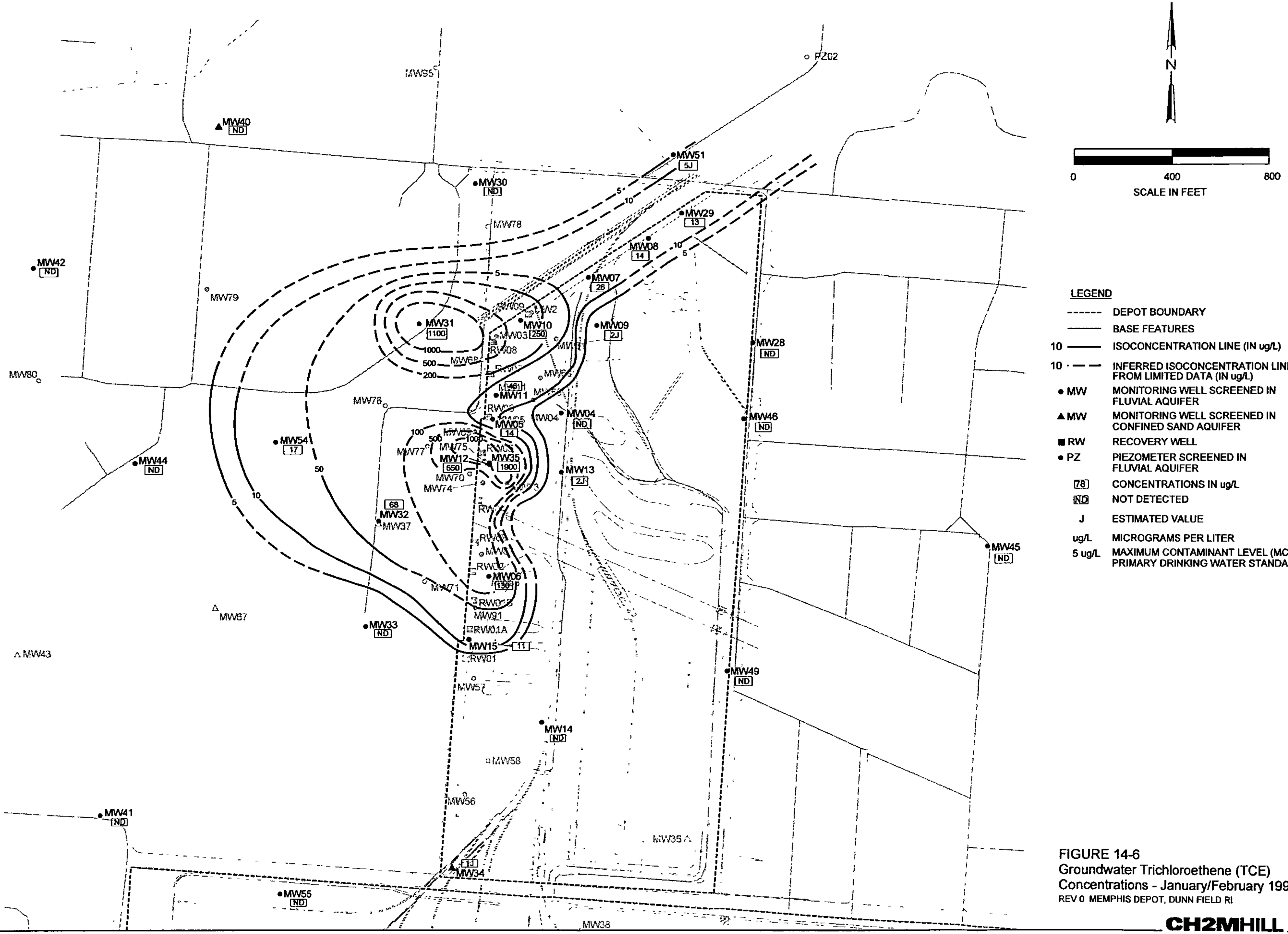
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-5
Groundwater Tetrachloroethene (PCE)
Concentrations - January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-5 dgn



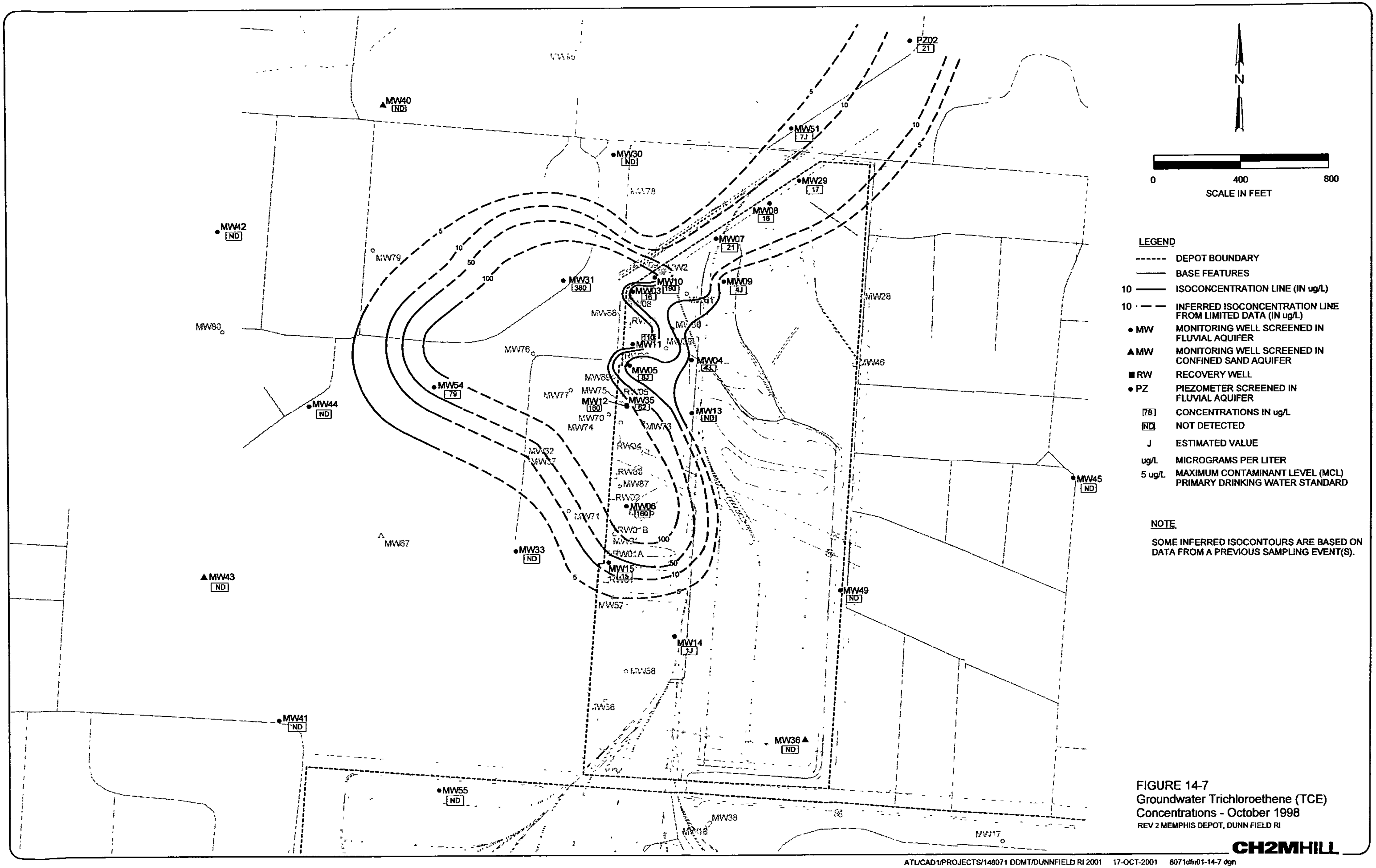
LEGEND

- - - - DEPOT BOUNDARY
——— BASE FEATURES
10 ——— ISOCONCENTRATION LINE (IN ug/L)
10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW RECOVERY WELL
● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78 CONCENTRATIONS IN ug/L
ND NOT DETECTED
J ESTIMATED VALUE
ug/L MICROGRAMS PER LITER
5 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

FIGURE 14-6
Groundwater Trichloroethene (TCE)
Concentrations - January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-6 dgn



LEGEND

------	DEPOT BOUNDARY
——	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 – –	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
● PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER
5 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

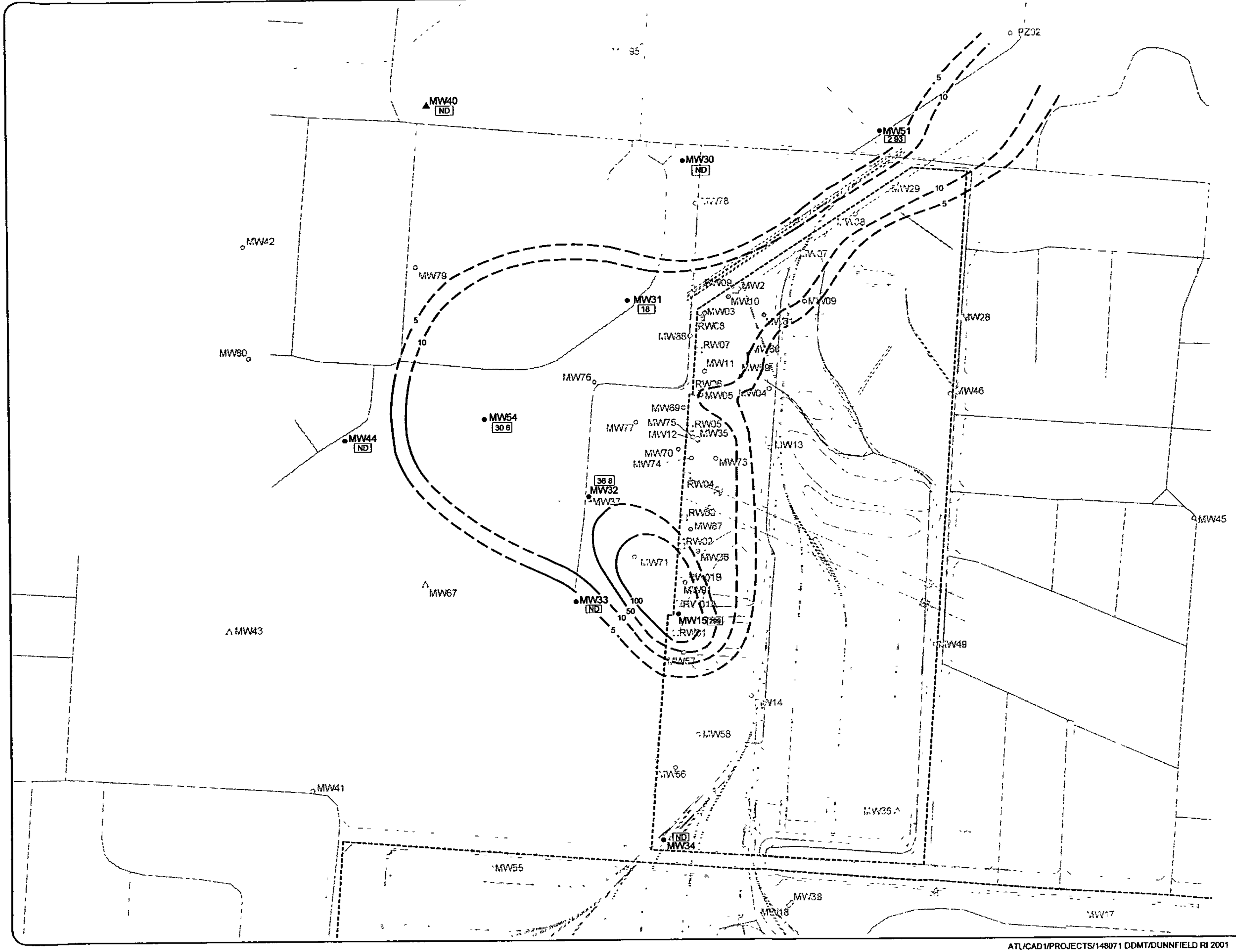
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S).

FIGURE 14-7
Groundwater Trichloroethene (TCE)
Concentrations - October 1998
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-7.dgn



N

0 400 800
SCALE IN FEET

LEGEND

-------	DEPOT BOUNDARY
———	BASE FEATURES
10 ———	ISOCONCENTRATION LINE (IN ug/L)
10 · — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
• MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■RW	RECOVERY WELL
• PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER
5 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

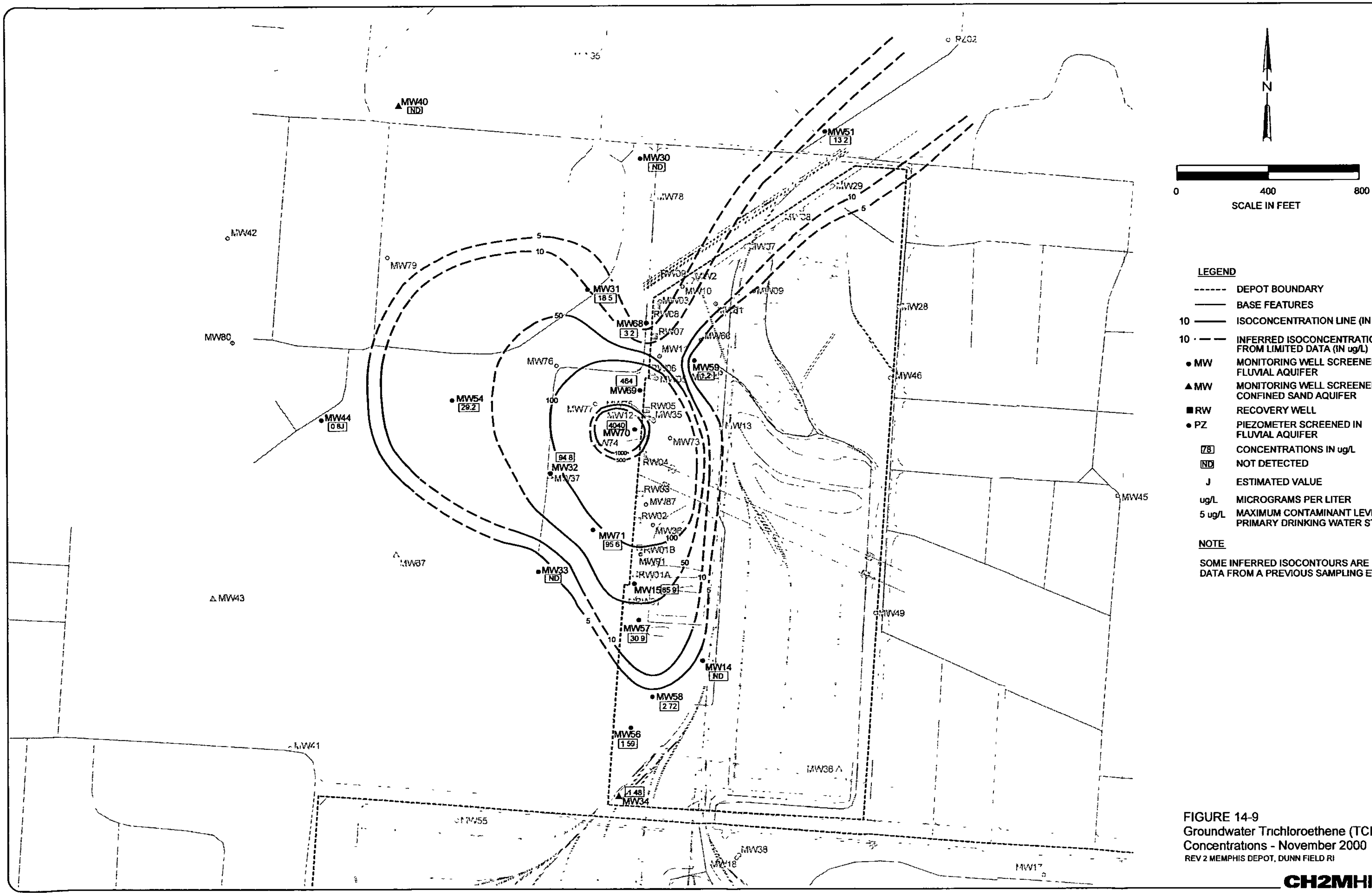
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S).

FIGURE 14-8
Groundwater Trichloroethene (TCE)
Concentrations - November 1999
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-8 dgn



LEGEND

- ------ DEPOT BOUNDARY
- —— BASE FEATURES
- 10 —— ISOCONCENTRATION LINE (IN ug/L)
- 10 - — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ■ RW RECOVERY WELL
- ● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- ug/L MICROGRAMS PER LITER
- 5 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

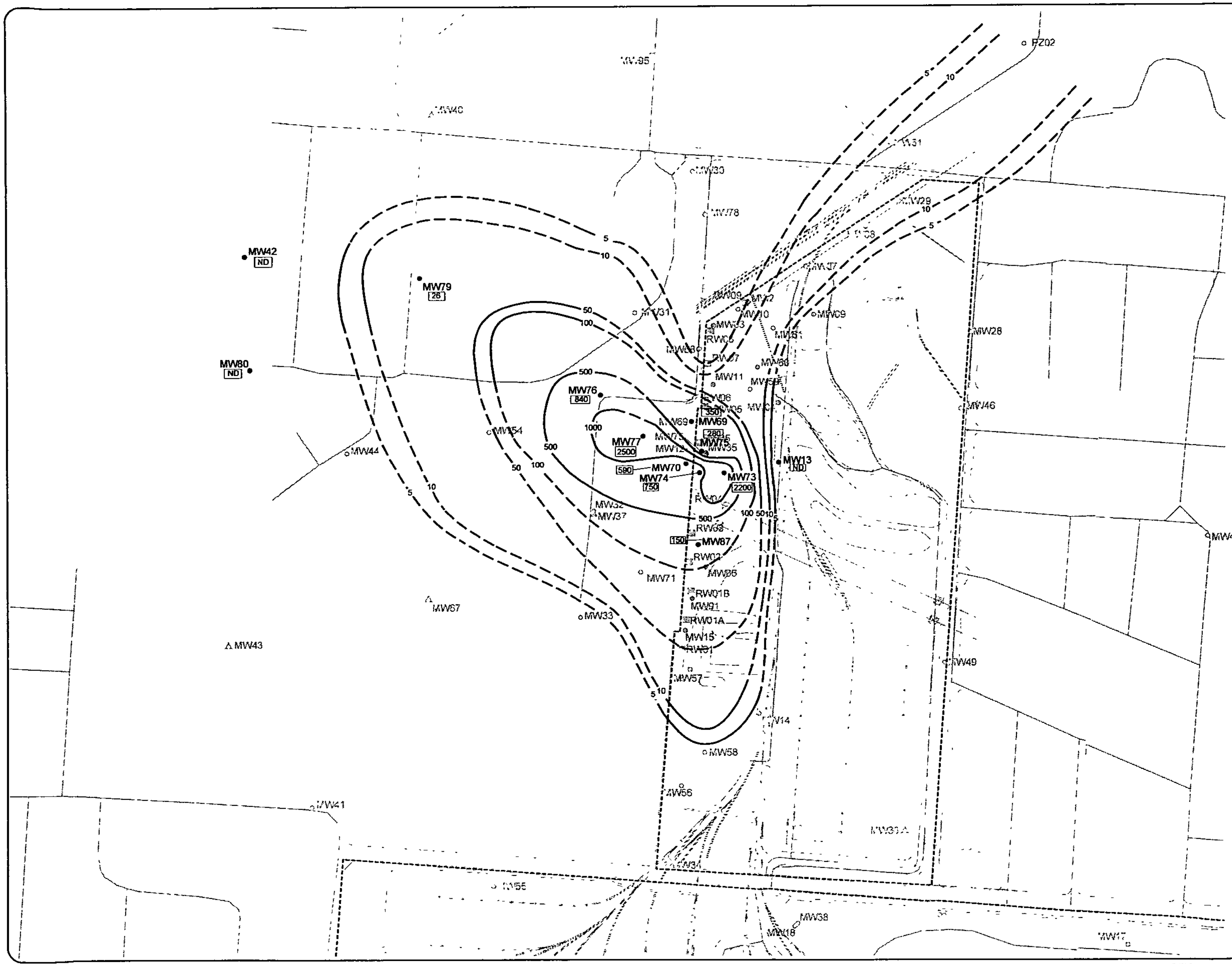
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S).

FIGURE 14-9
Groundwater Trichloroethene (TCE)
Concentrations - November 2000
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-9 dgn



N

0 400 800
SCALE IN FEET

LEGEND

------	DEPOT BOUNDARY
——	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 · — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
● PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER
5 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

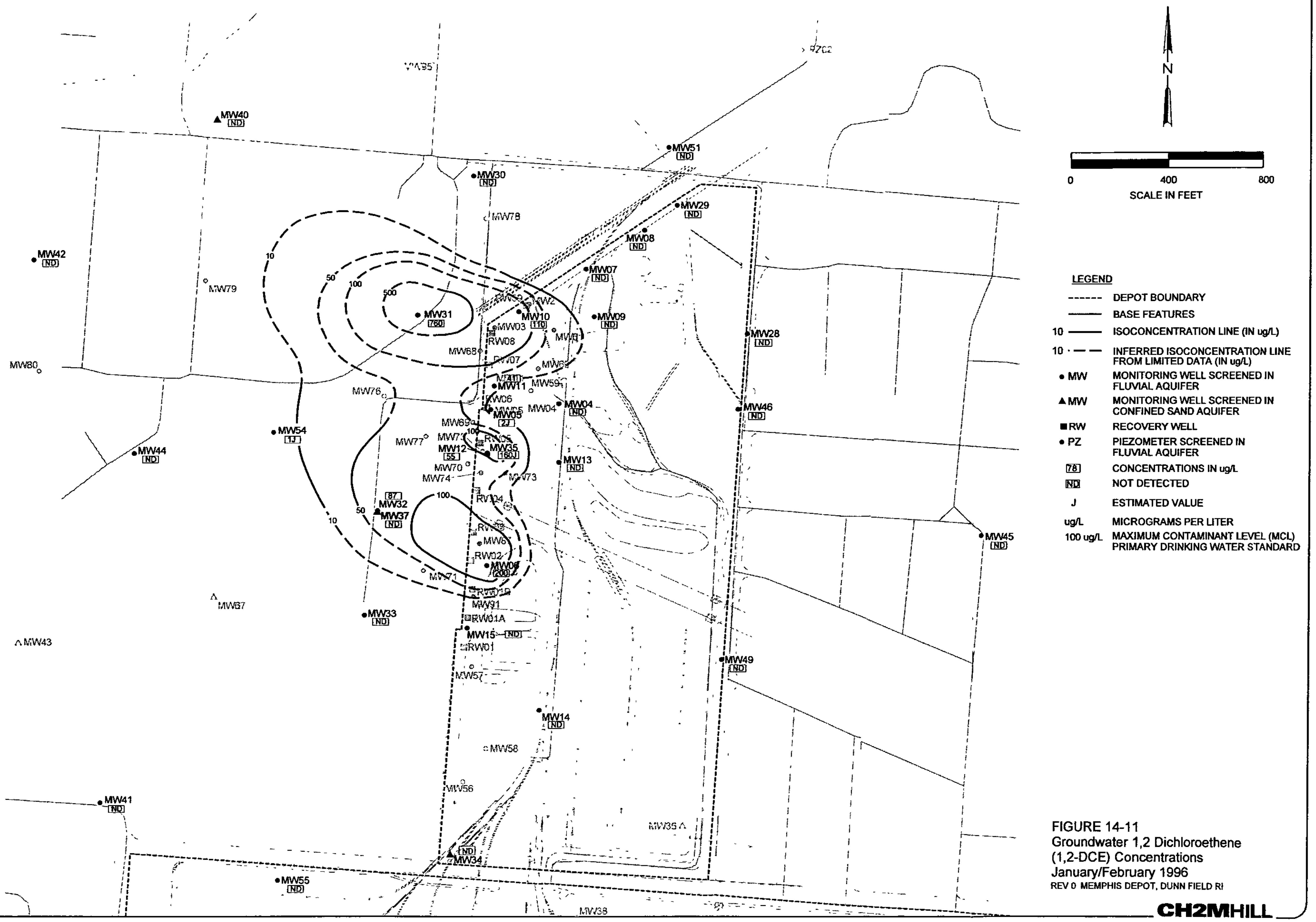
NOTE.

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-10
Groundwater Trichloroethene (TCE) Concentrations - January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 04-MARCH-2002 8071dfn01-14-10 dgn



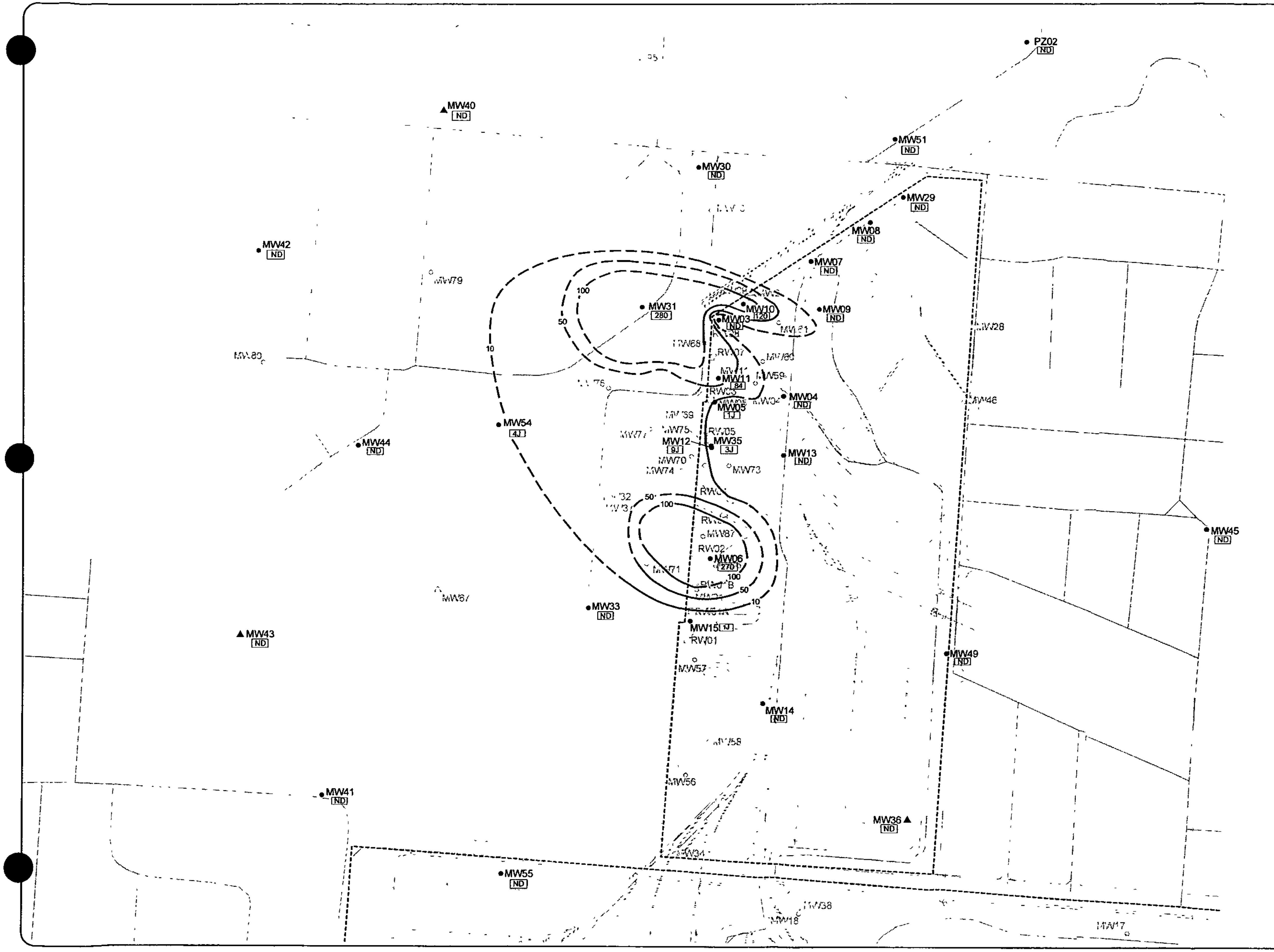
LEGEND

- ------ DEPOT BOUNDARY
- —— BASE FEATURES
- 10 —— ISOCONCENTRATION LINE (IN ug/L)
- 10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ■ RW RECOVERY WELL
- ● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- ug/L MICROGRAMS PER LITER
- 100 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

FIGURE 14-11
Groundwater 1,2 Dichloroethene
(1,2-DCE) Concentrations
January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-11 dgn



LEGEND

- - - - - - DEPOT BOUNDARY
———— BASE FEATURES
10 ———— ISOCONCENTRATION LINE (IN ug/L)
10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW RECOVERY WELL
● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78 CONCENTRATIONS IN ug/L
ND NOT DETECTED
J ESTIMATED VALUE
ug/L MICROGRAMS PER LITER
100 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

FIGURE 14-12
Groundwater 1,2-Dichloroethene
(1,2-DCE) Concentrations
October 1998
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-12 dgn

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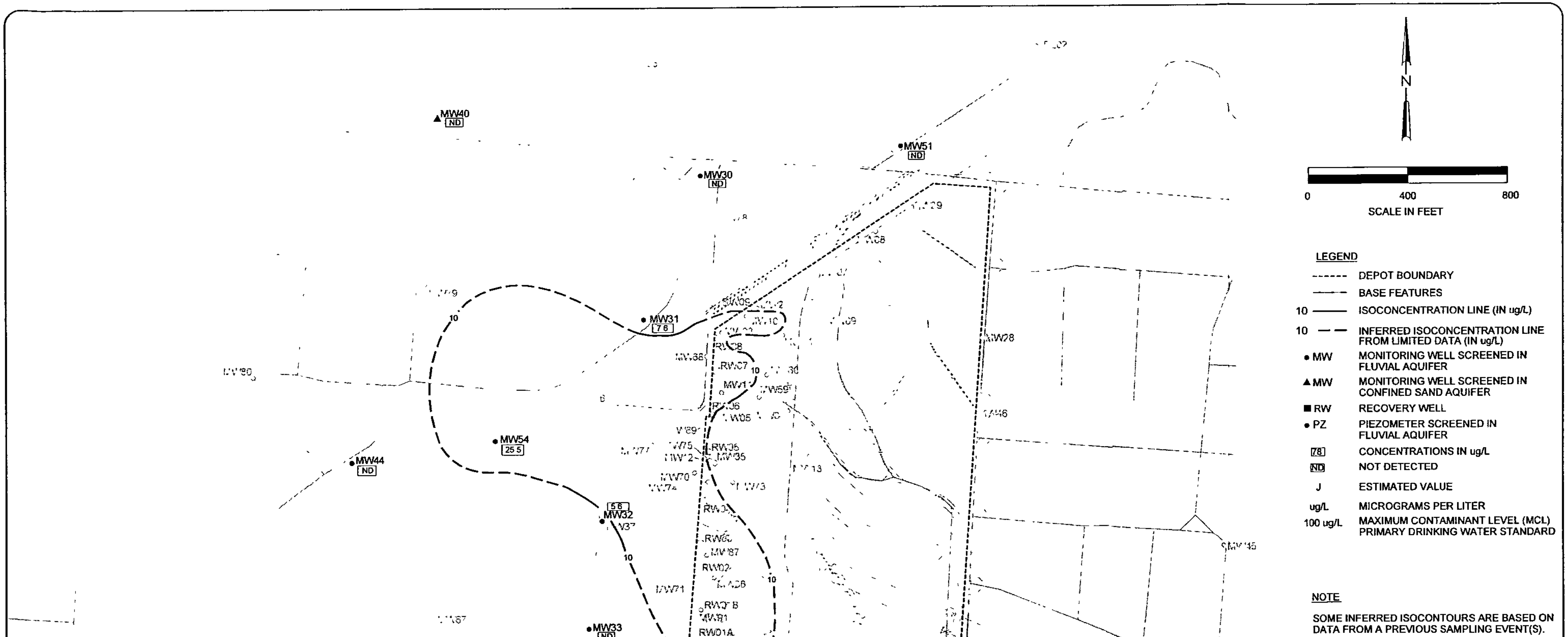


LEGEND

DEPOT BOUNDARY
BASE FEATURES
10 ISOCONCENTRATION LINE (IN ug/L)
10 INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW RECOVERY WELL
● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78 CONCENTRATIONS IN ug/L
ND NOT DETECTED
J ESTIMATED VALUE
ug/L MICROGRAMS PER LITER
100 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S).

FIGURE 14-13
Groundwater 1,2-Dichloroethene (1,2-DCE) Concentrations
November 1999
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-13 dgn

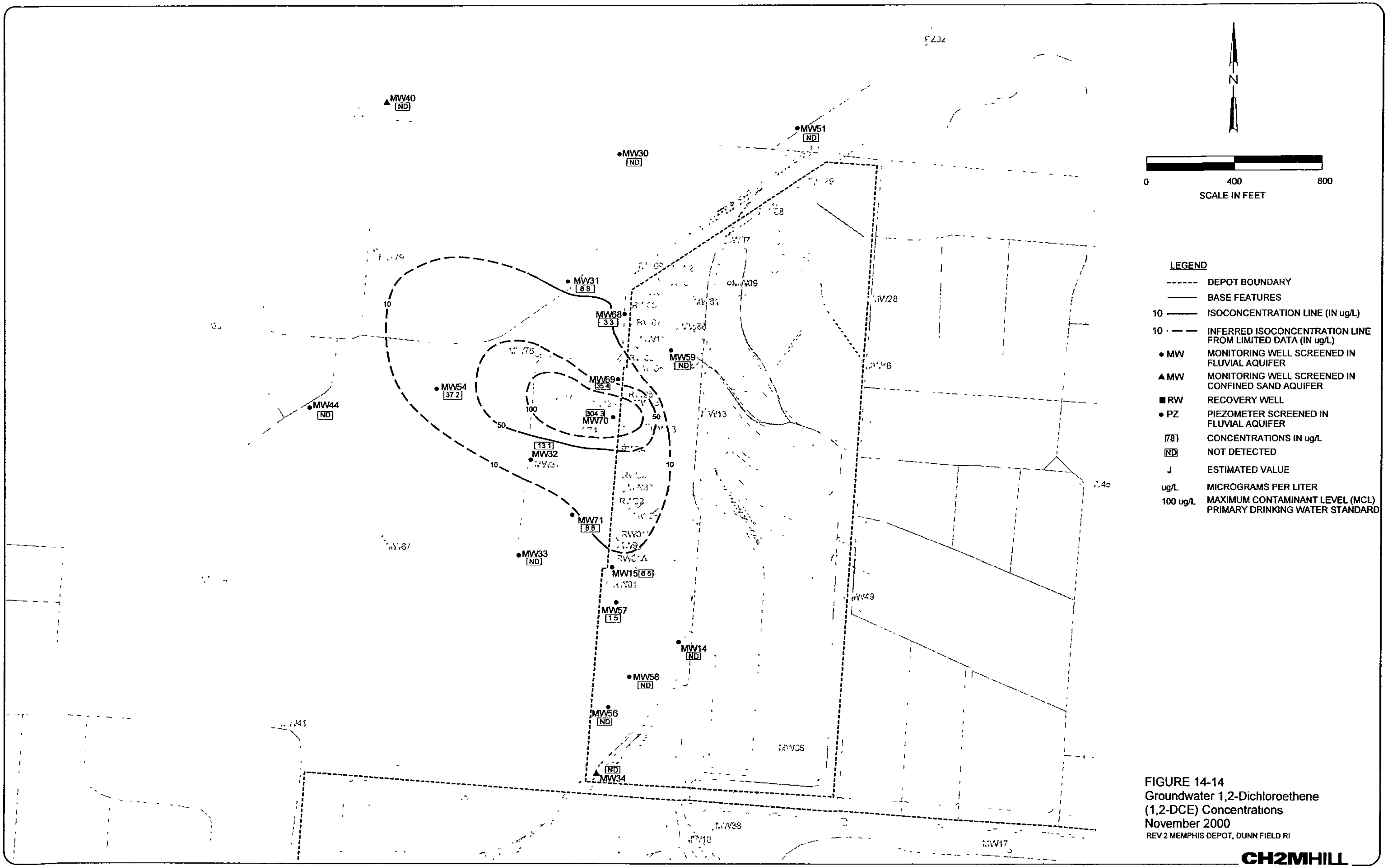
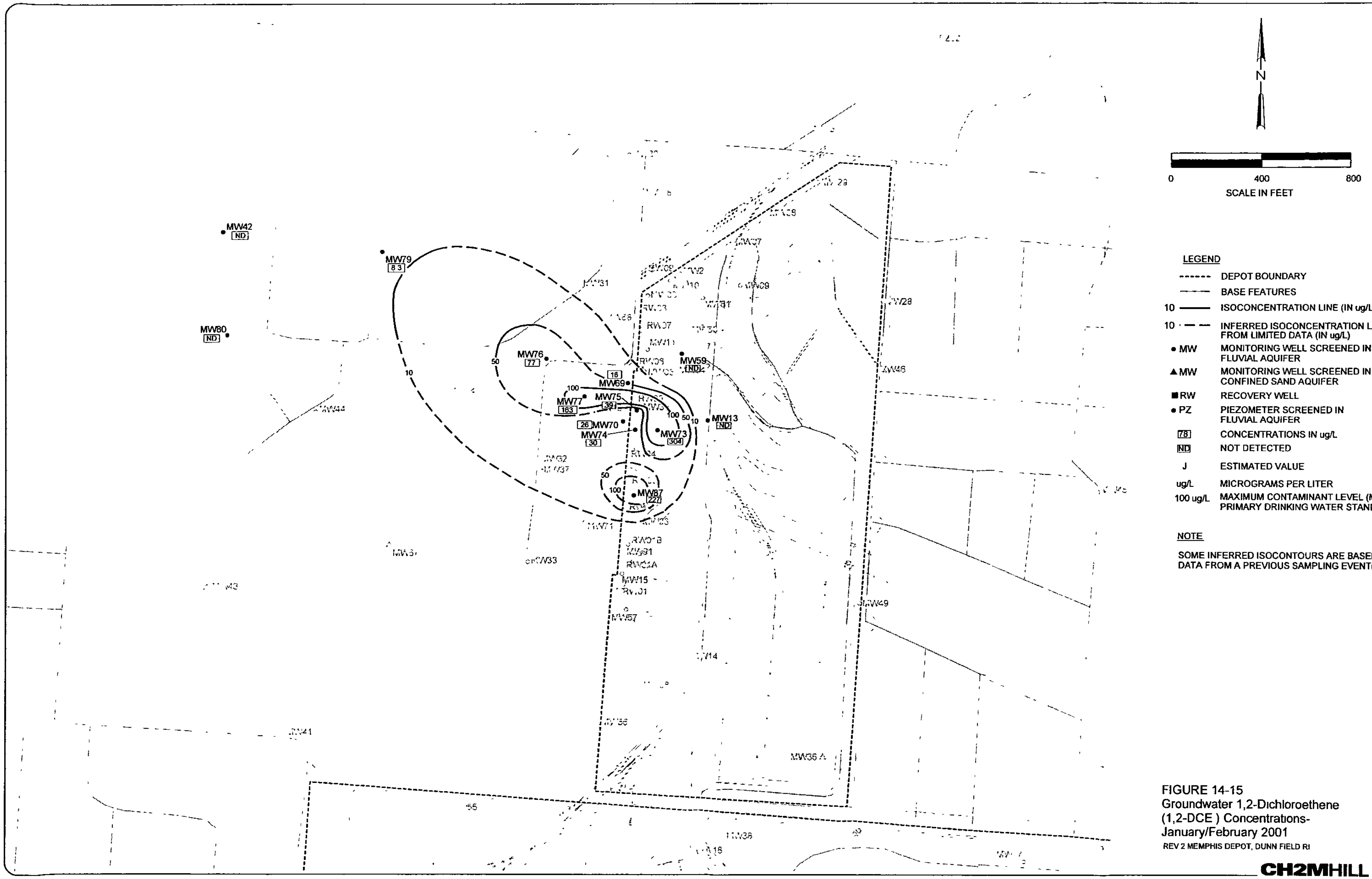


FIGURE 14-14
Groundwater 1,2-Dichloroethene
(1,2-DCE) Concentrations
November 2000
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-14 dgn



LEGEND

------	DEPOT BOUNDARY
—·—	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 ·– –	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
● PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER
100 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-15
Groundwater 1,2-Dichloroethene (1,2-DCE) Concentrations-
January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 04-MARCH-2002 8071dfn01-14-15 dgn

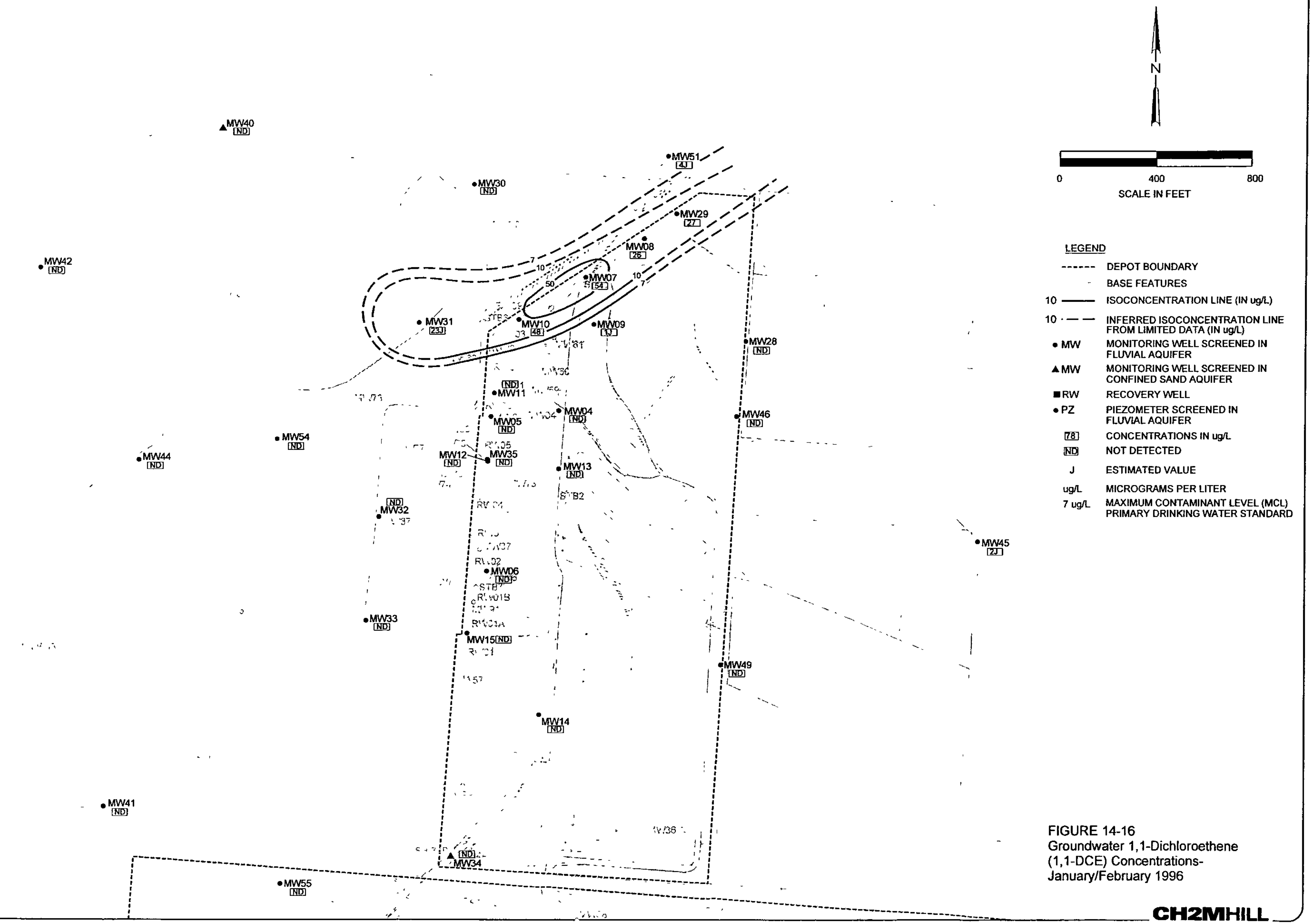


FIGURE 14-16
Groundwater 1,1-Dichloroethene
(1,1-DCE) Concentrations-
January/February 1996

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 04-MARCH-2002 8071dfn01-14-16 dgn

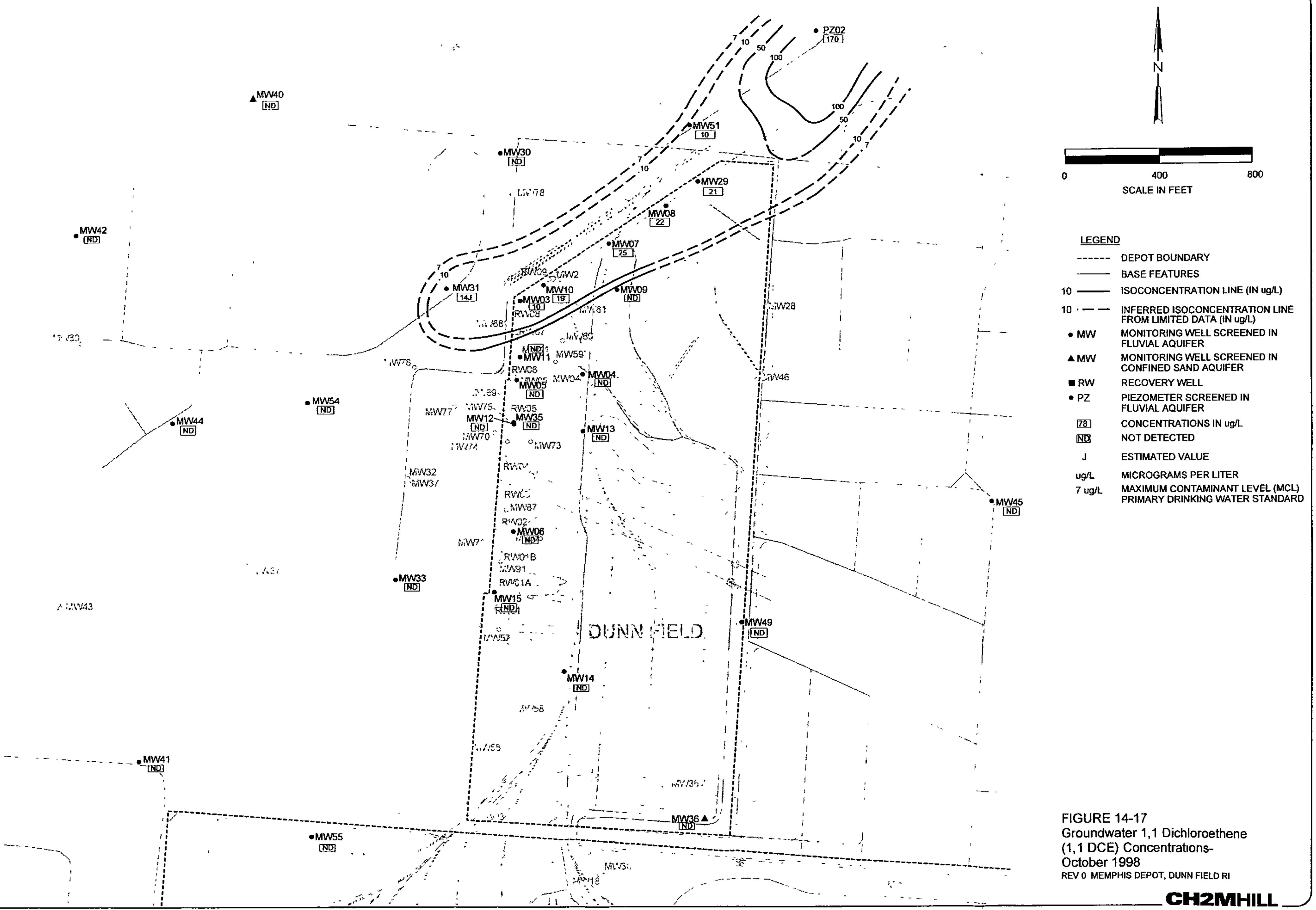
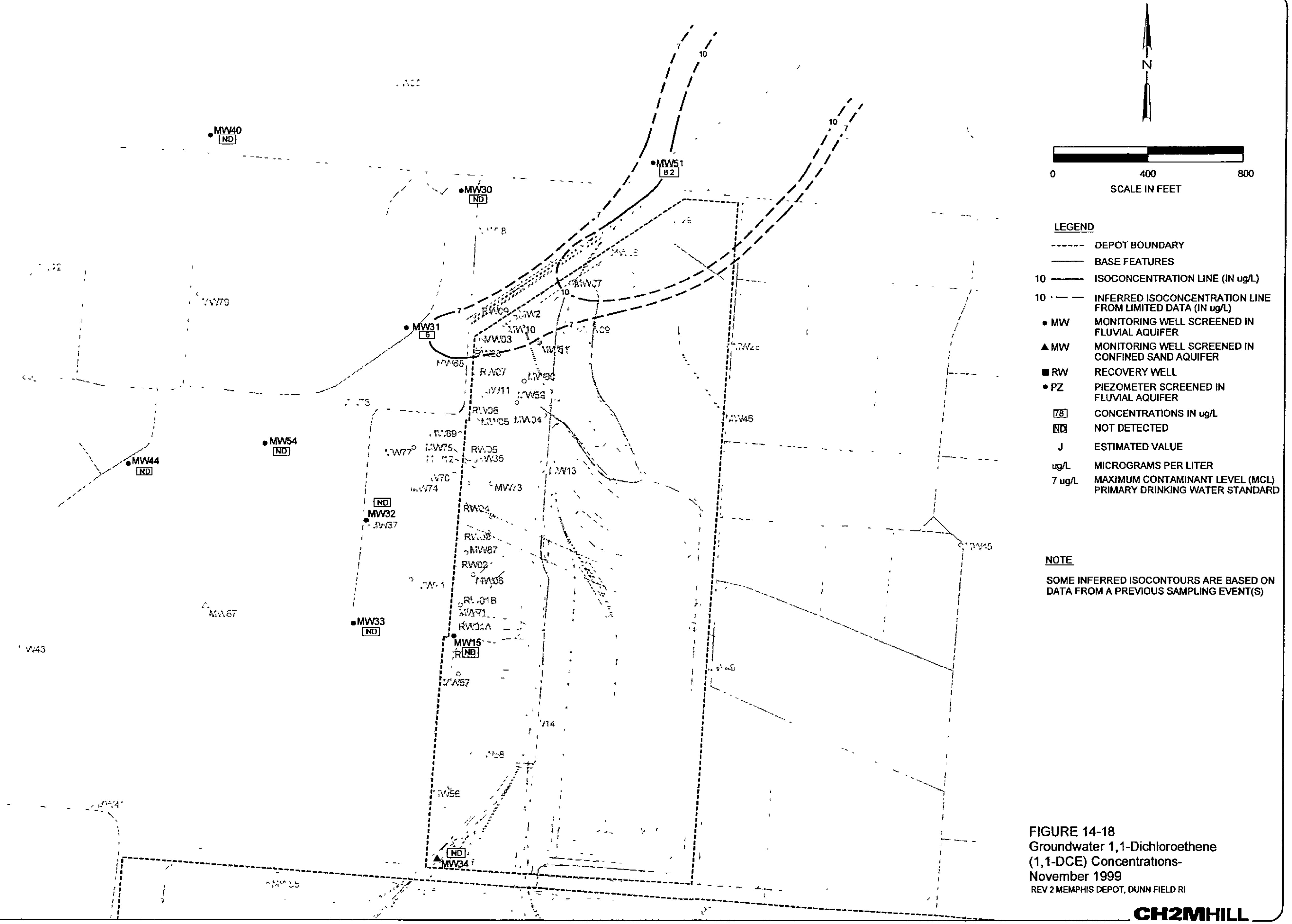


FIGURE 14-17
Groundwater 1,1 Dichloroethene
(1,1 DCE) Concentrations-
October 1998
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-17 dgn



LEGEND

- ------ DEPOT BOUNDARY
- ——— BASE FEATURES
- 10 ——— ISOCONCENTRATION LINE (IN ug/L)
- 10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ■ RW RECOVERY WELL
- ● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- ug/L MICROGRAMS PER LITER
- 7 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

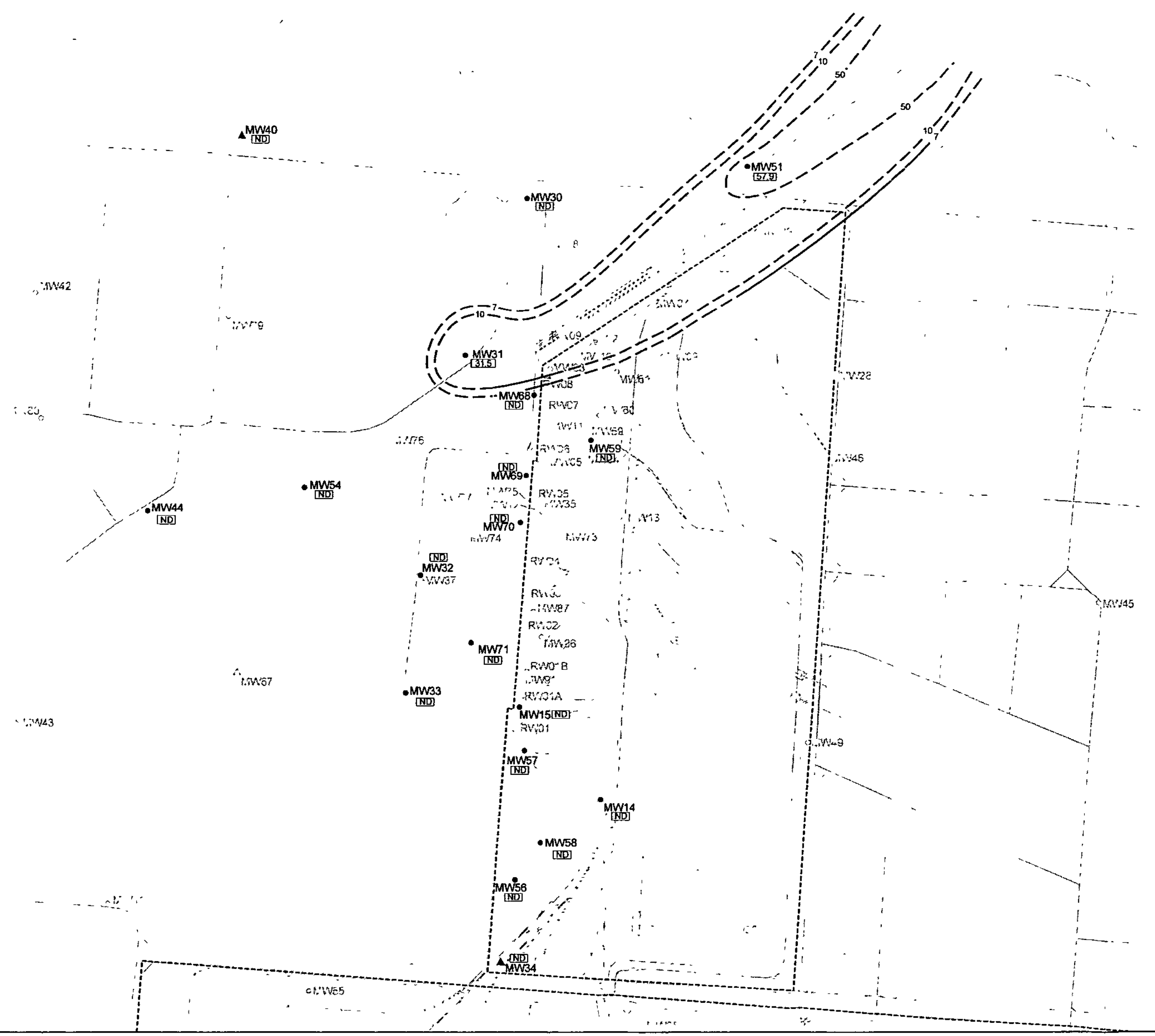
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-18
Groundwater 1,1-Dichloroethene (1,1-DCE) Concentrations-
November 1999
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-18.dgn



LEGEND

------	DEPOT BOUNDARY
——	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 · — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
● PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER
7 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

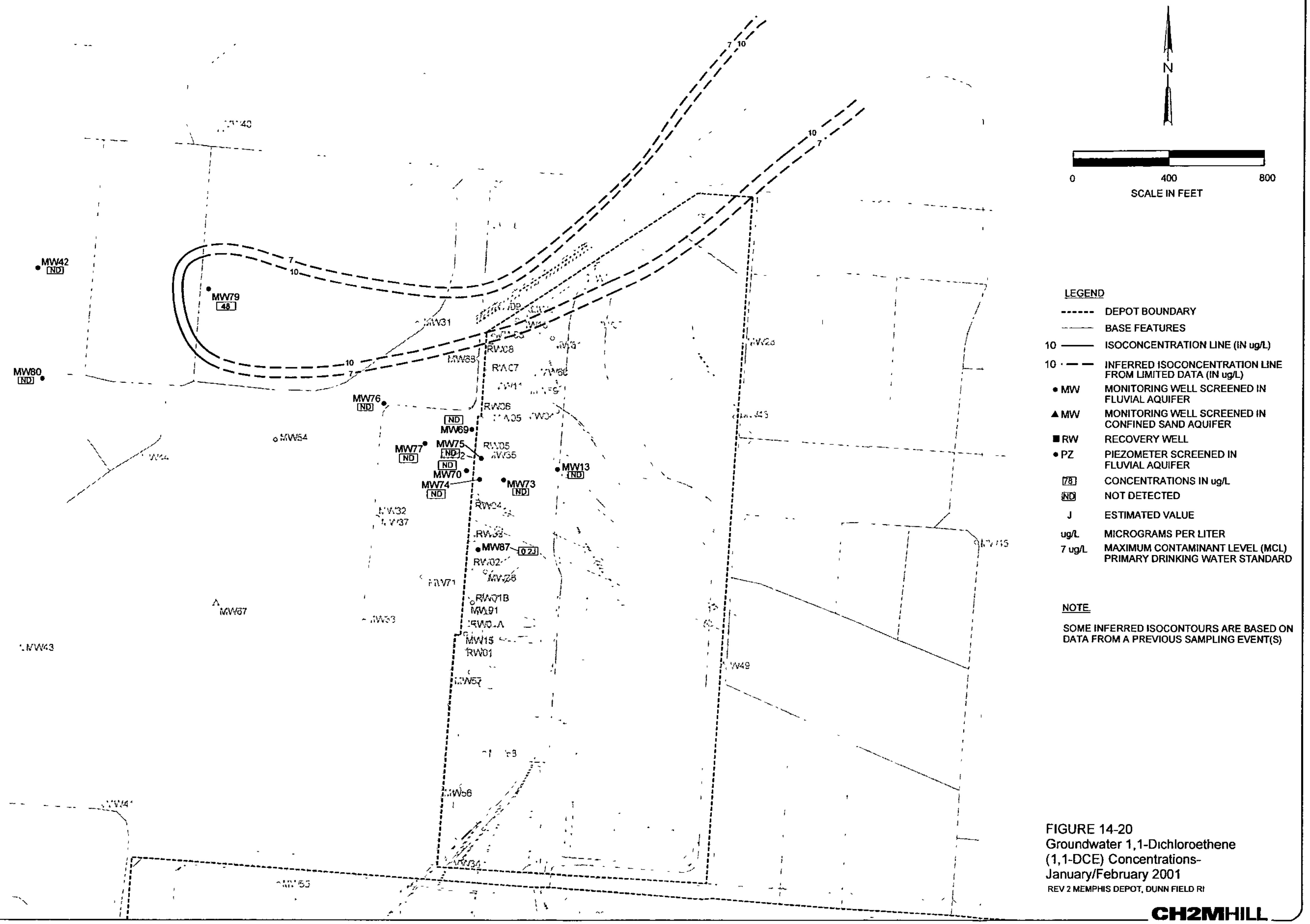
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-19
Groundwater 1,1-Dichloroethene (1,1-DCE) Concentrations-November 2000
REV 2 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-19 dgn



LEGEND

------	DEPOT BOUNDARY
------	BASE FEATURES
10 ———	ISOCONCENTRATION LINE (IN ug/L)
10 - — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
● PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER
7 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-20
Groundwater 1,1-Dichloroethene (1,1-DCE) Concentrations-January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

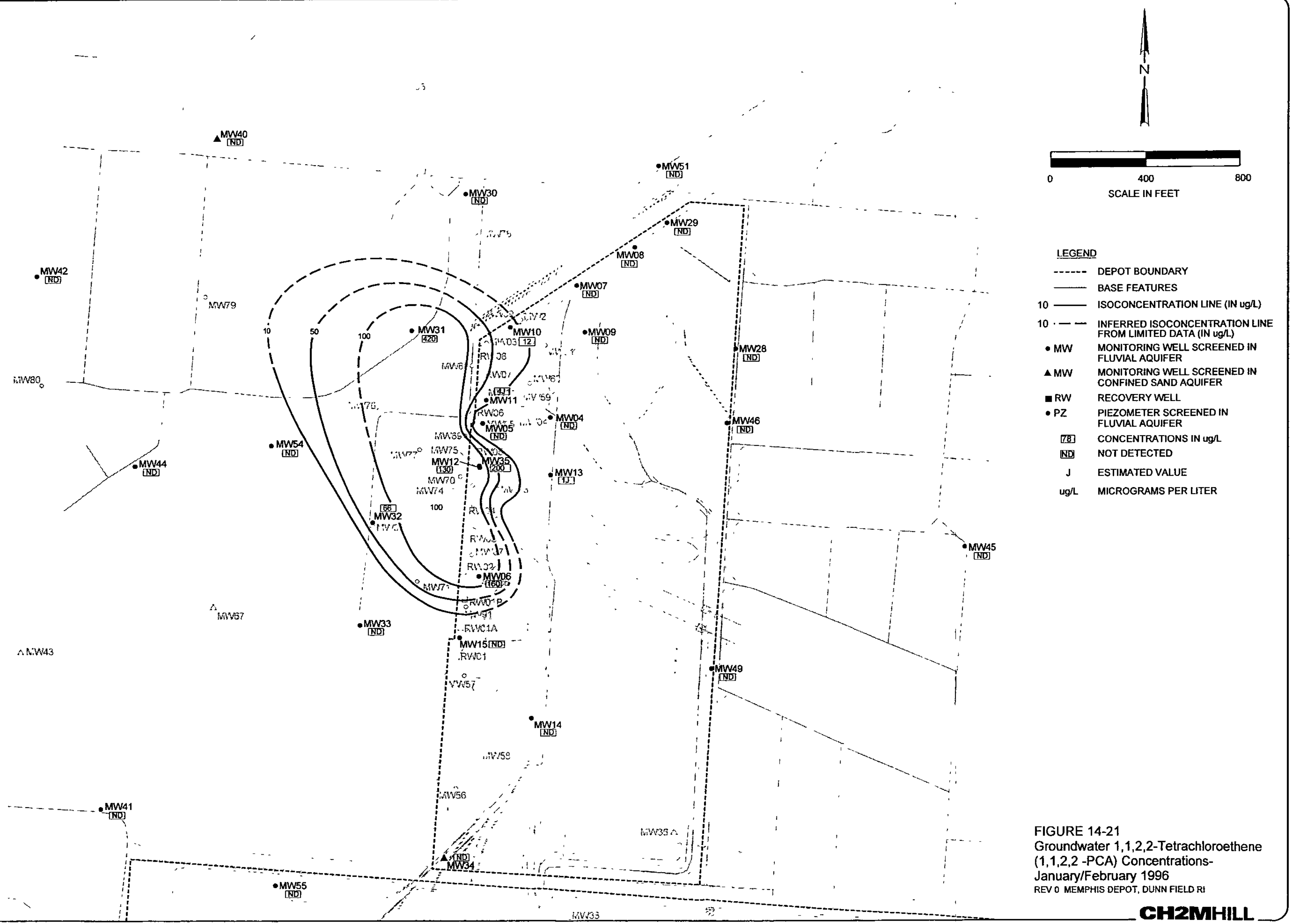


FIGURE 14-21
Groundwater 1,1,2,2-Tetrachloroethene
(1,1,2,2 -PCA) Concentrations-
January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

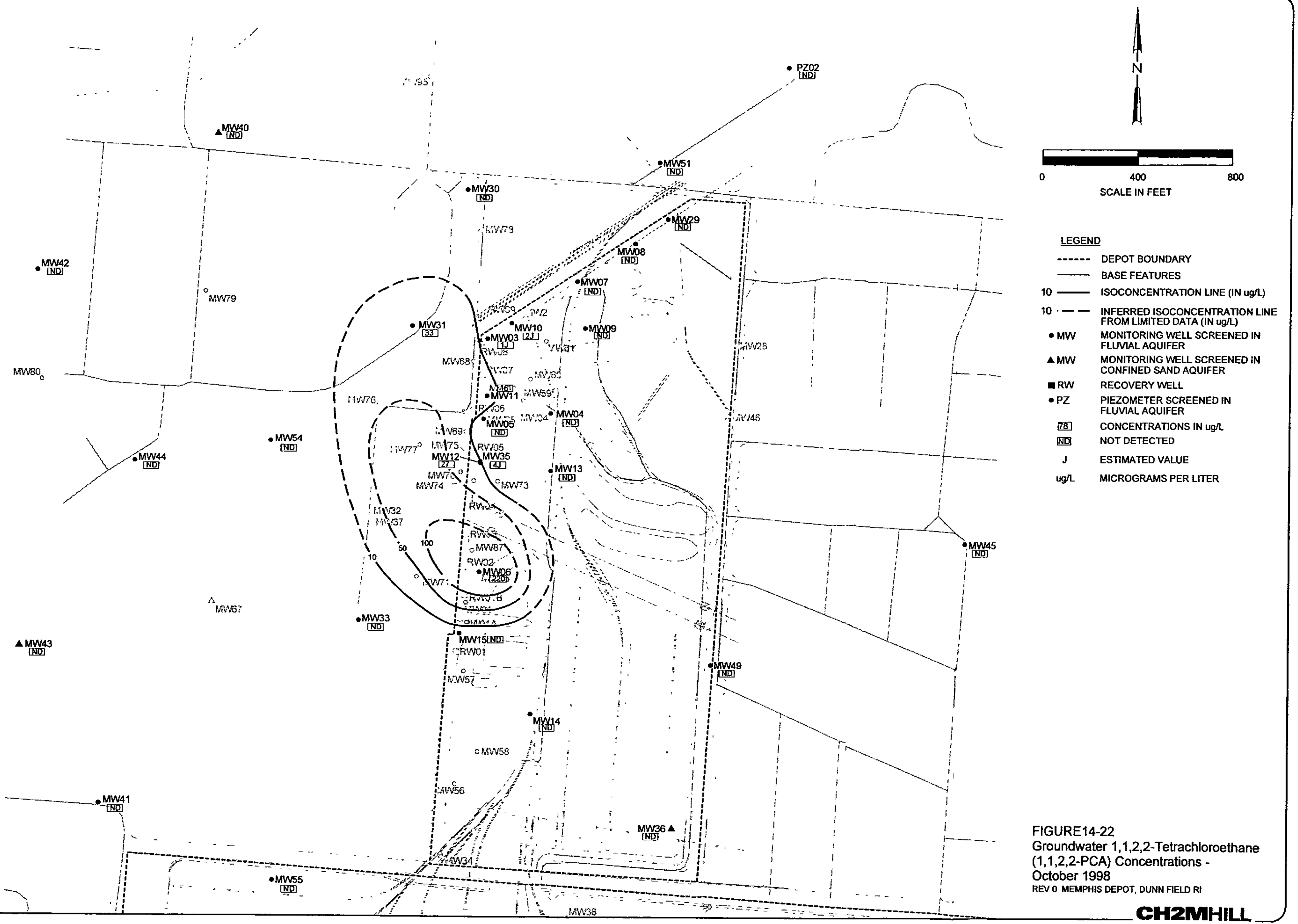
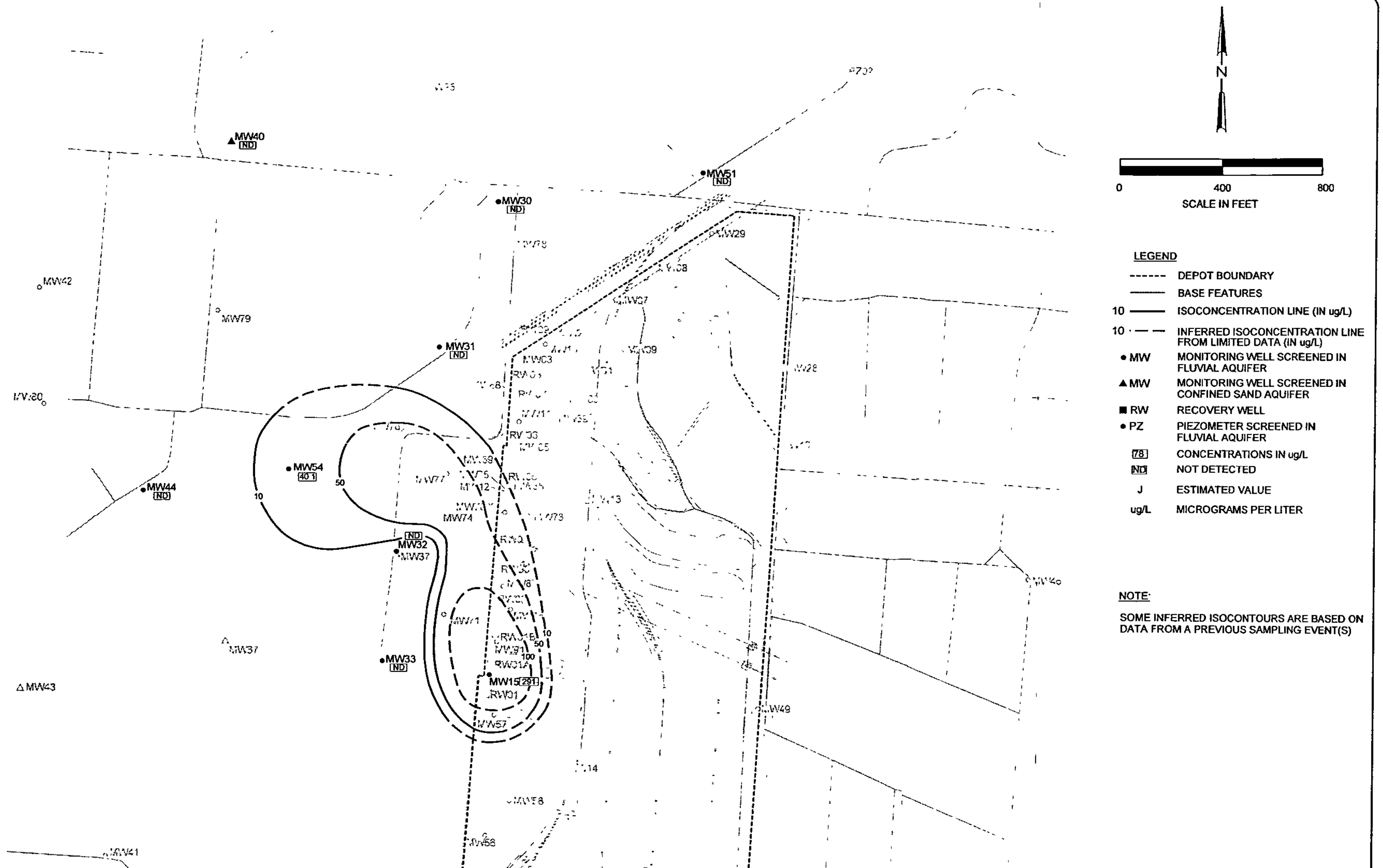


FIGURE14-22
Groundwater 1,1,2,2-Tetrachloroethane (1,1,2,2-PCA) Concentrations - October 1998
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfri01-14-22 dgn



NOTE:

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-23
Groundwater 1,1,2,2-Tetrachloroethane (1,1,2,2-PCA) Concentrations - November 1999
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-23 dgn

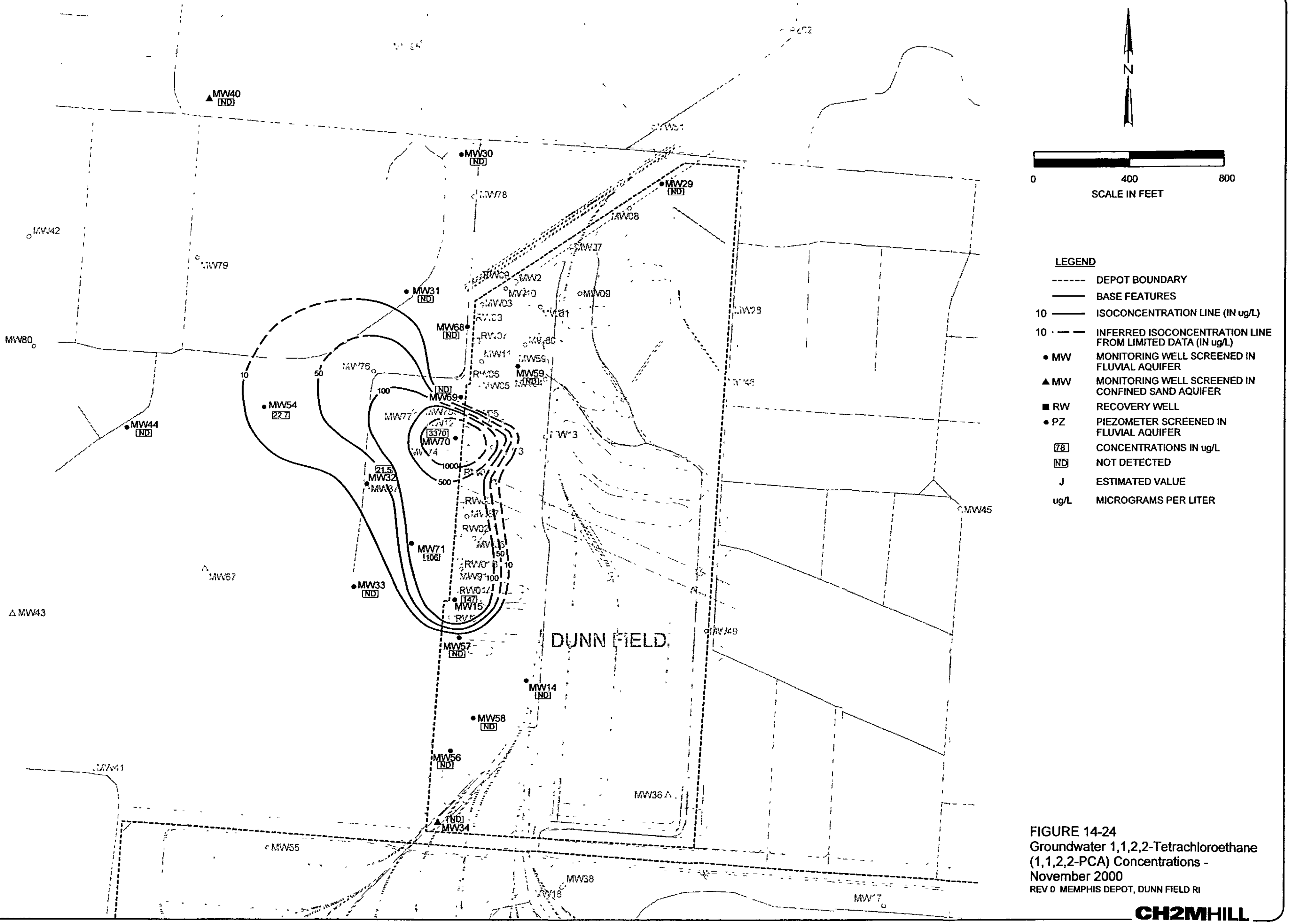


FIGURE 14-24
Groundwater 1,1,2,2-Tetrachloroethane (1,1,2,2-PCA) Concentrations - November 2000
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

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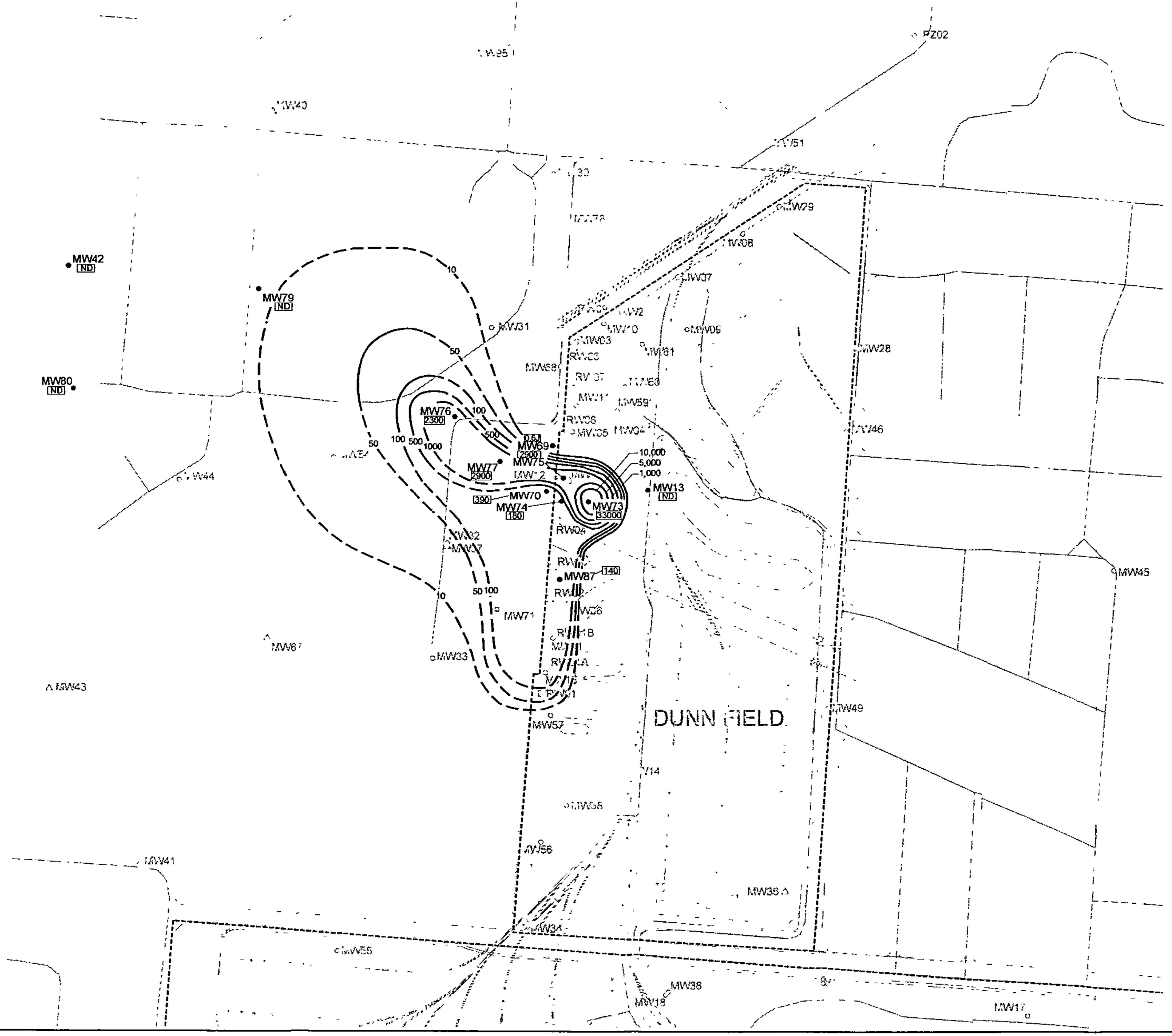


FIGURE 14-25
Groundwater 1,1,2,2-Tetrachloroethane
(1,1,2,2-PCA) Concentrations -
January/February 2001
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-25 dgn

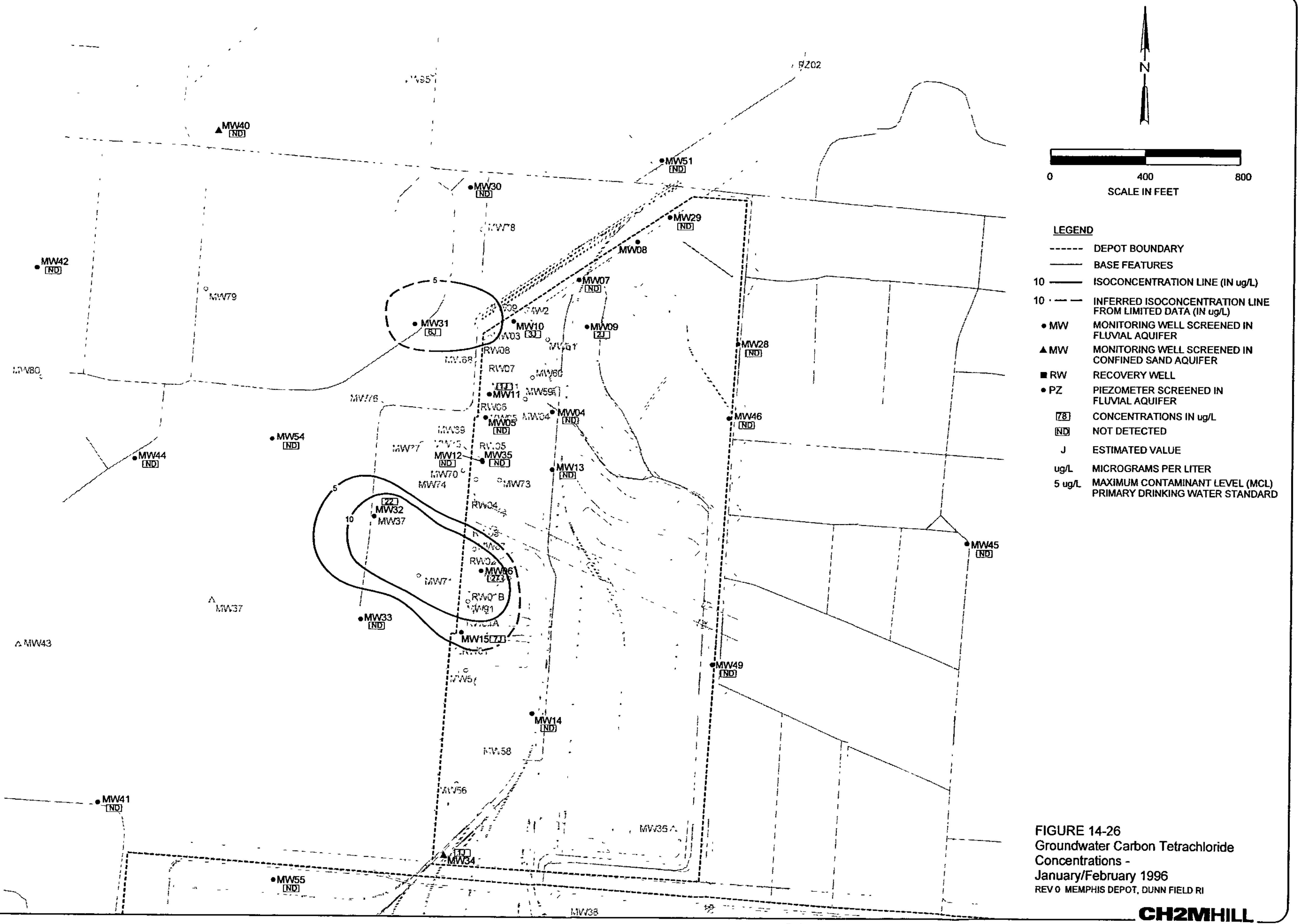


FIGURE 14-26
Groundwater Carbon Tetrachloride Concentrations - January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-26 dgn

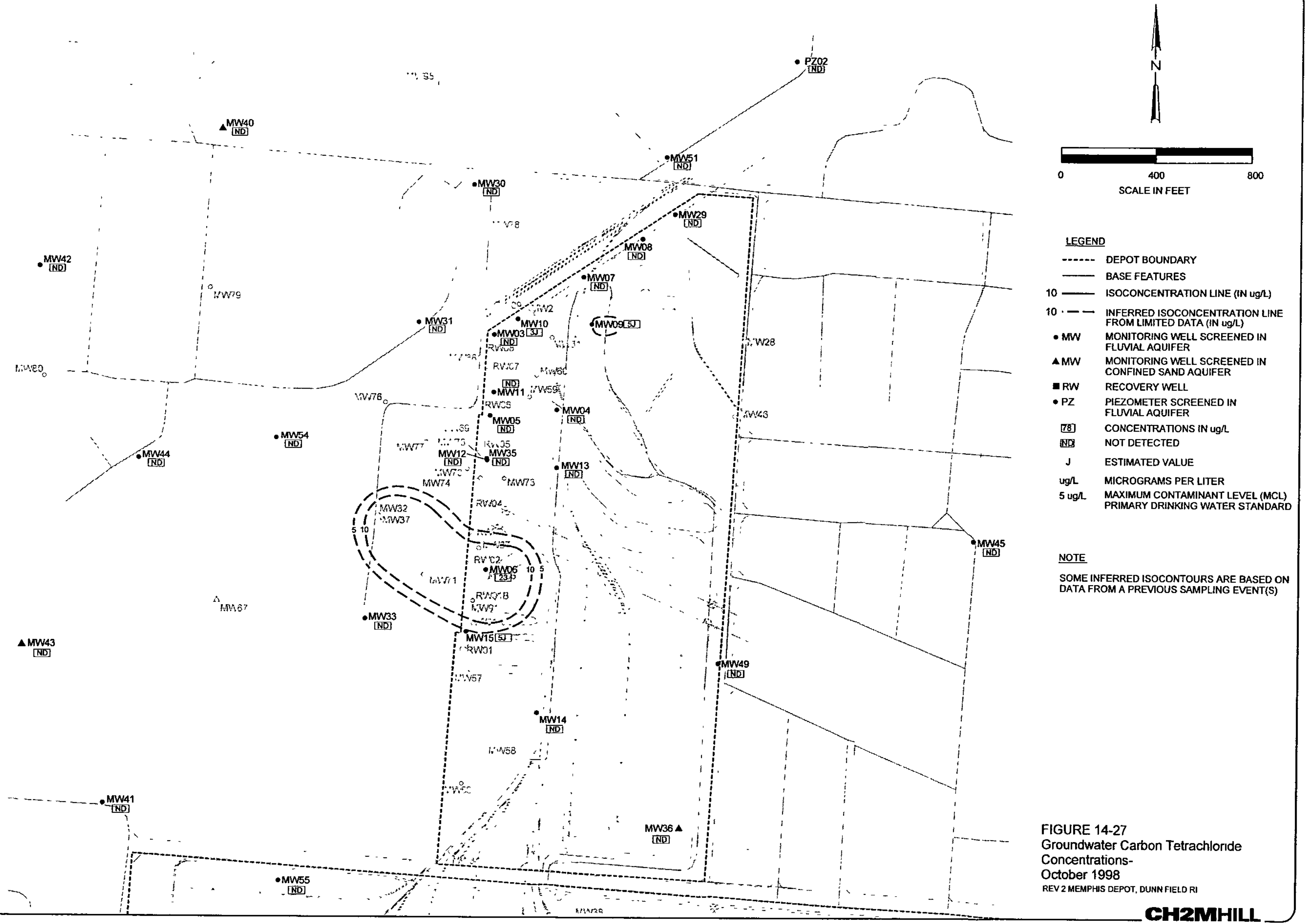


FIGURE 14-27
Groundwater Carbon Tetrachloride Concentrations-
October 1998
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 6071dfn01-14-27.dgn

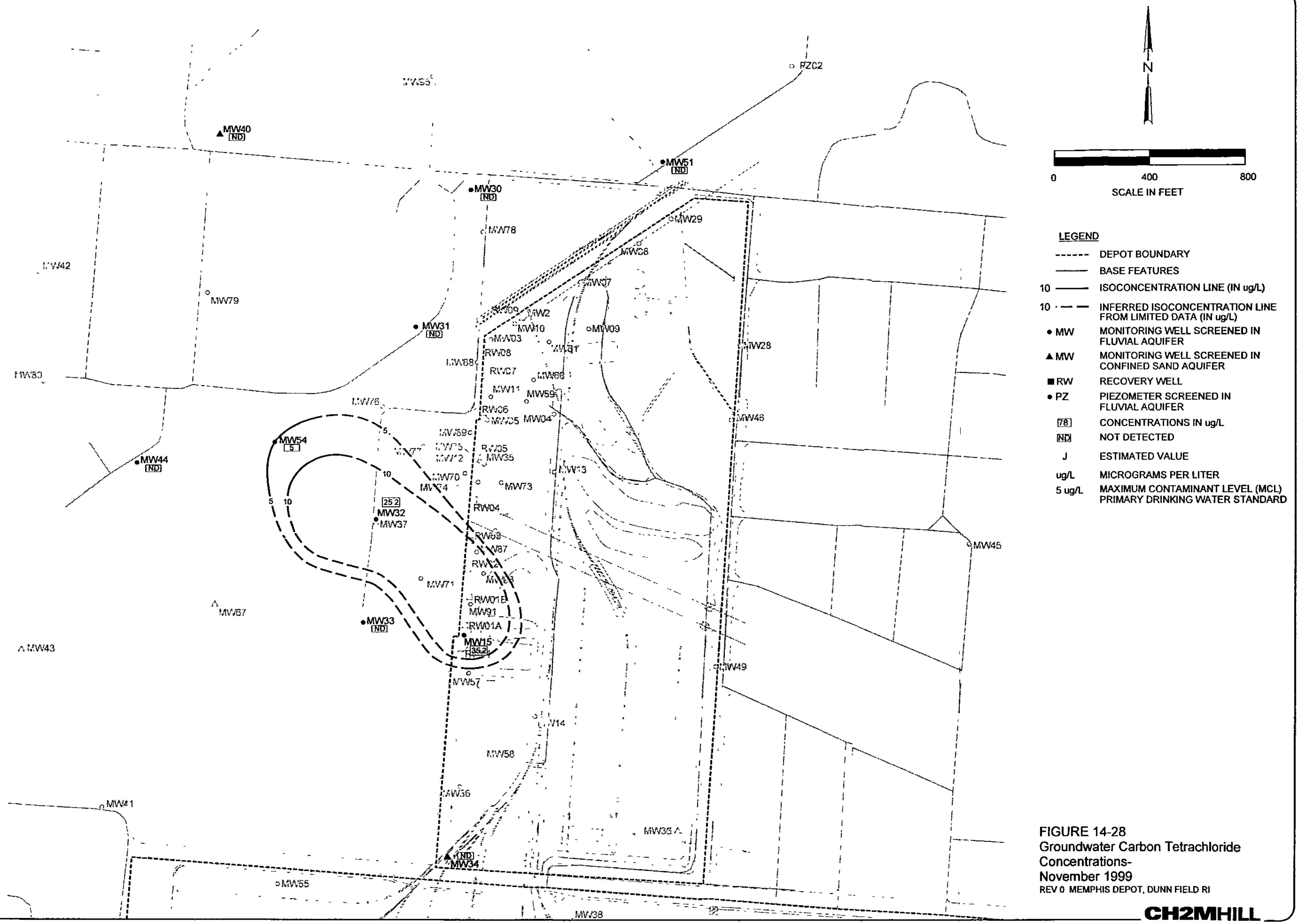


FIGURE 14-28
Groundwater Carbon Tetrachloride
Concentrations-
November 1999
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

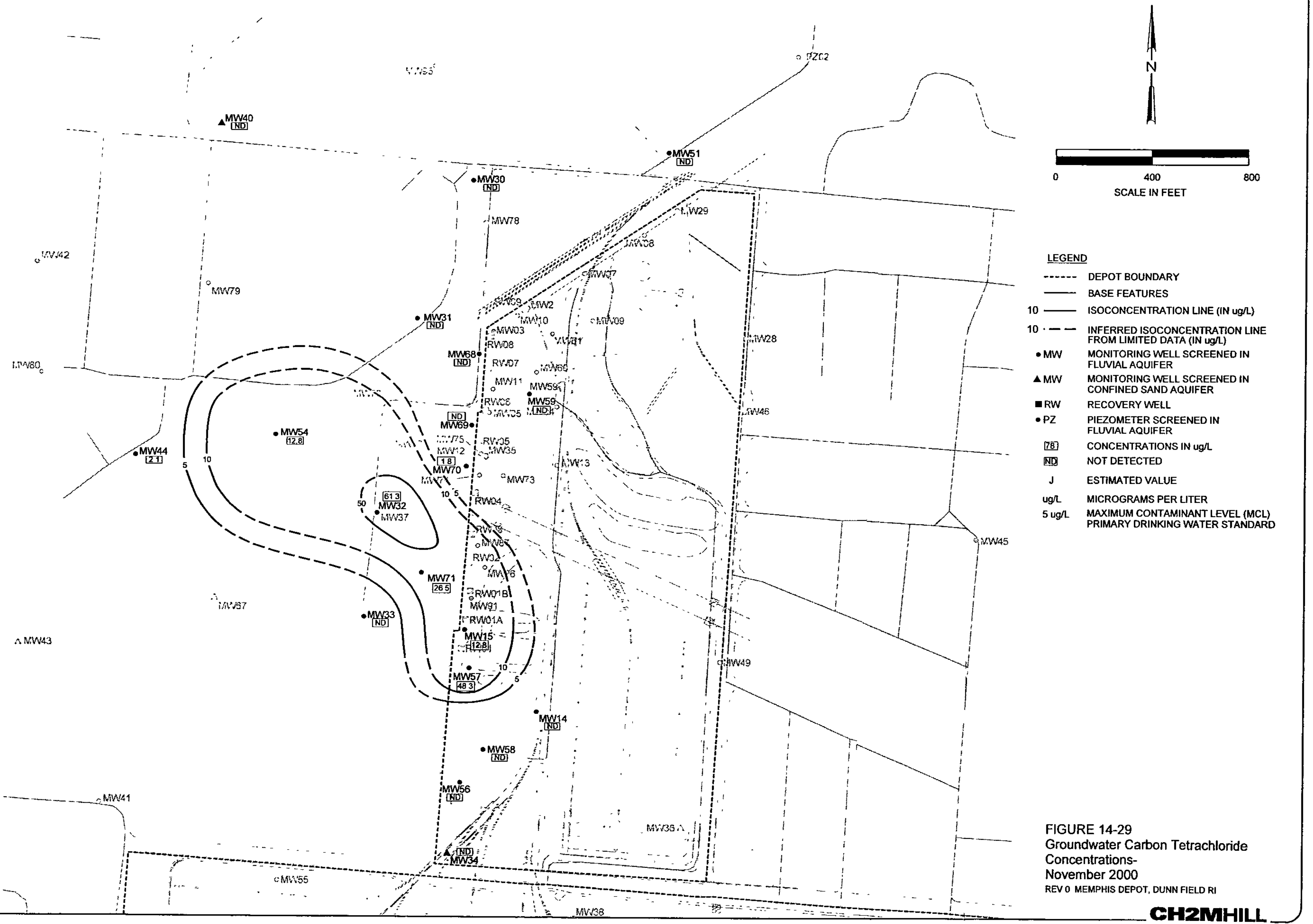


FIGURE 14-29
Groundwater Carbon Tetrachloride
Concentrations-
November 2000
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-29.dgn

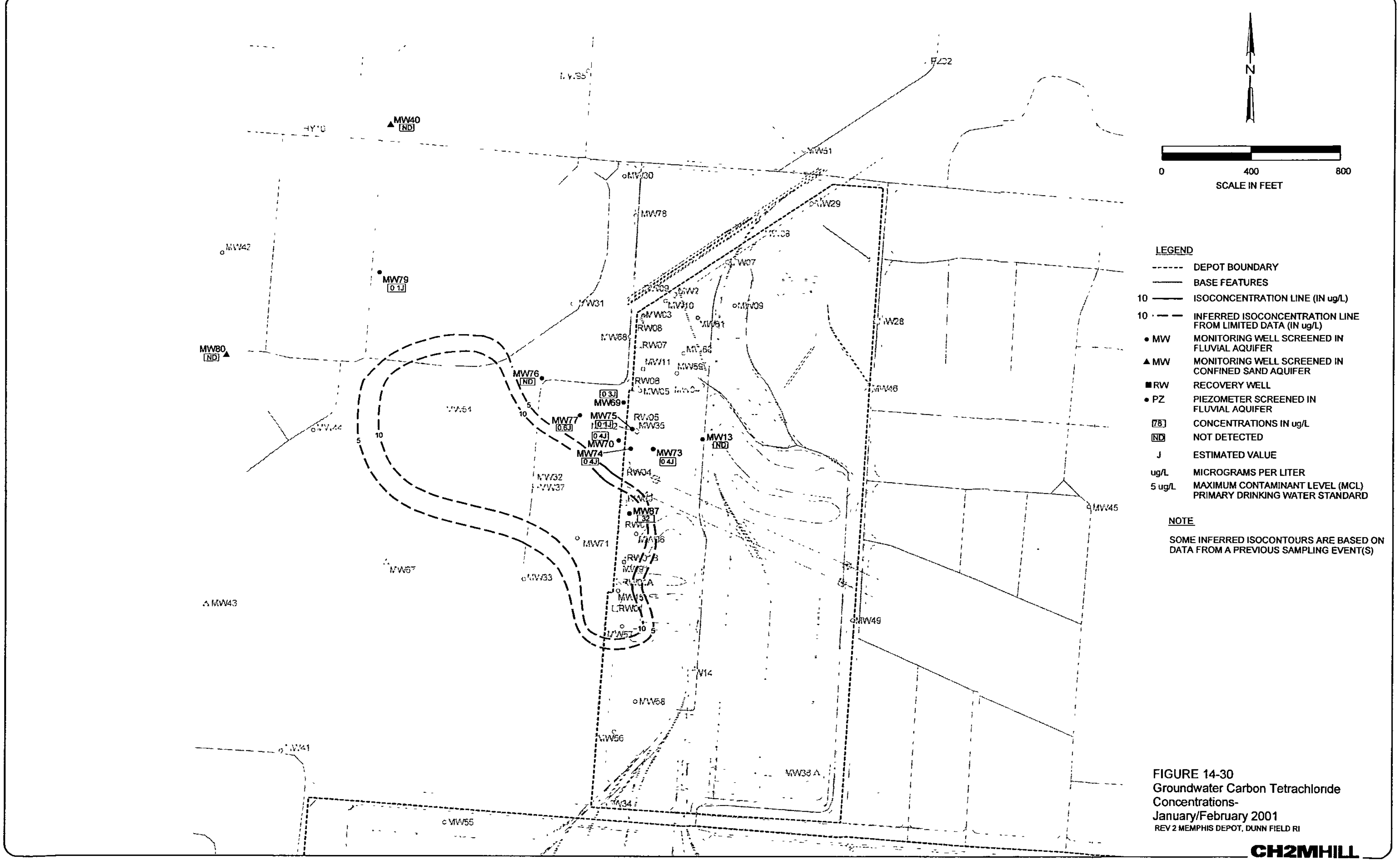
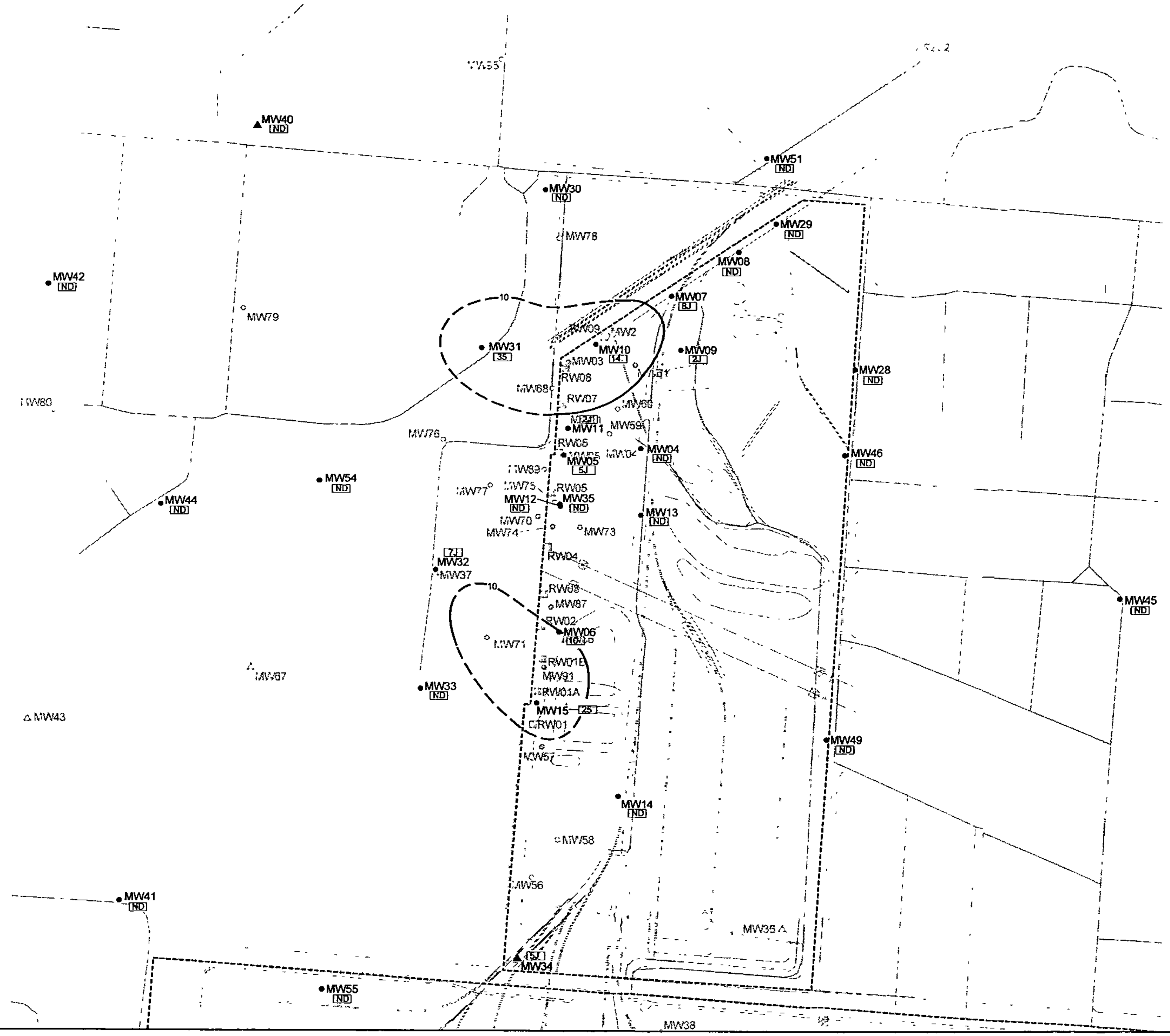


FIGURE 14-30
Groundwater Carbon Tetrachloride
Concentrations-
January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfri01-14-30.dgn



N

0 400 800
SCALE IN FEET

LEGEND

------	DEPOT BOUNDARY
——	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 · — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
• MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
■ RW	RECOVERY WELL
• PZ	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
ug/L	MICROGRAMS PER LITER

FIGURE 14-31
Groundwater Chloroform
Concentrations
January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-31 dgn

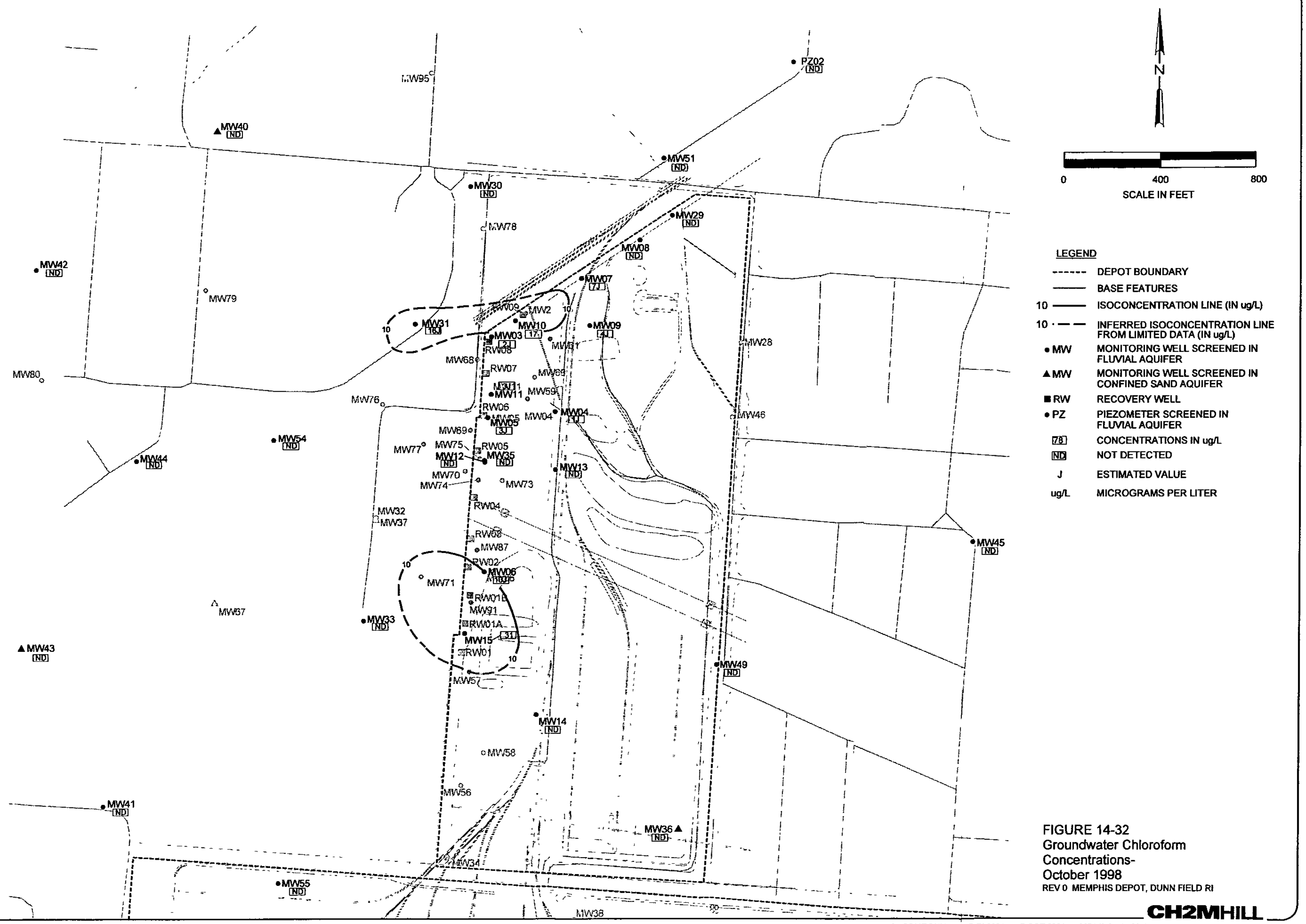


FIGURE 14-32
Groundwater Chloroform
Concentrations-
October 1998
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-32.dgn

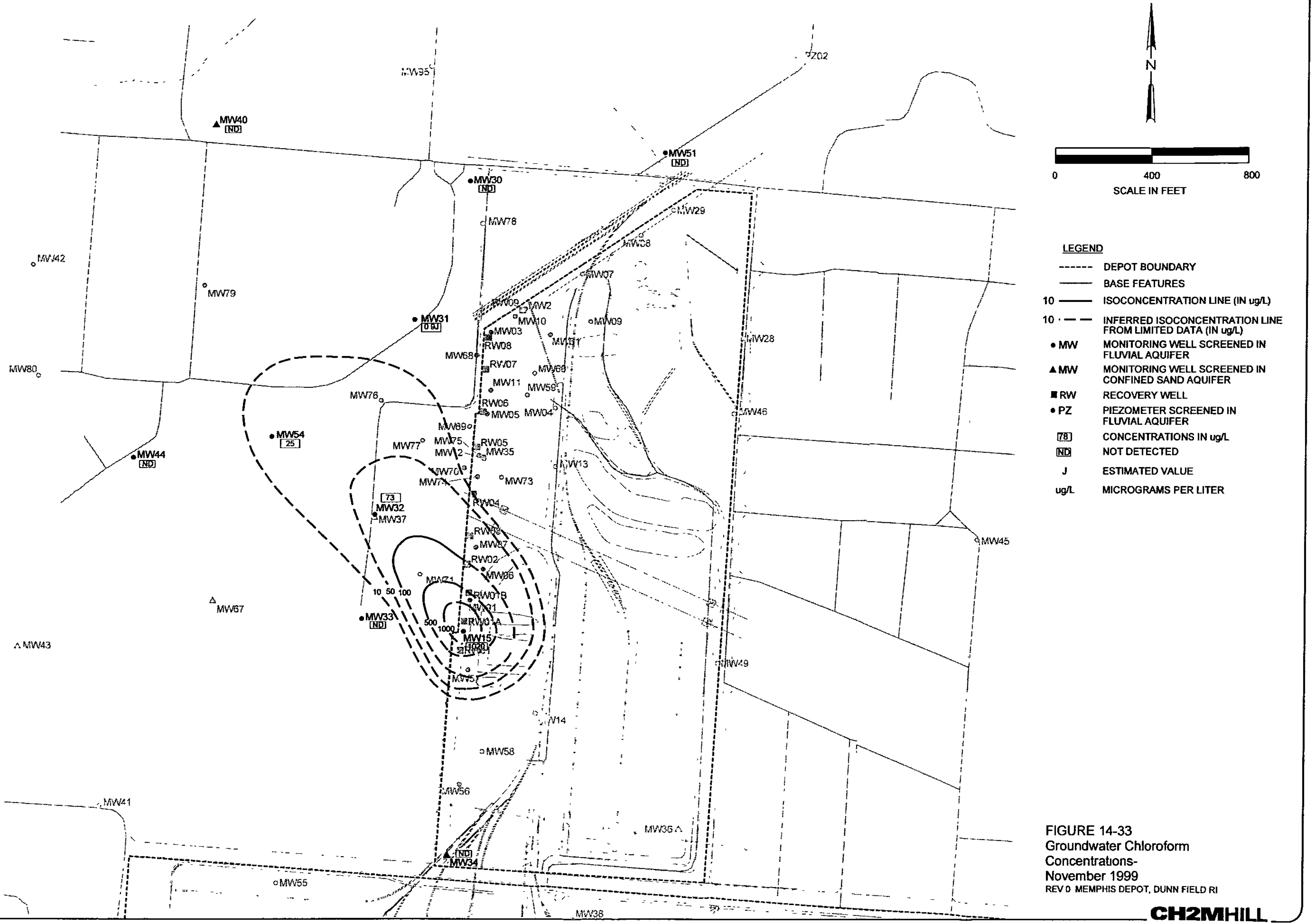


FIGURE 14-33
Groundwater Chloroform
Concentrations-
November 1999
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfm01-14-33.dgn

LEGEND

- ------ DEPOT BOUNDARY
- ——— BASE FEATURES
- 10 ——— ISOCONCENTRATION LINE (IN ug/L)
- 10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ■ RW RECOVERY WELL
- ● PZ PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- ug/L MICROGRAMS PER LITER

FIGURE 14-34
Groundwater Chloroform
Concentrations-
November 2000
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 17-OCT-2001 8071dfn01-14-34 dgn

FIGURE 14-35
Groundwater Chloroform Concentrations
January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 04-APRIL-2002 8071dfn01-14-35.dgn

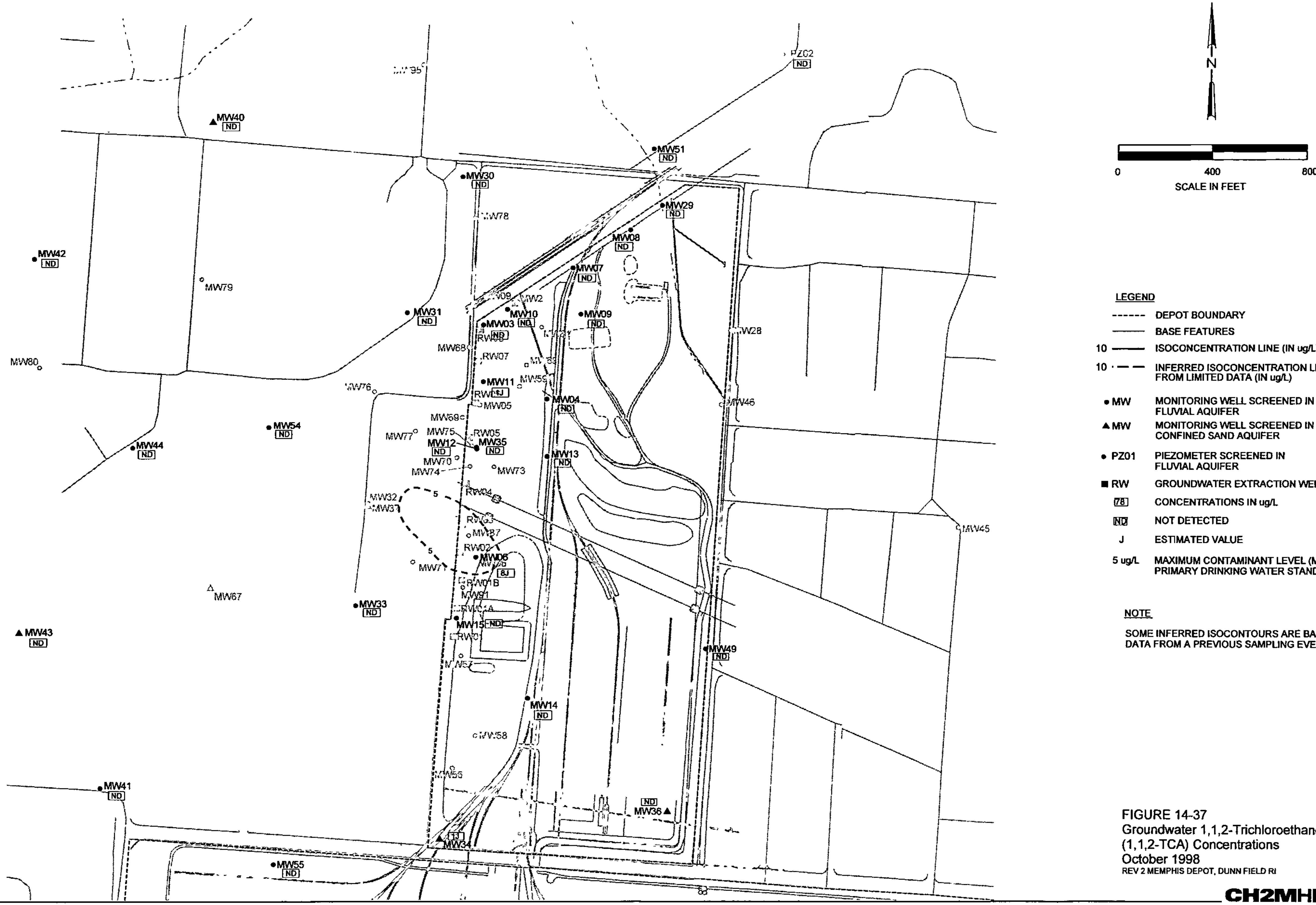
LEGEND

- ------ DEPOT BOUNDARY
- —— BASE FEATURES
- 10 —— ISOCONCENTRATION LINE (IN ug/L)
- 10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ● PZ01 PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- ■ RW GROUNDWATER EXTRACTION WELL
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- 5 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

FIGURE 14-36
Groundwater 1,1,2-Trichloroethane
(1,1,2-TCA) Concentrations
January/February 1996
REV 0 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

702 777



LEGEND

------	DEPOT BOUNDARY
——	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 · — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
● PZ01	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
■ RW	GROUNDWATER EXTRACTION WELL
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
5 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-37
Groundwater 1,1,2-Trichloroethane (1,1,2-TCA) Concentrations
October 1998
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 13-APR-2001 8071dfn01-14-37 dgn

LEGEND

- ------ DEPOT BOUNDARY
- —— BASE FEATURES
- 10 —— ISOCONCENTRATION LINE (IN ug/L)
- 10 · — — INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
- ● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
- ● PZ01 PIEZOMETER SCREENED IN FLUVIAL AQUIFER
- ■ RW GROUNDWATER EXTRACTION WELL
- 78 CONCENTRATIONS IN ug/L
- ND NOT DETECTED
- J ESTIMATED VALUE
- 5 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

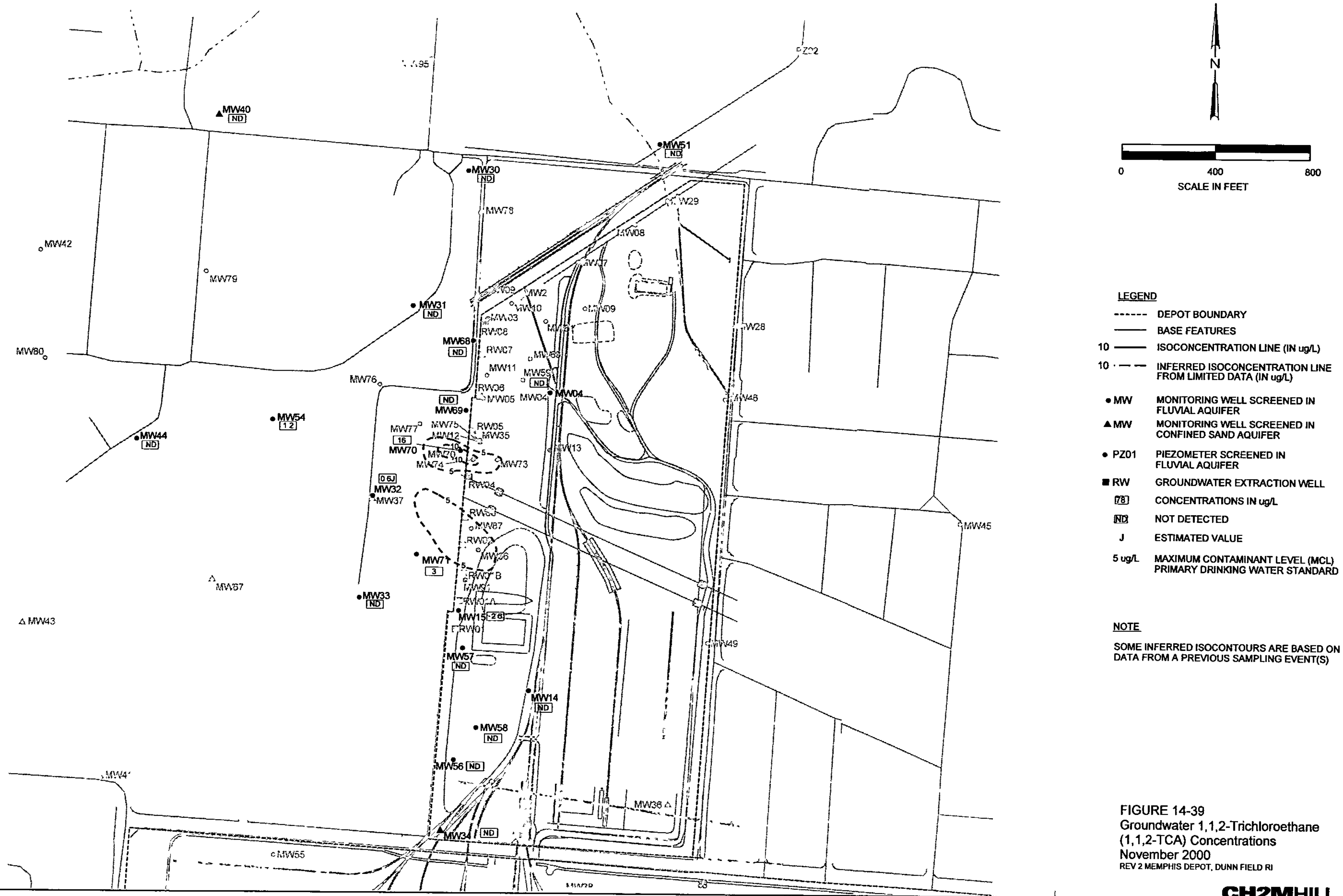
NOTE:

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-38
Groundwater 1,1,2-Trichloroethane
(1,1,2-TCA) Concentrations
November 1999
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 18-OCT-2001 8071dfn01-14-38 dgn



LEGEND

------	DEPOT BOUNDARY
——	BASE FEATURES
10 ——	ISOCONCENTRATION LINE (IN ug/L)
10 · — —	INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)
● MW	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
● PZ01	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
■ RW	GROUNDWATER EXTRACTION WELL
78	CONCENTRATIONS IN ug/L
ND	NOT DETECTED
J	ESTIMATED VALUE
5 ug/L	MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

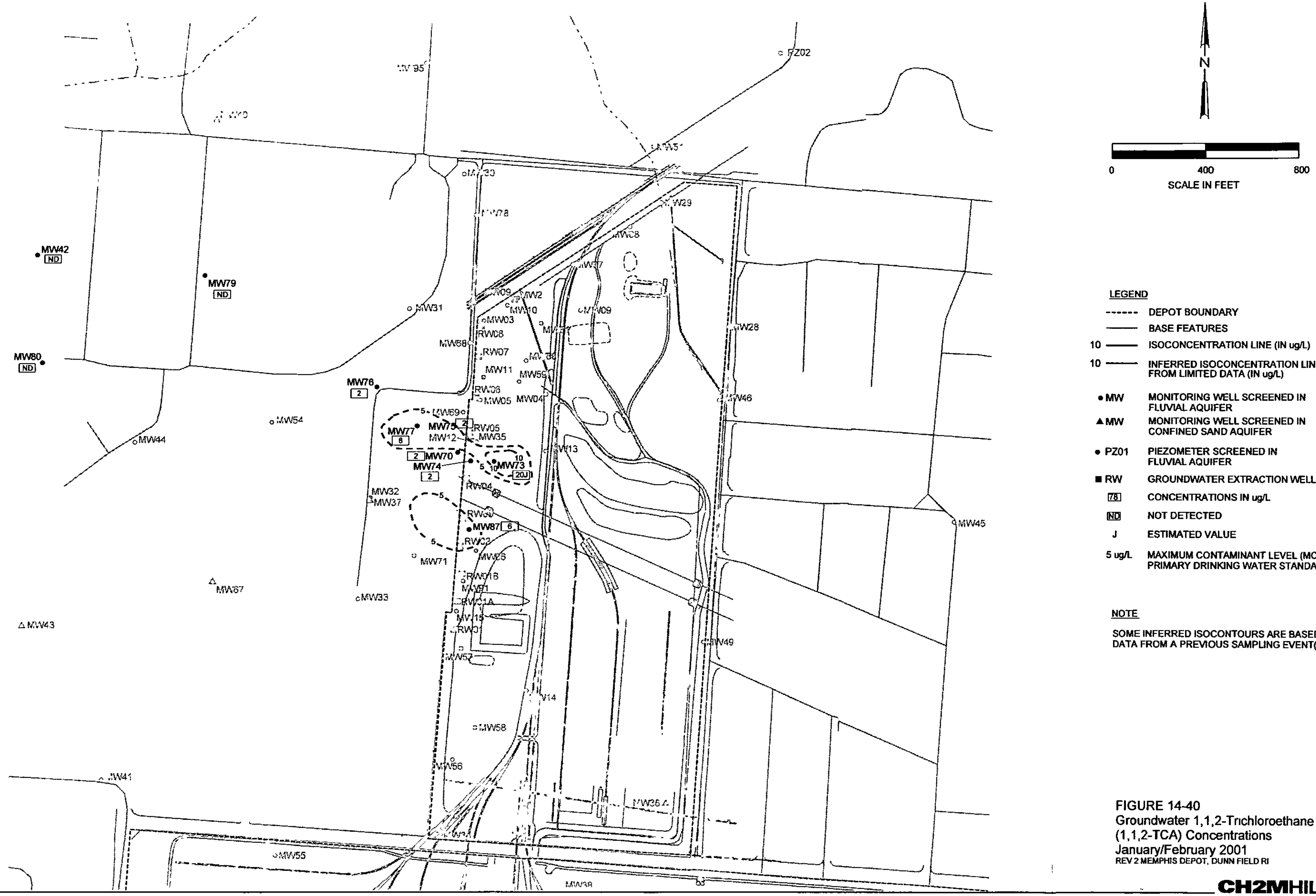
NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-39
Groundwater 1,1,2-Trichloroethane
(1,1,2-TCA) Concentrations
November 2000
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 04-MARCH-2002 8071dfri01-14-39.dgn



LEGEND

- - - - - DEPOT BOUNDARY

——— BASE FEATURES

10 ——— ISOCONCENTRATION LINE (IN ug/L)

10 - - - - INFERRED ISOCONCENTRATION LINE FROM LIMITED DATA (IN ug/L)

● MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER

▲ MW MONITORING WELL SCREENED IN CONFINED SAND AQUIFER

● PZ01 PIEZOMETER SCREENED IN FLUVIAL AQUIFER

■ RW GROUNDWATER EXTRACTION WELL

78 CONCENTRATIONS IN ug/L

ND NOT DETECTED

J ESTIMATED VALUE

5 ug/L MAXIMUM CONTAMINANT LEVEL (MCL) PRIMARY DRINKING WATER STANDARD

NOTE

SOME INFERRED ISOCONTOURS ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT(S)

FIGURE 14-40
Groundwater 1,1,2-Trichloroethane (1,1,2-TCA) Concentrations
January/February 2001
REV 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

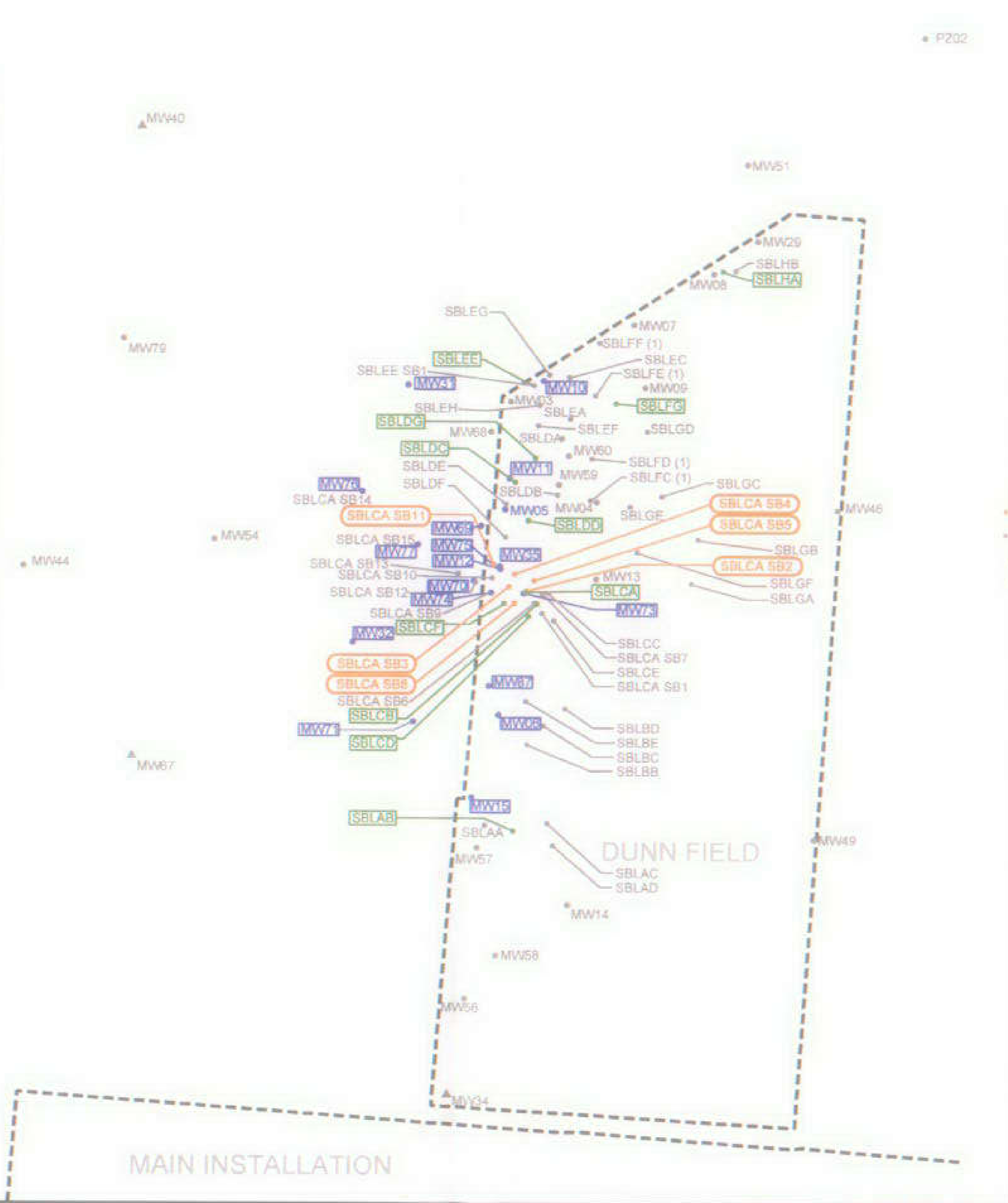
ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 04-APRIL-2002 8071dfn01-14-40 dgn

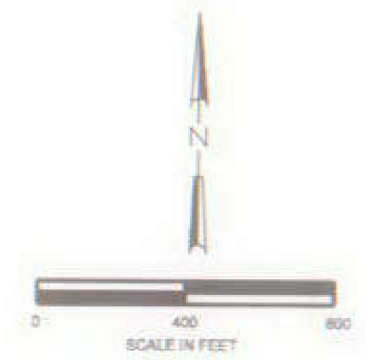
SOIL SAMPLES

Soil Boring	Installation Date	Total VOCs (ug/kg)
MW-42	Jan-96	ND
MW-43	Jan-96	ND
MW-44	Jan-96	ND
MW-51	Jan-96	ND
MW-54	Feb-96	ND
SB61A	Mar-99	ND
SBLAA	Mar-99	3.4
SBLAB	Mar-99	3,823.9
SBLAC	Mar-99	14.0
SBLAD	Mar-99	1.8
SBLBA	Mar-99	ND
SBLBB	Mar-99	8.0
SBLBC	Mar-99	330.0
SBLBD	Mar-99	30.0
SBLBE	Mar-99	6.0
SBLCA	Mar-99	52,039.0
SBLCA-SB1	Oct-00	160.7
SBLCA-SB10	Nov-00	315.0
SBLCA-SB11	Nov-00	6,083.8
SBLCA-SB12	Nov-00	251.0
SBLCA-SB13	Nov-00	407.2
SBLCA-SB14	Nov-00	8.4
SBLCA-SB15	Nov-00	221.7
SBLCA-SB2	Oct-00	22,835.1
SBLCA-SB3	Oct-00	1,140.0
SBLCA-SB4	Oct-00	2,216.1
SBLCA-SB5	Oct-00	3,548.0
SBLCA-SB8	Oct-00	978.6
SBLCA-SB9	Ocr-00	193.1
SBLCB	Mar-99	3,027.0
SBLCC	Mar-99	13.0
SBLCD	Mar-99	8,863.0
SBLCE	Mar-99	0.8
SBLCF	Apr-99	1,135.0
SBLDA	Mar-99	120.0
SBLDB	Mar-99	22.8
SBLDC	Mar-99	1,385.2
SBLDD	Mar-99	853.7
SBLDE	Mar-99	76.9
SBLDF	Mar-99	98.0
SBLDG	Apr-99	17,013.0
SBLDH	Apr-99	ND
SBLEA	Mar-99	5.0
SBLEB	Mar-99	ND
SBLEC	Mar-99	0.3
SBLED	Mar-99	ND
SBLEE	Mar-99	748,518.4
SBLEE-SB1	Oct-00	188.2
SBLEF	Mar-99	327.0
SBLEG	Mar-99	10.0
SBLEH	Apr-99	ND
SBLFA (1)	Mar-99	ND
SBLFA (2)	Oct-99	ND
SBLFB (1)	Mar-99	ND
SBLFB (2)	Oct-99	ND
SBLFC (1)	Mar-99	0.4
SBLFC (2)	Oct-99	ND
SBLFD (1)	Mar-99	10.2
SBLFD (2)	Oct-99	ND
SBLFE (1)	Mar-99	80.9
SBLFE (2)	Oct-99	ND
SBLFF (1)	Mar-99	1.6
SBLFF (2)	Oct-99	ND
SBLFG	Mar-99	20,839.0
SBLGA	Mar-99	7.0
SBLGB	Mar-99	0.8
SBLGC	Mar-99	139.0
SBLGD	Mar-99	2.0
SBLGE	Mar-99	110.0
SBLGF	Apr-99	6.0
SBLHA	Mar-99	935.0
SBLHB	Mar-99	0.7
SBLHC	Mar-99	ND

GROUNDWATER SAMPLES (1)

Monitoring Well	Installation Date	Total VOCs (ug/l)
MW-03	Jun-97	146.0
MW-04	Oct-98	125.0
MW-05	Feb-96	117.0
MW-06	Sep-97	903.0
MW-07	Sep-97	177.0
MW-08	Oct-98	74.0
MW-09	Jun-97	28.0
MW-10	Jun-97	980.0
MW-11	Sep-97	512.0
MW-12	Jun-97	6,664.0
MW-13	Sep-97	8.0
MW-14	Oct-98	1.0
MW-15	Mar-00	2,429.1
MW-28	Oct-98	ND
MW-29	Jun-97	98.0
MW-30	Nov-00	ND
MW-31	Feb-96	2,419.0
MW-32	Nov-00	569.7
MW-33	Nov-00	ND
MW-34	Feb-99	10.8
MW-35	Feb-96	2,286.0
MW-36	Oct-98	ND
MW-37	Mar-98	ND
MW-40	Feb-99	4.3
MW-41	Oct-98	ND
MW-42	Feb-01	ND
MW-44	Jun-97	18.0
MW-45	Feb-96	3.0
MW-46	Mar-00	2.0
MW-49	Oct-98	1.0
MW-51	Nov-00	76.4
MW-54	Mar-98	197.0
MW-56	May-00	45.2
MW-57	Aug-00	114.4
MW-58	May-00	10.1
MW-59	Nov-00	49.7
MW-60	Jan-00	4.0
MW-61	Mar-99	ND
MW-65	Nov-98	2.0
MW-67	Feb-00	1.3
MW-68	Aug-00	104.2
MW-69	May-00	701.5
MW-70	Feb-00	17,354.3
MW-71	Mar-00	2,256.0
MW-73	Jan-01	35,549.4
MW-74	Jan-01	972.7
MW-75	Jan-01	3,224.1
MW-76	Jan-01	3,071.3
MW-77	Jan-01	5,579.0
MW-79	Feb-01	109.8
MW-80	Feb-01	ND
MW-87	Jan-01	566.0
PZ-02	Oct-98	204.0





LEGEND

● MW79	MONITORING WELL SCREENED IN FLUVIAL AQUIFER
▲ MW34	MONITORING WELL SCREENED IN CONFINED SAND AQUIFER
● PZ02	PIEZOMETER SCREENED IN FLUVIAL AQUIFER
● SBL	SOIL BORING LOCATION
● SBLFA	SOIL SAMPLE (1) (TOTAL VOCs* > 500 ug/kg) [1999 DATA]
● SBLFA	SOIL SAMPLE (1) (TOTAL VOCs* < 500 ug/kg) [1999 DATA]
● SBLCA SB1	SOIL SAMPLE (2) (TOTAL VOCs* > 500 ug/kg) [2000 DATA]
● SBLCA SB1	SOIL SAMPLE (2) (TOTAL VOCs* < 500 ug/kg) [2000 DATA]
● MW51	GROUNDWATER SAMPLE (3) (TOTAL VOCs* > 500 ug/l)
● MW51	GROUNDWATER SAMPLE (3) (TOTAL VOCs* < 500 ug/l)

NOTE:

*SUM OF THE FOLLOWING CONTAMINANTS: TETRACHLOROETHENE, TRICHLOROETHENE, TOTAL 1,2-DICHLOROETHENE, 1,1-DICHLOROETHENE, VINYL CHLORIDE, 1,1,2,2-TETRACHLOROETHANE, 1,1,1-TETRACHLOROETHANE, 1,1,2-TRICHLOROETHANE, 1,1-DICHLOROETHANE, CARBON TETRACHLORIDE, CHLOROFORM.

(1) SOIL SAMPLES WERE COLLECTED FROM GROUND SUFACE TO 30 FEET BGS

(2) SOIL SAMPLES WERE COLLECTED FROM 30 FEET BGS TO THE TOP OF THE WATERTABLE.

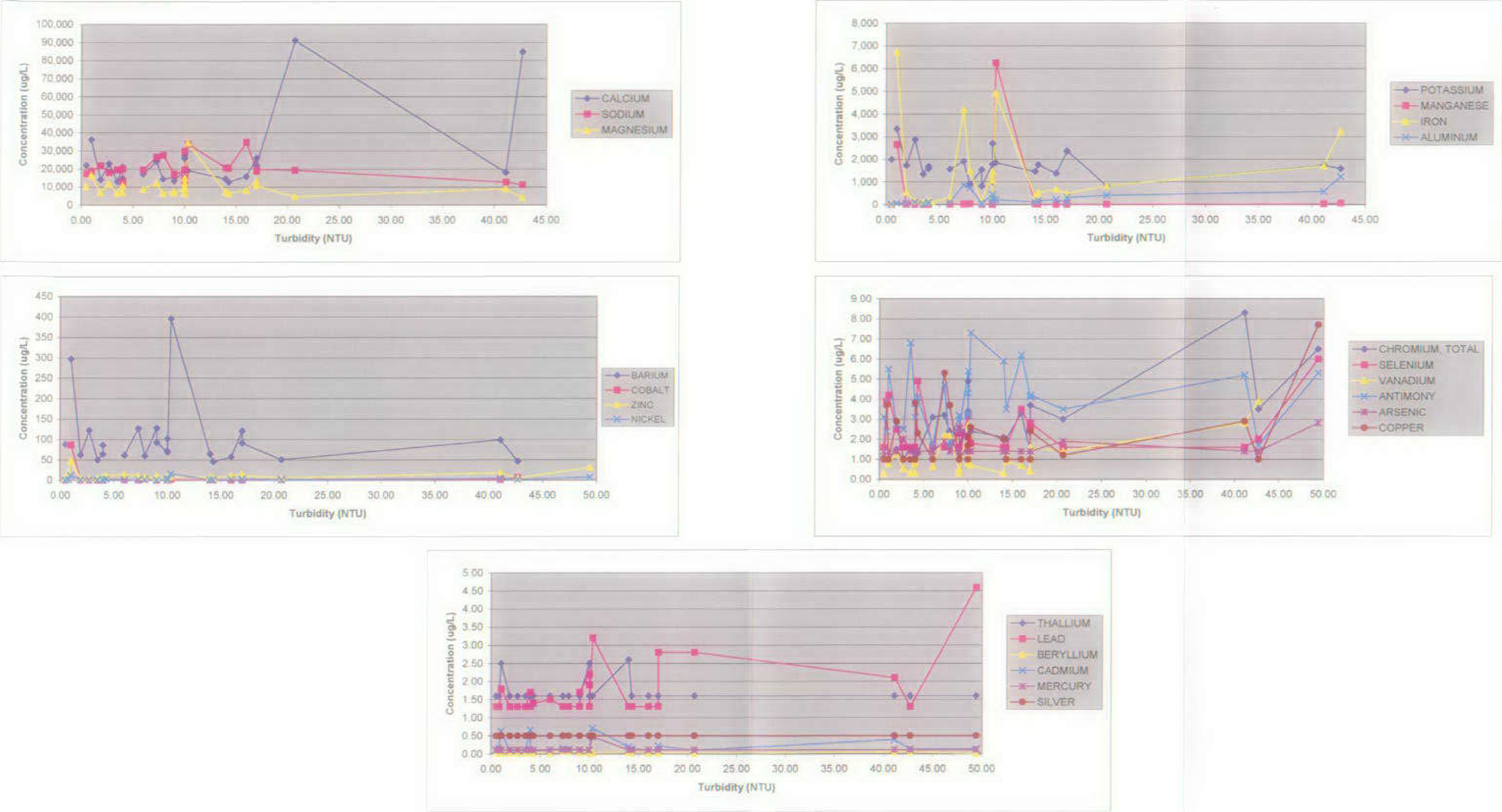
(3) FOR GROUNDWATER SAMPLES, HIGHEST TOTAL VOC CONCENTRATIONS THROUGH FEBRUARY 2001 ARE DENOTED.

FIGURE 14-41
Soil and Groundwater Total VOC* Correlation Map
REV. 1 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 29-MAR-2002 8071dff01-14-41.dgn

Figure 14-42
Turbidity versus Metal Concentration
Rev. 0 Memphis Depot Dunn Field RI



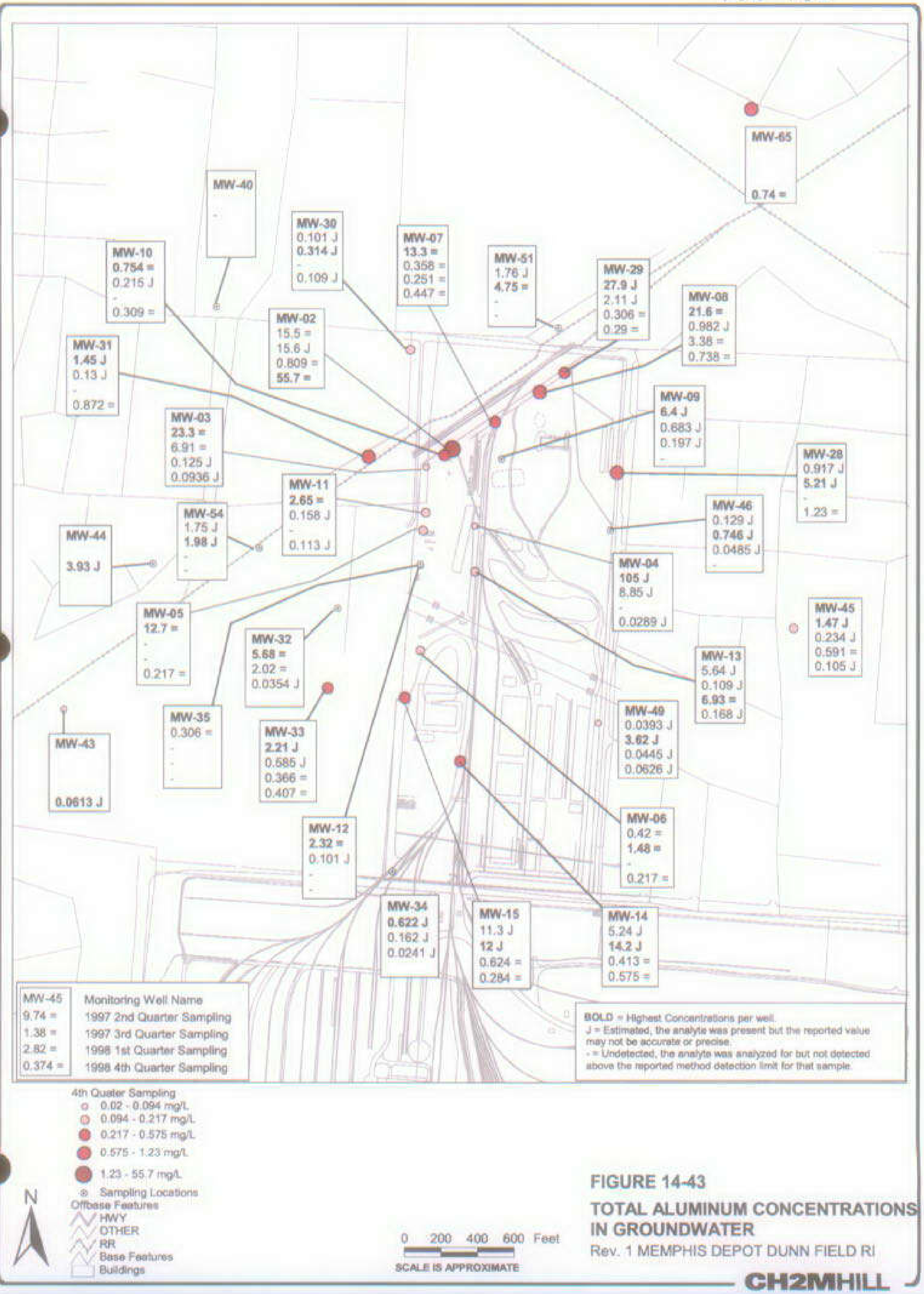
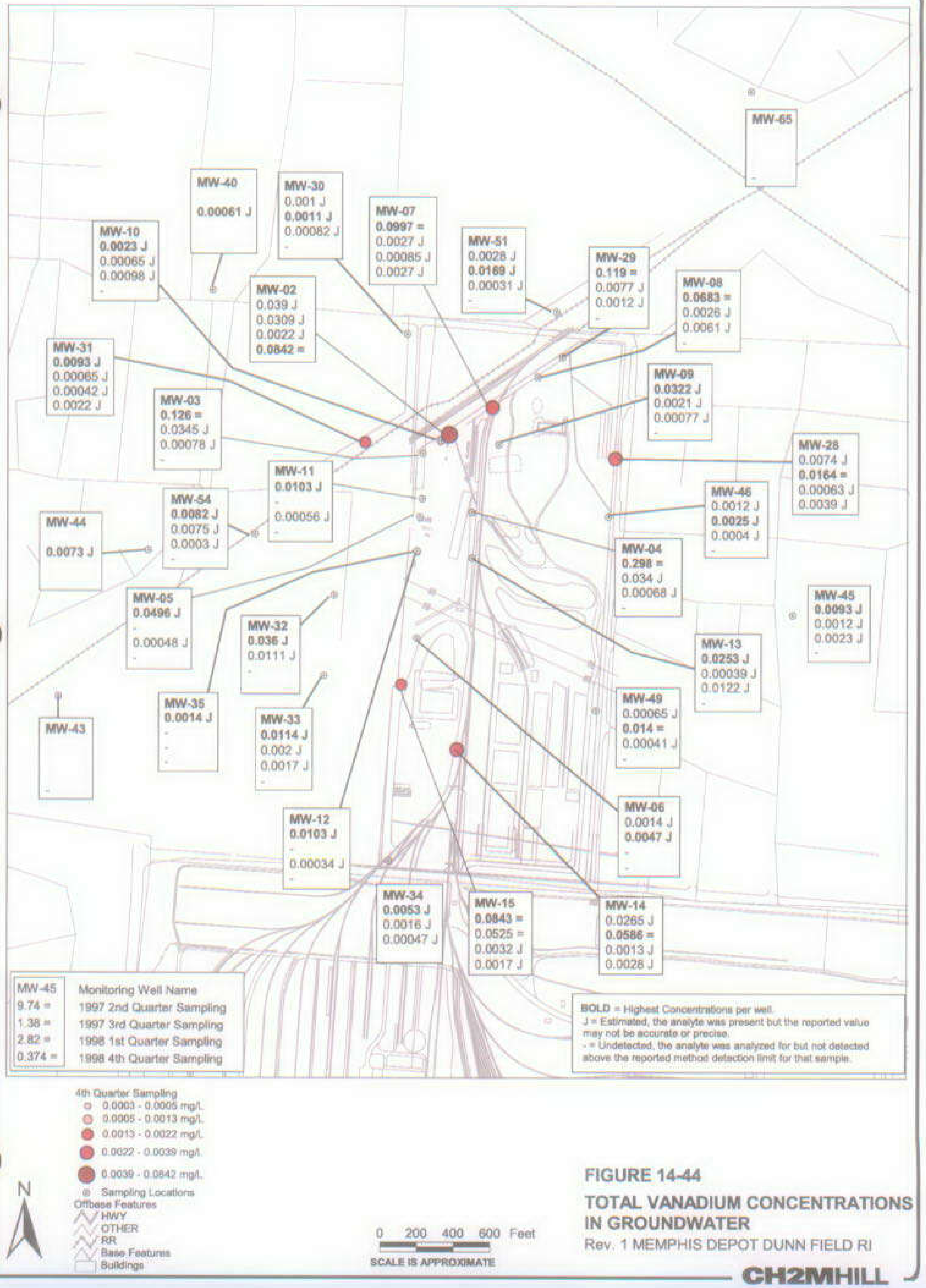


FIGURE 14-43

TOTAL ALUMINUM CONCENTRATIONS IN GROUNDWATER

Rev. 1 MEMPHIS DEPOT DUNN FIELD RI
]



File Path: H:\projects\[illegible]\gwmetals 040302.apr, Date: 04 Apr 2002 7:34, User: DABERCRO, GW VANADIUM Map

FIGURE 14-44

TOTAL VANADIUM CONCENTRATIONS IN GROUNDWATER

Rev. 1 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

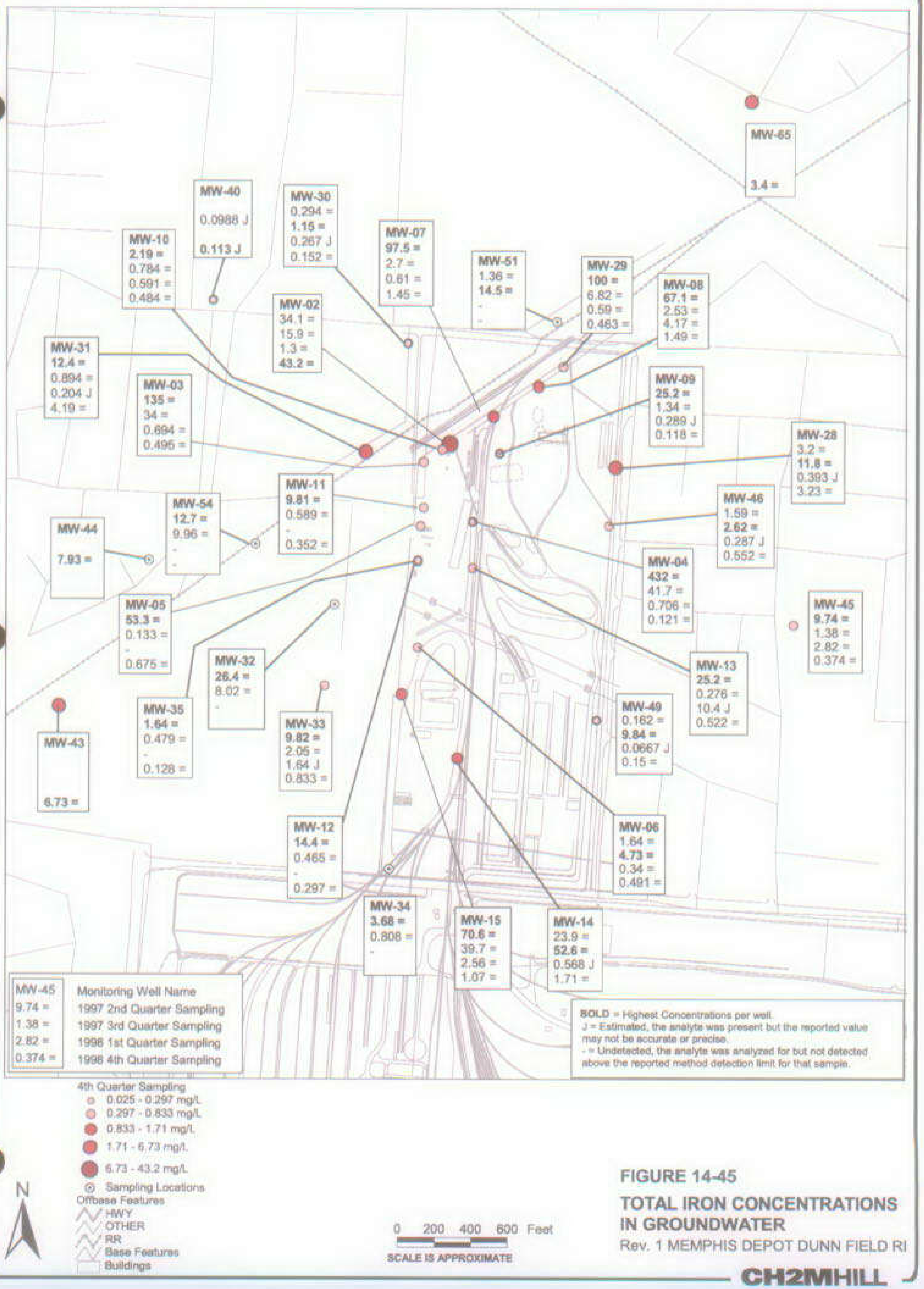


FIGURE 14-45

TOTAL IRON CONCENTRATIONS IN GROUNDWATER

Rev. 1 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

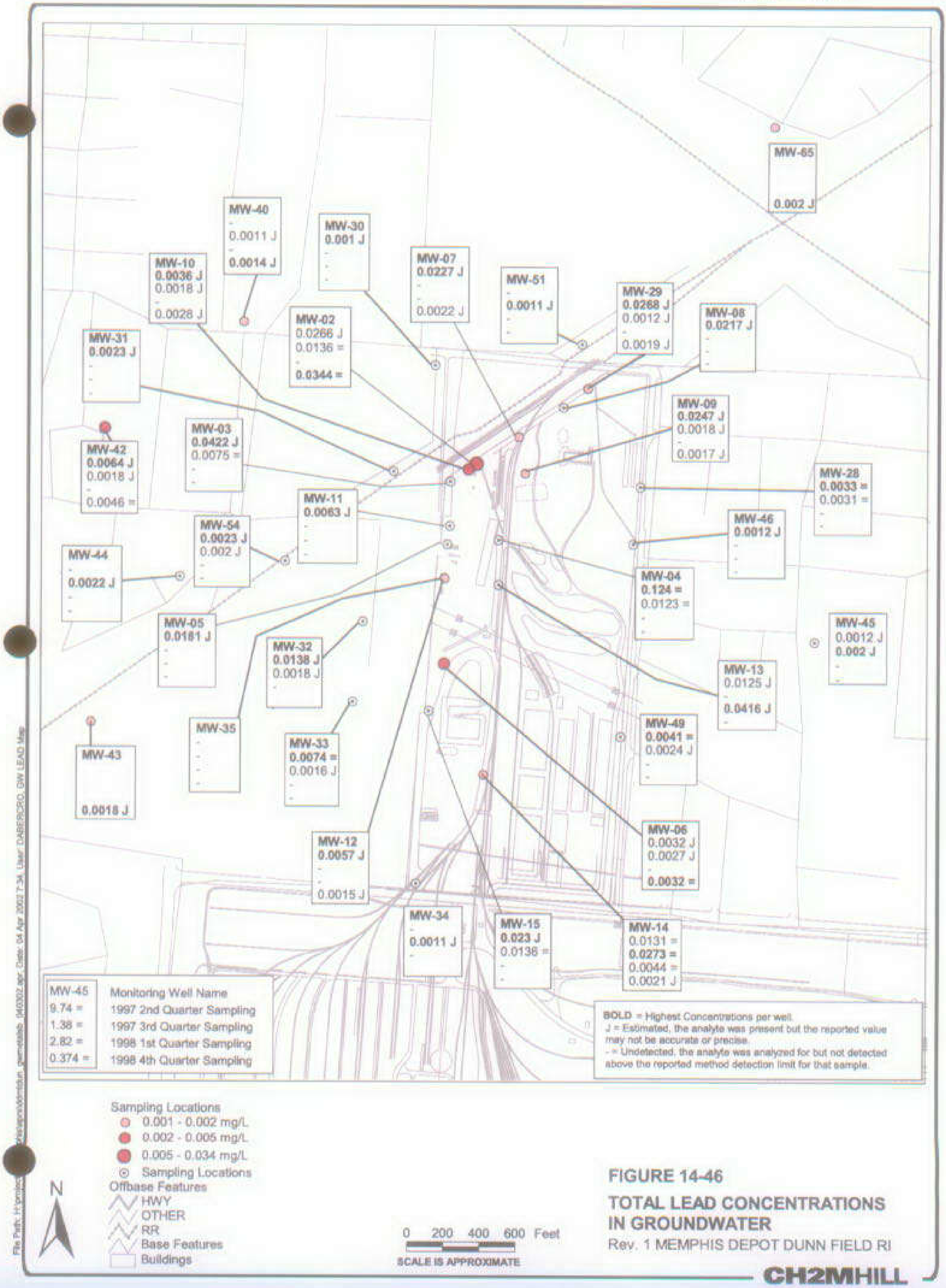


FIGURE 14-46

TOTAL LEAD CONCENTRATIONS IN GROUNDWATER

Rev. 1 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

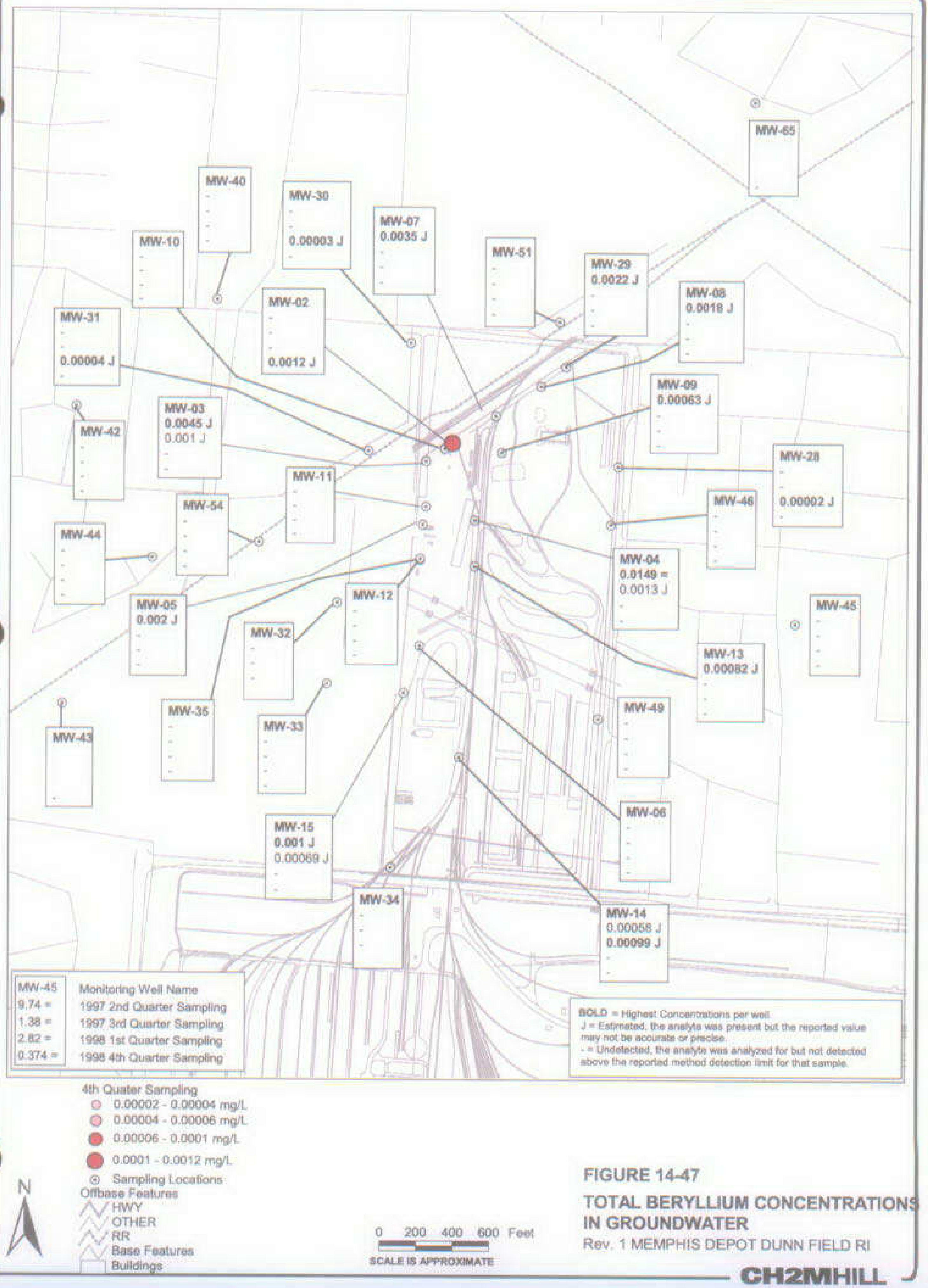
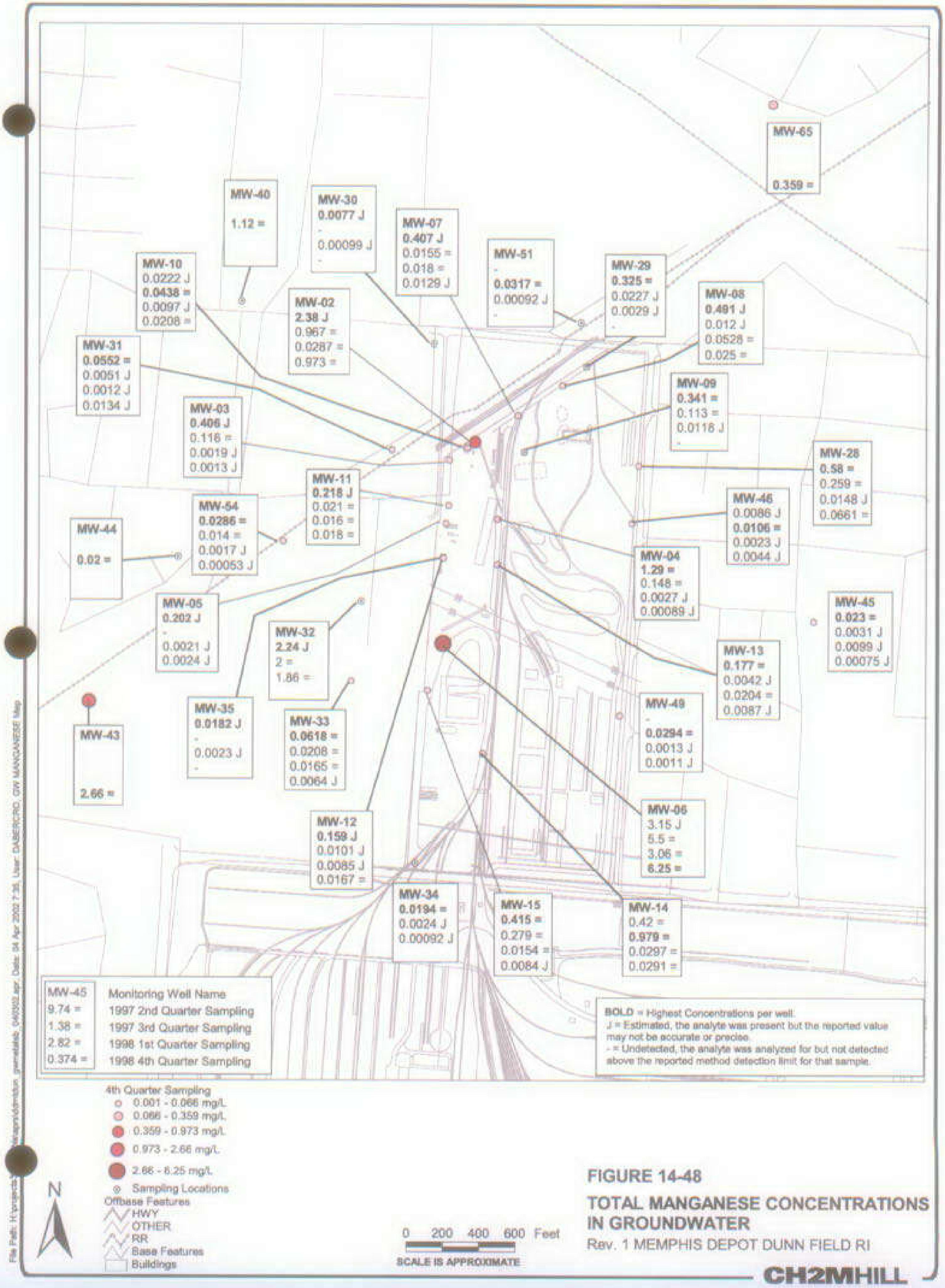


FIGURE 14-47

TOTAL BERYLLIUM CONCENTRATIONS IN GROUNDWATER

Rev. 1 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



File Path: H:\projects [illegible] \Maps\ddmtdon_gwmetalab_040302.apr, Date: 04 Apr 2002 7:36, User: DABERCRO, GW MANGANESE Map

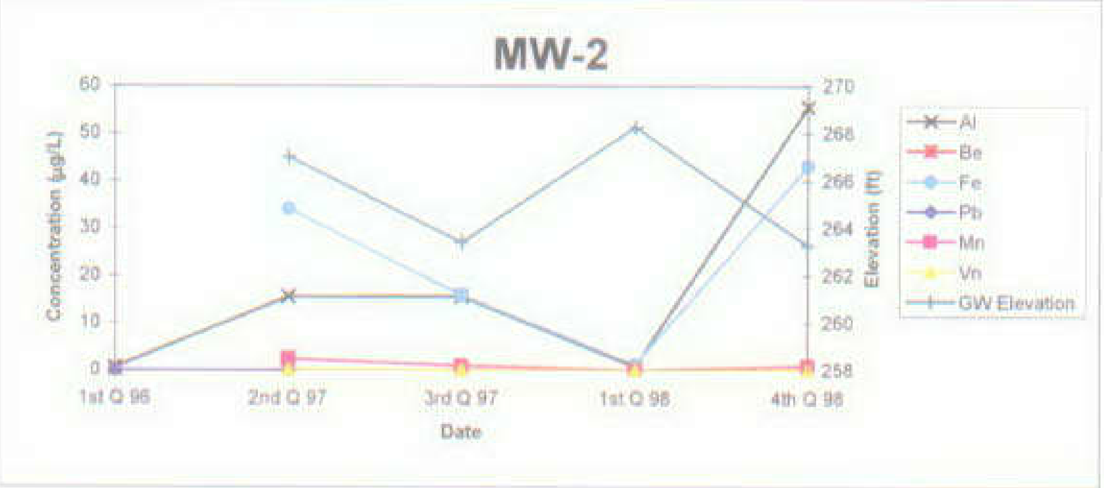
FIGURE 14-48

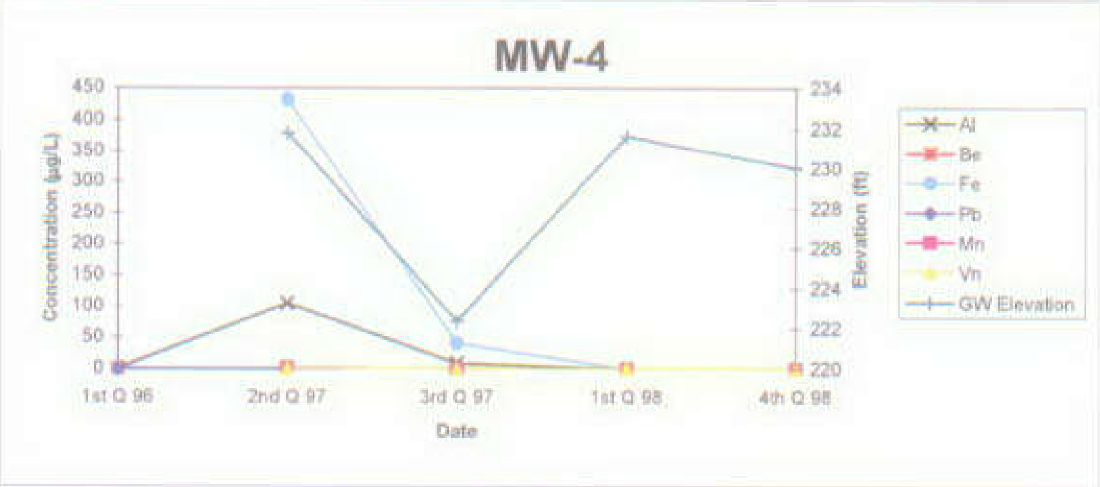
TOTAL MANGANESE CONCENTRATIONS IN GROUNDWATER

Rev. 1 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

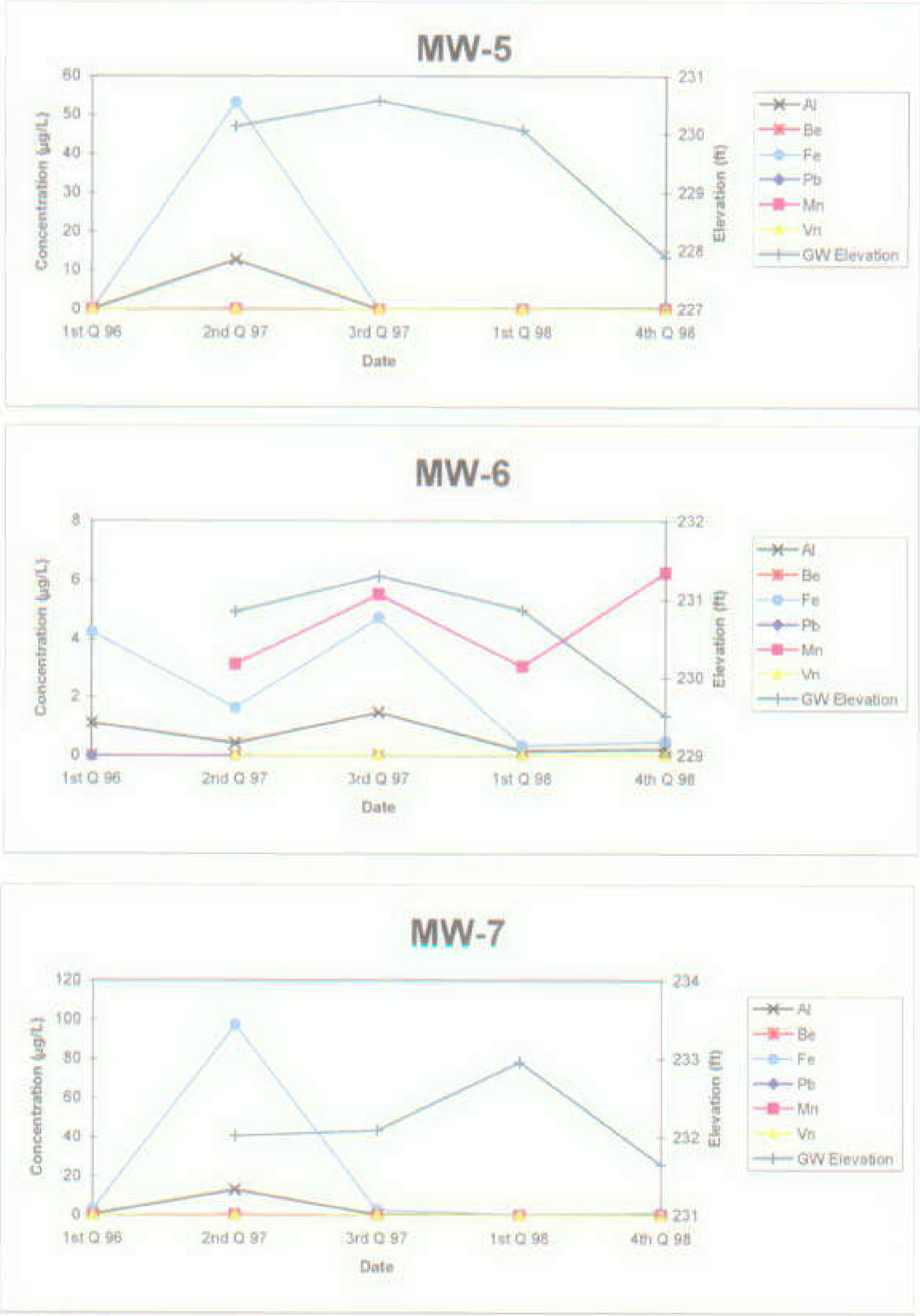
Figure 14-49a
Temporal Trends in Metals Concentrations and Groundwater Elevations
Rev. 1 Memphis Depot Dunn Field RI





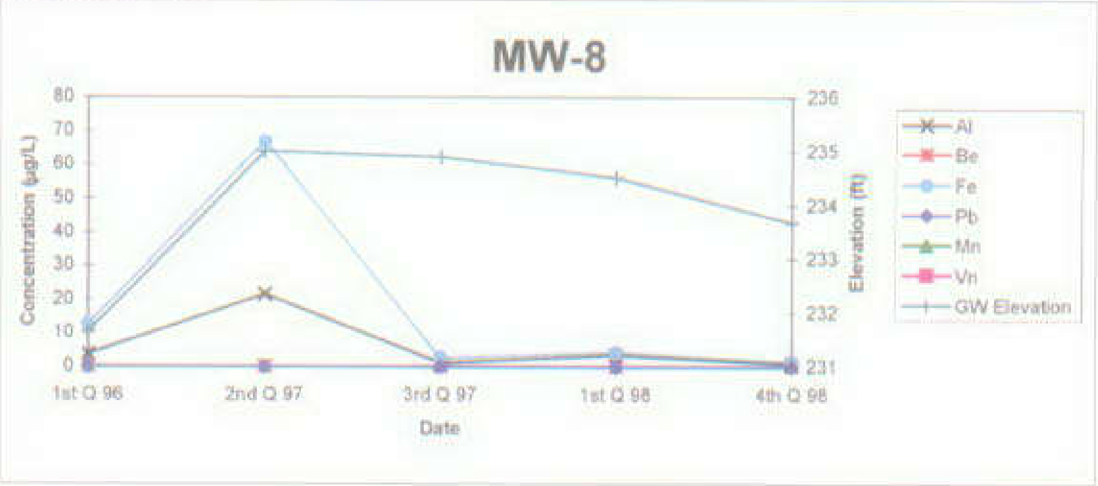
Al = Aluminum; Be = Berrylium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium

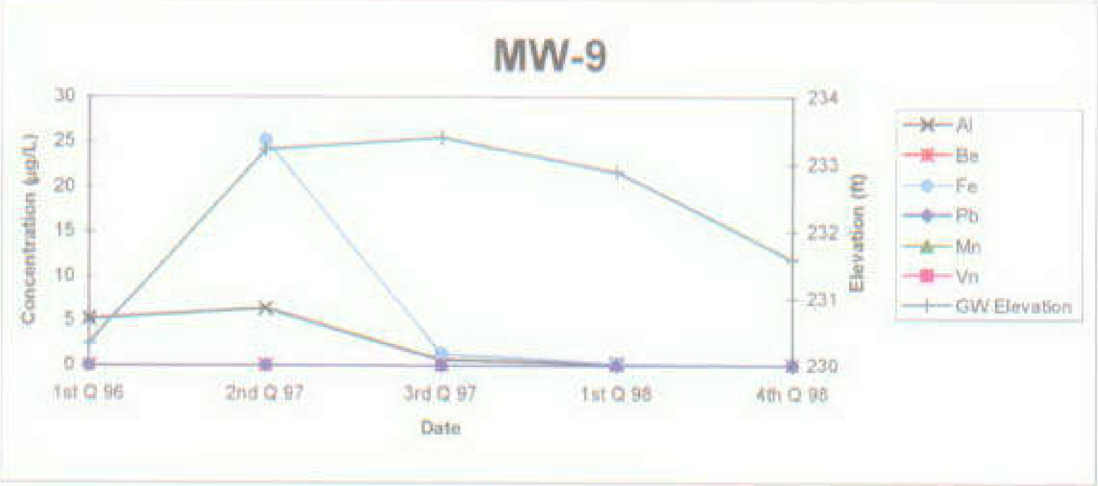
Figure 14-49b
Temporal Trends in Metals Concentrations and Groundwater Elevations
Rev. 1 Memphis Depot Dunn Field RI

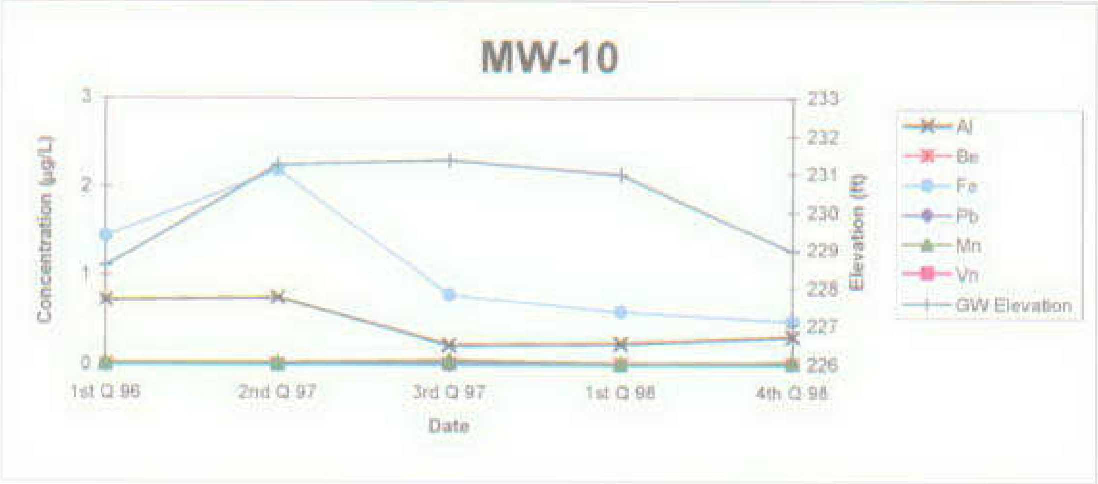


Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

Figure 14-49c
Temporal Trends in Metals Concentrations and Groundwater Elevations
Rev. 1 Memphis Depot Dunn Field RI





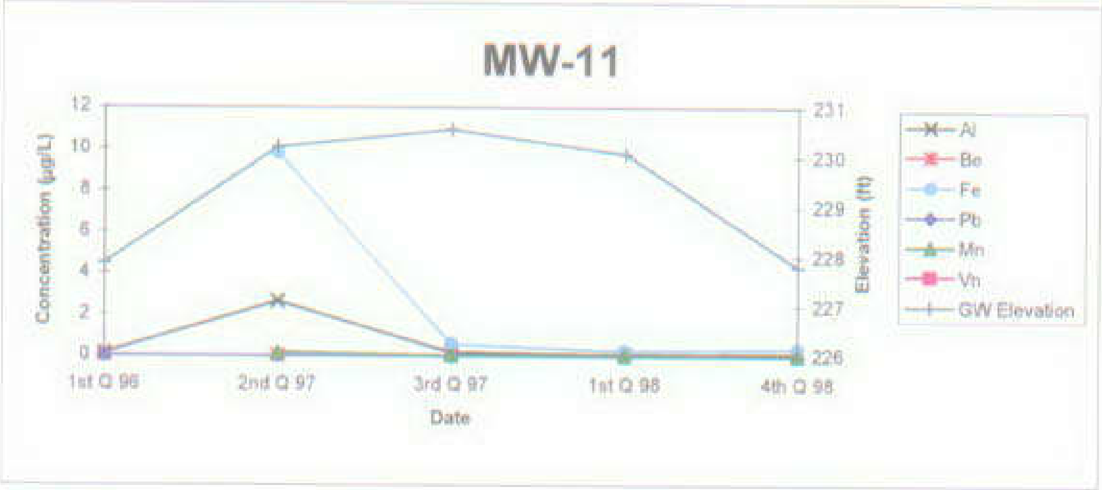


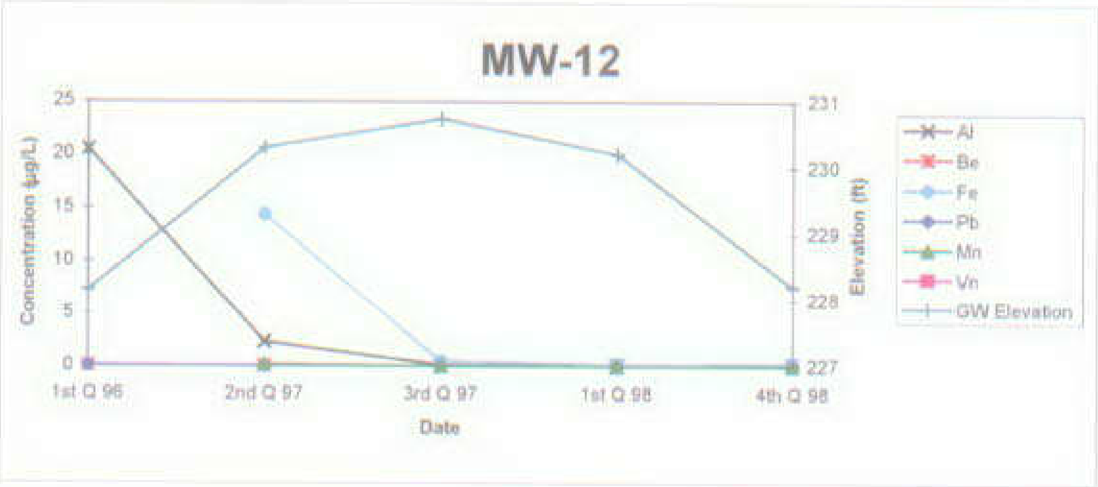
Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

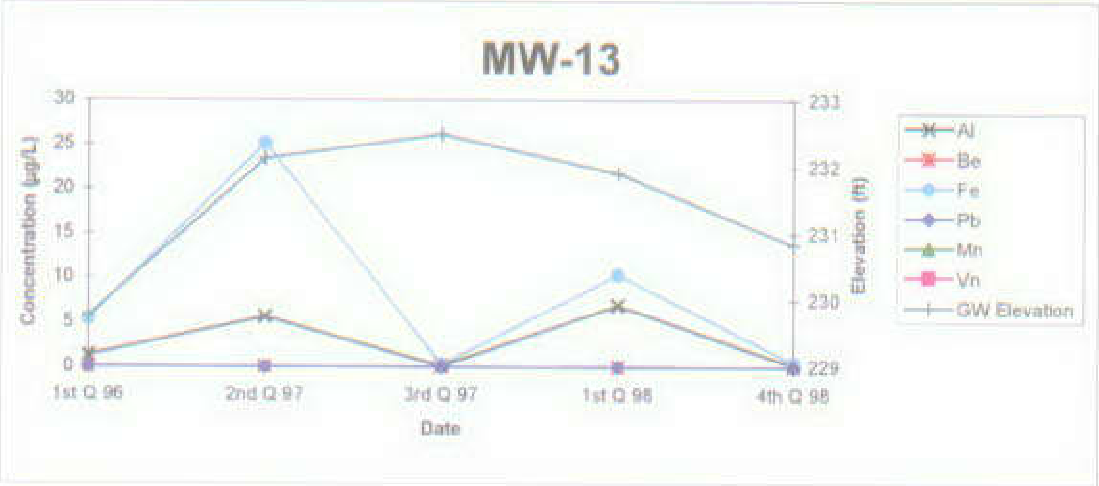
Figure 14-49d

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI

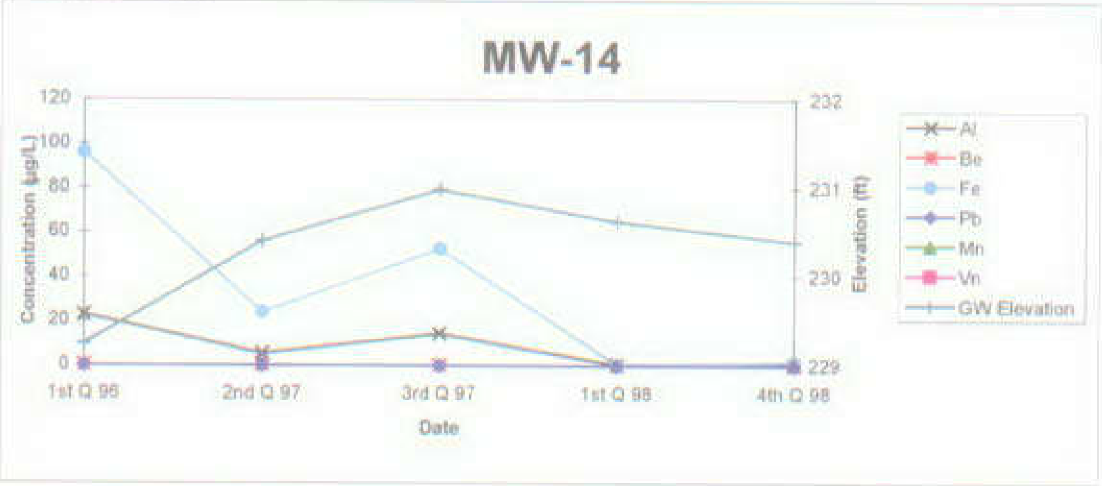


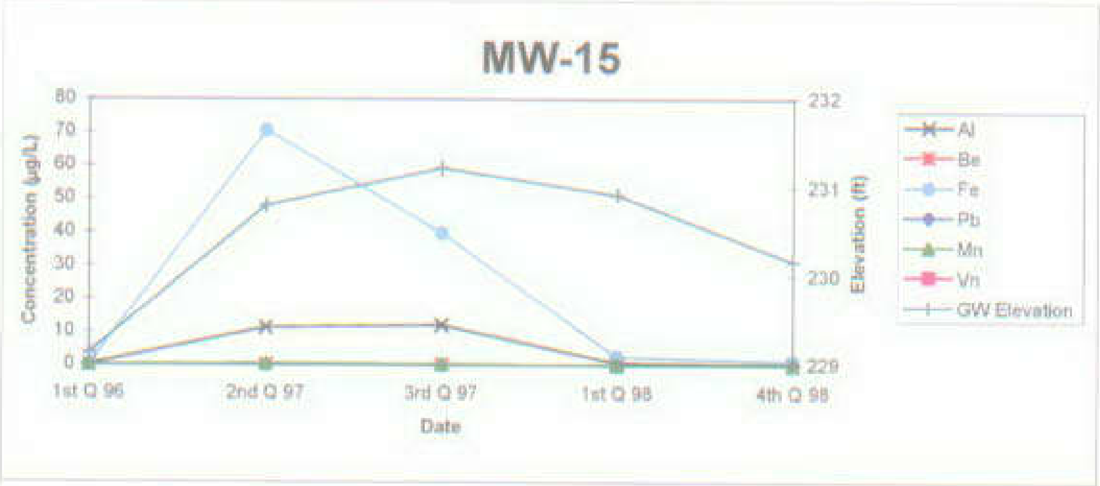


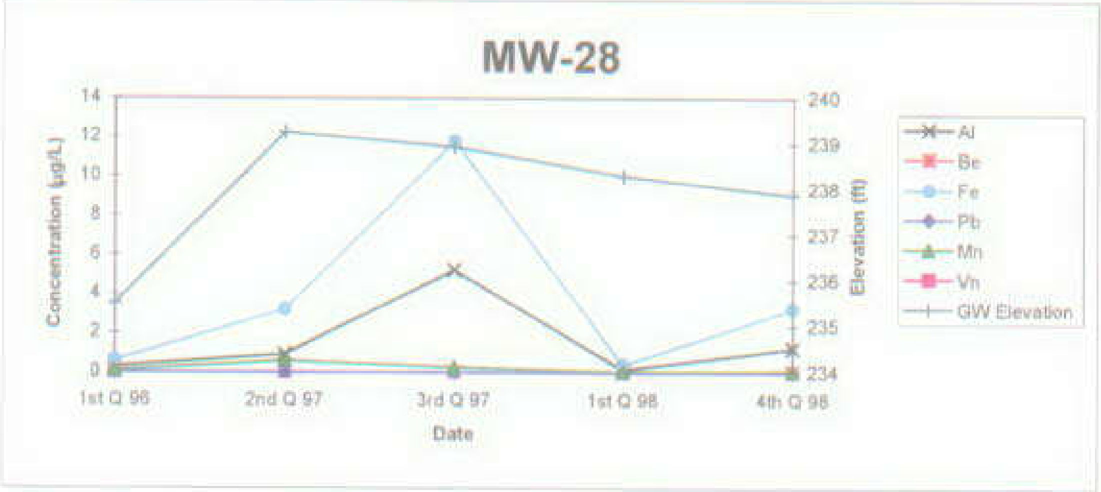


Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

Figure 14-49e
Temporal Trends in Metals Concentrations and Groundwater Elevations
Rev. 1 Memphis Depot Dunn Field RI





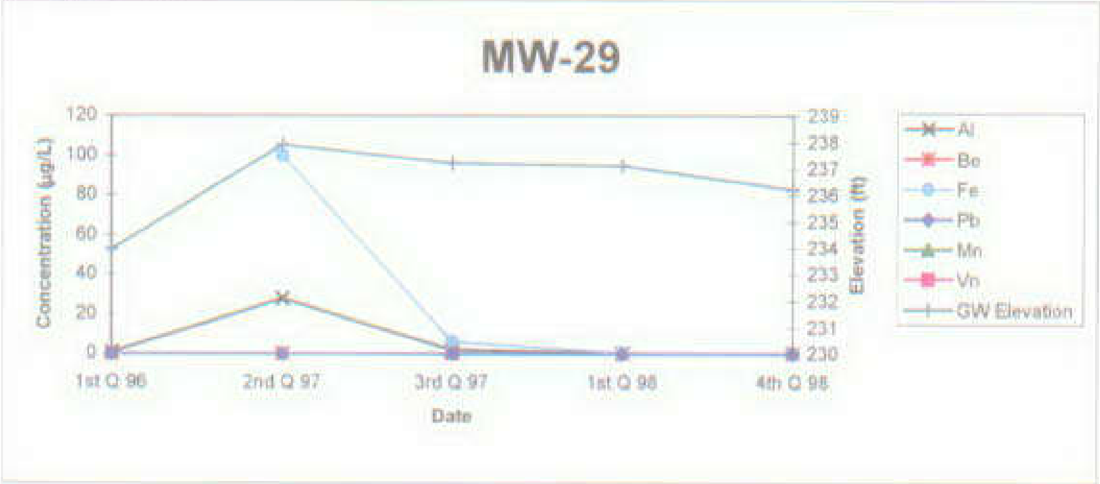


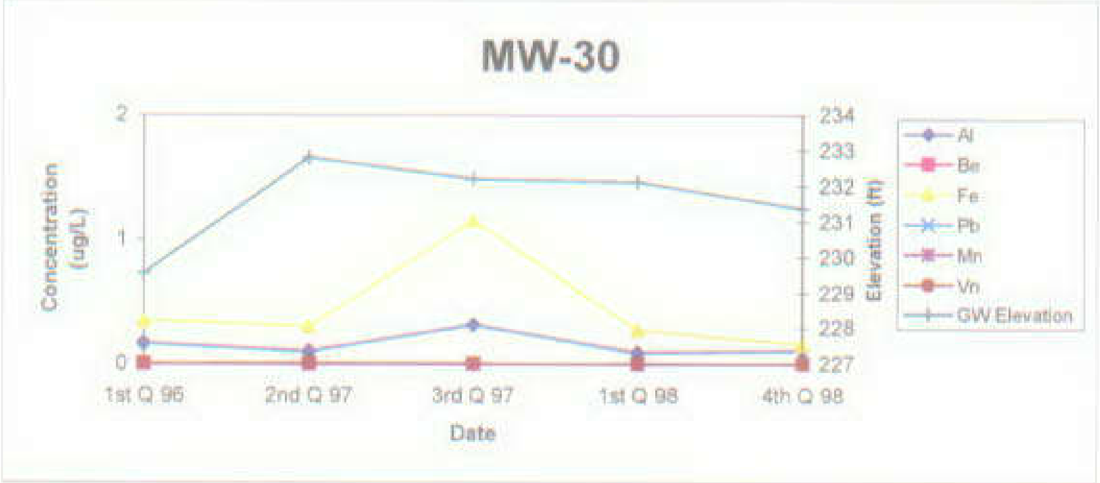
Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

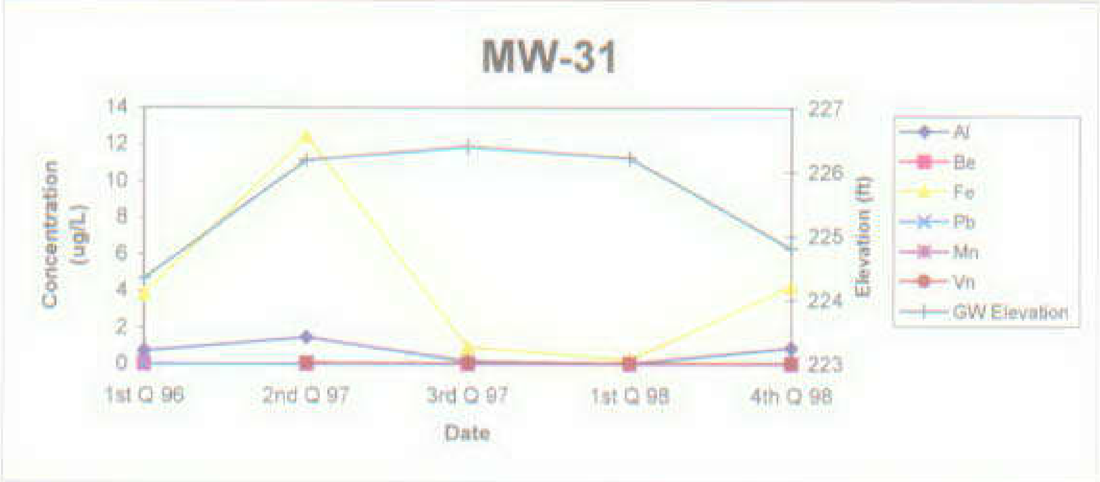
Figure 14-49f

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI





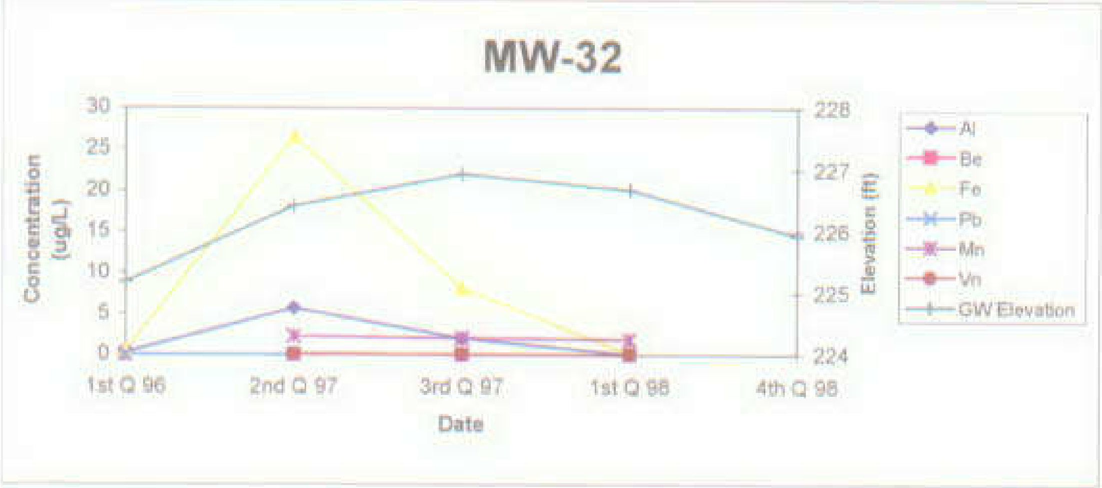


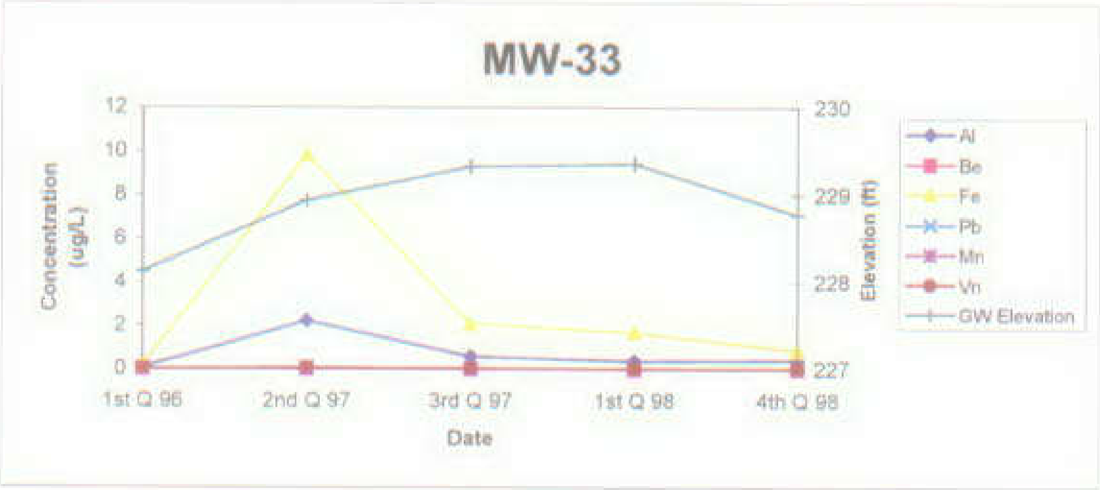
Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

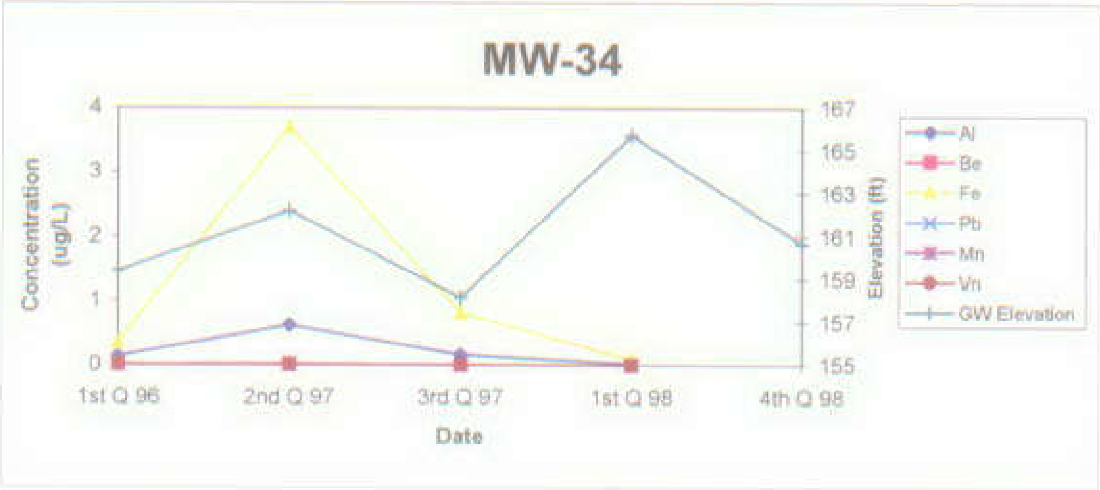
Figure 14-49g

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI





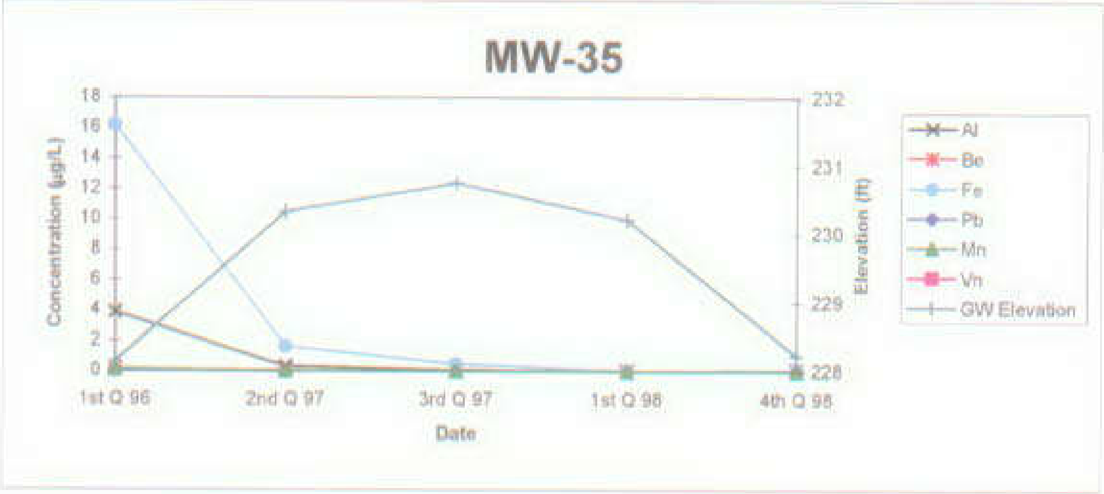


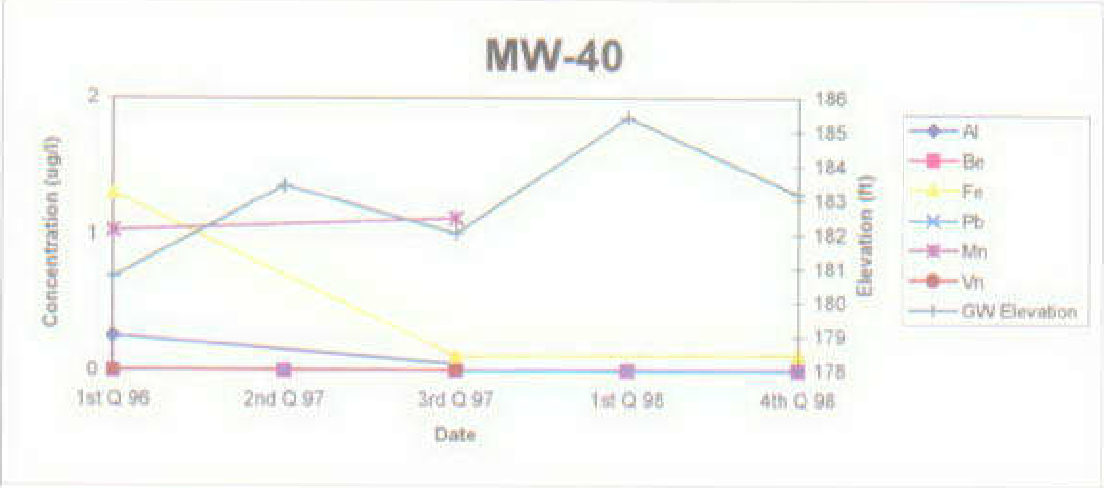
Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

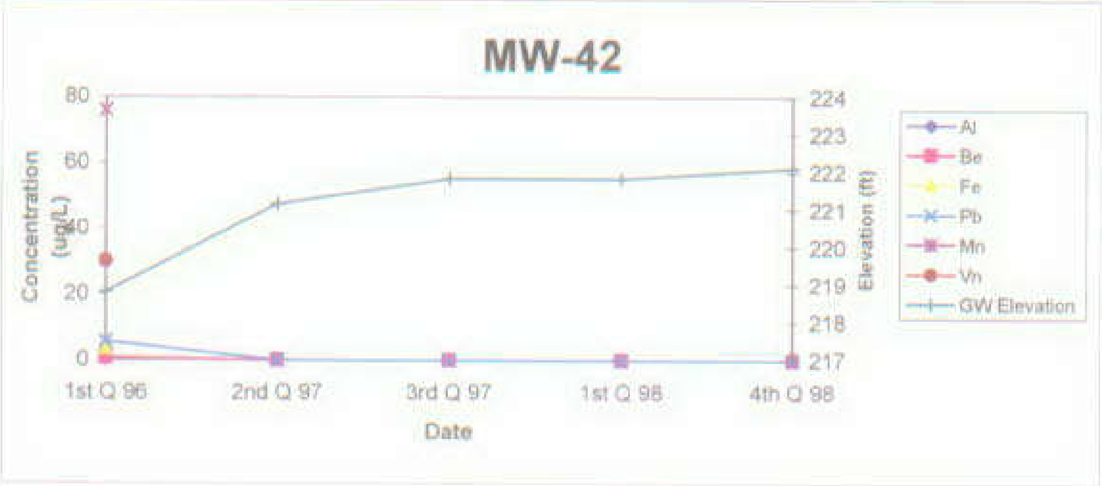
Figure 14-49h

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI





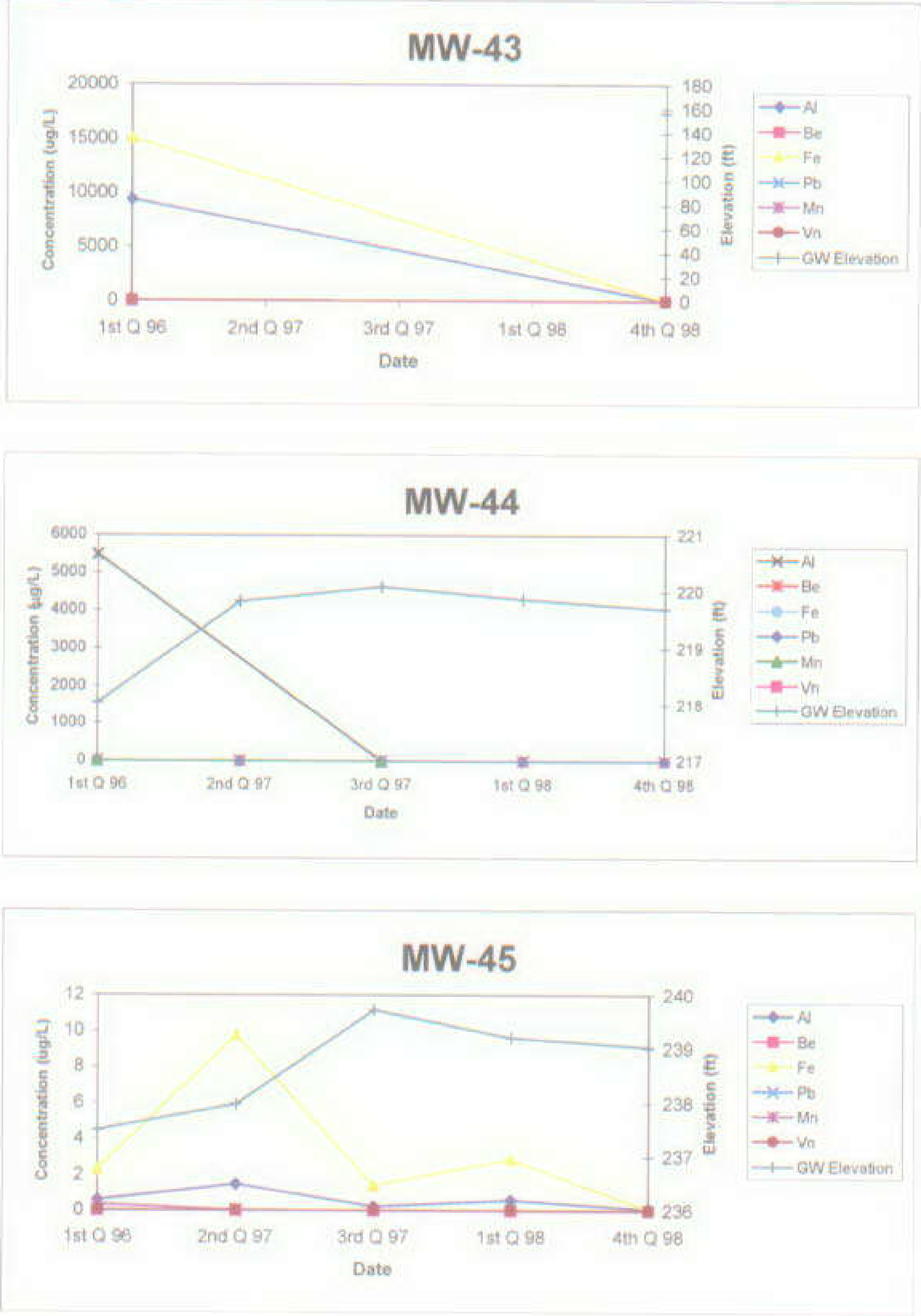


Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

Figure 14-49i

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI

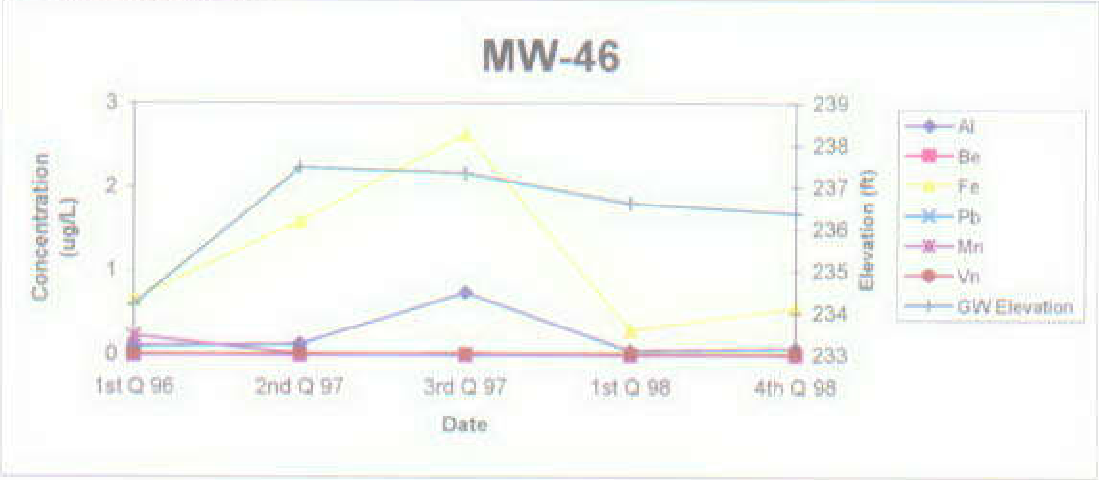


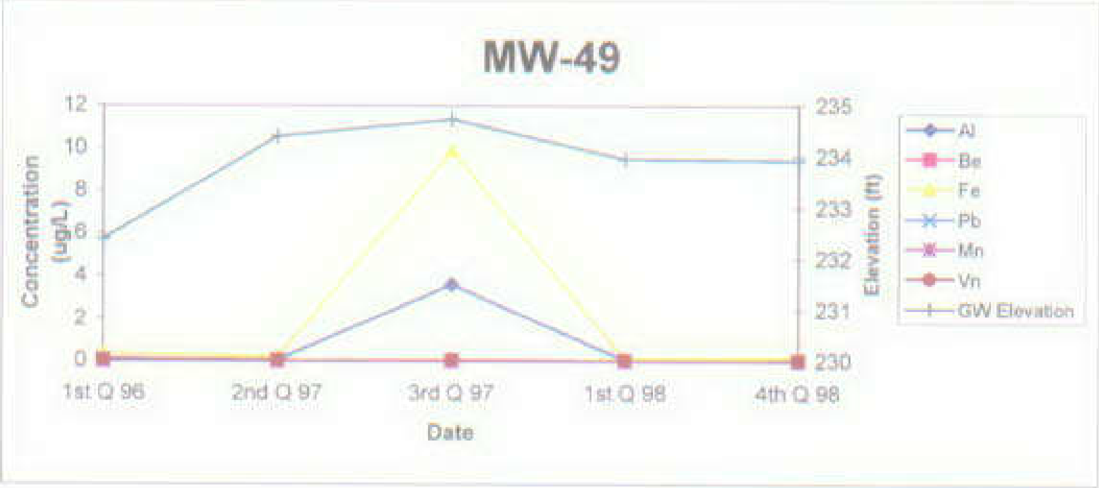
Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

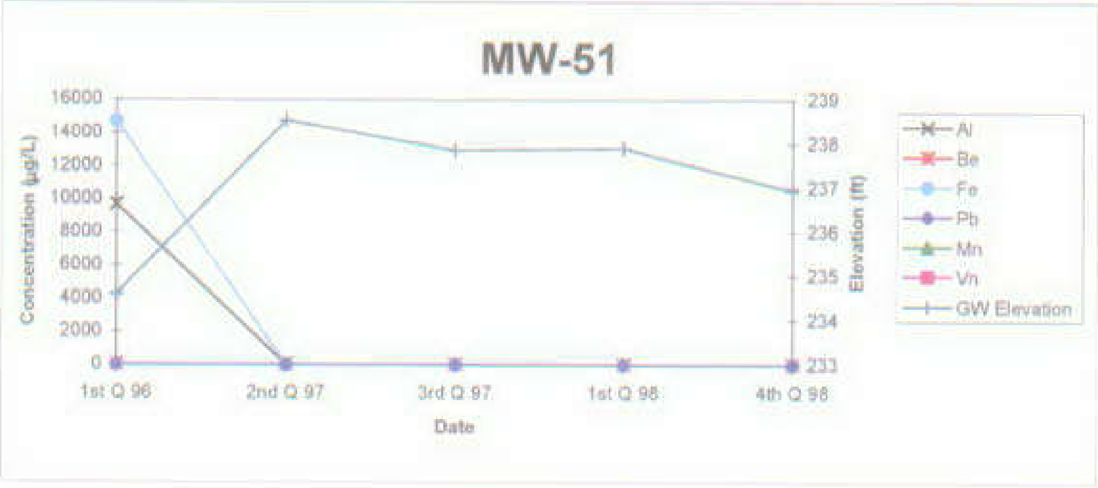
Figure 14-49j

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI





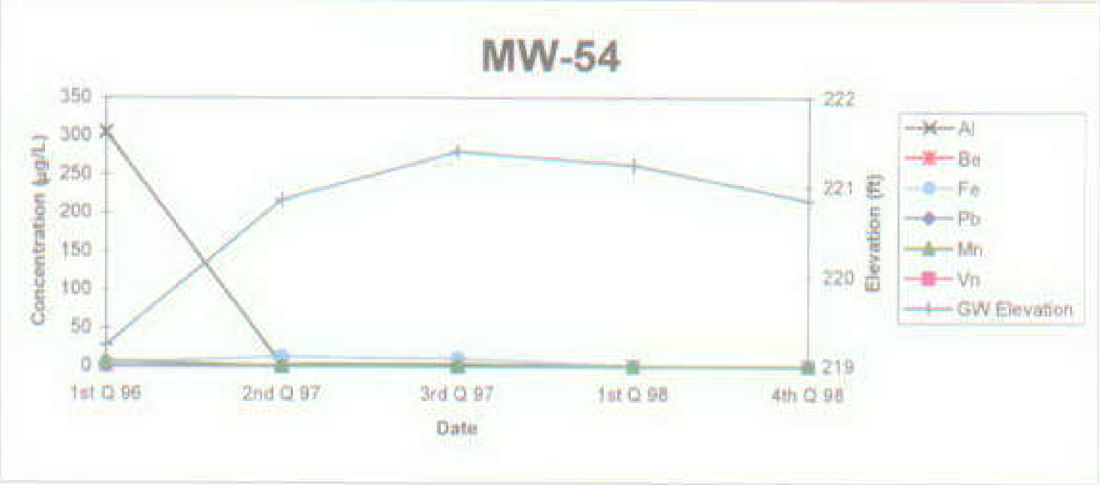


Al= Aluminum; Be = Berrylium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

Figure 14-49k

Temporal Trends in Metals Concentrations and Groundwater Elevations

Rev. 1 Memphis Depot Dunn Field RI



Al= Aluminum; Be = Berryllium; Fe = Iron; Pb = Lead; Mn = Manganese; Vn = Vanadium; GW = Groundwater

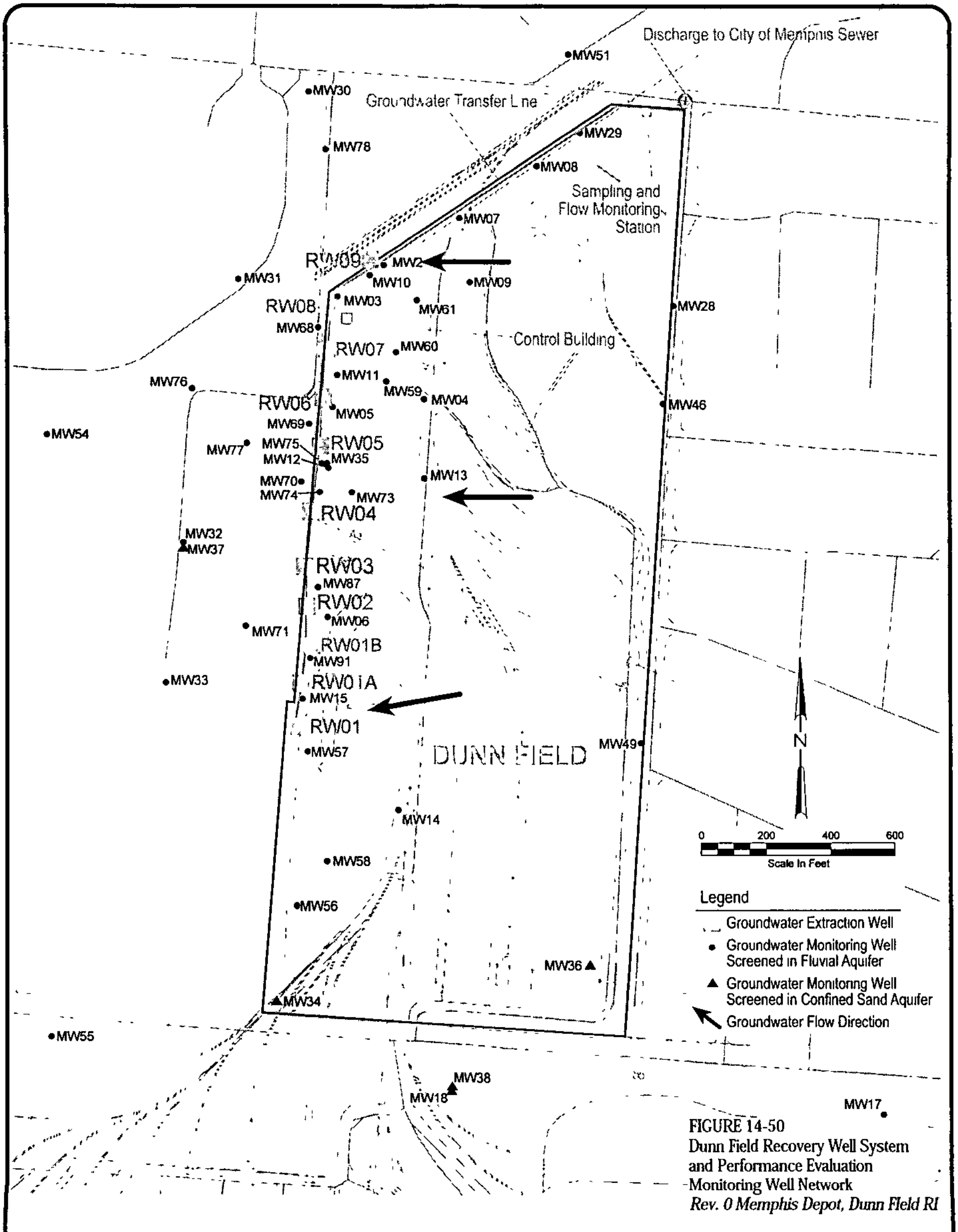


FIGURE 14-50
Dunn Field Recovery Well System and Performance Evaluation Monitoring Well Network
Rev. 0 Memphis Depot, Dunn Field RI

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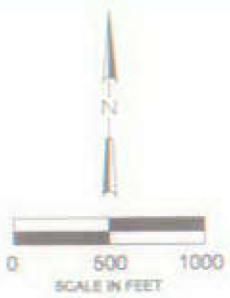
Well ID	Water Level Elevation (feet MSL)	Well ID	Water Level Elevation (feet MSL)
MW03	221.66	MW64	196.83
MW04	224.84	MW65	252.65
MW06	224.00	MW67	151.59
MW07	226.71	MW68	221.79
MW08	228.86	MW69	222.44
MW09	226.43	MW70	223.06
MW10	223.16	MW71	222.43
MW11	222.66	MW72	205.91
MW12	224.11	MW73	223.87
MW13	224.81	MW74	223.38
MW14	227.22	MW75	222.99
MW15	224.49	MW76	217.04
MW16	241.44	MW77	221.42
MW18	175.20	MW78	225.11
MW19	200.92	MW79	212.63
MW20	199.30	MW80	212.64
MW21	199.95	MW81	154.67
MW22	200.03	MW82	151.50
MW23	198.57	MW83	157.48
MW24	190.62	MW84	228.46
MW26	203.03	MW85	204.16
MW27	DRY	MW86	206.08
MW28	233.86	MW87	223.70
MW29	233.52	MW88	224.17
MW30	226.59	MW89	183.57
MW31	218.34	MW90	183.94
MW32	221.41	MW91	223.76
MW33	224.18	MW92	207.86
MW34	156.56	MW93	191.63
MW35	222.34	MW94	189.87
MW36	151.53	MW95	228.82
MW37	151.12	MW96	206.00
MW38	169.97	MW97	196.19
MW39	191.89	MW98	192.43
MW40	171.05	MW99	196.73
MW41	217.86	MW100	198.21
MW42	217.70	MW101	196.38
MW43	152.75	MW102	200.68
MW44	212.97	MW103	231.92
MW45	236.86	MW104	232.75
MW46	232.05	MW107	190.49
MW47	203.89	MW108	189.86
MW49	230.56	PZ01	202.74
MW50	212.21	PZ02	241.91
MW51	234.62	PZ03	191.47
MW52	197.25	PZ04	203.96
MW53	232.67	PZ05	196.54
MW54	213.60	PZ06	229.22
MW55	221.05	PZ07	206.74
MW56	225.61	PZ08	204.86
MW57	224.97	RW04	223.38
MW58	226.29	RW06	220.82
MW59	223.92	RW08	219.24
MW60	224.15	RW09	221.89
MW61	224.73	SB105	DRY
MW62	199.71	SB106	DRY
MW63	197.46		



LEGEND

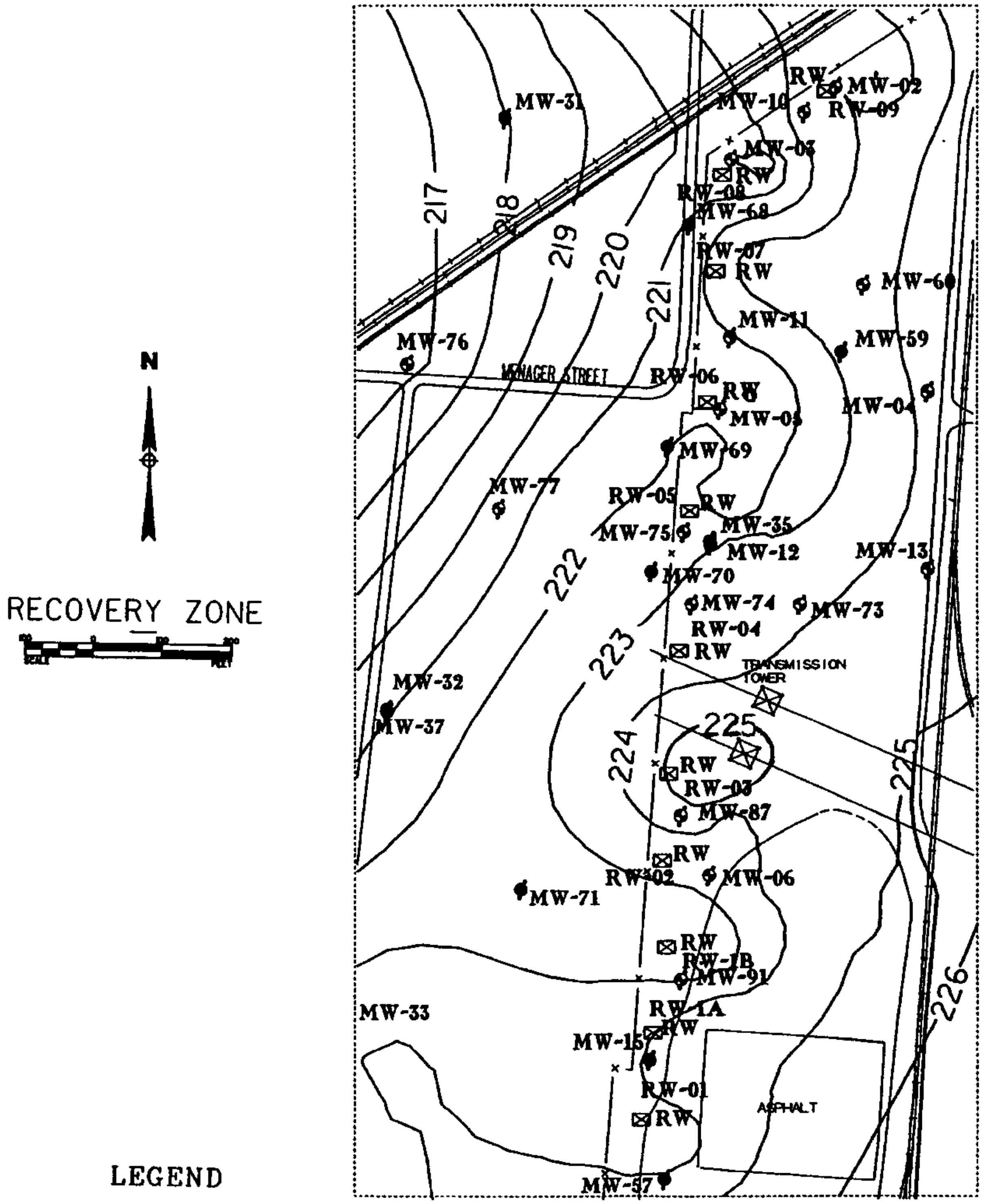
———	DEPOT BOUNDARY
	BASE FEATURES
215 ———	WATER TABLE ELEVATION IN THE FLUVIAL AQUIFER (FEET MSL)
215 – – –	INFERRED WATER TABLE ELEVATION IN THE FLUVIAL AQUIFER FROM LIMITED DATA (FEET MSL)
185 ———	WATER TABLE ELEVATION IN THE INTERMEDIATE AQUIFER (FEET MSL)
185 – – –	INFERRED WATER TABLE ELEVATION IN THE INTERMEDIATE AQUIFER FROM LIMITED DATA (FEET MSL)
—LF—	LIMITED TO NO FLOW BOUNDARY (SEE NOTE)
– –LF– –	INFERRED LIMITED TO NO FLOW BOUNDARY (SEE NOTE)
• MW63	MONITORING WELL
• PZ06	PIEZOMETER
• [illegible]	SOIL BORING
——→	GROUNDWATER FLOW DIRECTION
▨	CLAY ELEVATION EXCEEDS GROUNDWATER ELEVATION

NOTES

- THE "LIMITED TO NO FLOW BOUNDARY" BOUNDS AN AREA WHERE THE WATER LEVEL IN THE FLUVIAL AQUIFER INTERSECTS THE CLAY DIRECTLY UNDERLYING THE FLUVIAL DEPOSITS, LEAVING FLUVIAL DEPOSITS UNSATURATED.
- MW18, 34, 36, 37, 38, 40, 43, 81, 82, 83, 89, AND 90 ARE WELLS SCREENED WITHIN THE INTERMEDIATE AQUIFER.
- MW107 AND 108 ARE LOCATED IN A TRANSITION ZONE BETWEEN THE FLUVIAL AQUIFER AND THE INTERMEDIATE AQUIFER.
- MW18, 36, 37, 81, 82, 83, 89 AND 90 ARE NOT INCLUDED IN THIS POTENTIOMETRIC SURFACE MAP
- MW67 IS SCREENED IN THE MEMPHIS AQUIFER AND THEREFORE NOT INCLUDED IN THIS POTENTIOMETRIC SURFACE MAP
- NO MEASUREABLE WATER LEVELS WERE RECORDED IN MW2, 5, 17, AND 27.
- DEPTH TO WATER MEASUREMENTS WERE NOT COLLECTED IN MW25, 48 AND 66
- SB-105 AND 106 WERE MEASURED ON OCTOBER 16, 2001 AND OCTOBER 17, 2001, RESPECTIVELY
- EXCLUDES MW-88 GROUNDWATER ELEVATION DATA.

FIGURE 14-51
Potentiometric Surface
Map of the Fluvial Aquifer,
Including Intermediate Aquifer
November 01, 2001
REV. 2 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL



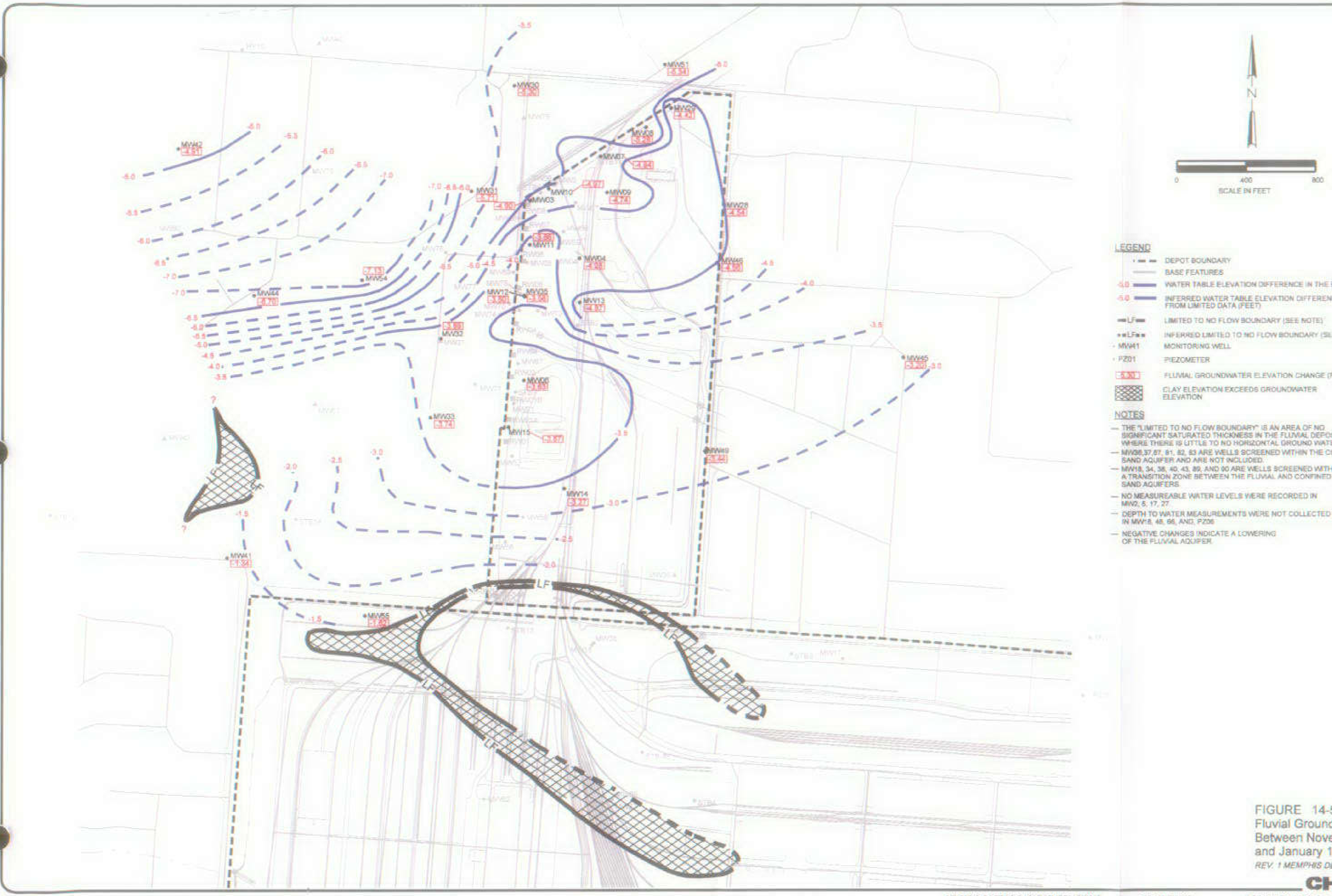
LEGEND

ɸ	MONITORING WELL
●	SELECTED SAMPLING MONITORING WELL
⊠	RECOVERY WELL
206	GROUNDWATER CONTOUR

* From Jacobs Engineering Inc., *Semi-Annual Groundwater Quality Report (Year Three, Second Half) Groundwater Interim Remedial Action, Dunn Field, Memphis Depot, Tennessee, February* 2002.

FIGURE 14-52
Potentiometric Surface Map for the Dunn Field Groundwater Extraction System
November 01, 2001

CH2MHILL



LEGEND

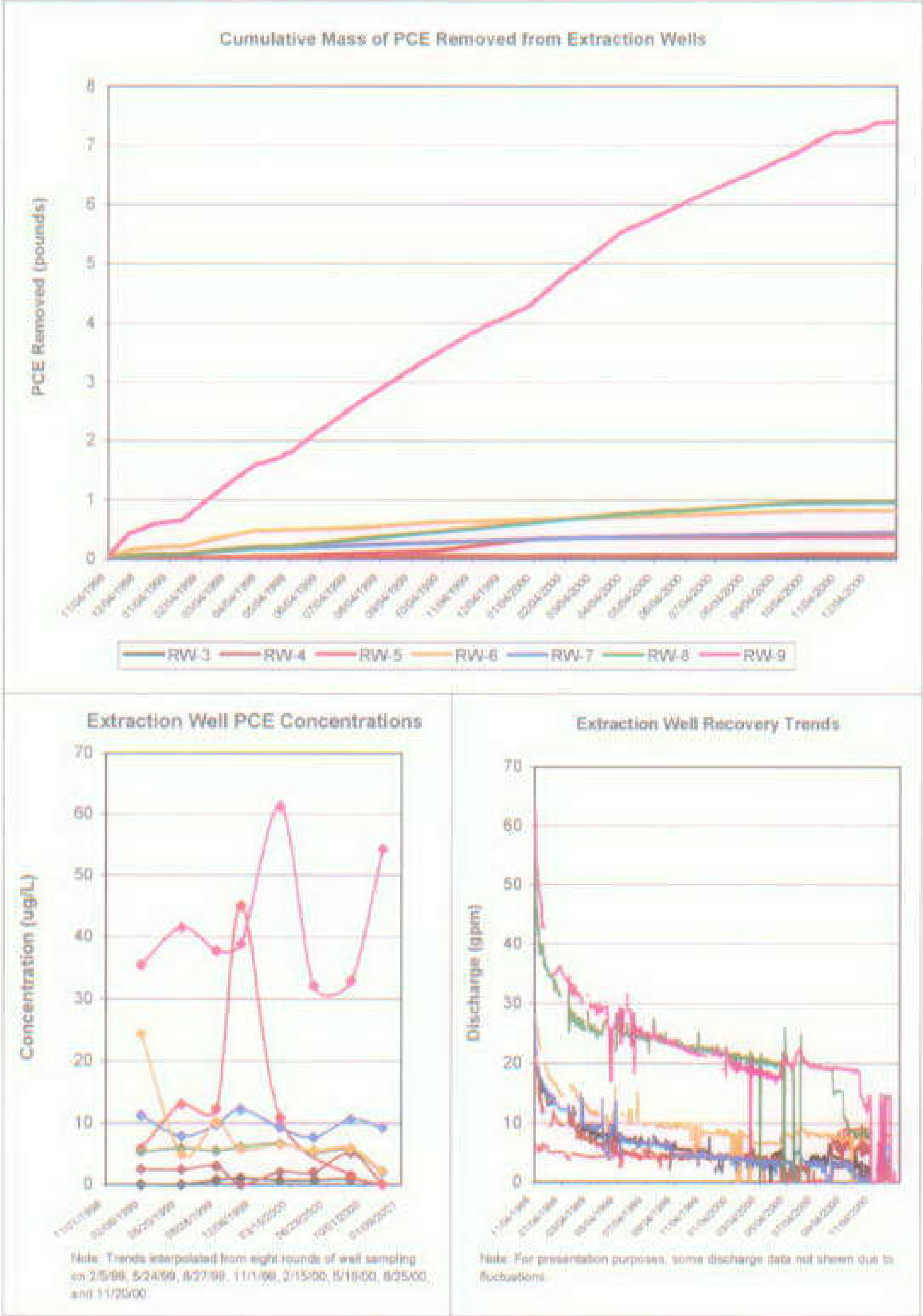
▪ ▬ ▬	DEPOT BOUNDARY
─	BASE FEATURES
-5.0 ▬	WATER TABLE ELEVATION DIFFERENCE IN THE FLUVIAL AQUIFER (FEET)
-5.0 ▬	INFERRED WATER TABLE ELEVATION DIFFERENCE IN THE FLUVIAL AQUIFER FROM LIMITED DATA (FEET)
▬LF▬	LIMITED TO NO FLOW BOUNDARY (SEE NOTE)
▪▪LF▪▪	INFERRED LIMITED TO NO FLOW BOUNDARY (SEE NOTE)
· MW41	MONITORING WELL
· PZ01	PIEZOMETER
-5.30	FLUVIAL GROUNDWATER ELEVATION CHANGE (FEET)
▩	CLAY ELEVATION EXCEEDS GROUNDWATER ELEVATION

NOTES

- THE "LIMITED TO NO FLOW BOUNDARY" IS AN AREA OF NO SIGNIFICANT SATURATED THICKNESS IN THE FLUVIAL DEPOSITS WHERE THERE IS LITTLE TO NO HORIZONTAL GROUND WATER FLOW.
- MW36,37,67, 81, 82, 83 ARE WELLS SCREENED WITHIN THE CONFINED SAND AQUIFER AND ARE NOT INCLUDED.
- MW18, 34, 38, 40, 43, 89, AND 90 ARE WELLS SCREENED WITHIN A TRANSITION ZONE BETWEEN THE FLUVIAL AND CONFINED SAND AQUIFERS.
- NO MEASUREABLE WATER LEVELS WERE RECORDED IN MW2, 5, 17, 27.
- DEPTH TO WATER MEASUREMENTS WERE NOT COLLECTED IN MW18, 48, 66, AND, PZ06
- NEGATIVE CHANGES INDICATE A LOWERING OF THE FLUVIAL AQUIFER.

FIGURE 14-53
Fluvial Groundwater Changes
Between November 3, 1998
and January 10, 2001
REV. 1 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL



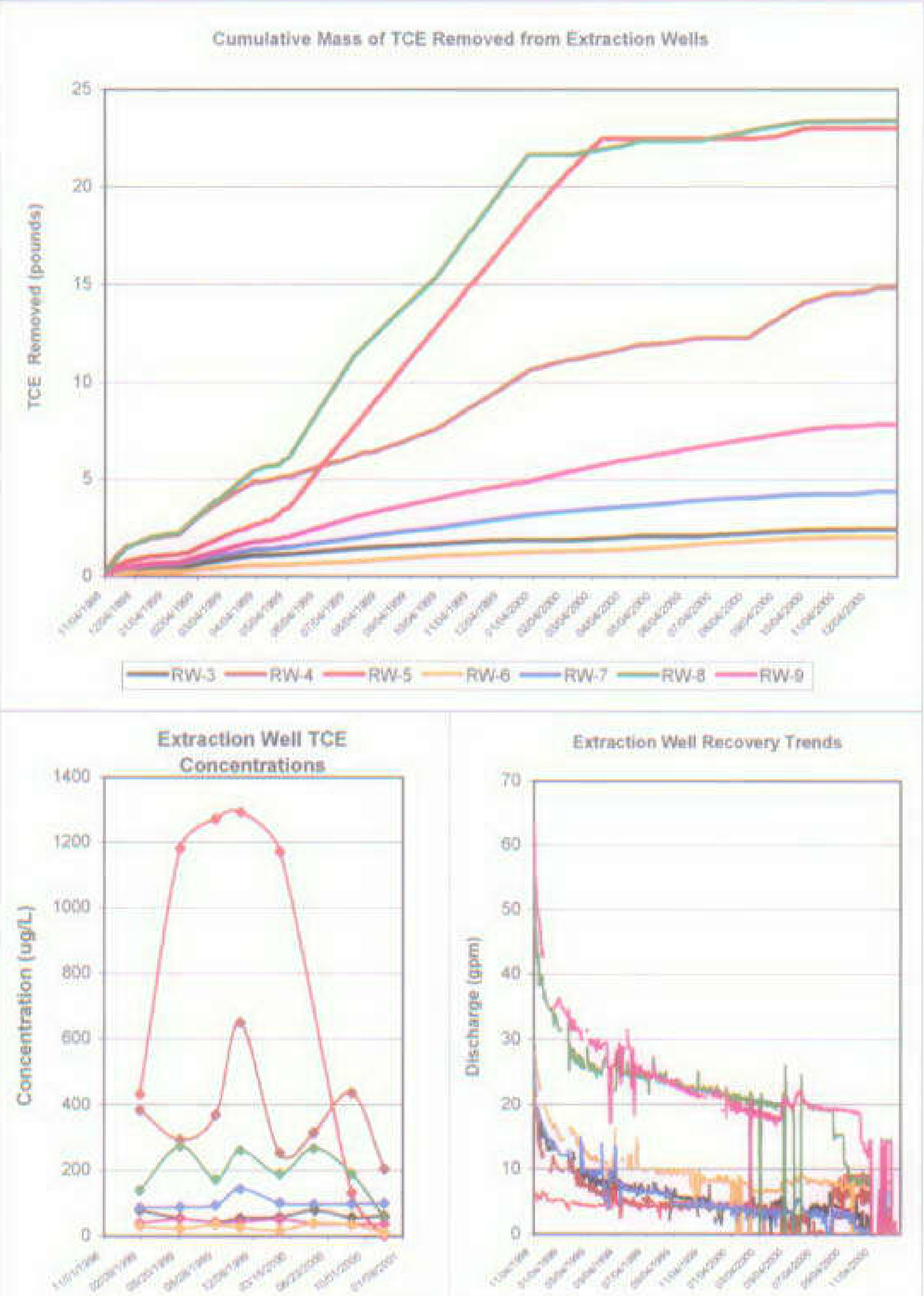
Note: Trends interpolated from eight rounds of well sampling on 2/5/99, 5/24/99, 8/27/99, 11/1/99, 2/15/00, 5/19/00, 8/25/00, and 11/20/00.

Note: For presentation purposes, some discharge data not shown due to fluctuations.

FIGURE 14-54

PCE CONCENTRATIONS AND MASS REMOVAL TRENDS IN EXTRACTION WELLS

REV. 0 MEMPHIS DEPOT DUNN FIELD RI



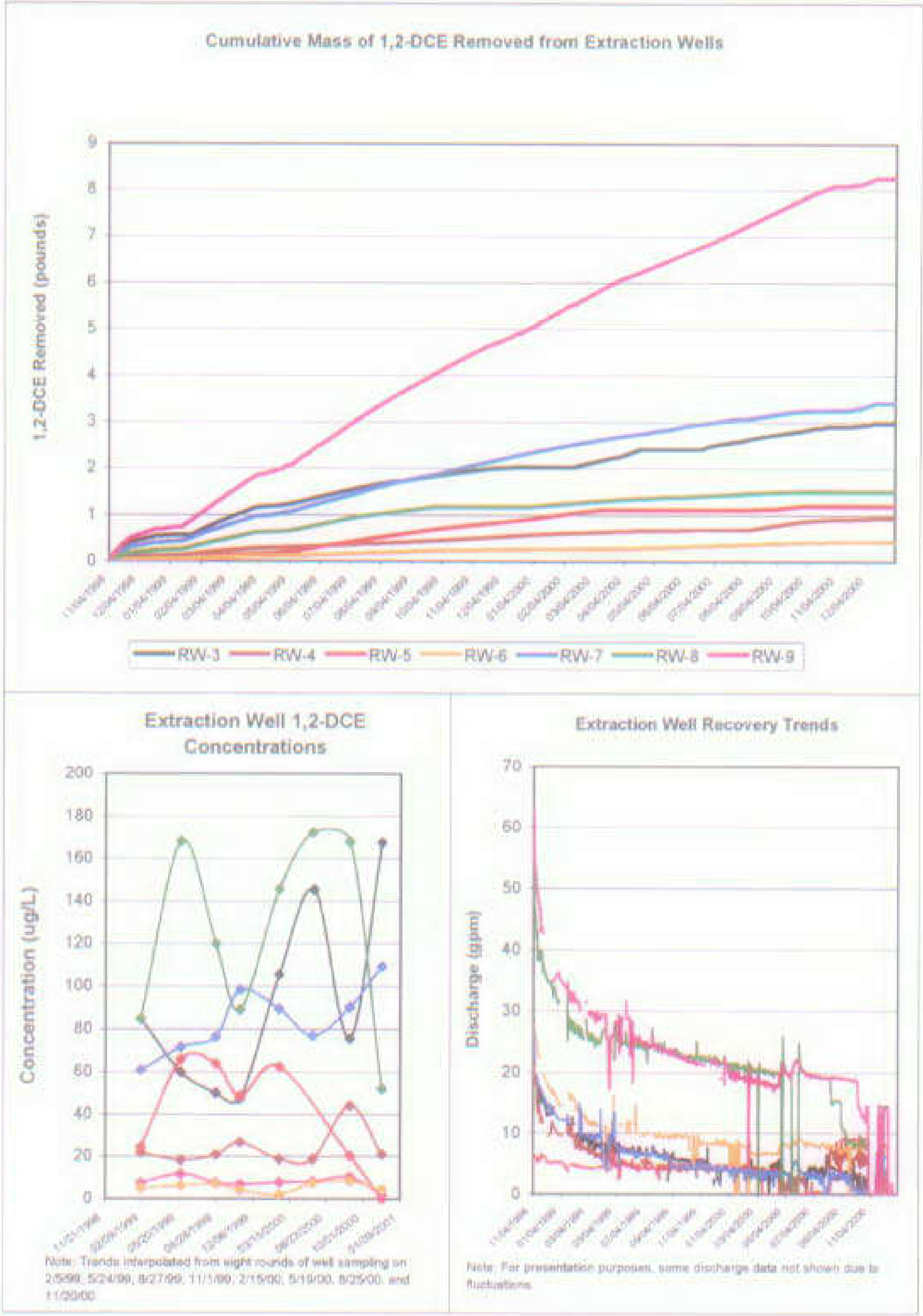
Note: Trends interpolated from eight rounds of well sampling on 2/5/99, 5/24/99, 8/27/99, 11/1/99, 2/15/00, 5/19/00, 8/25/00, and 11/20/00

Note: For presentation purposes, some discharge data not shown due to fluctuations

FIGURE 14-55

TCE CONCENTRATIONS AND MASS REMOVAL TRENDS IN EXTRACTION WELLS

REV. 0 MEMPHIS DEPOT DUNN FIELD RI

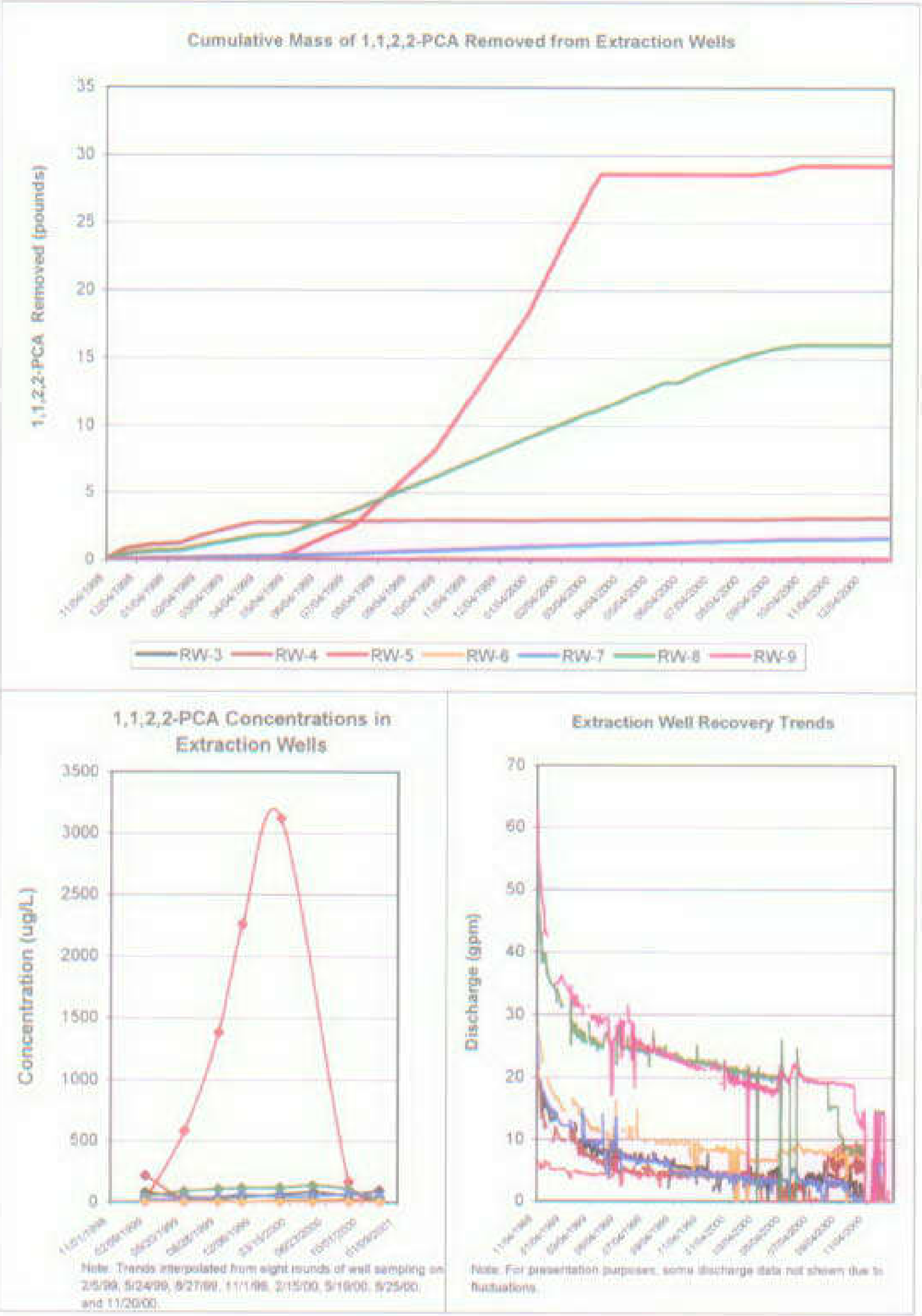


Note: Trends interpolated from eight rounds of well sampling on 2/5/99, 5/24/99, 8/27/99, 11/1/99, 2/15/00, 5/19/00, 8/25/00, and 11/20/00

Note: For presentation purposes, some discharge data not shown due to fluctuations

FIGURE 14-56

1,2-DCE CONCENTRATIONS AND MASS REMOVAL TRENDS IN EXTRACTION WELLS



Cumulative Mass of 1,1,2,2-PCA Removed from Extraction Wells

1,1,2,2-PCA Concentrations in Extraction Wells

Note: Trends interpolated from eight rounds of well sampling on 2/5/99, 5/24/99, 8/27/99, 11/1/99, 2/15/00, 5/19/00, 8/25/00, and 11/20/00.

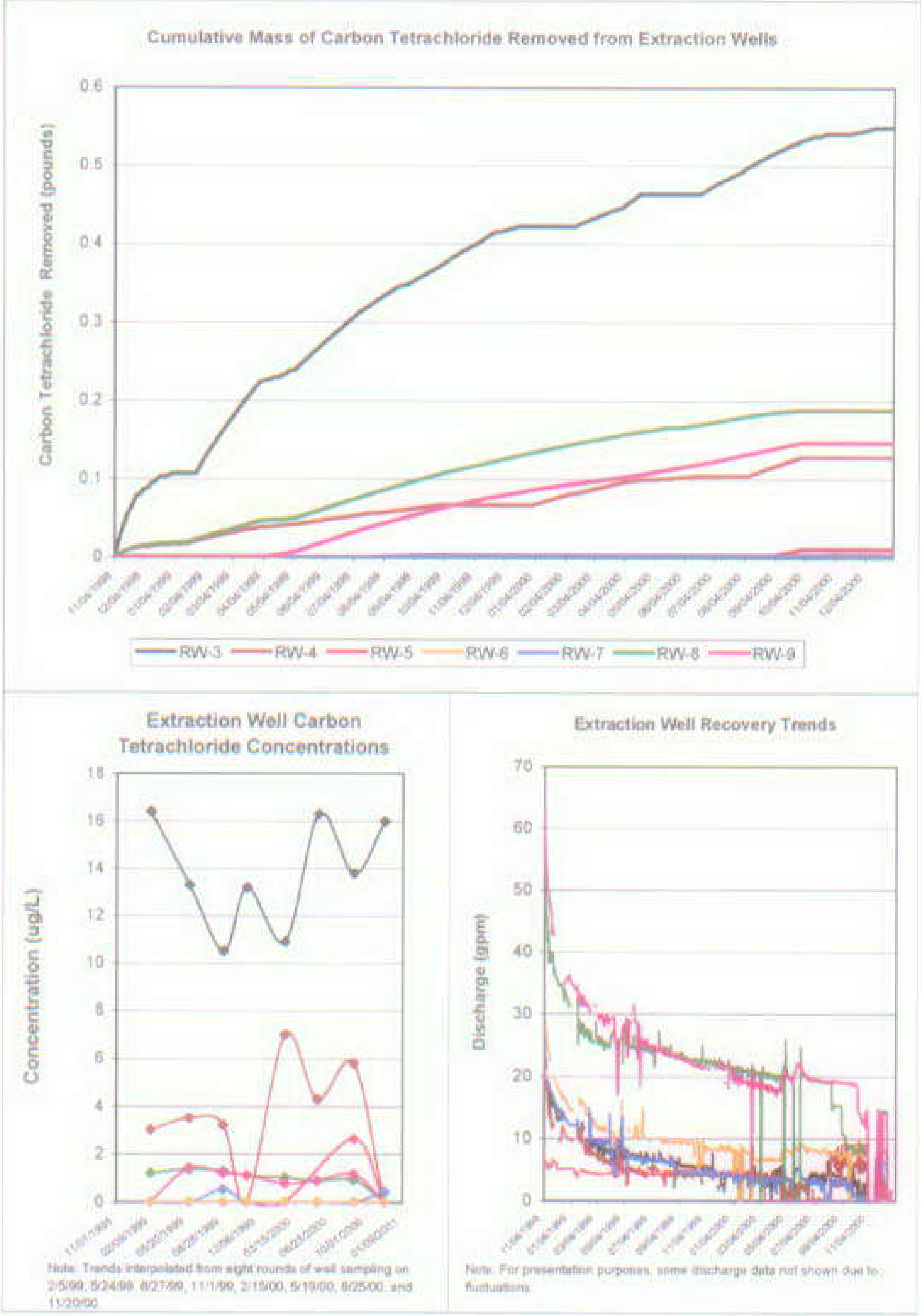
Extraction Well Recovery Trends

Note: For presentation purposes, some discharge data not shown due to fluctuations.

FIGURE 14-57

1,1,2,2-PCA CONCENTRATIONS AND MASS REMOVAL TRENDS IN EXTRACTION WELLS

REV. 0 MEMPHIS DEPOT DUNN FIELD RI



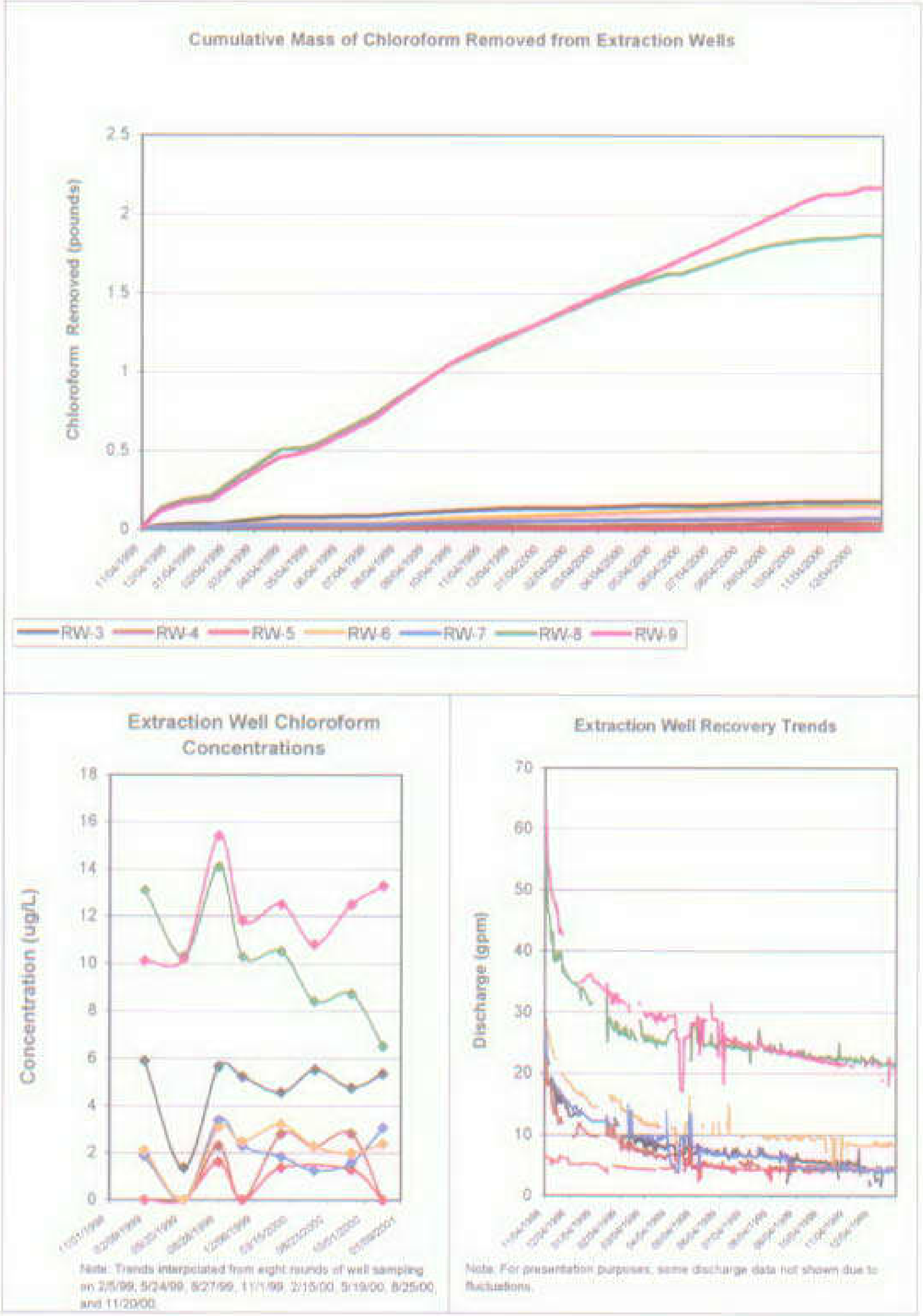
Note: Trends interpolated from eight rounds of well sampling on 2/5/99, 5/24/99, 8/27/99, 11/1/99, 2/15/00, 5/19/00, 8/25/00, and 11/20/00

Note: For presentation purposes, some discharge data not shown due to fluctuations.

FIGURE 14-58

CARBON TETRACHLORIDE CONCENTRATIONS AND MASS REMOVAL TRENDS IN EXTRACTION WELLS

REV. 0 MEMPHIS DEPOT DUNN FIELD RI



Note: Trends interpolated from eight rounds of well sampling on 2/5/99, 5/24/99, 8/27/99, 11/1/99, 2/15/00, 5/19/00, 8/25/00, and 11/20/00.

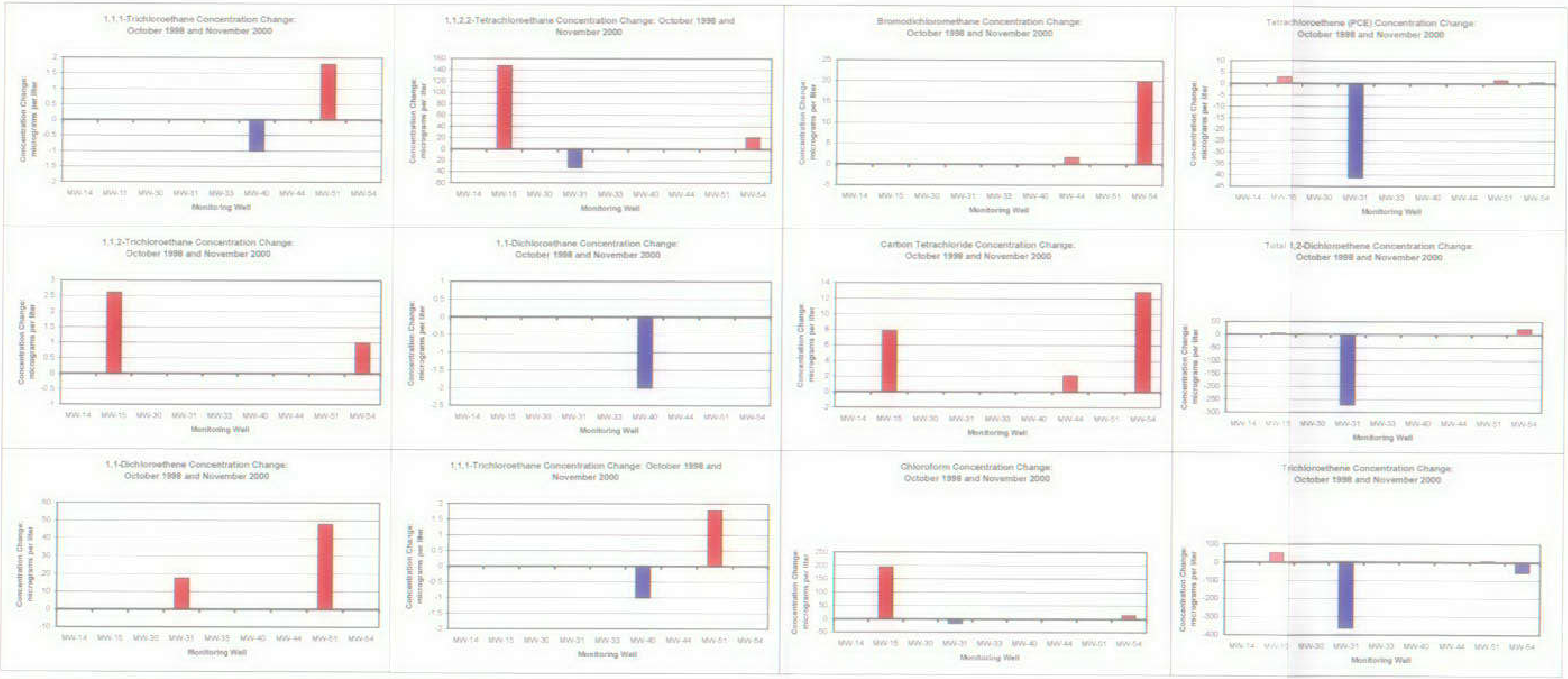
Note: For presentation purposes, some discharge data not shown due to fluctuations.

FIGURE 14-59

CHLOROFORM CONCENTRATIONS AND MASS REMOVAL TRENDS IN EXTRACTION WELLS

REV. 0 MEMPHIS DEPOT DUNN FIELD RI

Figure 14-60
Concentration Change in Monitoring Wells Between October 1998 and November 2000
Rev. 1 Memphis Depot Dunn Field RI



Note: Positive change denotes an increase in concentration; negative change denotes a decrease in concentration.

TAB

Section 15

15.0 Baseline Risk Assessment for Groundwater

15.1 Human Health Evaluation

This baseline RA was conducted in accordance with the approach presented in Section 7.0 and the memorandum of risk assessment approach prepared for BCT review prior to implementation of this RA (see Appendix C-1). This section describes each of the four steps of the RA as applied to groundwater at Dunn Field. Figure 2-11 shows the locations of the groundwater monitoring wells (located across Dunn Field and immediately offsite of the Depot). A groundwater potentiometric surface map is presented on Figure 2-12A. The Allen Well Field location relative to the Dunn Field area wells is shown on Figure 2-14. Monitoring well data collected from 1996 through 2001 were used for this RI and baseline RA.

Sample data collected from monitoring wells recently installed within the Disposal Area and west of the Dunn Field perimeter are also included in this updated RA. In addition, a groundwater extraction system was installed and made operational in 1999. Figures 14-1 through 14-40 present the distribution of VOCs in on- and offsite monitoring wells. The monitoring well samples were collected by standard well sampling methods, where well screen lengths are typically 10 ft long, and more recently introduced methods, specifically diffusion bag sampling. All data generated by these methods were used in this risk assessment. The diffusion sampling bags are 2-3 ft in length, each diffusion bag sample representing a shorter aquifer length compared to the 10 ft length in the standard samples. Also, the primary purpose of diffusion bag samplers is to determine specific aquifer depth at which contamination is present. The goal of this accuracy is greater definition of where groundwater remediation is necessary.

When multiple diffusion bag samples were collected from one well, they are reported as individual results. These results were averaged in the risk evaluations. When both standard sample and multiple diffusion bag samples are available for a well, an average of all these data are used. However, in this risk assessment, both of these types of data are combined and, when multiple monitoring data points are available, a maximum and an average of concentrations were included for exposure and risk evaluations.

A network of monitoring wells has been used to evaluate the nature and extent of groundwater contamination at Dunn Field. Low levels of VOCs were detected in the northeastern portions of Dunn Field, whereas higher levels were detected in the western portion and offsite wells of Dunn Field. A correlation between subsurface soil and groundwater contamination has been defined.

Potential risks from future groundwater use within Dunn Field are estimated for two separate areas representing organic chemicals that occur as plumes: one plume underlying the Northeast Open Area (Northern Plume) and a second plume underlying the Disposal Area and portions of the Stockpile Area (Western Plume). This plume is further divided into two portions: the Northwest Plume and Southwest plume. Although there were several common contaminants detected in groundwater, all groundwater data, including chemicals that do not occur as plumes, were evaluated for the entire Dunn Field area as one unit. In addition, VOCs occurring as plumes were evaluated by selecting wells from the center of the plumes. Monitoring wells selected from the center of the Northern Plume are MW-30, MW-31, MW-51, MW-78, MW-29, MW-08, MW-07, MW-02, MW-10, MW-03, and MW-68, those for the Northwest Plume are MW-12, MW-70, MW-73, and MW-75, and the Southwest Plume included MW-06, MW-15, and MW-57. Additionally, groundwater wells beyond the property boundary were evaluated as individual exposure points at each well for potable use.

There is currently no groundwater use within or surrounding the Depot. In the interest of conservatism, a future exposure scenario was assumed whereby industrial and residential receptors are exposed to groundwater via potable use. This section, therefore, focuses on risk estimations for a hypothetical future groundwater use.

15.1.1 Selection of COPCs for Onsite Groundwater

The concentrations of all detected chemicals in groundwater at Dunn Field and/or surrogate site levels were compared against background values and health-based criteria (i.e., Region III RBC), as described in Section 7.0. COPCs for onsite groundwater are presented in Table 15-1. A more detailed table showing human health screening criteria by medium and the results of the COPC screening is provided in Appendix D.

Compounds analyzed to characterize general aquifer water quality (e.g., sodium, chloride, TDS, and nitrate/nitrite) or essential nutrients often do not have toxicity values. Therefore, these general chemistry parameters were not included as COPCs. In addition, the relatively less soluble compounds like PAHs, pesticides, and other SVOCs that were detected in less than 5 percent of the samples were dropped from the risk analysis.

A total of 126 VOC, 118 inorganic, and 75 SVOC samples were collected from Dunn Field groundwater from 1996 through 2001. The inorganic COPCs for onsite groundwater are aluminum, arsenic, barium, beryllium, cadmium, chromium (total), copper, iron, lead, manganese, mercury, nickel, vanadium, and pesticides (dieldrin and heptachlor epoxide) with very low solubility. However, the pesticides may be sampling artifacts, rather than contaminants of groundwater at Dunn Field, because they were not detected frequently (see Table 15-1), they are not very soluble in water, and they were not detected in newer monitoring wells. Therefore, older analytical results may be an artifact from drilling procedures i.e., soils being dragged downwards from the surface during drilling during well installation or other sampling procedures.

Table 15-2 presents the volatile organic COPCs in onsite plumes, all of which are known as chlorinated solvents. The volatile organic COPCs for the Northern Plume are 1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCE, 1,2-DCA, bromodichloromethane, CCl4, chloroform, 1,2-DCE, methylene chloride, PCE, and TCE. The volatile COPCs for the Northwest plume are 1,1,2,2-TCA, 1,1,2-TCA, 1,1-DCE, 1,2-DCA, 1,2-dichloropropane, benzene, carbon tetrachloride, chloroform, 1,2-DCE, PCE, TCE, and vinyl chloride. Southwest Plume COPCs include 1,1,2,2-PCA, 1,1,2-TCA, bromodichloromethane, carbon tetrachloride, chloroform, 1,2-DCE, PCE, and TCE.

15.1.2 Selection of COPCs for Offsite Groundwater

A total of 17 offsite monitoring wells were screened individually for COPCs. The maximum detected concentration of a chemical in a well was compared against established background values and health-based criteria as described in Section 7.0. COPCs for offsite groundwater are presented in Table 15-3. A more detailed table showing human health screening criteria by medium and the results of the COPC screening is provided in Appendix D.

The general aquifer water quality parameters (sodium, chloride, TDS, and nitrate/nitrite) or essential nutrients often do not have toxicity values. Therefore, these general chemistry parameters were not included as COPCs. In addition, the relatively less soluble compounds like PAHs, pesticides, and other SVOCs that were detected in less than 5 percent of the samples were dropped from the risk analysis.

A total of 113 VOC samples, 101 SVOC samples, and 44 inorganic samples were collected from 1996 through 2001 from offsite monitoring wells evaluated in this risk analysis. Inorganic COPCs selected across all offsite wells include aluminum, arsenic, barium, cadmium, chromium (total), iron, lead, manganese, and vanadium These inorganic chemicals could be naturally occurring in the regional groundwater. Bis (2-ethylhexyl)phthalate was the only SVOC detected above criteria in offsite wells. Detection frequency was low and this chemical is a frequent lab contaminant and may be an artifact of offsite groundwater. Several VOCs were detected above criteria in offsite groundwater, including 1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCA, benzene, bromodichloromethane, carbon tetrachloride, chloroform, 1,2-DCE, PCE, and TCE. All these VOCs are likely to have originated from Dunn Field. Therefore, these are included for risk evaluation as COPCs.

15.1.3 Exposure Assessment for Onsite Groundwater

A CSM for groundwater was briefly discussed in Section 7. The primary sources of COPCs in environmental media within Dunn Field are buried wastes leaching to groundwater. Contaminants could be transported through infiltration and leaching to the fluvial aquifer and, subsequently, could migrate horizontally and vertically to downgradient areas and to the underlying confined sand aquifers.

Section 16 presents a fate and transport discussion for the groundwater flow direction, velocity, and contaminant migration pathways. The site groundwater flow patterns, and thus the contaminant fate and transport, can be summarized as follows. Groundwater in the uppermost water-bearing unit, the fluvial aquifer, flows generally from east to west across Dunn Field, with a northwesterly flow direction to the north and southwesterly flow direction to the south (see Figure 2-12A). Section 2.0 provides information on groundwater velocity and effective porosity.

Groundwater at Dunn Field is being actively removed with a groundwater extraction system. However, portions of the onsite contaminant plumes have been detected in offsite areas to the west. Table 15-4 presents VOCs detected in offsite wells. For contaminant plumes underlying Dunn Field, the groundwater concentrations in this risk analysis include historical and more recently collected data from new and existing monitoring wells. Several additional offsite wells were also monitored, and are included in this analysis.

As noted previously, there is no residential groundwater use on Dunn Field or in the surrounding community under current or foreseeable future land use conditions. The City of Memphis supplies drinking water, and regional water use patterns are well established for both commercial and residential areas surrounding the Depot. Due to the availability of municipal water supplies, the groundwater is not likely to be used as a potable source in the foreseeable future, even if land use were to be altered to include industrial or residential use (i.e., redevelopment of Dunn Field).

15.1.3.1 Onsite Exposure Pathways

Table 15-5 summarizes hypothetical future exposure pathways for the onsite groundwater plumes and identifies the pathways that were evaluated quantitatively in this risk assessment. The potential receptors evaluated for potable water use include:

- Hypothetical future industrial worker; and
- Hypothetical future onsite resident-adult and child (for comparison purposes only).

Exposure of onsite receptors to contaminants in groundwater via potable use is assumed to occur via ingestion, dermal contact, and inhalation. In addition, inhalation exposure to VOCs in groundwater is evaluated for volatilization to indoor air. The factors that were used include default parameters listed in the guidance, as cited in the Appendix H exposure factors table. The results of the quantitative exposure analysis (dose estimates), along with the risk calculations, are included in Appendix G.

The average concentrations of the wells in the center of the plume were used as the EPCs for groundwater from each plume for chemicals that exhibit plume behavior (e.g., VOCs). For chemicals that do not occur as plumes (e.g., inorganic chemicals), the upperbound exposure concentration was estimated using the UCL 95 percent estimates for all wells associated with Dunn Field (onsite).

The EPCs for indoor air were estimated using the Johnson-Ettinger model (J-E Model) from the EPA website for subsurface vapor intrusion, using the Tier 2 model (USEPA, 1997). The input concentrations for estimation of indoor air concentration include monitoring data from all the onsite and offsite wells. For onsite wells, center of the plume wells are used, and for offsite, each individual well was evaluated separately. When multiple diffusion bag samples are available for an individual onsite or offsite well, an average of these samples is used. The estimated groundwater concentration for an individual well was taken as the mean concentration of a chemical when multiple sampling rounds, and/or multiple diffusion bag samples existed for that well.

For offsite indoor air evaluations, mean concentrations of multiple diffusion bag samples or multiple sampling rounds in individual wells were used to estimate indoor air concentrations. For onsite plumes, the wells taken to represent the center of the plume were pooled and the average concentration among those wells were used to estimate indoor air concentrations for buildings located within the plume. The site-specific information such as depth to water and soil types were generally taken from the soil boring logs for wells used to characterize the plume. All other parameters were generally the recommended EPA default parameters. Input parameters are listed in Table 15-6. The use of site-specific information, use of the mean groundwater source concentrations as the EPC, and use of conservative default exposure assumptions are expected to result in a reasonable 'upper bound' estimate of the indoor air concentration for evaluation of the indoor air exposure pathway and related health risks.

15.1.3.2 Offsite Exposure Pathways

Table 15-7 summarizes hypothetical future exposure pathways for the individual wells monitored in the offsite area, and identifies the pathways that will be evaluated quantitatively in this RA. The potential receptors evaluated for potable water use include:

- Future offsite resident–adult and child.

About 14 individual offsite wells of 17 sampled were identified with COPCs, either VOCs or naturally occurring inorganic chemicals, or both. Exposure of offsite receptors to contaminants in groundwater via potable use is evaluated for ingestion, dermal contact, and inhalation. In addition, inhalation exposure to VOCs in groundwater is assumed to occur via volatilization to indoor air. The default exposure factors used originate from EPA guidance, as cited in the Appendix H exposure factors table. The results of the quantitative exposure analysis (dose estimates), along with the risk calculations, are included in Appendix G.

Seventeen individual wells in the offsite area were selected to conduct individual well-based RAs. EPCs for COPCs for individual wells were estimated by taking the average concentration of all rounds of sampling, and average of multiple diffusion bags samples from each individual well. The EPCs for indoor air were estimated using the Johnson-Ettinger Model as adopted by EPA for subsurface vapor intrusion (EPA, 1997), accounting for site-specific groundwater depth and soil type information. All other assumptions were default values in the GW-Tier 2 model, as previously described in Section 7.0. The dose estimates for the indoor air concentrations were made following intake estimation equations and exposure assumptions.

15.1.3.3 Chronic Daily Intake Estimates for Offsite and Onsite Receptors

The dose (intake) was estimated for each of the complete exposure pathways and included in Appendix G. The exposure assumptions are standard default factors. For example, ingestion rates of 2 L/day for an adult and 1 L/day for a child and industrial worker were used. Exposure frequency is assumed to be 350 days per year for residential receptors and 250 days per year for industrial receptors. All assumptions are presented in Appendix H.

The groundwater data used in this risk assessment were collected before continuous operation of the Dunn Field groundwater extraction system began. Therefore, groundwater risk calculations are based on exposures to "pre-pumping" groundwater concentrations that have not been affected by operation of the system. This is a conservative assumption.

An oral exposure dose was estimated for organic and inorganic COPCs. EPCs for inorganic constituents are either the UCL 95 percent estimates or maximum detected concentrations for the COPCs selected for the groundwater. The averages of the organic constituents within the wells identified as representing each of the three individual organic contaminant plumes were added to the inorganic data for risk evaluation A description of the UCL 95 percent calculation is provided in Appendix F. The potential risks from offsite downgradient wells were estimated for each of the individual wells. Table 15-8 includes the EPCs for all onsite groundwater plumes, and Table 15-9 includes EPCs for all offsite wells.

15.1.4 Toxicity Assessment for Onsite and Offsite Groundwater

Table 15-10 presents the toxicity factors for COPCs, as well as the WoE classifications. Detailed information on the basis of toxicity classification and the uncertainty associated with the listed toxicity factors based on the EPA toxicity database are presented in the master toxicity tables (Tables 7-7 and 7-8). All toxicity values used for the COPCs are chronic values. Acute and subchronic values are deemed inappropriate for use based on the long-term exposures assumed for dose estimations. The EPA has withdrawn the TCE toxicity factor pending review. However, the old toxicity value was used as an interim value, as this chemical was frequently detected at relatively high concentrations at the site. This adds to uncertainty in the risk estimations.

The dose estimates are used for comparison with the CSFs and the RfDs to estimate risks and hazards. Inhalation exposure to the CVOCs was assumed equal to the oral dose to estimate intake. Inorganic COPCs were evaluated for oral and dermal doses.

Oral toxicity factors were reduced by the gastrointestinal dermal absorption (ABS_{GI}) factors for comparisons with dermal intake estimates. These values can be found in Table 7-10. All of the chemicals were analyzed for their potential toxicity contribution to represent the combined effect of all site-related chemicals.

EPA RAGS guidance recommends discussion of chemicals without toxicity factors. Of the COPCs, only silicon detected at a low concentration in one sample had no available toxicity criteria. Silicon is a commonly used inert chemical that is generally non-toxic and was detected once at a low level. Its presence in groundwater could have resulted from sampling/analysis methods.

15.1.5 Risk Characterization of Onsite Groundwater

Estimates of ELCR and noncarcinogenic health hazards are summarized for all of the COPCs on a route- and receptor-specific basis for the onsite groundwater in Table 15-11. Appendix G presents detailed intake estimates and risk and HI calculations along with histograms of the risks and the HIs per receptor group. For the chemicals that do not occur as plumes (e.g., inorganic and non-volatile COPCs), EPC was estimated as the UCL 95 percent concentration while EPCs for plume forming chemicals (e.g. VOCs) were estimated as the mean concentration in the groundwater plume. Indoor air EPCs were estimated using the mean concentration in groundwater as the input for the Johnson-Ettinger model. Histograms of the ELCR and HI from onsite groundwater can be found on Figures 15-1 through 15-2.

15.1.5.1 Risk Results for the Northern Plume

Table 15-11 summarizes the risks and health hazards for receptors evaluated for exposure to the Northern Plume groundwater COPCs.

For a future industrial worker's exposure to inorganic and organic chemicals in the Northern Plume, the ELCR estimate is 1×10^{-4}, and the HI is 0.9. Indoor air risks and HIs were negligible at 7×10^{-8} and 0.00005, respectively. The COPCs driving the risks/hazards to a future worker are arsenic, dieldrin, 1,1,2,2-TCA, 1,2-DCA, 1,1-DCE, CCl_4, PCE, chloroform, and TCE.

For a future hypothetical residential adult's exposure to inorganic and organic chemicals in the Northern Plume, the ELCR estimate is 5x 10^{-4}, and the HI is 2.5. Indoor air risk and HI are negligible at 2 x 10^{-7} and 0.00007. Risks and HIs are above acceptable limits for residential potable use. The COPCs driving the risks/hazards for this receptor include arsenic, dieldrin, 1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCE, 1,2-DCA, bromodichloromethane, CCl4, chloroform, PCE, and TCE.

For exposure to inorganic chemicals and organic chemicals from the Northern Plume, the HI to a future hypothetical residential child is 5.7. Exposure to indoor air-borne COPCs during potable water use also presented HI well below a value of 1.0. The HI for indoor air from volatilization from groundwater through subsurface into indoor air exposure is minimal, at 0.0002. None of the HIs for individual COPCs exceed 1.0. TCE and manganese had the highest HIs. Overall risks and HI are unacceptable for the Northern Plume.

15.1.5.2 Risk Results for Northwest Plume

Table 15-11 summarizes the risks and health hazards for receptors evaluated for exposure to groundwater COPCs in the Northwest Plume.

For a future industrial worker's exposure to inorganics and organics the Northwest Plume, the ELCR estimate is 3 x 10^{-3}, and the HI is 5.3. Indoor air exposure is below acceptable levels for risks and HIs (8 x 10^{-8} and 0.0002, respectively). The COPCs driving the risks/hazards for this receptor include arsenic, 1,1,2,2-TCA, 1,1,2-TCA, 1,1-DCE, 1,2-DCA, 1,2-dichloropropane, benzene, CCl4, chloroform, PCE, TCE, and vinyl chloride.

For a future hypothetical residential adult's exposure to inorganic and organic COPCs in the Northwest Plume, the ELCR estimate is 2 x 10^{-2}, and the HI is 15. Indoor air risks and HIs are 2 x 10-7 and 0.0003, respectively. The COPCs driving the risks/hazards for this receptor include arsenic, 1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCE, 1,2-DCA, 1,2-dichloropropane, benzene, CCl4, chloroform, PCE, TCE, and vinyl chloride.

For a future hypothetical residential child's exposure to inorganic and organic COPCs from the Northwest Plume, the HI is 34, and from indoor air exposure the HI is 0.001. The COPC driving the risks/hazards for this receptor is TCE.

Groundwater is not currently used for potable purposes at the site. Overall, risks to a future industrial worker or hypothetical resident from exposure to maximum concentrations are above the acceptable 1 to 100 in a million range (10^{-6} to 10^{-4}). Although there is no intent to use groundwater for potable purposes in the future, any plans for future use would have to be carefully evaluated. There are no unacceptable risks or hazards to future workers or residents due to exposure of VOCs volatilizing from subsurface groundwater to indoor air.

15.1.5.3 Risk Results for Southwest Plume

Table 15-11 summarizes the risks and health hazards for receptors evaluated for exposure to the Southwest Plume groundwater COPCs.

For a future industrial worker's exposure to inorganic and organic compounds in the Southwest Plume, the ELCR estimate is 3 x 10^{-4}, and the HI is 1.6. Indoor air exposure results in an ELCR and HI of 2 x 10^{-8} and 0.00002, respectively. The COPCs driving the risks/

hazards for this receptor include arsenic, 1,1,2,2-PCA, 1,1,2-TCA, CCl4, chloroform, PCE, and TCE.

For a future hypothetical residential adult's exposure to inorganics and organics from the Southwest Plume, the ELCR estimate is 1 x 10^{-3}, and the HI is 4.6. Indoor air risks and HIs are 4 x 10^{-8} and 0.00002. The COPCs driving the risks/hazards for this receptor include arsenic, 1,1,2,2-PCA, 1,1,2-TCA, bromodichloromethane, CCl4, chloroform, PCE and TCE.

For a future hypothetical residential child's exposure to inorganics and organics from the Southwest Plume, the HI is 11. Exposure to VOCs in indoor air from subsurface groundwater is 0.0001. The COPCs driving the risks/hazards for this receptor include CCl4, chloroform, and TCE.

Groundwater is not currently used for potable purposes at the site. Overall, risks to a future industrial worker or hypothetical resident from exposure to maximum concentrations are above the acceptable range of 1 to 100 in a million (10^{-6} to 10^{-4}). Although there is no intent to use groundwater as potable water in the future, any plans for future use would have to be carefully evaluated. There are no unacceptable risks or hazards to future workers or residents due to exposure of VOCs volatilizing from subsurface groundwater to indoor air.

In addition to baseline RA results, the following factors must also be considered for future site management decisions:

- Distance to the potential exposure point for the observed plume(s); and
- Time required for the plume(s) to attenuate below MCLs at the identified point of exposure.

There are no residential or industrial groundwater users within the site. The downgradient location of the nearest potential receptor is not clearly known because there are no known potable water users from the shallow aquifer, and the City does not allow for such use. Also, in a well survey no potable wells were identified between the Depot and the Allen Well Field (see Figure 2-14). A conservative assumption regarding exposure is that fluvial groundwater enters the Memphis Sand aquifer in the southwest portion of Dunn Field where it is eventually pumped and potentially enters the City of Memphis drinking water supply. It should be stressed that this assumption has not been verified in evaluating groundwater at the Depot or in monitoring wells at the Allen Well Field. The groundwater in the Disposal Area is currently being actively removed through an extraction system.

The groundwater within areas of organic contamination is not usable for potable purposes due to the presence of VOCs. Although site groundwater has VOC contamination, the shallow aquifer is not used for residential or industrial potable purposes at Dunn Field or within the surrounding community. Because of this lack of exposure, risks associated with concentrations directly beneath Dunn Field are not considered significant.

15.1.6 Risk Characterization of Offsite Groundwater

The chlorinated solvent plumes seem to be migrating in a westerly and northwesterly direction at the western boundary of Dunn Field. Sixteen selected offsite monitoring wells were screened and evaluated for impacts to human health as a worst-case scenario. The monitoring wells used in the offsite assessment are listed in Table 15-12, which includes monitoring wells with and without detection of VOCs. The data collected from 1996 through 2001 were included in this well-specific evaluation. Estimates of ELCR and non-carcinogenic health hazards are summarized for all of the COPCs on a route- and receptor-specific basis for the offsite groundwater wells in Table 15-13. Appendix G includes detailed risk calculations along with histograms of the risks and HIs per receptor group. A set of risk and HI calculations was estimated for organic and inorganic COPCs for each well. Histograms of the ELCR and HI from offsite groundwater can be found on Figures 15-3 and 15-4.

For exposure to COPCs from MW-30, the ELCR to a future hypothetical residential adult is 5×10^{-5} and the HI is 0.8. The HI to a future hypothetical residential child is 1.9, primarily from arsenic in groundwater. Overall risks and HI are above the acceptable limits for potable use. No CVOCs were detected above criteria in this well.

For exposure to COPCs from MW-31, the ELCR to a future hypothetical residential adult is 8×10^{-4} and the HI is 3. The HI to a future hypothetical residential child is 7, primarily from VOCs in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-32, the ELCR to a future hypothetical residential adult is 2×10^{-3} and the HI is 5. The HI to a future hypothetical residential child is 12, primarily from VOCs in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-33, the ELCR to a future hypothetical residential adult is 2×10^{-4} and the HI is 1.4. The HI to a future hypothetical residential child is 3, primarily from VOCs in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-40, the ELCR to a future hypothetical residential adult is 3×10^{-5} and the HI is 0.35. The HI to a future hypothetical residential child is 0.83. Risks are due to 1,1-DCE in groundwater. Overall risks for adults are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-44, the ELCR to a future hypothetical residential adult is 2×10^{-4} and the HI is 2.2. The HI to a future hypothetical residential child is 5, primarily from arsenic, iron (child scenario), and VOCs in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-51, the ELCR to a future hypothetical residential adult is 2×10^{-4} and the HI is 0.4. The HI to a future hypothetical residential child is 1.0, primarily from VOCs in groundwater. Hazards for children are primarily associated with arsenic (HI=0.7). Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-54, the ELCR to a future hypothetical residential adult is 1×10^{-4} and the HI is 1.2. The HI to a future hypothetical residential child is 2.8, primarily from iron and VOCs in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-71, the ELCR to a future hypothetical residential adult is 2×10^{-3} and the HI is 5. The HI to a future hypothetical residential child is 12, from VOCs, particularly chloroform, in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-76 and MW-77, the ELCR to a future hypothetical residential adult is 2×10^{-2} and the HI is 9. The HI to a future hypothetical residential child is 22. Risks are primarily from VOCs, particularly PCA and TCE, in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

For exposure to COPCs from MW-79, the ELCR to a future hypothetical residential adult is 5×10^{-4} and the HI is 0.4. The HI to a future hypothetical residential child is 0.8. Risks are from VOCs in groundwater. Overall risks and HI are above the acceptable limits for potable use. Indoor air risks and HIs are well below acceptable limits.

There are no carcinogenic or non-carcinogenic risks above acceptable levels from exposure to potable water or indoor air from MW-37, MW-40, or MW-42. No chemicals were detected above criteria in MW-80 and MW-67 and none were selected for individual risk evaluation.

There are houses in the offsite areas west of Dunn Field. However all of the residents are supplied water via a municipal waterline. Although the monitoring wells listed in the previous paragraph have been sampled, these monitoring wells are not in use as a potable source. Since contamination has been detected in selected offsite wells, indoor air exposures are the most pertinent exposure pathway. Risks through this pathway to the offsite residents are well within the acceptable limits, presenting negligible risks and HI.

Although there is no intent to use groundwater as a potable water source, any plans for future use would have to be carefully evaluated. The groundwater contaminant plume, which has crossed the property boundary to the west of Dunn Field, could diminish in concentration with distance and time due to the extraction system currently in operation. The lack of contamination in wells located 1,000 feet from the fence line, and in the even more distant Allen Well Field, indicates that contamination may not have reached this well field. The Allen Well Field is located approximately 1.5 miles from the western boundary of Dunn Field.

Groundwater under the site, and offsite near the property boundary in downgradient locations, is contaminated in the shallow aquifer and is unfit for potable use. Based on available data, the contamination is currently not reaching the Allen Well Field. The extraction system currently in operation could reduce concentrations with time. However, a narrow channel of contaminant flow potentially moving beyond recovery wells in the extraction system should be addressed to eliminate future, continued offsite releases of the site shallow groundwater contamination and to limit vertical migration within the high concentration areas.

15.1.7 Remedial Action Objectives

Based on the results of this risk assessment, remedial action objectives were developed and are presented in Table 15-14.

Tables

Table 15-1
Constituents of Potential Concern in All Onsite Groundwater
Rev 1 Memphis Depot Dunn Field RI

Unit	Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Groundwater	COPC	Basis
ONSITE	WG	MG/L	ALUMINUM	108	87	2 00E-01	1 05E+02	6 00E+00	1 80E+00	3 65E+00	TRUE	A
ONSITE	WG	MG/L	ARSENIC	108	20	1 00E-02	1 00E-01	2 00E-02		4 46E-05	TRUE	A
ONSITE	WG	MG/L	BARIUM	98	98	2 00E-01	2 00E+00	1 00E-01	2 24E-01	2 56E-01	TRUE	A
ONSITE	WG	MG/L	BERYLLIUM	108	22	5 00E-03	2 00E-02	3 00E-03		7 30E-03	TRUE	A
ONSITE	WG	MG/L	CADMIUM	108	44	5 00E-03	2 00E-02	3 00E-03		1 83E-03	TRUE	A
ONSITE	WG	MG/L	CHROMIUM, TOTAL	108	64	1 00E-02	2 00E-01	2 00E-02	5 44E-02	1 10E-02	TRUE	A
ONSITE	WG	MG/L	COBALT	98	42	5 00E-02	5 00E-01	3 00E-02	2 48E-02	2 19E-01	TRUE	A
ONSITE	WG	MG/L	COPPER	108	40	3 00E-02	2 00E-01	3 00E-02	1 63E-01	1 46E-01	TRUE	A
ONSITE	WG	MG/L	LEAD	108	56	1 00E-03	2 00E-01	2 00E-02	9 40E-03	1 50E-02	TRUE	A
ONSITE	WG	MG/L	MANGANESE	98	90	9 00E-04	8 00E+00	4 00E-01	5 60E-01	7 30E-02	TRUE	A
ONSITE	WG	MG/L	MERCURY	108	23	6 00E-05	2 00E-03	3 00E-04		1 00E-03	TRUE	A
ONSITE	WG	MG/L	NICKEL	108	49	4 00E-02	1 00E-01	2 00E-02	3 14E-02	7 30E-02	TRUE	A
ONSITE	WG	MG/L	SILICON	1	1	1 50E+01	1 50E+01	1 50E+01			TRUE	D
ONSITE	WG	MG/L	VANADIUM	98	67	3 00E-04	4 00E-01	3 00E-02	6 00E-03	2 56E-02	TRUE	A
ONSITE	WG	MG/L	DIELDRIN	15	1	9 00E-05	9 00E-05	9 00E-05		4 20E-06	TRUE	A
ONSITE	WG	MG/L	HEPTACHLOR EPOXIDE	15	3	9 00E-06	1 00E-05	1 00E-05		7 40E-06	TRUE	A
N PLUME	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	78	16	1 00E-03	4 20E-01	4.85E-02		5 27E-05	TRUE	A
N PLUME	WG	MG/L	1,1,2-TRICHLOROETHANE	78	4	4 00E-03	1 10E-02	6 41E-03		1 88E-04	TRUE	A
N PLUME	WG	MG/L	1,1-DICHLOROETHENE	78	55	1 08E-03	8 86E-02	2 67E-02		4 36E-05	TRUE	A
N PLUME	WG	MG/L	1,2-DICHLOROETHANE	78	5	1 00E-03	9 58E-03	3 53E-03		1 16E-04	TRUE	A
N PLUME	WG	MG/L	BROMODICHLOROMETHANE	78	1	4 70E-04	4 70E-04	4 70E-04		1 70E-04	TRUE	A
N PLUME	WG	MG/L	CARBON TETRACHLORIDE	78	14	4 00E-04	8 00E-03	3 11E-03		1 62E-04	TRUE	A
N PLUME	WG	MG/L	CHLOROFORM	78	30	9 20E-04	6 00E-02	1 20E-02		1 52E-04	TRUE	A
N PLUME	WG	MG/L	cis-1,2-DICHLOROETHYLENE	27	11	1 90E-03	5 89E-02	1 44E-02		6 08E-03	TRUE	A
N PLUME	WG	MG/L	METHYLENE CHLORIDE	51	1	2 24E-01	2 24E-01	2 24E-01		4 10E-03	TRUE	A
N PLUME	WG	MG/L	TETRACHLOROETHYLENE(PCE)	78	57	4 00E-04	1 92E-01	3 93E-02		1 07E-03	TRUE	A
N PLUME	WG	MG/L	trans-1,2-DICHLOROETHENE	34	12	1 40E-03	1 64E-01	2 94E-02		1 22E-02	TRUE	A
N PLUME	WG	MG/L	TRICHLOROETHYLENE (TCE)	78	60	7 00E-04	1 11E+00	1 07E-01		1 55E-03	TRUE	A
NW PLUME	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	23	23	2 00E-03	3 30E+01	2 23E+00		5 27E-05	TRUE	A
NW PLUME	WG	MG/L	1,1,2-TRICHLOROETHANE	23	12	4 00E-04	3 97E-02	8 79E-03		1 88E-04	TRUE	A
NW PLUME	WG	MG/L	1,1-DICHLOROETHENE	23	1	6 10E-04	6 10E-04	6 10E-04		4 36E-05	TRUE	A
NW PLUME	WG	MG/L	1,2-DICHLOROETHANE	23	5	2 00E-04	1 77E-03	9 54E-04		1 16E-04	TRUE	A
NW PLUME	WG	MG/L	1,2-DICHLOROPROPANE	18	1	2 00E-04	2 00E-04	2 00E-04		1 55E-04	TRUE	A
NW PLUME	WG	MG/L	BENZENE	23	2	7 00E-04	1 00E-03	8 50E-04		3 19E-04	TRUE	A
NW PLUME	WG	MG/L	CARBON TETRACHLORIDE	23	8	1 00E-04	3 48E-03	1 20E-03		1 62E-04	TRUE	A
NW PLUME	WG	MG/L	CHLOROFORM	23	13	1 00E-04	1 82E-02	4 54E-03		1 52E-04	TRUE	A
NW PLUME	WG	MG/L	cis-1,2-DICHLOROETHYLENE	15	14	2 00E-04	5 22E-01	1 02E-01		6 08E-03	TRUE	A
NW PLUME	WG	MG/L	TETRACHLOROETHYLENE(PCE)	23	20	8 00E-04	8 97E-02	2 09E-02		1 07E-03	TRUE	A
NW PLUME	WG	MG/L	trans-1,2-DICHLOROETHENE	16	14	2 00E-04	1 49E-01	2 69E-02		1 22E-02	TRUE	A
NW PLUME	WG	MG/L	TRICHLOROETHYLENE (TCE)	23	23	3 00E-03	1 17E+01	1 83E+00		1 55E-03	TRUE	A
NW PLUME	WG	MG/L	VINYL CHLORIDE	23	5	6 20E-04	8 00E-03	2 64E-03		1 91E-05	TRUE	A
SW PLUME	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	25	14	2 71E-03	5 22E-01	2 12E-01		5 27E-05	TRUE	A
SW PLUME	WG	MG/L	1,1,2-TRICHLOROETHANE	25	13	2 60E-03	1 02E-02	6 22E-03		1 88E-04	TRUE	A
SW PLUME	WG	MG/L	BROMODICHLOROMETHANE	25	4	1 12E-03	1 24E-02	4 07E-03		1 70E-04	TRUE	A

Table 15-1

Constituents of Potential Concern in All Onsite Groundwater

Rev. 0 Memphis Depot Dunn Field RI

Unit	Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Background Concentration	Regulatory Criteria for Groundwater	COPC	Basis
SW PLUME	WG	MG/L	CARBON TETRACHLORIDE	25	25	3.00E-03	7.96E-02	3.14E-02		1.62E-04	TRUE	A
SW PLUME	WG	MG/L	CHLOROFORM	25	25	6.00E-03	1.61E+00	3.19E-01		1.52E-04	TRUE	A
SW PLUME	WG	MG/L	cis-1,2-DICHLOROETHYLENE	12	10	4.10E-04	2.26E-02	9.07E-03		6.08E-03	TRUE	A
SW PLUME	WG	MG/L	TETRACHLOROETHYLENE(PCE)	25	22	1.00E-03	2.06E-02	5.75E-03		1.07E-03	TRUE	A
SW PLUME	WG	MG/L	trans-1,2-DICHLOROETHENE	14	14	1.50E-03	2.08E-02	4.34E-03		1.22E-02	TRUE	A
SW PLUME	WG	MG/L	TRICHLOROETHYLENE (TCE)	25	25	6.00E-03	5.18E-01	1.45E-01		1.55E-03	TRUE	A

Note COPC screening was performed on maximum detected concentrations from all onsite groundwater wells, and was not segregated by Area or plume

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available
E	Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC
F	Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC
G	Chemical is a member of a chemical class which contains other COPCs
H	Chemical's frequency of detection was less than 5% and professional judgement was used in eliminating it as a COPC

Table 15-2
Volatiles Detected per Onsite Plumes
Rev 1 Memphis Depot Dunn Field RI

Parameter Name	North Plume	Northwest Plume	Southwest Plume	COPC
1,1,1-TRICHLOROETHANE	X			NO
1,1,2-TRICHLOROETHANE	X	X	X	YES
1,1,2,2-TETRACHLOROETHANE	X	X	X	YES
1,1-DICHLOROETHANE	X			NO
1,1-DICHLOROETHENE	X	X		YES
1,2-DICHLOROETHANE	X	X		YES
1,2-DICHLOROPROPANE		X		YES
BENZENE		X		YES
BROMODICHLOROETHANE			X	YES
BROMOMETHANE		X		NO
CARBON TETRACHLORIDE	X	X	X	YES
CHLOROFORM	X	X	X	YES
CHLOROETHANE		X		NO
cis-1,2-DICHLOROETHENE	X	X	X	YES
METHYL ETHYL KETONE (2-BUTANONE)	X			NO
METHYLENE CHLORIDE	X			YES
TETRACHLOROETHYLENE(PCE)	X	X	X	YES
trans-1,2-DICHLOROETHENE	X	X	X	YES
TRICHLOROETHYLENE (TCE)	X	X	X	YES
VINYL CHLORIDE		X		YES
XYLENES		X		NO

COPC = Chemical of Potential Concern

Table 15-3

Constituents of Potential Concern in Offsite Individual Wells

Rev 1 Memphis Depot Dunn Field RI

Unit	Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Regulatory Criteria for Groundwater	Background Concentration	COPC	Basis
MW30	WG	MG/L	ALUMINUM	6	4	1.01E-01	7.55E+01	1.90E+01	3.65E+00	1.80E+00	TRUE	A
MW30	WG	MG/L	ARSENIC	6	1	8.40E-03	8.40E-03	8.40E-03	4.46E-05		TRUE	A
MW30	WG	MG/L	BARIUM	6	6	1.16E-01	3.16E-01	1.60E-01	2.56E-01	2.24E-01	TRUE	A
MW30	WG	MG/L	bis(2-ETHYLHEXYL) PHTHALATE	6	1	1.10E-02	1.10E-02	1.10E-02	4.78E-03		TRUE	A
MW30	WG	MG/L	CHROMIUM, TOTAL	6	1	1.17E-01	1.17E-01	1.17E-01	1.10E-02	5.44E-02	TRUE	A
MW30	WG	MG/L	LEAD	6	2	1.00E-03	2.02E-02	1.06E-02	1.50E-02	9.40E-03	TRUE	A
MW31	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	14	6	3.22E-03	4.20E-01	1.10E-01	5.27E-05		TRUE	A
MW31	WG	MG/L	1,1,2-TRICHLOROETHANE	14	3	4.00E-03	1.10E-02	7.16E-03	1.88E-04		TRUE	A
MW31	WG	MG/L	1,1-DICHLOROETHENE	14	13	5.98E-03	5.24E-02	2.39E-02	4.36E-05		TRUE	A
MW31	WG	MG/L	1,2-DICHLOROETHANE	14	2	1.50E-03	9.58E-03	5.54E-03	1.16E-04		TRUE	A
MW31	WG	MG/L	ALUMINUM	6	4	1.30E-01	7.89E+01	2.03E+01	3.65E+00	1.80E+00	TRUE	A
MW31	WG	MG/L	ARSENIC	6	3	8.10E-04	1.20E-02	5.54E-03	4.46E-05		TRUE	A
MW31	WG	MG/L	BARIUM	5	5	1.19E-01	3.81E-01	1.79E-01	2.56E-01	2.24E-01	TRUE	A
MW31	WG	MG/L	CARBON TETRACHLORIDE	14	8	4.00E-04	8.00E-03	3.16E-03	1.62E-04		TRUE	A
MW31	WG	MG/L	CHLOROFORM	14	11	9.20E-04	4.90E-02	1.49E-02	1.52E-04		TRUE	A
MW31	WG	MG/L	CHROMIUM, TOTAL	6	2	3.20E-03	1.63E-01	8.31E-02	1.10E-02	5.44E-02	TRUE	A
MW31	WG	MG/L	cis-1,2-DICHLOROETHYLENE	8	8	4.24E-03	5.89E-02	1.40E-02	6.08E-03		TRUE	A
MW31	WG	MG/L	IRON	5	5	2.04E-01	1.24E+01	4.30E+00	1.10E+00	6.73E+00	TRUE	A
MW31	WG	MG/L	LEAD	6	2	2.00E-03	6.11E-02	3.16E-02	1.50E-02	9.40E-03	TRUE	A
MW31	WG	MG/L	TETRACHLOROETHYLENE(PCE)	14	14	6.40E-04	1.10E-01	3.31E-02	1.07E-03		TRUE	A
MW31	WG	MG/L	trans-1,2-DICHLOROETHENE	9	8	2.14E-03	1.64E-01	2.64E-02	1.22E-02		TRUE	A
MW31	WG	MG/L	TRICHLOROETHYLENE (TCE)	14	14	1.80E-02	1.11E+00	2.62E-01	1.55E-03		TRUE	A
MW32	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	13	10	9.20E-04	1.62E-01	6.04E-02	5.27E-05		TRUE	A
MW32	WG	MG/L	1,1,2-TRICHLOROETHANE	13	7	6.10E-04	7.69E-03	4.26E-03	1.88E-04		TRUE	A
MW32	WG	MG/L	ALUMINUM	5	4	3.54E-02	1.27E+02	3.37E+01	3.65E+00	1.80E+00	TRUE	A
MW32	WG	MG/L	ARSENIC	5	1	2.06E-02	2.06E-02	2.06E-02	4.46E-05		TRUE	A
MW32	WG	MG/L	BARIUM	4	4	1.57E-01	1.45E+00	5.11E-01	2.56E-01	2.24E-01	TRUE	A
MW32	WG	MG/L	bis(2-ETHYLHEXYL) PHTHALATE	1	1	4.60E-02	4.60E-02	4.60E-02	4.78E-03		TRUE	A
MW32	WG	MG/L	CADMIUM	5	3	2.00E-04	2.80E-03	1.40E-03	1.83E-03		TRUE	A
MW32	WG	MG/L	CARBON TETRACHLORIDE	13	13	1.42E-02	6.13E-02	2.84E-02	1.62E-04		TRUE	A
MW32	WG	MG/L	CHLOROFORM	13	13	6.00E-03	3.72E-01	7.43E-02	1.52E-04		TRUE	A
MW32	WG	MG/L	CHROMIUM, TOTAL	5	2	1.66E-02	2.31E-01	1.24E-01	1.10E-02	5.44E-02	TRUE	A
MW32	WG	MG/L	cis-1,2-DICHLOROETHYLENE	8	8	4.59E-03	3.05E-02	1.03E-02	6.08E-03		TRUE	A
MW32	WG	MG/L	IRON	4	2	8.02E+00	2.64E+01	1.72E+01	1.10E+00	6.73E+00	TRUE	A
MW32	WG	MG/L	LEAD	5	4	1.50E-03	9.81E-02	2.88E-02	1.50E-02	9.40E-03	TRUE	A
MW32	WG	MG/L	MANGANESE	3	3	1.86E+00	2.24E+00	2.03E+00	7.30E-02	5.60E-01	TRUE	A
MW32	WG	MG/L	TETRACHLOROETHYLENE(PCE)	13	13	1.00E-03	6.39E-03	2.53E-03	1.07E-03		TRUE	A
MW32	WG	MG/L	TRICHLOROETHYLENE (TCE)	13	13	2.81E-02	1.37E-01	6.84E-02	1.55E-03		TRUE	A
MW32	WG	MG/L	VANADIUM	3	2	1.11E-02	3.60E-02	2.36E-02	2.56E-02	6.00E-03	TRUE	A
MW33	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	14	1	2.28E-03	2.28E-03	2.28E-03	5.27E-05		TRUE	A
MW33	WG	MG/L	ALUMINUM	6	5	3.66E-01	6.32E+01	1.34E+01	3.65E+00	1.80E+00	TRUE	A
MW33	WG	MG/L	ARSENIC	6	2	5.80E-03	2.94E-02	1.76E-02	4.46E-05		TRUE	A
MW33	WG	MG/L	BARIUM	6	6	4.56E-02	4.35E-01	1.18E-01	2.56E-01	2.24E-01	TRUE	A
MW33	WG	MG/L	CHROMIUM, TOTAL	6	2	4.00E-03	1.16E-01	6.00E-02	1.10E-02	5.44E-02	TRUE	A

Table 15-3
Constituents of Potential Concern in Offsite Individual Wells
Rev 0 Memphis Depot Dunn Field RI

Unit	Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Regulatory Criteria for Groundwater	Background Concentration	COPC	Basis
MW33	WG	MG/L	IRON	5	4	8.33E-01	9.82E+00	3.59E+00	1.10E+00	6.73E+00	TRUE	A
MW33	WG	MG/L	LEAD	6	3	1.60E-03	4.61E-02	1.84E-02	1.50E-02	9.40E-03	TRUE	A
MW37	WG	MG/L	BARIUM	4	4	5.88E-01	6.93E-01	6.39E-01	2.56E-01	2.24E-01	TRUE	A
MW37	WG	MG/L	bis(2-ETHYLHEXYL) PHTHALATE	4	1	1.30E-02	1.30E-02	1.30E-02	4.78E-03		TRUE	A
MW37	WG	MG/L	CHROMIUM, TOTAL	5	1	2.40E-02	2.40E-02	2.40E-02	1.10E-02		TRUE	A
MW37	WG	MG/L	MANGANESE	3	3	1.60E-01	2.17E-01	1.88E-01	7.30E-02	5.60E-01	TRUE	A
MW40	WG	MG/L	1,1-DICHLOROETHENE	14	3	1.06E-03	2.00E-03	1.38E-03	4.36E-05		TRUE	A
MW40	WG	MG/L	BARIUM	2	2	3.45E-01	3.62E-01	3.54E-01	2.56E-01	2.24E-01	TRUE	A
MW40	WG	MG/L	MANGANESE	2	2	1.01E+00	1.12E+00	1.07E+00	7.30E-02	5.60E-01	TRUE	A
MW42	WG	MG/L	CADMIUM	5	3	1.40E-03	4.40E-03	2.90E-03	1.83E-03		TRUE	A
MW42	WG	MG/L	MANGANESE	1	1	3.83E-01	3.83E-01	3.83E-01	7.30E-02	5.60E-01	TRUE	A
MW44	WG	MG/L	ALUMINUM	2	2	3.93E+00	4.72E+00	4.33E+00	3.65E+00	1.80E+00	TRUE	A
MW44	WG	MG/L	ARSENIC	5	1	3.74E-02	3.74E-02	3.74E-02	4.46E-05		TRUE	A
MW44	WG	MG/L	BROMODICHLOROMETHANE	13	1	1.66E-03	1.66E-03	1.66E-03	1.70E-04		TRUE	A
MW44	WG	MG/L	CADMIUM	5	2	8.40E-04	5.70E-03	3.27E-03	1.83E-03		TRUE	A
MW44	WG	MG/L	CARBON TETRACHLORIDE	13	6	2.10E-03	6.00E-03	4.28E-03	1.62E-04		TRUE	A
MW44	WG	MG/L	CHLOROFORM	13	5	1.23E-03	6.00E-03	3.35E-03	1.52E-04		TRUE	A
MW44	WG	MG/L	IRON	2	2	7.93E+00	1.40E+01	1.10E+01	1.10E+00	6.73E+00	TRUE	A
MW44	WG	MG/L	MANGANESE	2	2	2.00E-02	7.55E-01	3.88E-01	7.30E-02	5.60E-01	TRUE	A
MW44	WG	MG/L	TETRACHLOROETHYLENE(PCE)	13	1	4.92E-03	4.92E-03	4.92E-03	1.07E-03		TRUE	A
MW44	WG	MG/L	TRICHLOROETHYLENE (TCE)	13	5	7.90E-04	5.00E-03	2.83E-03	1.55E-03		TRUE	A
MW51	WG	MG/L	1,1-DICHLOROETHENE	13	13	1.08E-03	5.79E-02	1.67E-02	4.36E-05		TRUE	A
MW51	WG	MG/L	ALUMINUM	5	2	1.76E+00	4.75E+00	3.26E+00	3.65E+00	1.80E+00	TRUE	A
MW51	WG	MG/L	IRON	5	2	1.36E+00	1.45E+01	7.93E+00	1.10E+00	6.73E+00	TRUE	A
MW51	WG	MG/L	TETRACHLOROETHYLENE(PCE)	13	10	5.40E-04	4.00E-03	2.09E-03	1.07E-03		TRUE	A
MW51	WG	MG/L	TRICHLOROETHYLENE (TCE)	13	13	7.00E-04	1.50E-02	6.89E-03	1.55E-03		TRUE	A
MW54	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	13	4	4.90E-03	4.01E-02	2.28E-02	5.27E-05		TRUE	A
MW54	WG	MG/L	1,1,2-TRICHLOROETHANE	13	4	5.60E-04	1.24E-03	9.63E-04	1.88E-04		TRUE	A
MW54	WG	MG/L	BENZENE	13	1	3.30E-04	3.30E-04	3.30E-04	3.19E-04		TRUE	A
MW54	WG	MG/L	CARBON TETRACHLORIDE	13	9	1.00E-03	1.47E-02	7.14E-03	1.62E-04		TRUE	A
MW54	WG	MG/L	CHLOROFORM	13	7	1.00E-03	1.98E-02	8.59E-03	1.52E-04		TRUE	A
MW54	WG	MG/L	cis-1,2-DICHLOROETHYLENE	8	8	3.60E-03	3.46E-02	1.51E-02	6.08E-03		TRUE	A
MW54	WG	MG/L	IRON	5	3	4.66E+00	1.27E+01	9.11E+00	1.10E+00	6.73E+00	TRUE	A
MW54	WG	MG/L	TETRACHLOROETHYLENE(PCE)	13	6	6.80E-04	2.00E-03	1.21E-03	1.07E-03		TRUE	A
MW54	WG	MG/L	TRICHLOROETHYLENE (TCE)	13	13	1.16E-02	1.80E-01	6.14E-02	1.55E-03		TRUE	A
MW71	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	4	4	9.77E-02	1.81E-01	1.38E-01	5.27E-05		TRUE	A
MW71	WG	MG/L	1,1,2-TRICHLOROETHANE	4	3	2.99E-03	4.04E-03	3.41E-03	1.88E-04		TRUE	A
MW71	WG	MG/L	CARBON TETRACHLORIDE	4	4	2.65E-02	5.39E-02	3.68E-02	1.62E-04		TRUE	A
MW71	WG	MG/L	CHLOROFORM	4	4	6.05E-01	1.08E+00	9.18E-01	1.52E-04		TRUE	A
MW71	WG	MG/L	cis-1,2-DICHLOROETHYLENE	4	4	6.49E-03	1.15E-02	9.23E-03	6.08E-03		TRUE	A
MW71	WG	MG/L	TETRACHLOROETHYLENE(PCE)	4	4	4.09E-03	1.00E-02	6.41E-03	1.07E-03		TRUE	A
MW71	WG	MG/L	TRICHLOROETHYLENE (TCE)	4	4	9.56E-02	3.30E-01	2.02E-01	1.55E-03		TRUE	A
MW76 77	WG	MG/L	1,1,2,2-TETRACHLOROETHANE	4	4	2.00E+00	2.90E+00	2.40E+00	4.06E-04		TRUE	A
MW76 77	WG	MG/L	1,1,2-TRICHLOROETHANE	4	4	2.00E-03	8.00E-03	4.75E-03	1.88E-04		TRUE	A

Table 15-3

Constituents of Potential Concern in Offsite Individual Wells

Rev 0 Memphis Depot Dunn Field RI

Unit	Matrix	Units	Parameter Name	Number Analyzed	Number Detected	Minimum Detected Concentration	Maximum Detected Concentration	Arithmetic Mean Detected Concentration	Regulatory Criteria for Groundwater	Background Concentration	COPC	Basis
MW76 77	WG	MG/L	1,2-DICHLOROETHANE	4	1	4.00E-04	4.00E-04	4.00E-04	1.16E-04		TRUE	A
MW76 77	WG	MG/L	BENZENE	4	3	2.00E-04	4.00E-03	1.70E-03	3.19E-04		TRUE	A
MW76 77	WG	MG/L	CARBON TETRACHLORIDE	4	1	6.00E-04	6.00E-04	6.00E-04	1.62E-04		TRUE	A
MW76 77	WG	MG/L	CHLOROFORM	4	4	9.00E-04	4.00E-03	2.48E-03	1.52E-04		TRUE	A
MW76 77	WG	MG/L	cis-1,2-DICHLOROETHYLENE	4	4	3.40E-02	1.30E-01	8.80E-02	6.08E-03		TRUE	A
MW76 77	WG	MG/L	TETRACHLOROETHYLENE(PCE)	4	4	1.00E-03	1.10E-02	5.75E-03	1.07E-03		TRUE	A
MW76 77	WG	MG/L	trans-1,2-DICHLOROETHENE	4	4	1.10E-02	3.30E-02	2.33E-02	1.22E-02		TRUE	A
MW76 77	WG	MG/L	TRICHLOROETHYLENE (TCE)	4	4	6.90E-01	2.50E+00	1.61E+00	1.55E-03		TRUE	A
MW76 77	WG	MG/L	VINYL CHLORIDE	4	2	3.00E-04	4.00E-04	3.50E-04	1.91E-05		TRUE	A
MW79	WG	MG/L	1,1-DICHLOROETHENE	4	4	2.20E-02	4.80E-02	4.10E-02	4.36E-05		TRUE	A
MW79	WG	MG/L	1,2-DICHLOROETHANE	4	4	4.20E-04	5.60E-04	5.18E-04	1.16E-04		TRUE	A
MW79	WG	MG/L	BENZENE	4	1	4.30E-03	4.30E-03	4.30E-03	3.19E-04		TRUE	A
MW79	WG	MG/L	CHLOROFORM	4	4	7.60E-04	1.70E-03	1.01E-03	1.52E-04		TRUE	A
MW79	WG	MG/L	cis-1,2-DICHLOROETHYLENE	4	4	5.10E-04	6.10E-03	2.01E-03	6.08E-03		TRUE	A
MW79	WG	MG/L	TETRACHLOROETHYLENE(PCE)	4	4	3.20E-03	3.40E-02	2.53E-02	1.07E-03		TRUE	A
MW79	WG	MG/L	TRICHLOROETHYLENE (TCE)	4	4	1.80E-02	2.60E-02	2.10E-02	1.55E-03		TRUE	A

Note COPC screening was performed on maximum detected concentrations from all onsite groundwater wells, and was not segregated by Area or plume

A Exceeds Criteria

B Does not exceed Criteria

C Does not exceed Background

D No Criteria available & exceeds Background, or no Criteria or Background available

E Chemical is an essential nutrient and professional judgement was used in eliminating it as a COPC

F Chemical is a common lab contaminant and professional judgement was used in eliminating it as a COPC

G Chemical is a member of a chemical class which contains other COPCs

H Chemical's frequency of detection was less than 5% and professional judgement was used in eliminating it as a COPC

MG/L = milligrams per liter

COPC = Chemical of Potential Concern

Table 15-4

Volatiles Detected per Offsite Plumes

Rev 1 Memphis Depot Dunn Field RI

Parameter	MW30	MW31	MW32	MW33	MW37	MW40	MW42	MW44	MW51	MW54	MW67	MW71	MW76/77	MW78	MW79	MW80	COPC
1,1,1-TRICHLOROETHANE		X				X		X	X						X		NO
1,1,2-TRICHLOROETHANE		X	X							X			X	X			YES
1,1,2,2-TETRACHLOROETHANE		X	X							X			X	X			YES
1,1-DICHLOROETHANE		X				X									X		NO
1,1-DICHLOROETHENE		X				X			X						X		YES
1,2-DICHLOROETHANE		X											X		X		YES
1,2-DICHLOROPROPANE																	YES
BENZENE										X			X		X		YES
BROMODICHLOROMETHANE								X									YES
BROMOMETHANE															X		NO
CARBON TETRACHLORIDE		X	X					X		X			X	X	X		YES
CHLOROBENZENE						X											NO
CHLOROFORM		X	X					X		X			X	X	X		YES
CHLOROETHANE																	NO
CHLOROMETHANE								X							X		NO
cis-1,2-DICHLOROETHENE		X	X					X		X			X	X	X		YES
METHYL ETHYL KETONE (2-BUTANONE)							X								X		NO
METHYLENE CHLORIDE						X				X							NO
TETRACHLOROETHYLENE(PCE)		X	X						X	X			X	X	X		YES
TOLUENE							X	X					X				YES
trans-1,2-DICHLOROETHENE		X	X							X			X	X	X		YES
TRICHLOROETHYLENE (TCE)		X	X					X	X	X	X		X	X	X		YES
VINYL CHLORIDE													X				YES
XYLENES																	NO

COPC = Chemical of Potential Concern

TABLE 15-5
Summary of Exposure Pathways to be Quantified at Onsite Groundwater
Rev 0 Memphis Depot Dunn Field RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Future Land Use			
On-site Industrial Worker	Incidental ingestion, dermal contact, and inhalation from the groundwater.	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
	Inhalation of Indoor Air VOCs volatilizing from subsurface groundwater	Yes	Hypothetical future reasonable maximum exposure scenario for future workers
Hypothetical On-site Residential	Incidental ingestion, dermal contact, and inhalation from the groundwater	Yes	Evaluated for comparison purposes only
	Inhalation of Indoor Air VOCs volatilizing from subsurface groundwater	Yes	Evaluated for comparison purposes only

Table 15-6

Johnson-Ettinger Model Critical Input Parameters

Rev 1 Memphis Depot Dunn Field RI

Input Parameter	Units	Default Value	Source
Average soil/groundwater temperature (T_s)	C	16	Estimated
Depth below grade to bottom of enclosed space (L_F) (Slab-on-grade)	cm	15	Recommended EPA default value
Depth below grade to water table (L_{WT})	cm	variable	Appendix I
Thickness of soil stratum A (h_A)	cm	variable	Appendix I
SCS soil type directly above water table	–	variable	Appendix I
Stratum A soil dry bulk density ($\rho_b{}^A$)	g/cm^2	1 5	Recommended EPA default value
Stratum A soil total porosity (n^A)	unitless	0 43	Recommended EPA default value
Stratum A soil water-filled porosity ($\Theta_w{}^A$)	cm^3/cm^3	0 3	Recommended EPA default value

C = celcius

cm = centimeters

g/cm^2 = grams per centimeter squared

cm^3/cm^3 = cubic centimeters per cubic centimeters

TABLE 15-7
Summary of Exposure Pathways to be Quantified at Offsite Groundwater
Rev 0 Memphis Depot Dunn Field RI

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Future Land Use			
Hypothetical Future Off-site Residential	Incidental ingestion, dermal contact, and inhalation from the groundwater.	Yes	Evaluated for comparison purposes only.
	Inhalation of Indoor Air VOCs volatilizing from subsurface groundwater	Yes	Evaluated for comparison purposes only

Table 15-8

Exposure Point Concentrations for Dunn Field Onsite Plumes

Rev 1 Memphis Depot Dunn Field RI

Units	Parameter Name	Number of Analyses	Number of Detects	Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
Site-Wide Inorganics:								
MG/L	ALUMINUM	108	87	5.00E+00	1.05E+02	7.00E+00	1.30E+01	1.30E+01
MG/L	ARSENIC	108	20	4.00E-03	1.00E-01	6.00E-03	3.00E-03	3.00E-03
MG/L	BARIUM	98	98	1.00E-01	2.00E+00	2.00E-01	1.00E-01	1.00E-01
MG/L	BERYLLIUM	108	22	7.00E-04	2.00E-02	1.00E-03	7.00E-04	7.00E-04
MG/L	CADMIUM	108	44	1.00E-03	2.00E-02	2.00E-03	2.00E-03	2.00E-03
MG/L	CHROMIUM, TOTAL	108	64	1.00E-02	2.00E-01	2.00E-02	2.00E-02	2.00E-02
MG/L	COBALT	98	42	1.00E-02	5.00E-01	2.00E-02	2.00E-02	2.00E-02
MG/L	COPPER	108	40	1.00E-02	2.00E-01	2.00E-02	2.00E-02	2.00E-02
MG/L	LEAD	108	56	9.00E-03	2.00E-01	1.00E-02	1.00E-02	1.00E-02
MG/L	MANGANESE	98	90	4.00E-01	8.00E+00	6.00E-01	2.00E+00	2.00E+00
MG/L	MERCURY	108	23	1.00E-04	2.00E-03	1.00E-04	1.00E-04	1.00E-04
MG/L	NICKEL	108	49	9.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
MG/L	SILICON	1	1	1.50E+01	1.50E+01			1.50E+01
MG/L	VANADIUM	98	67	2.00E-02	4.00E-01	3.00E-02	4.00E-02	4.00E-02
MG/L	DIELDRIN	15	1	4.00E-05	9.00E-05	5.00E-05	6.00E-05	6.00E-05
MG/L	HEPTACHLOR EPOXIDE	15	3	2.00E-05	1.00E-05	2.00E-05	3.00E-05	1.00E-05
North Plume.								
MG/L	1,1,2,2-TETRACHLOROETHANE	78	16	1.22E-02	4.20E-01	2.15E-02	1.26E-02	1.22E-02
MG/L	1,1,2-TRICHLOROETHANE	78	4	3.58E-03	1.10E-02	4.20E-03	5.85E-03	3.58E-03
MG/L	1,1-DICHLOROETHENE	78	55	1.97E-02	8.86E-02	2.32E-02	5.17E-02	1.97E-02
MG/L	1,2-DICHLOROETHANE	78	5	3.82E-03	9.58E-03	4.61E-03	6.13E-03	3.82E-03
MG/L	BROMODICHLOROMETHANE	78	1	3.74E-03	4.70E-04	4.53E-03	6.08E-03	3.74E-03
MG/L	CARBON TETRACHLORIDE	78	14	3.14E-03	8.00E-03	3.62E-03	4.89E-03	3.14E-03
MG/L	CHLOROFORM	78	30	6.36E-03	6.00E-02	8.21E-03	1.03E-02	6.36E-03
MG/L	cis-1,2-DICHLOROETHYLENE	27	11	6.17E-03	5.89E-02	1.03E-02	1.52E-02	6.17E-03
MG/L	METHYLENE CHLORIDE	51	1	9.84E-03	2.24E-01	1.71E-02	1.09E-02	9.84E-03
MG/L	TETRACHLOROETHYLENE(PCE)	78	57	2.94E-02	1.92E-01	3.72E-02	1.06E-01	2.94E-02
MG/L	trans-1,2-DICHLOROETHENE	34	12	1.07E-02	1.64E-01	2.05E-02	1.34E-02	1.07E-02
MG/L	TRICHLOROETHYLENE (TCE)	78	60	8.28E-02	1.11E+00	1.24E-01	1.66E-01	8.28E-02
Northwest Plume·								
MG/L	1,1,2,2-TETRACHLOROETHANE	23	23	2.23E+00	3.30E+01	4.67E+00	3.44E+01	2.23E+00
MG/L	1,1,2-TRICHLOROETHANE	23	12	2.62E-02	3.97E-02	4.37E-02	1.99E-01	2.62E-02
MG/L	1,1-DICHLOROETHENE	23	1	2.19E-02	6.10E-04	3.98E-02	1.31E-01	2.19E-02
MG/L	1,2-DICHLOROETHANE	23	5	2.20E-02	1.77E-03	3.99E-02	1.32E-01	2.20E-02
MG/L	1,2-DICHLOROPROPANE	18	1	2.78E-02	2.00E-04	5.05E-02	7.04E-01	2.78E-02
MG/L	BENZENE	23	2	2.19E-02	1.00E-03	3.98E-02	1.27E-01	2.19E-02
MG/L	CARBON TETRACHLORIDE	23	8	2.21E-02	3.48E-03	4.00E-02	1.75E-01	2.21E-02
MG/L	CHLOROFORM	23	13	2.42E-02	1.82E-02	4.18E-02	2.41E-01	2.42E-02
MG/L	cis-1,2-DICHLOROETHYLENE	15	14	9.56E-02	5.22E-01	1.63E-01	7.94E+00	9.56E-02
MG/L	TETRACHLOROETHYLENE(PCE)	23	20	1.82E-02	8.97E-02	2.72E-02	8.80E-02	1.82E-02
MG/L	trans-1,2-DICHLOROETHENE	16	14	2.36E-02	1.49E-01	4.07E-02	3.84E-01	2.36E-02
MG/L	TRICHLOROETHYLENE (TCE)	23	23	1.83E+00	1.17E+01	2.81E+00	3.26E+01	1.83E+00
MG/L	VINYL CHLORIDE	23	5	2.23E-02	8.00E-03	4.02E-02	1.34E-01	2.23E-02
Southwest Plume								
MG/L	1,1,2,2-TETRACHLOROETHANE	25	14	1.21E-01	5.22E-01	1.71E-01	6.33E+00	1.21E-01
MG/L	1,1,2-TRICHLOROETHANE	25	13	5.05E-03	1.02E-02	6.25E-03	1.19E-02	5.05E-03
MG/L	BROMODICHLOROMETHANE	25	4	4.15E-03	1.24E-02	5.61E-03	1.08E-02	4.15E-03
MG/L	CARBON TETRACHLORIDE	25	25	3.14E-02	7.96E-02	3.74E-02	4.89E-02	3.14E-02
MG/L	CHLOROFORM	25	25	3.19E-01	1.61E+00	4.82E-01	2.59E+00	3.19E-01
MG/L	cis-1,2-DICHLOROETHYLENE	12	10	7.64E-03	2.26E-02	1.13E-02	7.86E-02	7.64E-03
MG/L	TETRACHLOROETHYLENE(PCE)	25	22	5.66E-03	2.06E-02	7.04E-03	7.52E-03	5.66E-03
MG/L	trans-1,2-DICHLOROETHENE	14	14	4.34E-03	2.08E-02	6.75E-03	6.84E-03	4.34E-03
MG/L	TRICHLOROETHYLENE (TCE)	25	25	1.45E-01	5.18E-01	1.88E-01	3.33E-01	1.45E-01

MG/L = milligrams per liter

UCL = Upper confidence limit

EPC = Exposure point concentration

Note EPC is referred to as RME in Appendix tables

Table 15-9

Exposure Point Concentrations for Dunn Field Offsite Individual Monitoring Wells

Rev 1 Memphis Depot Dunn Field RI

Location	Units	Parameter Name	Number of Analyses	Number of Detects	Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MW30	MG/L	ALUMINUM	6	4	1 27E+01	7 55E+01	3 80E+01	1 05E+07	7 55E+01
MW30	MG/L	ARSENIC	6	1	2 23E-03	8 40E-03	4 74E-03	1 80E-02	8 40E-03
MW30	MG/L	BARIUM	6	6	1 60E-01	3 16E-01	2.23E-01	2 40E-01	2 40E-01
MW30	MG/L	CHROMIUM, TOTAL	6	1	2 08E-02	1 17E-01	5 96E-02	1 34E+01	1 17E-01
MW30	MG/L	LEAD	6	2	3 95E-03	2 02E-02	1 05E-02	1 21E-01	2 02E-02
MW30	MG/L	bis(2-ETHYLHEXYL) PHTHALATE	6	1	6 00E-03	1 10E-02	8 02E-03	8 38E-03	8 02E-03
MW31	MG/L	ALUMINUM	6	4	1 36E+01	7 89E+01	3 99E+01	1 46E+10	7 89E+01
MW31	MG/L	ARSENIC	6	3	3 26E-03	1 20E-02	6 91E-03	3 07E-02	1 20E-02
MW31	MG/L	BARIUM	5	5	1 79E-01	3 81E-01	2 87E-01	3 67E-01	3 67E-01
MW31	MG/L	CHROMIUM, TOTAL	6	2	2.89E-02	1 63E-01	8 30E-02	2 10E+01	1 63E-01
MW31	MG/L	IRON	5	5	4 30E+00	1 24E+01	8 93E+00	2 95E+03	1 24E+01
MW31	MG/L	LEAD	6	2	1 09E-02	6 11E-02	3 12E-02	4 18E+00	6 11E-02
MW31	MG/L	1,1,2,2-TETRACHLOROETHANE	14	6	4 77E-02	4 20E-01	1 01E-01	3 41E+00	4 77E-02
MW31	MG/L	1,1,2-TRICHLOROETHANE	14	3	3 78E-03	1 10E-02	5 91E-03	1 78E-02	3 78E-03
MW31	MG/L	1,1-DICHLOROETHENE	14	13	2 22E-02	5 24E-02	2 96E-02	8 59E-02	2 22E-02
MW31	MG/L	1,2-DICHLOROETHANE	14	2	5 68E-03	9 58E-03	9 17E-03	3 89E-02	5 68E-03
MW31	MG/L	CARBON TETRACHLORIDE	14	8	2 88E-03	8 00E-03	4 63E-03	8 90E-03	2 88E-03
MW31	MG/L	CHLOROFORM	14	11	1 18E-02	4 90E-02	1 90E-02	1 24E-01	1 18E-02
MW31	MG/L	cis-1,2-DICHLOROETHYLENE	8	8	1 40E-02	5 89E-02	2 65E-02	4 10E-02	1 40E-02
MW31	MG/L	TETRACHLOROETHYLENE(PCE)	14	14	3 31E-02	1 10E-01	5 20E-02	9 86E-01	3 31E-02
MW31	MG/L	trans-1,2-DICHLOROETHENE	9	8	2 35E-02	1 64E-01	5 64E-02	3 43E-01	2 35E-02
MW31	MG/L	TRICHLOROETHYLENE (TCE)	14	14	2 62E-01	1 11E+00	4 41E-01	1 25E+00	2 62E-01
MW32	MG/L	ALUMINUM	5	4	2 70E+01	1 27E+02	8 03E+01	1 62E+13	1 27E+02
MW32	MG/L	ARSENIC	5	1	5 55E-03	2 06E-02	1 38E-02	4 62E+00	2 06E-02
MW32	MG/L	BARIUM	4	4	5 11E-01	1 45E+00	1 25E+00	1 19E+02	1 45E+00
MW32	MG/L	CADMIUM	5	3	1 52E-03	2 80E-03	2 57E-03	2 96E-02	2 57E-03
MW32	MG/L	CHROMIUM, TOTAL	5	2	5 04E-02	2 31E-01	1 47E-01	1 81E+04	2 31E-01
MW32	MG/L	IRON	4	2	8 66E+00	2 64E+01	2 32E+01	4 84E+22	2 64E+01
MW32	MG/L	LEAD	5	4	2 32E-02	9 81E-02	6 34E-02	6 06E+02	9 81E-02
MW32	MG/L	MANGANESE	3	3	2 03E+00	2 24E+00	2 36E+00	2 44E+00	2 24E+00
MW32	MG/L	VANADIUM	3	2	1 58E-02	3 60E-02	4 67E-02	6 69E+32	3 60E-02
MW32	MG/L	bis(2-ETHYLHEXYL) PHTHALATE	1	1	4 60E-02	4 60E-02		0 00E+00	0 00E+00
MW32	MG/L	1,1,2,2-TETRACHLOROETHANE	13	10	4 65E-02	1 62E-01	7 61E-02	5 59E+00	4 65E-02
MW32	MG/L	1,1,2-TRICHLOROETHANE	13	7	2 53E-03	7 69E-03	3 82E-03	7 99E-03	2 53E-03
MW32	MG/L	CARBON TETRACHLORIDE	13	13	2 84E-02	6 13E-02	3 50E-02	3 64E-02	2 84E-02
MW32	MG/L	CHLOROFORM	13	13	7 43E-02	3 72E-01	1 25E-01	4 09E-01	7 43E-02
MW32	MG/L	cis-1,2-DICHLOROETHYLENE	8	8	1 03E-02	3 05E-02	1 64E-02	2 08E-02	1 03E-02
MW32	MG/L	TETRACHLOROETHYLENE(PCE)	13	13	2 53E-03	6 39E-03	3 42E-03	3 91E-03	2 53E-03
MW32	MG/L	TRICHLOROETHYLENE (TCE)	13	13	6 84E-02	1 37E-01	8 49E-02	9 57E-02	6 84E-02
MW33	MG/L	ALUMINUM	6	5	1 11E+01	6 32E+01	3 21E+01	1 14E+06	6 32E+01
MW33	MG/L	ARSENIC	6	2	6 37E-03	2 94E-02	1 58E-02	1 01E+00	2 94E-02
MW33	MG/L	BARIUM	6	6	1 18E-01	4 35E-01	2 46E-01	4 79E-01	4 35E-01
MW33	MG/L	CHROMIUM, TOTAL	6	2	2 12E-02	1 16E-01	5 94E-02	6 47E+00	1 16E-01
MW33	MG/L	IRON	5	4	2 88E+00	9 82E+00	6 65E+00	1 02E+04	9 82E+00
MW33	MG/L	LEAD	6	3	9 72E-03	4 61E-02	2 45E-02	9 72E-01	4 61E-02
MW33	MG/L	1,1,2,2-TETRACHLOROETHANE	14	1	2 23E-03	2 28E-03	3 27E-03	6 25E-03	2 23E-03
MW37	MG/L	BARIUM	4	4	6 39E-01	6 93E-01	7 08E-01	7 26E-01	6 93E-01
MW37	MG/L	CHROMIUM, TOTAL	5	1	7 71E-03	2 40E-02	1 65E-02	1 27E-01	2 40E-02
MW37	MG/L	MANGANESE	3	3	1 88E-01	2 17E-01	2 36E-01	2 62E-01	2 17E-01
MW37	MG/L	bis(2-ETHYLHEXYL) PHTHALATE	4	1	7 13E-03	1 30E-02	1 17E-02	2 38E-02	1 30E-02
MW40	MG/L	BARIUM	2	2	3 54E-01	3 62E-01	4 07E-01	3 88E-01	3 62E-01
MW40	MG/L	MANGANESE	2	2	1 07E+00	1 12E+00	1 41E+00	1 30E+00	1 12E+00
MW40	MG/L	1,1-DICHLOROETHENE	14	3	2 30E-03	2 00E-03	3 30E-03	5 84E-03	2 30E-03
MW42	MG/L	CADMIUM	5	3	2 09E-03	4 40E-03	3 56E-03	9 99E-03	4 40E-03
MW42	MG/L	MANGANESE	1	1	3 83E-01	3 83E-01		0 00E+00	3 83E-01
MW44	MG/L	ALUMINUM	2	2	4 33E+00	4 72E+00	6 82E+00	6 33E+00	4 72E+00
MW44	MG/L	ARSENIC	5	1	8 69E-03	3 74E-02	2 40E-02	2 50E+00	3 74E-02
MW44	MG/L	CADMIUM	5	2	1 56E-03	5 70E-03	3 81E-03	7 99E+00	5 70E-03
MW44	MG/L	IRON	2	2	1 10E+01	1 40E+01	3 01E+01	9 40E+01	1 40E+01
MW44	MG/L	MANGANESE	2	2	3 88E-01	7 55E-01	2 71E+00	8 96E+37	7 55E-01
MW44	MG/L	BROMODICHLOROMETHANE	13	1	2 32E-03	1 66E-03	3 42E-03	7 04E-03	2 32E-03
MW44	MG/L	CARBON TETRACHLORIDE	13	6	2 94E-03	6 00E-03	4 09E-03	9 36E-03	2 94E-03
MW44	MG/L	CHLOROFORM	13	5	2 63E-03	6 00E-03	3 70E-03	7 63E-03	2 63E-03
MW44	MG/L	TETRACHLOROETHYLENE(PCE)	13	1	2 57E-03	4 92E-03	3 72E-03	8 91E-03	2 57E-03
MW44	MG/L	TRICHLOROETHYLENE (TCE)	13	5	2 09E-03	5 00E-03	3 07E-03	5 39E-03	2 09E-03
MW51	MG/L	ALUMINUM	5	2	1 32E+00	4 75E+00	3 28E+00	2 12E+09	4 75E+00
MW51	MG/L	IRON	5	2	3 21E+00	1 45E+01	9 25E+00	2 16E+09	1.45E+01
MW51	MG/L	1 1-DICHLOROETHENE	13	13	1 67E-02	5 79E-02	2 41E-02	4 34E-02	1 67E-02

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Table 15-9

Exposure Point Concentrations for Dunn Field Offsite Individual Monitoring Wells

Rev 0 Memphis Depot Dunn Field RI

Location	Units	Parameter Name	Number of Analyses	Number of Detects	Mean Concentration	Maximum Detected Concentration	UCL95 Normal	UCL95 Lognormal	EPC
MW51	MG/L	TETRACHLOROETHYLENE(PCE)	13	10	1 72E-03	4 00E-03	2 38E-03	3 20E-03	1 72E-03
MW51	MG/L	TRICHLOROETHYLENE (TCE)	13	13	6 89E-03	1 50E-02	9 04E-03	1 35E-02	6 89E-03
MW54	MG/L	IRON	5	3	5 49E+00	1 27E+01	1 10E+01	6 62E+08	1 10E+01
MW54	MG/L	1,1,2,2-TETRACHLOROETHANE	13	4	9 10E-03	4 01E-02	1 51E-02	7 05E-02	9 10E-03
MW54	MG/L	1,1,2-TRICHLOROETHANE	13	4	2 37E-03	1 24E-03	3 45E-03	6 32E-03	2 37E-03
MW54	MG/L	BENZENE	13	1	2 22E-03	3 30E-04	3 35E-03	7 32E-03	2 22E-03
MW54	MG/L	CARBON TETRACHLORIDE	13	9	6 14E-03	1 47E-02	8 42E-03	1 59E-02	6 14E-03
MW54	MG/L	CHLOROFORM	13	7	6 24E-03	1 98E-02	9 07E-03	2 22E-02	6.24E-03
MW54	MG/L	cis-1,2-DICHLOROETHYLENE	8	8	1 51E-02	3 46E-02	2 26E-02	4 46E-02	1 51E-02
MW54	MG/L	TETRACHLOROETHYLENE(PCE)	13	6	1 87E-03	2 00E-03	2 79E-03	3 93E-03	1 87E-03
MW54	MG/L	TRICHLOROETHYLENE (TCE)	13	13	6 14E-02	1 80E-01	8 62E-02	1 11E-01	6 14E-02
MW71	MG/L	1,1,2,2-TETRACHLOROETHANE	4	4	1 38E-01	1.81E-01	1 88E-01	2 57E-01	1 38E-01
MW71	MG/L	1,1,2-TRICHLOROETHANE	4	3	2 69E-03	4 04E-03	4 48E-03	4 19E-01	2 69E-03
MW71	MG/L	CARBON TETRACHLORIDE	4	4	3 68E-02	5.39E-02	5 08E-02	6 51E-02	3 68E-02
MW71	MG/L	CHLOROFORM	4	4	9 18E-01	1 08E+00	1 17E+00	1 48E+00	9 18E-01
MW71	MG/L	cis-1,2-DICHLOROETHYLENE	4	4	9 23E-03	1.15E-02	1 17E-02	1 41E-02	9 23E-03
MW71	MG/L	TETRACHLOROETHYLENE(PCE)	4	4	6 41E-03	1 00E-02	9 61E-03	1 71E-02	6 41E-03
MW71	MG/L	TRICHLOROETHYLENE (TCE)	4	4	2 02E-01	3 30E-01	3 24E-01	1 07E+00	2 02E-01
MW76_77	MG/L	1,1,2,2-TETRACHLOROETHANE	4	4	2 40E+00	2 90E+00	2 84E+00	3 02E+00	2 90E+00
MW76_77	MG/L	1,1,2-TRICHLOROETHANE	4	4	4 75E-03	8.00E-03	8 52E-03	1 10E-01	8 00E-03
MW76_77	MG/L	1,2-DICHLOROETHANE	4	1	1 60E-03	4 00E-04	4 27E-03	2 66E+00	4 00E-04
MW76_77	MG/L	BENZENE	4	3	2 53E-03	4 00E-03	5 27E-03	4 11E+02	4 00E-03
MW76_77	MG/L	CARBON TETRACHLORIDE	4	1	1 65E-03	6 00E-04	4 28E-03	1 20E+00	6 00E-04
MW76_77	MG/L	CHLOROFORM	4	4	2 48E-03	4 00E-03	4 55E-03	1 02E-01	4 00E-03
MW76_77	MG/L	cis-1,2-DICHLOROETHYLENE	4	4	8 80E-02	1 30E-01	1 46E-01	9 30E-01	1 30E-01
MW76_77	MG/L	TETRACHLOROETHYLENE(PCE)	4	4	5 75E-03	1 10E-02	1 06E-02	1 64E+00	1 10E-02
MW76_77	MG/L	trans-1,2-DICHLOROETHENE	4	4	2.33E-02	3 30E-02	3 52E-02	9 60E-02	3 30E-02
MW76_77	MG/L	TRICHLOROETHYLENE (TCE)	4	4	1 61E+00	2 50E+00	2 76E+00	1 97E+01	2 50E+00
MW76_77	MG/L	VINYL CHLORIDE	4	2	1 55E-03	4 00E-04	4 26E-03	9 12E+00	4 00E-04
MW79	MG/L	1,1-DICHLOROETHENE	4	4	4 10E-02	4 80E-02	5 59E-02	9 81E-02	4 80E-02
MW79	MG/L	1,2-DICHLOROETHANE	4	4	5 18E-04	5 60E-04	5 95E-04	6 32E-04	5 60E-04
MW79	MG/L	BENZENE	4	1	1 45E-03	4 30E-03	3 69E-03	6 09E-01	4 30E-03
MW79	MG/L	CHLOROFORM	4	4	1.01E-03	1 70E-03	1 55E-03	2 48E-03	1 70E-03
MW79	MG/L	cis-1,2-DICHLOROETHYLENE	4	4	2 01E-03	6 10E-03	5 22E-03	2 55E+00	6 10E-03
MW79	MG/L	TETRACHLOROETHYLENE(PCE)	4	4	2 53E-02	3 40E-02	4 27E-02	3 83E+01	3 40E-02
MW79	MG/L	TRICHLOROETHYLENE (TCE)	4	4	2 10E-02	2 60E-02	2 51E-02	2 66E-02	2 60E-02

MG/L = milligrams per liter

UCL = Upper confidence limit

EPC = Exposure point concentration

TABLE 15-10
Toxicity Factors for All Groundwater
Rev. 1 Memphis Depot Dunn Field RI

Parameter Name	Weight-of-Evidence Class	Oral SF kg-day/mg	Inhal SF kg-day/mg	C Oral RfD mg/kg-day	C Inhal RfD mg/kg-day
1,1,2,2-Tetrachloroethane	C	2.00E-01	2.03E-01	6.00E-02	
1,1,2-Trichloroethane		5.70E-02	5.60E-02	4.00E-03	
1,1-Dichloroethene	C	6.00E-01	1.75E-01	9.00E-03	
1,2-Dichloroethane		9.10E-02	9.10E-02	3.00E-02	1.40E-03
1,2-Dichloropropane	B2	6.80E-02			1.14E-03
Aluminum				1.00E+00	1.00E+00
Arsenic	A	1.50E+00	1.51E+01	3.00E-04	
Barium	D			7.00E-02	1.43E-04
Benzene	A	5.50E-02	2.70E-02	3.00E-03	1.70E-03
Beryllium	B1		8.40E+00	2.00E-03	5.70E-06
bis(2-Ethylhexyl)phthalate	B2	0.014	0.014	2.00E-02	
Bromodichloromethane	B2	0.062		2.00E-02	
Cadmium	B1		6.30E+00	1.00E-03	
Carbon tetrachloride	B2	1.30E-01	5.25E-02	7.00E-04	5.71E-04
Chloroform	B2	6.10E-03	8.10E-02	1.00E-02	8.60E-05
Chromium (total)	A		4.20E+01	3.00E-03	2.86E-05
cis-1,2-Dichloroethene	D			1.00E-02	1.00E-02
Cobalt				6.00E-02	
Copper	D			3.70E-02	
Dieldrin	B2	1.60E+01	1.60E+01	5.00E-05	
Heptachlor epoxide	B2	9.10E+00	9.10E+00	1.30E-05	
Iron				3.00E-01	
Lead	B2				
Manganese	D			1.40E-01	1.43E-05
Mercury	D				8.57E-05
Methylene chloride	B2	7.50E-03	1.65E-03	6.00E-02	8.57E-01
Nickel	D			2.00E-02	
Silicon					
Tetrachloroethene	C-B2	5.20E-02	2.00E-03	1.00E-02	1.71E-01
Thallium	D			8.00E-05	
trans-1,2-Dichloroethene				2.00E-02	2.00E-02
Trichloroethene	B2	1.10E-02	6.00E-03	6.00E-03	
Vanadium				7.00E-03	
Vinyl chloride	A	7.20E-01	1.54E-02	3.00E-03	1.10E-01

Notes:

A	Exceeds Criteria
B	Does not exceed Criteria
C	Does not exceed Background
D	No Criteria available & exceeds Background, or no Criteria or Background available

SF = slope factor
RfD = Reference dose
kg-day/mg = kilograms per day/milligram
mg/kg-day = milligrams per kilogram day

Table 15-11

Summary of Risks and Hazards at Onsite Plumes

Rev 1 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Groundwater				Indoor Air	Total ELCR	Groundwater				Indoor Air	Total HI	COPCs of Concern
	Ingestion	Dermal	Inhalation	Total	Inhalation		Ingestion	Dermal	Inhalation	Total	Inhalation		
North Plume,													
Industrial Worker	8 E-05	3 E-08	3 E-05	1 E-04	7 E-08	1E-04	0 84	7 01E-04	0 040	0 88	4 76E-05	0 88	As dieldrin, PCA1122, DCA12, DCE11, CCl4, PCE, Chloroform, TCE
Residential Adult	4 E-04	4 E-07	1 E-04	5 E-04	2 E-07	5E-04	2 3	0 0073	0 11	2 5	6 66E-05	2.5	As, dieldrin, PCA1122, TCA112, DCE11, DCA12, Bromodichloromethane, CCl4, Chloroform, PCE, TCE
Residential Child							5 5	0 011	0 26	5 7	2 33E-04	5 7	TCE, Manganese
Northwest Plume;													
Industrial Worker	2 E-03	6 E-07	2 E-03	3 E-03	8 E-08	3E-03	4 6	0 0067	0 63	5 3	2 04E-04	5 3	As, PCA1122, TCA112, DCE11, DCA12, DCP12, Benzene, CCl4 Chloroform PCE, TCE, VC
Residential Adult	8 E-03	8 E-06	7 E-03	1 E-02	2 E-07	1E-02	13	0 070	1 8	15	2 86E-04	15	As, PCA1122, TCA112, DCE11, DCA12, DCP12, Benzene, CCl4, Chloroform, PCE, TCE, VC
Residential Child							30	0 11	4 1	34	0 0010	34	TCE
Southwest Plume;													
Industrial Worker	1 E-04	5 E-08	2 E-04	3 E-04	2 E-08	3E-04	1 6	0 0014	0 0099	1 6	2.02E-05	1 6	As, PCA1122, TCA112, CCl4, Chloroform, PCE, TCE
Residential Adult	6 E-04	7 E-07	8 E-04	1 E-03	4 E-08	1E-03	4 5	0 014	0 028	4 6	2 82E-05	4 6	As, PCA1122 TCA112, Bromodichloromethane, CCl4, Chloroform, PCE TCE
Residential Child							11	0 022	0 065	11	9 87E-05	11	CCl4, Chloroform, TCE

HI = Hazard indices

ELCR = Exposure

TABLE 15-12
Offsite and Onsite Monitoring Wells

Rev. 1 Memphis Depot Dunn Field RI

LOCATION	COPCs	VOCs Detected
OFFSITE INDIVIDUAL WELLS		
MW30	YES	NO
MW31	YES	YES
MW32	YES	YES
MW33	YES	YES
MW37	YES	NO
MW40	YES	YES
MW42	YES	NO
MW44	YES	YES
MW54	YES	YES
MW51	YES	YES
MW67	NO	YES
MW71	YES	YES
MW76	YES	NO
MW77	YES	NO
MW80	NO	NO
MW78	NO	NO
MW79	YES	YES
SOUTHWEST PLUME	YES	YES
MW06		
MW15		
MW57		
NORTHWEST PLUME	YES	YES
MW12		
MW70		
MW73		
MW75		
NORTH PLUME	YES	YES
MW30		
MW31		
MW51		
MW78		
MW29		
MW08		
MW07		
MW02		
MW10		
MW03		
MW68		

COPCs = Chemicals of Potential Concern
VOCs = Volatile Organics

Table 15-13

Summary of Risks and Hazards at Offsite Plumes

Rev 1 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Groundwater				Indoor Air	Total ELCR	Groundwater				Indoor Air	Total HI	COPCs of Concern
	Ingestion	Dermal	Inhalation	Total	Inhalation		Ingestion	Dermal	Inhalation	Total	Inhalation		
MW30,													
Residential Adult	5 E-05	1 E-09		5 E-05		5E-05	0.81	0.0027		0.81		0.81	As
Residential Child							1.9	0.0041		1.9		1.9	As
MW31													
Residential Adult	5 E-04	7 E-07	3 E-04	8 E-04	1 E-07	8E-04	3.0	0.014	0.076	3.1	5.29E-05	3.1	Chlorinated solvents
Residential Child							7.0	0.021	0.18	7.2	1.85E-04	7.2	Chlorinated solvents
MW32													
Residential Adult	3 E-04	3 E-07	2 E-03	2 E-03	4 E-08	2E-03	5.0	0.013	0.029	5.0	1.52E-05	5.0	Chlorinated solvents
Residential Child							12	0.020	0.067	12	5.31E-05	12	Chlorinated solvents
MW33													
Residential Adult	1 E-04	9 E-09	7 E-06	2 E-04	5 E-10	2E-04	1.4	0.0028	0	1.4	0	1.4	Chlorinated solvents
Residential Child							3.2	0.0043	0	3.2	0	3.2	Chlorinated solvents
MW37													
Residential Adult	*No carcinogenic COPCs*						0.36	0.0010	0	0.36		0.36	
Residential Child							0.83	0.0016	0	0.84		0.84	
MW40													
Residential Adult	2 E-05	2 E-08	6 E-06	3 E-05	6 E-08	3E-05	0.35	8.83E-05	0	0.35	0	0.35	1,1-Dichloroethene
Residential Child							0.83	1.35E-04	0	0.83	0	0.83	
MW42													
Residential Adult	0 E+00	0 E+00	0 E+00	0 E+00		0E+00	0.19	8.23E-04	0	0.19		0.19	
Residential Child							0.44	0.0013	0	0.44		0.44	
MW44													
Residential Adult	2 E-04	3 E-08	6 E-06	2 E-04	4 E-08	2E-04	2.2	0.0011	0	2.2	3.09E-08	2.2	As, Chlorinated solvents
Residential Child							5.2	0.0017	0	5.2	1.08E-05	5.2	As, Fe, Chlorinated solvents

Table 15-13

Summary of Risks and Hazards at Offsite Plumes

Rev 0 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Groundwater				Indoor Air	Total ELCR	Groundwater				Indoor Air	Total HI	COPCs of Concern
	Ingestion	Dermal	Inhalation	Total	Inhalation		Ingestion	Dermal	Inhalation	Total	Inhalation		
MW54													
Residential Adult	5 E-05	1 E-07	5 E-05	1 E-04	5 E-08	1E-04	1 1	0 0028	0 077	1 2	1 30E-04	1.2	Chlorinated solvents
Residential Child							2 6	0 0044	0 18	2 8	4 54E-04	2.8	Chlorinated solvents
MW51													
Residential Adult	2 E-04	2 E-07	4 E-05	2 E-04	2 E-07	2E-04	0 42	3 34E-04	2 76E-04	0 42	4 22E-06	0.42	Chlorinated solvents
Residential Child							0 97	5 10E-04	6 43E-04	0 97	1 48E-05	0.97	As
MW71													
Residential Adult	6 E-04	9 E-07	2 E-03	2 E-03	5 E-08	2E-03	5 0	0 018	0 026	5 0	1 91E-05	5.0	Chlorinated solvents
Residential Child							12	0 028	0 061	12	6 68E-05	12	Chlorinated solvents
MW76/77													
Residential Adult	7 E-03	7 E-06	7 E-03	1 E-02	5 E-08	1E-02	8 9	0 056	0 35	9 3	0 0016	9.3	Chlorinated solvents
Residential Child							21	0 086	0 81	22	5 26E-04	22	Chlorinated solvents
MW79													
Residential Adult	4 E-04	4 E-07	1 E-04	5 E-04	1 E-07	5E-04	0 31	0 0011	0 043	0 36	1 37E-04	0 36	Chlorinated solvents
Residential Child							0 73	0 0017	0 10	0 83	4 80E-04	0 83	Chlorinated solvents

HI = Hazard Indices

ELCR = Excess Lifetime Cancer Risk

COPC = Chemicals of Potential Concern

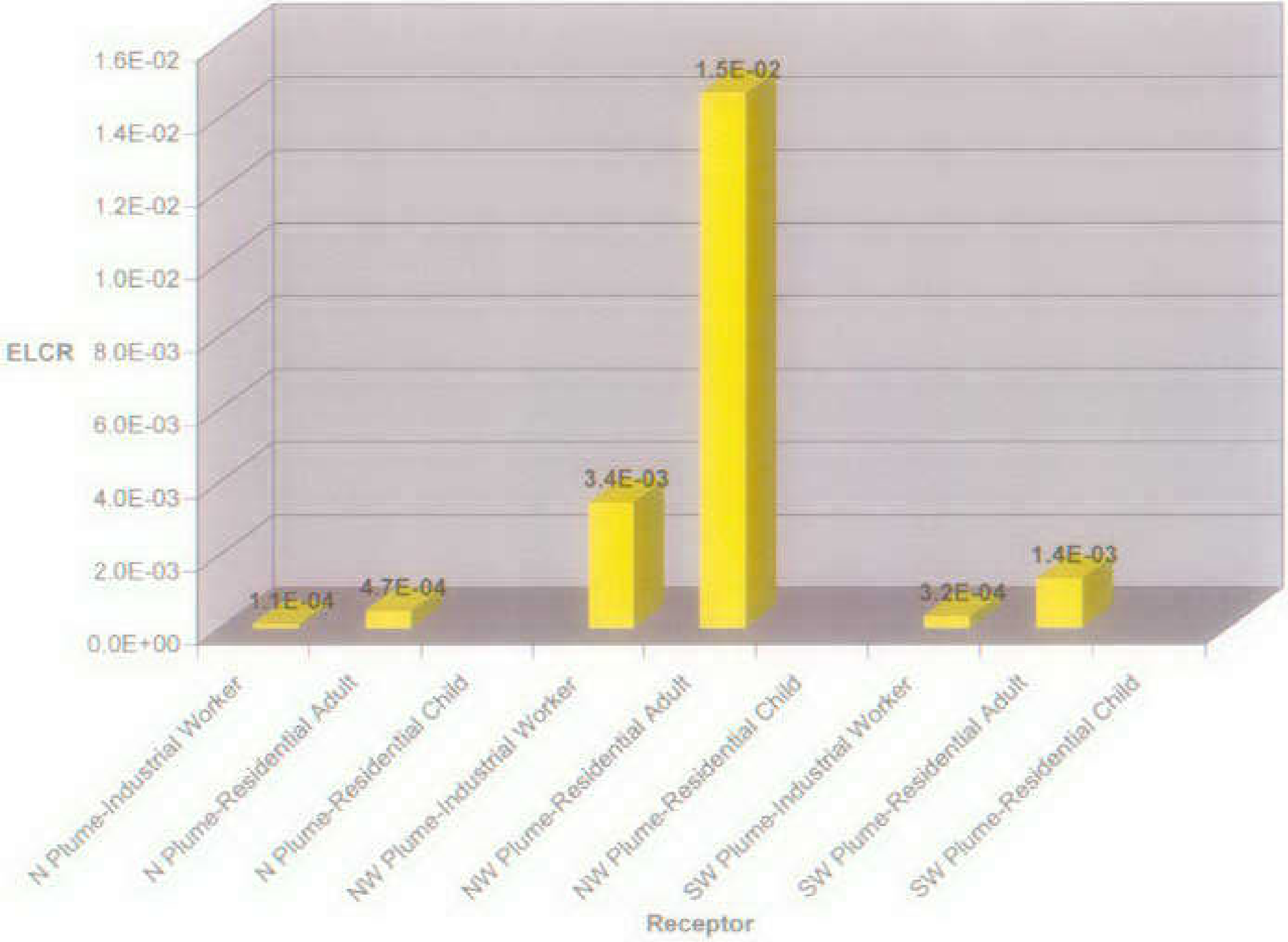
Table 15-14
Remedial Action Objectives for Groundwater
Rev 1 Memphis Depot Dunn Field RI

Media	Land Use	Remedial Action Objectives (from RI)	General Response Actions
Groundwater (Onsite) (Disposal Area and Northeast Open Area)	Industrial worker	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
	Residential Adult	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
	Residential Child	HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
Groundwater (Onsite) (Disposal Area and Northeast Open Area)	Industrial worker/Residential Adult and Child	No gropundwater contamination was identified in this area of Dunn Field	No Action
Indoor Air (Onsite) (Groundwater-to-Indoor Air)	Industrial worker	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for inhalation exposures from VOCs migrating to indoor air	No Action
	Residential Adult	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for inhalation exposures from VOCs migrating to indoor air	No Action
	Residential Child	HI is less than 1 0, for inhalation exposures from VOCs migrating to indoor air	No Action
Groundwater (Offsite)	Industrial worker	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1.0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
	Residential Adult	Risks exceed acceptable range of 1 in 10,000 to one million and HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
	Residential Child	HI exceeds 1 0 due to presence of chlorinated VOCs	Prevent use of groundwater for potable use/prevent offsite migration/remediate groundwater to drinking water standards
Indoor Air (Offsite) (Groundwater-to-Indoor Air)	Industrial worker	Risks are below 1 in a million, and hazard index (HI) is less than 1 0, for inhalation exposures from VOCs migrating to indoor air	No Action
	Residential Adult	Risks are below 1 in a million, and hazard index (HI) is less than 1.0, for inhalation exposures from VOCs migrating to indoor air	No Action
	Residential Child	HI is less than 1.0, for inhalation exposures from VOCs migrating to indoor air	No Action

Figures

Figure 15-1.Total Excess Lifetime Cancer Risk for Onsite Groundwater Exposure

Rev. 1 Memphis Depot Dunn Field RI



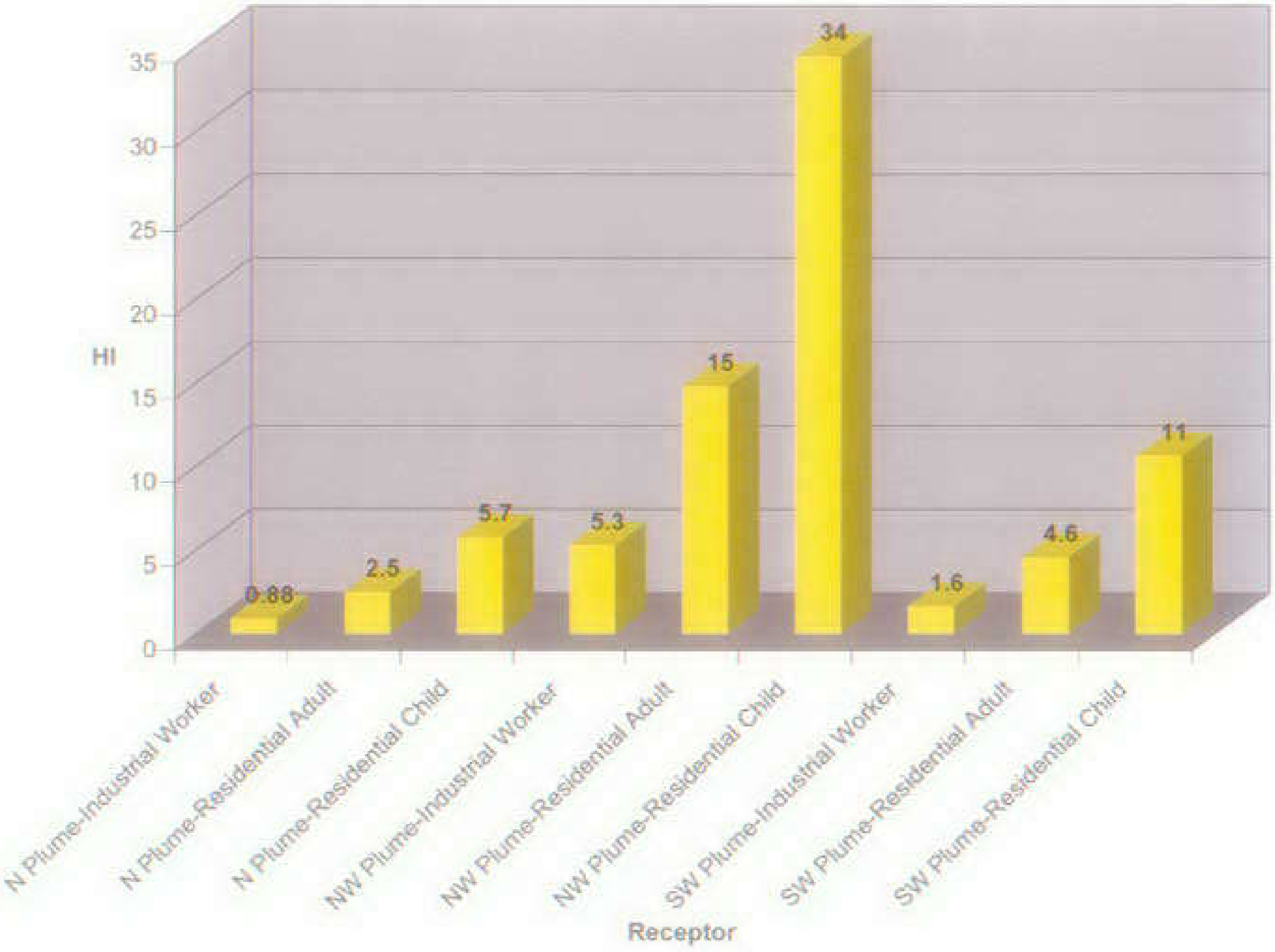


Figure 15-2.Total Hazard Indices for Onsite Groundwater Exposure
Rev. 1 Memphis Depot Dunn Field RI

Figure 15-3.Total Excess Lifetime Cancer Risk for Offsite Residential Groundwater Exposure

Rev. 1 Memphis Depot Dunn Field RI

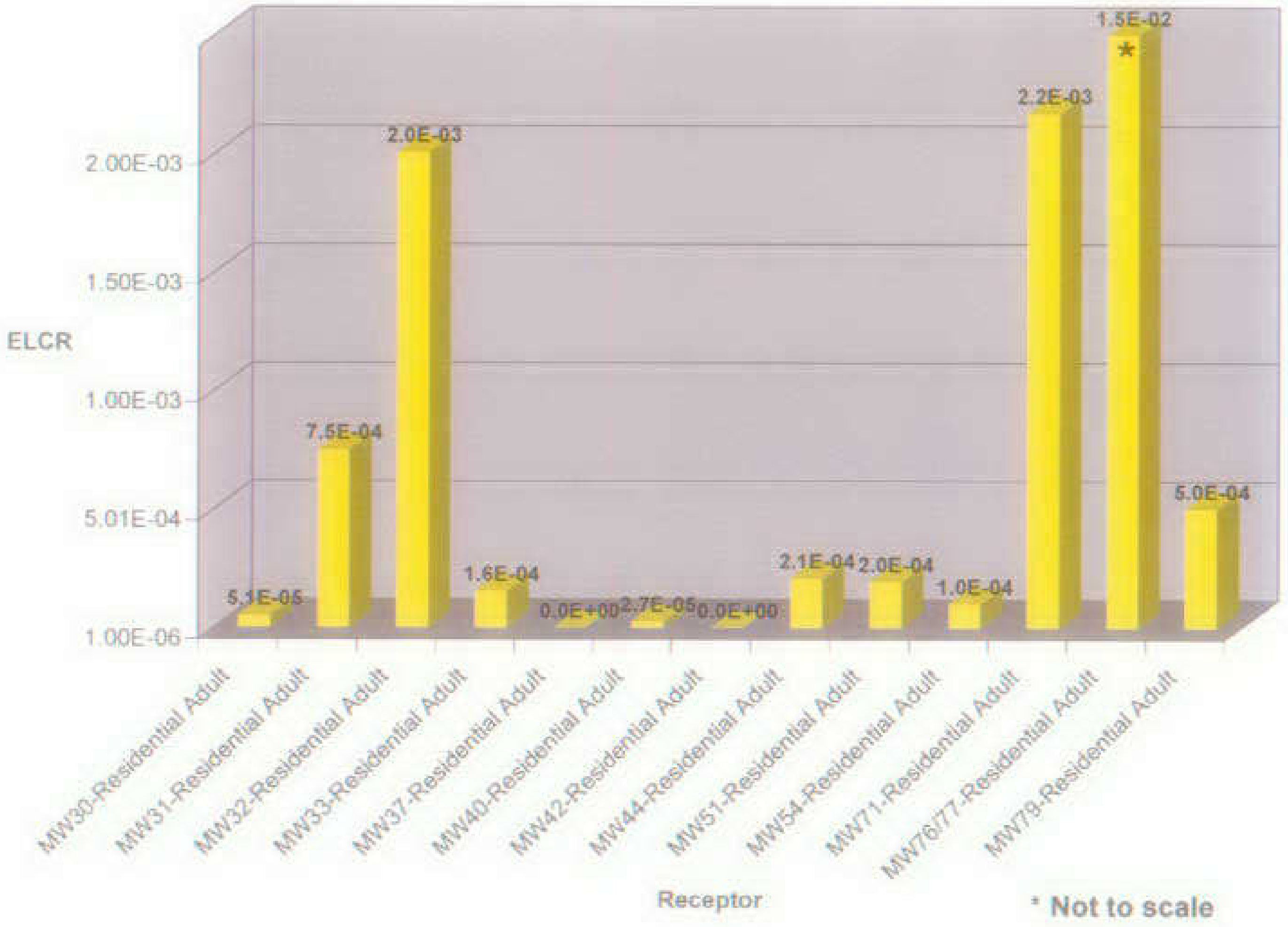
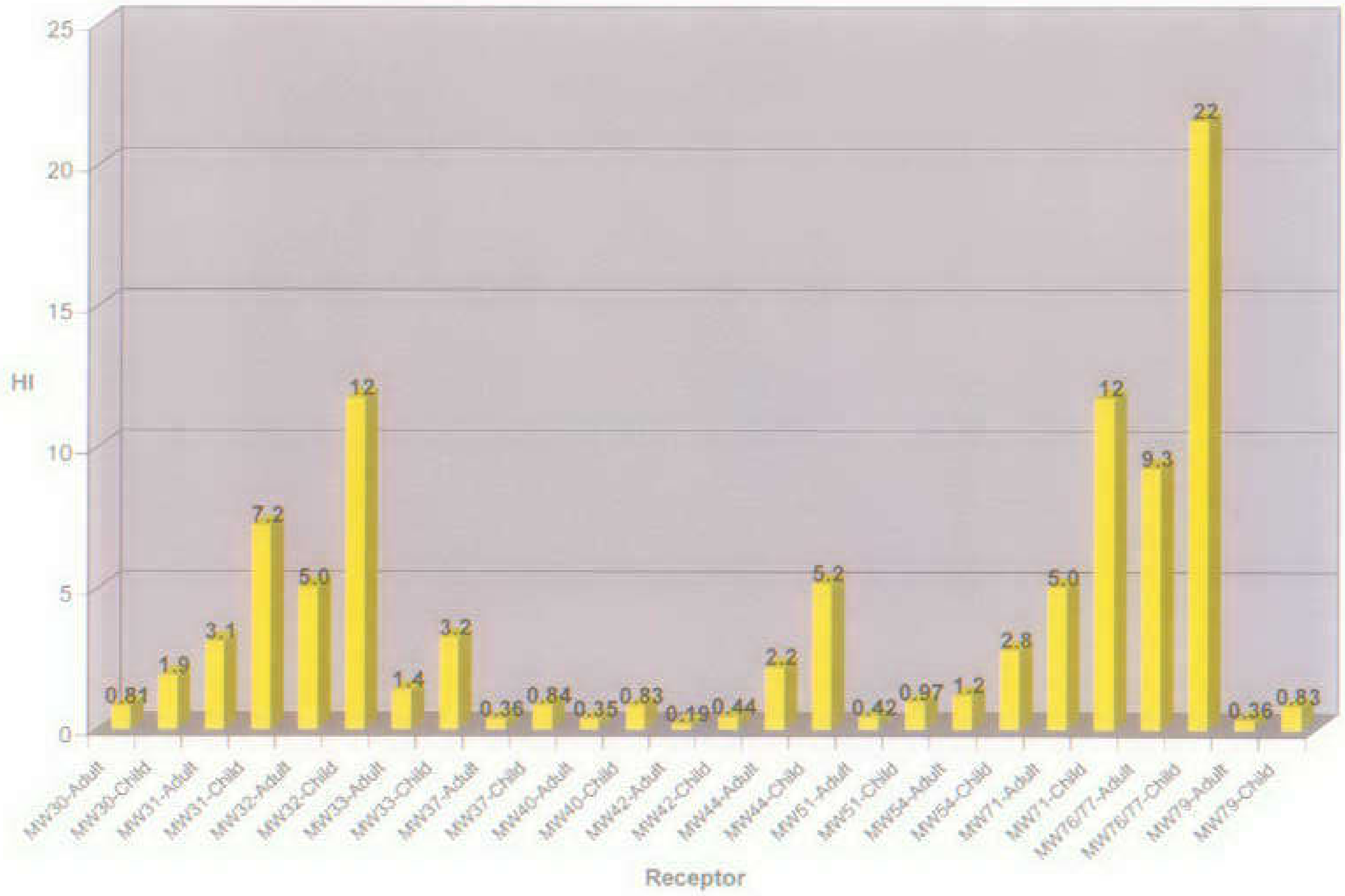


Figure 15-4. Total Hazard Indices for Offsite Residential Groundwater Exposure
Rev. 1 Memphis Depot Dunn Field RI



TAB

Section 16

16.0 Groundwater Contaminant Fate and Transport

16.1 Introduction

Understanding the fate and transport of site-related contaminants is important in assessing how well proposed remedial actions (including no action) may reduce exposure to potential offsite receptors. This section describes the potential migration pathways, mechanisms for transport, and behavior (fate) of chemical substances migrating from the site into groundwater. Previous sections discussed the potential exposure both from direct contact with chemicals in surface soil and from residual chemicals in soil that affect onsite groundwater Dunn Field includes numerous disposal pits and trenches. Available information indicates that only pits and trenches located on the western half of Dunn Field (the Disposal Area) and an undetermined source near PZ02 are potential sources of offsite groundwater contamination.

This section presents the following:

- Review of the CSM;
- Description of the properties and migration potential of COCs,
- Description of processes affecting migration of COCs in groundwater; and
- Description of potential plume migration downgradient of Dunn Field.

16.2 Conceptual Site Model

Dunn Field is the only known area at the Depot to include landfilling activities, and the majority of the burial sites are located on the western side in the Disposal Area. Installation records indicate that various types and quanities of wastes were buried in this area. The wastes have the potential to leach contaminants to groundwater. Based on frequency of detection and spatial occurrence in groundwater, eleven VOCs were selected as COCs:

Tetrachloroethene (PCE)	Trichloroethene (TCE)	Carbon tetrachloride (CCl4)
Total 1,2-dichloroethene (total 1,2-DCE)	1,1-dichloroethane (1,1-DCA)	1,1-dichloroethene (1,1-DCE)
1,1,2- trichloroethane (1,1,2-TCA)	1,1,1-trichloroethane (1,1,1-TCA)	1,1,2,2-tetrachloroethane (1,1,2,2-PCA)
Vinyl chloride	Chloroform	Arsenic

Some of these COCs were not disposed of within Dunn Field, but have formed through degradation of other COCs. Only 1,1-DCE is considered to have been released from an offsite source. The highest concentrations of 1,1-DCE have been detected north-northeast of Dunn Field in the vicinity of PZ02, indicating an offsite source area for this compound.

The CSM for groundwater at Dunn Field has a hydrogeological framework of three water-bearing units: the fluvial aquifer, the intermediate aquifer, and the Memphis aquifer. Logs of multiple test borings indicate that the vadose zone consists of about 30 feet of loess (silt), 10 feet of sandy clay/clayey sand, and up to 45 feet of sand, gravelly sand, and sandy gravel. The fluvial aquifer is locally 10 to 12 feet thick and occurs within gravelly sand lithologies below the vadose zone. Beneath the fluvial aquifer is a confining clay (approximately 70 to 95 feet thick) followed by the intermediate aquifer comprised of up to 50 feet of alternating sand and clay layers (each layer up to 20 feet thick). Approximately 75 to 100 feet of alternating sand, silt, and clay layers (each layer averages 5 feet thick) separate this aquifer from the underlying Memphis aquifer

Movement of COCs begins with infiltration of rain through contaminated soil. The rainwater dissolves the chemicals and carries them vertically through the vadose zone into the fluvial aquifer (Figure 16-1). Within the fluvial aquifer, the dissolved COCs migrate in the direction of groundwater flow. Although there is a pervasive downward gradient, the clay layer that separates the fluvial aquifer from the underlying intermediate aquifer greatly slows the downward migration of the COCs. In areas west of Dunn Field, test borings indicate the clay is thin or absent (Figure 2-9). Wherever the clay is thin or absent, COCs may migrate downward into the intermediate aquifer, and may ultimately reach the Memphis aquifer (Figure 16-1).

Within the fluvial aquifer, the groundwater flows predominantly to the west/northwest shifting more north/northwest near MW-54 and MW-76 (Figure 2-12A). A potentiometric low occurs near MW-40 that is interpreted as an area where the fluvial aquifer is draining into the underlying intermediate aquifer. If there is a local opening in the clay layer separating these two aquifers, then COCs may be able to migrate down into the lower aquifer.

Below the intermediate aquifer is the Memphis aquifer. The log of MW-67 (total depth: 275 feet bgs) shows 80 feet of alternating clay/silt layers separating the intermediate aquifer from the Memphis aquifer. A "continuous" clay/silt unit in the area between Dunn Field and the Allen Well Field (Figure 16-1) would be a substantial barrier to potential migration of dissolved COCs into the Memphis aquifer. However, if the unit is discontinuous, there is a possibility that dissolved COCs within the intermediate aquifer could migrate into the Memphis aquifer and then into municipal wells at the Allen Well Field. There is currently no evidence that COCs in the fluvial aquifer at Dunn Field have entered the Memphis aquifer. As indicated in later paragraphs of this section, a "reasonable worst case scenario" assumes that COCs will migrate from the fluvial aquifer through the intermediate aquifer into the Memphis aquifer (Figure 16-1).

16.3 Chemical Properties

The physical and chemical properties of chemicals detected in soil and groundwater at Dunn Field are discussed in Section 6 and summarized in Tables 6-1 and 6-2. This section focuses on the properties of COCs reported in groundwater (Table 16-1). Many of the properties listed in Tables 16-1 and 16-2 can be used to estimate the relative mobility of a chemical in groundwater. The property best suited for estimating migration is Kd, the distribution coefficient (between soil/aquifer matrix and groundwater).

Published K_d values for metals and organic chemicals generally represent the potential relationship between water and the chemical at the surface of the soil, which is as follows:

$$K_d = C_{absorbed}/C_{water}$$

Where:

$C_{absorbed}$ = absorbed concentration of chemical on soil/matrix

C_{water} = concentration of chemical in groundwater

This relationship is useful in determining retardation, or the "speed" of the chemical migration relative to the "speed" of groundwater movement. The use of the retardation factor is discussed in more detail in Section 16.4.

16.3.1 Metals

Inorganic chemicals including metals released to unsaturated soil may migrate if they become dissolved in soil moisture and groundwater. The process of transporting metals through the vadose zone at Dunn Field might take many years, due to the generally low solubility of metals, and their tendency to adsorb to soil. Within the fluvial aquifer, dissolved metals typically move at a slower rate than groundwater. The estimated retardation factors for metals in Table 16-1 are all less than 1. True retardation factors for metals in the fluvial aquifer are difficult to determine because the K_d values may vary widely in the same soil type, and may vary by orders of magnitude in different soil types from the same site (EPA, 1996).

Growth of a contaminant plume is affected by both contaminant mobility and persistence. Contaminant persistence is a function of physical, chemical, and biological processes that affect the chemical as it moves through water. Metals, unlike organic compounds, do not degrade in either soil or groundwater. Therefore, a plume of dissolved metals is controlled primarily by the mobility of each metal The mobility of most metals is directly related to solubility, pH, and redox conditions The pH of groundwater in the fluvial aquifer ranges from 5.49 (MW-35) to 7.9 (MW-62). Most cationic metals in Table 16-1 (beryllium, cadmium, lead, manganese, and nickel) show increased solubility at lower (more acidic) pH, while anionic metals (aluminum, arsenic, chromium, vanadium) may exhibit the reverse behavior (Dominico and Schwartz, 1990). Similarly, redox conditions will have very little effect on most metal ions that occur in a single oxidation state in water (beryllium, cadmium, lead, and nickel) In contrast, changes in redox conditions may have dramatic effects on the solubility of metal ions that may occur in multiple oxidation states (aluminum, arsenic, chromium, manganese, and vanadium).

In summary, changes in local groundwater chemistry may enhance or diminish the solubility of a metal contaminant In general, groundwater conditions at Dunn Field cause metals to adsorb to soil and to occur at low dissolved concentrations. These conditions indicate that, although metals have been detected in the fluvial aquifer, they are not mobile and have a very low migration potential.

A recurring issue at the Depot has been the level of aluminum and iron in groundwater samples. Distinguishing between evidence of a contaminant release and the natural occurrence of these metals is important. Stockpiles of bauxite, which is an aluminum ore, was stored on Dunn Field. Concentrations of aluminum in groundwater associated with Dunn Field could be attributed to leaching from former onsite bauxite.

Iron is not a primary constituent of materials handled or wastes disposed of at Dunn Field. The occurrence of iron in groundwater suggests that this metal is not related to site activities, based on the following:

- Along with other metals detected in groundwater, the distribution of iron above screening levels in the fluvial aquifer appears to be random. The distribution has no apparent correlation with process/disposal areas within the Depot.
- There is no "plume" of iron relating to groundwater flow directions. In addition, at some locations the concentrations are directly related to the turbidity (sediment content) of the groundwater sample.
- Iron is the third most abundant metal in the earth's crust. Natural processes continually release iron (and other metals) from soil and in groundwater with low redox potential. The dissolved levels of iron may naturally be very high.

16.3.2 Chlorinated VOCs (CVOCs)

The principal source of CVOCs in groundwater is releases of chlorinated solvents. As discussed in Section 14, there are primarily two dissolved CVOC plumes in the fluvial aquifer at Dunn Field. The Western Plume is the largest, most concentrated of the plumes, and has two distinct centroids: one in the Disposal Area near MW-73 (northwest portion of Dunn Field), and the second near MW-15. Consistent with the CSM, the western CVOC plume extends in the direction of groundwater flow towards the west/northwest. The second CVOC plume is in the northeastern corner of Dunn Field This plume also follows groundwater flow to the west. Two components of the second plume, 1,1,1-TCA and its degradation product 1,1-DCA, are the result of an offsite 1,1,1-TCA source near PZ02. Low levels of PCE and TCE in the second plume appear to be from an unidentified source in the northeastern corner of Dunn Field (Northeast Open Area).

Releases of chlorinated solvents sometimes create both DNAPL and dissolved plumes. As discussed above, the CSM of COC migration contains only a dissolved plume. One test for the presence of a DNAPL plume is CVOC concentrations in groundwater. EPA (1991) suggests a measured concentration equal to 1 percent of the effective solubility of a chlorinated solvent is a good indicator of a DNAPL plume. Prior to 2000, maximum CVOC concentrations in groundwater samples from Dunn Field were orders of magnitude below this criterion. However, in sampling performed at MW-70 in February 2000, a TCE concentration of 11,700 µg/L (>1 percent of TCE solubility) was detected. Since the February 2000 sampling event, MW-70 has been re-sampled 5 times, with TCE concentrations ranging from 538 to 4,240 µg/L MW-73 was installed during November 2000 and sampled during the January/February 2001 sampling event A 1,1,2,2-PCA concentration of 33,000 µg/L was detected and exceeds 1 percent of 1,1,2,2-PCA solubility (29,000 µg/L). These findings indicate possible evidence of a DNAPL in the groundwater near MW-70 or beneath Dunn Field near MW-73.

Another measure of a potential DNAPL plume is solvent levels in soil. Results of extensive soil testing conducted in the Southeast have suggested that TCE soil concentrations above 225,000 µg/kg are a reliable indicator of DNAPL (LMES, 1997). In extensive soil sampling in potential source areas at Dunn Field, only one boring, SBLEE (TCE at 460,000 µg/kg), exceeded this DNAPL threshold. Soil boring SBLEE-SB-1 was drilled within 5 feet of SBLEE in 2000 and sampled at 5, 34, and 67 feet bgs, with no TCE concentrations exceeding 11.1 µg/kg. In addition, soil samples collected during the 2000 soil sampling event at Dunn Field were subjected to a shake test using a hydrophobic dye (Sudan IV dye) which turns bright red in the presence of DNAPL. Although these tests do not indicate the presence of DNAPL in the soil, historical information (analytical results and disposal information) suggests that DNAPL may be present in the soils beneath Dunn Field.

16.4 Physical Processes Affecting Chemical Migration

Chemicals dissolved in groundwater typically migrate more slowly than the water. The retardation factor, R_d, is the migration rate (velocity) of the chemical relative to the velocity of the water:

$$R_d = Vc/V = 1 + (K_d\,\rho)/\eta$$

Where:

R_d = chemical-specific retardation factor (dimensionless)

Vc = average migration rate of chemical (ft/day)

V = seepage velocity of groundwater (ft/day)

ρ = bulk density of aquifer matrix (g/cc) {typically assumed to be 1.67 g/cc (Everett, Wilson, and Hoylman, 1984)}

η = total porosity (dimensionless) {typically assumed to be 0.40 (Dawson and Istock, 1991)}

K_d = chemical-specific distribution coefficient between soil and water (cc/g)

The distribution coefficient K_d (Table 16-1) may be measured, or for organic chemicals estimated, from the following:

$$K_d = K_{oc} * foc$$

Where:

K_{oc} = chemical-specific organic carbon partition coefficient

foc = fraction of organic carbon in soil {average value for Dunn Field is 0.002315 for all soil samples analyzed during this RI)}

Using estimates of K_d from literature or calculations, the chemical migration rates for site-related COCs are presented in Table 16-1.

The rate of migration of dissolved COCs in an aquifer is affected by two flow-related components· advection and dispersion. Advection is transport in the moving groundwater; the advective rate component is related to the seepage velocity. The advective rate can be estimated using the seepage velocity of the fluvial aquifer and the retardation factor. At Dunn Field, the seepage velocity within the fluvial aquifer is estimated to be 0.57 foot/day. If retardation is negligible, then a dissolved chemical might migrate within the fluvial aquifer at the rate of 0.57 foot/day or about 210 feet/year.

Plume migration through the aquifer causes dispersion or mixing that tends to spread the plume. Dispersion sometimes causes contaminants to move ahead of adjacent particles of water, thus making the plume appear to move more rapidly than the average seepage rate. Note that dispersion occurs both horizontally and vertically, both along the flow direction and perpendicular to it. Dispersion may cause chemicals to migrate from 10 percent to 20 percent farther than predicted from advection alone.

As mentioned above, the retardation factor is used to estimate the "overall" rate of chemical migration relative to the groundwater seepage velocity:

$$V_c = V / R_d$$

where

V_c = chemical horizontal migration velocity (ft/yr)

V = site-specific groundwater flow velocity (ft/yr)

R_d = chemical-specific retardation factor (dimensionless)

Using an estimated seepage velocity and 20 percent increase due to dispersion, horizontal migration velocities in the fluvial aquifer were calculated (Table 16-1). The calculations do not include any effects of degradation of the organic chemicals (see below). As indicated in the table, the CVOCs are potentially the most mobile compounds in the fluvial aquifer. Assuming no degradation has occurred, the calculations in Table 16-1 indicate that a CVOC plume should extend as much as 4,302 feet (0.81 mile) downgradient of Dunn Field. These estimates show that the plume in the fluvial aquifer should not yet have reached the Allen Well Field, which is about 1.5 miles from Dunn Field.

16.5 Natural Attenuation

Biological and chemical processes can degrade plumes of chlorinated solvents. The calculations presented in Table 16-1 suggest that the CVOC plume should extend up to 0.8 miles downgradient of Dunn Field. The fact that the plume is only about one-fourth of this length is partly attributed to degradation of the CVOCs. Flow boundary conditions located west and southwest of Dunn Field in the fluvial aquifer also effect CVOC movement. The confining clay surface below the fluvial aquifer in this area rises and creates low saturated thickness conditions, which are reflected in the westernmost sentry wells. A thinning of the aquifer would cause a retarding effect on plume migration.

Both aerobic and anaerobic biodegradation are important transformation processes for CVOCs in natural water systems and soil (Wiedemeier *et al.*, 1999). Considerable research has been done on the degradation mechanisms and pathways for this class of compounds.

Although several degradation pathways could occur for these constituents, the following pattern appears to be the primary pathway for degradation under anaerobic conditions:

PCE-----> TCE-----> DCE-----> vinyl chloride-----> ethene-----> ethane

The most practical method to evaluate biodegradation is to measure the concentration of CVOCs and their metabolites or biodegradation byproducts within the contaminant plume. A typical pattern is maximum PCE and/or TCE concentrations in (near) the source area, with elevated DCE concentrations (consisting mostly of *cis*-1,2-DCE) in and just downgradient of the source area (Vogel, 1994, Wiedemeier *et al.*, 1999). Vinyl chloride concentrations may occur along the entire plume length, with the highest concentrations likely to be found near the downgradient end of the plume. If vinyl chloride is being reductively dechlorinated, dissolved ethene (and possibly ethane) will also be measurable in downgradient parts of the plume

Data collection and analysis to support monitored natural attenuation (MNA) was implemented at the Depot during quarterly sampling events. Selected MNA parameters were collected for screening purposes during the March and October 1998 sampling events. The results of the 1998 study indicated that a more complete MNA study of the fluvial aquifer across Memphis Depot should be completed. The follow-up MNA study, which was originally published in the 2000 RI report for the MI, is presented in Appendix A-1. The following paragraphs discuss the findings of the 1998 and 2000 MNA studies.

16.5.1 1998 MNA Results

During the March 1998 and October 1998 groundwater monitoring events, natural attenuation parameters were measured from wells installed at Dunn Field (Table 16-2). The MNA measurements indicated that biodegradation was not a dominant physical process in the fluvial aquifer. Certain observations, such as the presence of cis-1,2-DCE associated with PCE and TCE, indicated biotransformation of PCE and TCE. The geochemical conditions in groundwater did not indicate a reductive environment, but reductive conditions appeared to occur in the soil column. The lack of detectable vinyl chloride in the groundwater plume indicated that vinyl chloride was degrading within the fluvial aquifer. The results also indicated that reductive dechlorination was occurring in the fluvial aquifer, but possibly at low rates.

16.5.2 2000 MNA Results

The 2000 MNA study was conducted to assess the rate of reductive dechlorination within the fluvial aquifer. The work was performed at Dunn Field on March 20 through 24, 2000, in accordance with the Sampling and Analysis Plan for Evaluation of Biodegradation of VOCs in Groundwater at the Memphis Depot (CH2M HILL, March 2000). Data were collected to allow application of the Wiedemeier *et al.* (1996) protocol to confirm the biodegradation potential within the fluvial aquifer associated with Dunn Field, as required in the screening step of the EPA Region IV Natural Attenuation Guidance (USEPA, 1998). The document was revised in 2001 based on comments received in the final *Remedial Process Optimization* report (Parsons, 2001). Worksheets based on the Wiedemeier protocol with detailed descriptions of all of the monitoring wells are located in Table 12 of Appendix A-1 A summary of the Wiedemeier scores is included below:

702 855

Monitoring Well (Dunn Field)	Total Score	Interpretation
MW-46	4	Inadequate evidence for biodegradation of chlorinated organics
MW-71	4	Inadequate evidence for biodegradation of chlorinated organics
MW-15	8	Limited evidence for biodegradation of chlorinated organics.
MW-31	9	Limited evidence for biodegradation of chlorinated organics.
MW-35	9	Limited evidence for biodegradation of chlorinated organics.
MW-54	10	Limited evidence for biodegradation of chlorinated organics.
MW-70	10	Limited evidence for biodegradation of chlorinated organics.
MW-40	14	Limited evidence for biodegradation of chlorinated organics.

In summary, the MNA study showed that although CVOCs at Dunn Field are undergoing reductive dechlorination, the process is limited and localized. As a result, TCE comprises the majority of the CVOC contamination throughout most of the plume.

16.5.3 Biodegradation Rates

The 2000 MNA dataset was used to estimate the first-order biological rate constants. Details of the methods are provided in Appendix A-1. Two approaches – the normalization method and the Buscheck and Alcantar (1995) method - may be used to calculate the first-order biological rate constant for a steady-state plume. The normalization method uses inorganic compounds (chloride) as conservative tracers to allow the measured contaminant (CVOC) concentrations to be corrected for the effects of dispersion, dilution, and sorption. The Buscheck and Alcantar method uses regression analysis of concentrations in a CVOC plume to determine the rate constants. The latter method was used for all of the CVOCs modeled in Section 16.6 below.

The first step for the Buscheck and Alcantar (1995) method involves plotting known concentrations for the CVOC versus the distance downgradient of the source, and calculating the slope of the regression line for these points (Tables 16-3A through 16-3H). The monitoring wells selected for this method are assumed to be within and downgradient of the source area, and located within a groundwater flow pathway. Once the slope is calculated, the following equation is used to calculate the first-order biological rate constant:

$$\lambda = \frac{v_c}{4\alpha_x}\left([1-2\alpha_x(m)]^2 - 1\right)$$

Where:

λ = first-order biological rate constant

v_c = retarded contaminant velocity in the x-direction

α = dispersivity
m = slope of line formed by making a ln-linear plot of contaminant concentration versus distance downgradient along flow path

Using the Buscheck and Alcantar (1995) method, estimated first-order rate constants and half-lives for PCE, TCE, 1,2-DCE, 1,1-DCE, 1,1,2,2-PCA, CCl4, and chloroform were calculated for the Dunn Field plumes. This method assumes no continued input from source areas. The normalization method was used to estimate the first-order rate constant and half-life for TCE only (Appendix A-1): Both of these methods assume the source term is not constant.

Data Set for Normalization Method		
COC	**λ (per year)**	**Half-Life (years)**
TCE	0.093 - 0.199	3.5 - 7.5

Buscheck and Alcantar Method (1995)		
COC	**λ (per year)**	**Half-Life (years)**
PCE	0.12	6.0
TCE	0.21	3.4
1,2-DCE	0.14	5.1
1,1-DCE	0.15	4.6
1,1,2,2-PCA	0.26	2.7
1,1,2-TCA	0.32	2.1
CCl4	0.057	12.2
Chloroform	0.58	1.2

16.6 Potential Plume Migration

A groundwater extraction system (see Section 14) operates along the western perimeter of Dunn Field to provide a hydraulic barrier to offsite migration of CVOC plumes in the fluvial aquifer. Data evaluated since network start-up show the system has been effective in reducing VOC concentrations in some offsite monitoring wells. However, a residual offsite plume is not captured by the extraction system. Downward leakage from the fluvial aquifer to the underlying intermediate aquifer may allow the offsite CVOC plumes to reach the Memphis aquifer; once within the Memphis aquifer, the CVOCs are expected to migrate toward the Allen Well Field (Figure 16-2). The Allen Well Field consists of 33 wells in the Memphis aquifer, each pumping approximately 1,000,000 gallons per day (MLGW, 1999).

This subsection discusses calculations used to evaluate potential plume impacts on water supplied from the Allen Well Field. The calculations assume the closest opening in the confining clay unit beneath the fluvial aquifer is located northwest of Dunn Field at (or near) MW-40. Plume calculations were performed using well-established transport models: BIOSCREEN (Air Force Center for Environmental Excellence [AFCEE], 1997) and BIOCHLOR (Air Force Center for Environmental Excellence [AFCEE], 2000). BIOSCREEN is able to simulate 2-dimensional advection, dispersion, and adsorption, plus both anaerobic and aerobic decay of organic contaminants in groundwater. BIOCHLOR has the same abilities as BIOSCREEN, but is also able to simulate sequential degradation of PCE to TCE to DCE to vinyl chloride. BIOSCREEN and BIOCHLOR were selected for their ability to provide a bounding transport calculation without extensive data. This approach is necessary because only limited hydrogeological data are available for the Memphis aquifer near Dunn Field.

The model calculations were based on the following:

1. Estimates of biodegradation rates for parent compounds (PCE, PCA) and compounds not in the degradation sequence (1,1-DCE, CCl4 and chloroform). All biodegradation rates used in the models were calculated using the Buscheck and Alcantar (1995) method;
2. Estimates of fluvial and Memphis aquifer parameters (hydraulic conductivity, effective porosity, hydraulic gradient, and dispersivity) are based on available area-specific and published data;
3. Estimates of the location and geometry of the opening in the confining clay near MW-40;
4. Stepwise estimates of CVOC concentrations in the fluvial aquifer that would be available to migrate down into the Memphis aquifer at the opening in the confining clay;
5. An average TOC within the fluvial aquifer (0.0046 g/g) determined from six soil samples collected during the 2000 DNAPL investigation at Dunn Field, and
6. A model domain assumed to be 2,000 feet wide by 12,000 feet long.

16.6.1 Potential CVOC Migration in the Fluvial Aquifer

The transport of CVOCs from Dunn Field to the opening in the confining clay at MW-40 was modeled using both BIOSCREEN and BIOCHLOR. The BIOSCREEN model was used for 1,1-DCE, CCl4, and chloroform. Biodegradation rates for these compounds were determined using the Buscheck and Alcantar method (Tables 16-3A through 16-3H). The BIOCHLOR model was used for PCE and its degradation products (TCE, 1,2-DCE, vinyl chloride) and for 1,1,2,2-PCA and its degradation products (1,1,2-TCA, 1,2-DCE, vinyl chloride). The source of CVOCs in the fluvial aquifer was represented by a constant source 500 feet wide and 12 feet deep.

The fluvial aquifer parameters used in the models are presented in the following table:

Parameter	Value	Basis
Hydraulic Conductivity	8.5 ft/day	Based on the geometric mean from slug test data at Dunn Field presented in Figure 2-13.
Hydraulic Gradient	0.0085 ft/ft 0.011 ft/ft	Hydraulic gradient between MW-73 and MW-79. Hydraulic gradient between MW-15 and MW-54.
Porosity	0.3	Estimated for a clean sand aquifer.
Biodegradation Rate and Half-life	Contaminant Specific	Calculated for parent compound using the Buscheck and Alcantar Method (1995). Rates for degradation products determined from model calibration. See Tables 16-3A through 16-3H.
PCE Retardation Factor	3.75	Tables 16-3A through 16-3H.
TCE Retardation Factor	2.74	
1,2-DCE Retardation Factor	2.13	
1,1-DCE Retardation Factor	2.13	
1,1,2,2-PCA Retardation Factor	3.75	
1,1,2-TCA Retardation Factor	2 74	
CCl4 Retardation Factor	2.25	
Chloroform Retardation Factor	1.90	

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BIOCHLOR was used for the ethene and ethane groups because it can simulate transport and biodegradation of CVOCs from parent to daughter compounds. BIOSCREEN was used to simulate transport and biodegradation of compounds that are not modeled by BIOCHLOR. For each model, estimated distances were calculated for each constituent from its source area to the opening in the clay (Figure 16-3) as follows:

Compound	**Estimated Distance to Opening (feet)**
PCE, TCE, 1,2-DCE, 1,1,2,2-PCA (MW-15 to MW-40)	2,100
CCl4, Chloroform (MW-73 to MW-40)	2,400
1,1-DCE (PZ-02 to MW-40)	3,200

Contaminant concentrations within Dunn Field have been greatly affected by recent groundwater remediation activities. Therefore, offsite concentrations were used to estimate initial source area concentrations. The following concentrations were used in BIOSCREEN or BIOCHLOR to represent source areas:

Compound	**Estimated Source Concentration (µg/L)**
PCE	300
TCE	11,000
1,2-DCE	100
1,1-DCE	150,000
1,1,2,2-PCA	33,000
CCl4	70
Chloroform	25,000

Each model was calibrated to recent groundwater concentrations based on an assumed initial release occurring in 1946 (55 years of plume migration). During model calibration, source area concentrations were modified to produce output that matched current groundwater concentrations. All calculated biodegradation rates approximately matched known groundwater concentrations except 1,1,2,2-PCA. This biodegradation rate grossly overestimated the known concentration at MW-79 by approximately 300 µg/L Therefore, the rate was modified to indicate a more reducing environment After the model was calibrated (matched current concentrations), it was used to estimate maximum concentrations that might reach the opening in the clay near MW-40. If estimated concentrations for a constituent equaled or exceeded EPA groundwater MCLs, then those concentrations reaching the breach were used as the initial concentration (source) inputs for modeling plume migration in the Memphis aquifer

The model inputs are presented on Figures 16-4A through 16-4E. Plots of CVOC concentrations calculated along the centerline of the plume from the source area to the clay opening are shown on Figures 16-5A through 5D. Estimated concentrations of each CVOC reaching the opening are shown below.

COC	Model	MCL (µg/L)	Maximum Concentration at Opening (µg/L)	Years to Reach Opening	Years to Reach Maximum Concentration at Opening
PCE	BIOCHLOR	5	**19**	22	87
TCE	BIOCHLOR	5	**5**	20	60
1,2-DCE	BIOCHLOR	70	1	26	30
1,1,2,2-PCA	BIOCHLOR	NA*	ND	NA	NA
1,1,2-TCA	BIOCHLOR	5	ND	NA	NA
1,2-DCE	BIOCHLOR	70	ND	NA	NA
1,1-DCE	BIOSCREEN	7	**25**	51	91
CCl4	BIOSCREEN	5	4	38	56
Chloroform	BIOSCREEN	NA*	ND	NA	NA

NA Not Applicable
* No MCL Established
Bolded estimates exceeded MCL

As indicated in the table, the models predict that only PCE, TCE, and 1,1-DCE may equal or exceed their respective MCL at the opening in the clay. All other CVOCs were predicted to be below detection limits. PCE and TCE would be transported to the opening within about 22 years. PCE and TCE would not reach maximum concentrations (of 19 and 5 µg/L, respectively) until approximately 90 and 60 years, respectively, after introduction to the fluvial aquifer. 1,1-DCE would reach the opening in approximately 50 years, and obtain a maximum concentration of 25 µg/L at approximately 90 years.

16.6.2 Potential CVOC Migration in the Memphis Aquifer

The potential transport of CVOCs in the Memphis aquifer was modeled using both BIOSCREEN and BICHLOR. Groundwater flow and transport parameters used in the models for the Memphis aquifer are tabulated below:

Parameter	Value	Basis
Hydraulic Conductivity	259 5 ft/yr 0.024 cm/sec	Based on the maximum published transmissivity measured in the Memphis aquifer - 53,500 ft^2/day - and an aquifer thickness of 800 ft. Transmissivity data from Parks and Carmichael (1990).
Hydraulic Gradient	0.00319 ft/ft	Measured from the potentiometric surface map of the Memphis aquifer, late summer-fall 1988 (Parks, 1990; Plate 3). A 40-ft drop in head was measured over a distance of 12,540 ft to the east of the Allen Well Field
Porosity	0.3	Estimated for a clean sand aquifer.
Longitudinal Dispersivity	54.9 ft 120.0	Calculated by BIOSCREEN for a plume 9,700 ft long. Calculated by BIOCHLOR for a plume 12,000 ft long.
Horizontal Dispersivity	5.5 ft 12.0	BIOSCREEN default of 1/10th of the longitudinal dispersivity. BIOCHLOR default of 1/10th of the longitudinal dispersivity
PCE Retardation Factor	3.75	Same factors as for fluvial aquifer (Tables 16-3A through 16-3D).
TCE Retardation Factor	2.74	
1,2-DCE Retardation Factor	2.13	
1,1-DCE Retardation Factor	2 13	

Due to lack of data, biodegradation rates within the Memphis aquifer were assumed to be 20 percent of the rates calculated for the fluvial aquifer. Assuming low degradation rates is a conservative approach to estimating plume migration. Actual degradation rates within the Memphis aquifer would likely be higher due to the anaerobic conditions in the aquifer. The following degradation rates were used in the models:

Compound	Estimated Biodegradation Rate for Memphis Aquifer (1/year)	Estimated Half-life for the Memphis Aquifer (years)
PCE	0.023	30.0
TCE	0 041	17.0
1,2-DCE	0.027	25.5
1,1-DCE	0.023	30.0

The model inputs for the Memphis aquifer are shown on Figures 16-6A and 16-6B. The source of CVOCs to the Memphis aquifer was represented as a "constant" source 500 feet wide and 50 feet deep. Sensitivity analyses were performed to evaluate the uncertainty of the source area (clay opening) dimensions. Increasing the width of the source from 500 to 1,000 feet did not increase the calculated centerline concentration (assuming biodegradation is occurring) of PCE, TCE, and 1,1,-DCE at the Allen Well Field. Increasing the depth of the source area to 200 feet also had no effect.

Plots of VOC concentrations calculated along the centerline of the hypothetical groundwater plume from the clay opening to the nearest Allen Well Field pumping well are shown on Figures 16-7A. These figures suggest a PCE plume may migrate to the nearest pumping well (approximately 9,700 feet) after 57 years, and reach a maximum concentration of 0.001 µg/L TCE at detectable concentrations probably will not reach the Allen Well Field The BIOSCREEN models indicate that 1,1-DCE may migrate to the Allen Well Field in about 72 years; and a maximum concentration of 0.002 µg/L may occur within about 82 years. The models predict that none of the CVOCs would exceed their respective MCL at the nearest pumping well within the Allen Well Field.

16.7 Evaluation of Assumptions

The plume migration models are based on very conservative assumptions and, in all likelihood, provide gross overestimates of future CVOC concentrations. The effects of the assumptions are discussed below.

- The models assume that a "source" concentration for the PCE, TCE, 1,2-DCE, 1,1-DCE, 1,1,2,2-PCA, CCl4, and chloroform is sustained indefinitely within the fluvial and Memphis aquifers. This assumption ignores biodegradation that would occur within the intervening intermediate aquifer. This is an extremely conservative assumption regarding potential concentrations of CVOCs in the Memphis aquifer

- The models assume the CVOC source is located within Dunn Field and does not migrate. This assumption ignores a mobile source, which would decrease the travel distance of the dissolved plume from "source" to breach; thus decreasing travel time and possibly increasing the CVOC concentrations reaching the breach.

- The models assume CVOCs migrate directly from the fluvial aquifer into the Memphis aquifer. In reality, CVOC concentrations should decrease during transport within the intermediate aquifer, possibly at the same rates that they decrease within the fluvial aquifer. This is considered an extremely conservative assumption about potential concentrations of CVOCs and travel time to the Allen Well Field.

- The models assume very low degradation rates for CVOCs within the Memphis aquifer. If biodegradation rates were set in the model equal to those of the fluvial aquifer, no constituents of the VOC plume would reach the well field. This is considered a reasonably conservative assumption about CVOC transport within the Memphis aquifer.

- The models assume the most significant and applicable down gradient breach or "window" in the upper clay confining unit beneath the fluvial aquifer to the lower intermediate aquifer is located northwest of Dunn Field at (or near) MW-40. This assumption is based on the fact that the highest concentrations of the groundwater

CVOCs are migrating from Dunn Field in a northwest direction toward this location. There are two other known breaches in the upper clay confining unit One breach is located to the west of Dunn Field near MW-43 and the other breach is located to the south near MW-34 (see Figure 16-2) The locations of these breaches or "windows" were not included as assumptions in the transport models. However, these breaches are important elements of the CSM and there is the potential for contaminant migration into the intermediate aquifer and Memphis aquifer at these locations.

The results from the model suggest PCE, TCE, and 1,1-DCE in the fluvial aquifer at Dunn Field will not adversely affect the water supply wells at Allen Well Field. Nonetheless, monitoring of potential VOC contamination within the intermediate aquifer as part of the onsite and offsite groundwater remedy would be required to be protective of the Memphis aquifer. Early warning from groundwater monitoring would allow time to implement additional remedial strategies to protect the water supply at the Allen Well Field

16.8 Summary of Findings

EPA models, BIOSCREEN and BIOCHLOR, were used as conservative approaches to estimate the movement of COCs from the source area at Dunn Field to the Allen Well Field. Two scenarios were used to model this pathway: (1) transport from source area to a breach in the confining clay below the fluvial aquifer near MW-40 and (2) transport from the breach to the Allen Well Field assuming the fluvial aquifer is connected directly to the Memphis aquifer. During the first scenario, the fate and transport of PCE, TCE, 1,2-DCE, 1,1-DCE, 1,1,2,2-PCA, CCl4, and chloroform were modeled and maximum concentrations were calculated at the breach for each constituent PCE, TCE, and 1,1-DCE were the only constituents that had concentrations equal to or exceeding EPA MCLs; only these constituents were used in the second scenario Maximum concentrations at the breach occur after 87 (19 µg /L), 60 (5 µg /L), and 91 years (25 µg /L). These maximum concentrations were used as initial inputs within the Memphis aquifer Using conservative estimates of natural attenuation rates, only PCE and 1,1-DCE reached the closest Allen Well Field pumping well above detection limits but still below the EPA MCLs of 5 and 7 µg/L, respectively; maximum concentrations would not occur at the pumping well for at least 57 years for PCE and 82 years for 1,1-DCE after VOCs entered the Memphis aquifer The model results strongly suggest the VOC contamination at Dunn Field will not affect the wells at Allen Well Field

Monitoring for VOCs within the intermediate aquifer at Dunn Field would be useful in providing early warning in the event that the Memphis aquifer were to become contaminated

Tables

Table 16-1

Distribution Coefficients and Horizontal Groundwater Migration Potential for Groundwater COPCs

Rev 0 Memphis Depot Dunn Field RI

Chemical Name of Groundwater COPC	K_{OC} (ml/g)	Distribution Coefficient K_d (cc/g)	Retardation Factor (R_f)	Chemical Migration Rate (ft/year)	Chemical Migration Rate (20% Increase Due to Dispersion) (ft/yr)	Horizontal Migration Potential (Distance [ft] over 55 years)
Volatile Organic Compounds						
1,1-Dichloroethene	43 8	0 2	3 3	62	74	3417
1,1,1-Trichloroethane	67 7	0 3	3 8	54	65	3592
1,1,2-Trichloroethane	67 7	0 3	3 8	54	65	3592
1,2-Dichloroethane	35 0	0 2	3 2	65	78	4302
1,2 Dichloroethene	43 8	0 2	3 3	62	74	4086
cis-1,2-Dichloroethene	43 8	0 2	3 3	62	74	4086
trans-1,2-Dichloroethene	43 8	0 2	3 3	62	74	4086
Carbon Tetrachloride	48 6	0 2	3 4	60	72	3975
Chloroform	35 0	0 2	3 2	65	78	4302
Tetrachloroethene	106 8	0 5	4 6	45	55	2999
Trichloroethene	67 7	0 3	3 8	54	65	3592
1,1,2,2-Tetrachloroethane	106 8	0 5	4 6	45	55	2999
Metals						
Aluminum		1500	6265	0 03	0 04	2
Arsenic		25	107	1 9	2 3	128
Beryllium		650	2716	0 08	0 09	5
Cadmium		80	337	0 6	0 7	41
Chromium		35	149	1 4	1 7	92
Lead		270	1130	0 2	0 2	12
Manganese		50	211	1 0	1 2	65
Nickel		400	1673	0 1	0 1	8
Vanadium		1000	4178	0 05	0 06	3

Assumptions

Transport Parameter	Value	Basis
(1) Foc (unitless)	0 0046	TOC data reported in Section 16 4
(2) Bulk density (g/cm^3)	1 67	Assumed for fluvial deposits
(3) Total porosity (unitless)	0 4	Assumed for fluvial deposits
(4) Effective porosity (unitless)	0 3	Assumed for fluvial deposits
(5) Hydraulic conductivity (ft/day)	8 5	Geometric Mean obtained from slug testing at Dunn Field (Figure 2-13)
(6) Hydraulic gradient (unitless)	0 02	Gradient from Wells MW-13 to MW-40 Assumed constant for all constituents
(7) Seepage velocity (ft/day)	0 57	[(5) x (6)]/(4)
(8) Seepage velocity (ft/year)	207	(7) x 365 days/year

Notes

$K_d = K_{OC} * F_{OC}$

K_{OC} coefficients are estimated using PCKOCWIN v1 66 software (2000 U S EPA)

Table 16-2

Summary of 1998 Natural Attenuation Parameters

Rev 1 Memphis Depot Dunn Field RI

Well No	Sampling Method	Conductivity (mS/cm)	Turbidity (NTU)	pH	Temp (oC)	DO (mg/L)	Redox (mV)	Nitrate (mg/L)	Sulfate (mg/L)	HCO3 (mg/L)	TOC (mg/L)	NH4 (mg/L)	Fe (ug/L)	Cl (mg/L)	Methane (ug/L)
Dunn Field - March 1998															
03	p	0 366	51	5 85	18.8	3 25	216 8	3 0	50 7	nc			694.0	19 9	nc
04	b	0 259	18	6 07	17 5	12 74	145 1	nc	nc	nc	nc	nc	706.0	nc	nc
05	p	0 311	5.5	5 66	19 0	6 44	213 9	nc	nc	nc	nc	nc		nc	nc
06	p	1 072	7 15	5 54	19 2	6 86	259 0	nc	nc	nc	nc	nc	340.0	nc	nc
07	b	0 295	53 6	5 98	18.6	6 13	201 5	nc	nc	nc	nc	nc	610 0	nc	nc
08	p	0 322	>100	5 91	18 6	5 90	212 4	1 8	41 1	nc			4170 0	17 8	nc
09	p/b	0 34	3 1	5 96	18 8	4.80	133 7	nc	nc	nc	nc	nc	289J	nc	nc
10	p	0 322	17 5	5 66	18 9	4 68	142.7	2 6	45 5	nc			591.0	12 0	nc
11	p	0 252	6 7	5 68	18 4	4 34	184 0	nc	nc	nc	nc	nc		nc	nc
12	p/b	0 25	3 4	6 17	20 9	7 21	183 0	nc	nc	nc	nc	nc		nc	nc
15	p	0.216	46	5 72	18 1	6.83	181.4	nc	nc	nc	nc	nc	2560.0	nc	nc
29	p	0 424	17	5 71	19 0	3 20	217.5	nc	nc	nc	nc	nc	590 0	nc	nc
31	p/b	0 344	2 6	5.99	17 5	5 11	178 0	2.8	51 4	nc			204J	17.7	
32	p	0 813	7 2	5 59	17 2	5 93	229 9	4 0	12 4	36.0				199 0	
35	p	0 251	0 8	5 84	19.0	5 42	213 4	4.8	19 5	nc				14 0	nc
44	b	0.347	>100	6 25	18 9	11.16	132 0	nc	nc	nc	nc	nc	nc	nc	
51	p	0 3	2 8	5 81	18 9	5 89	216 4	nc	nc	nc	nc	nc		nc	
54	p	0 227	6 4	6 04	20 9	8 78	138 2	nc	nc	nc	nc	nc		nc	
02	b	0 572	>100	6 38	16 9	18 35	183 0	nc	nc	nc	nc	nc	1300 0	nc	nc
13	b	0 267	>100	5 77	19 0	6 75	187 5	3 4	38 7	nc	1 6		10400J	10 2	nc
14	p/b	0 278	6 75	5 86	19 2	5 80	196 5	4 8	43 8	nc			558J	7 4	nc
28	p	0 179	4 2	5 56	18 2	4 79	226 8	nc	nc	nc	nc	nc	393J	nc	nc
30	p/b	0 027	2 6	6 15	19 0	7 10	263 6	2 2	26 4	nc			267J	31 3	
33	p/b	0 187	18	5 67	18 5	8 59	252 0	nc	nc	nc	nc	nc	1640J	nc	
34	p	0 2	19	5 78	19 9	5 44	191 9	4 8	12 6	nc				11 4	nc
36	p/b	0 237	92 5	6 66	20 1	3 52	-128 7	nc	nc	nc	nc	nc	3690J	nc	nc
37	p	0 375	50	6 53	19 9	1 88	-21 9		9 3	167 0	nc	nc	4150 0	6 6	nc
40	p	0 7	0 9	6 10	20 2	5 31	100 9	1 5	41 8	nc	2 5	1 7	nc	38 1	3 5
42	b	0 219	58	6 23	17 4	11 52	156 0	nc	nc	nc	nc	nc	nc	nc	
45	b	0 379	96	6 12	19 1	7 61	112 0	nc	nc	nc	nc	nc	2820 0	nc	nc
46	p/b		2 5	nc	nc	nc	nc	nc	nc	nc	nc	nc	287J	nc	nc
49	p/b	0 203	1	5 72	19 3	5 79	210 1	nc	nc	nc	nc	nc	66 7J	nc	nc
Dunn Field - October 1998															
03	p	0 313	17	5 78	18 2	3 54	163 6	nc	52 8	nc			495 0	13 6	nc
04	p	0 195	3 5	5 89	19 0	6 02	165 0	nc	nc	nc	nc	nc	121 0	nc	nc
05	p	0 323	16	5 88	20 3	6 39	182 7	nc	nc	nc	nc	nc	675 0	nc	nc
06	p	1 659	10 3	5 58	18 5	5 35	nc	nc	nc	nc	nc	nc	491 0	nc	nc
07	p	0 329	10	6 08	18 5	5 05	nc	nc	nc	nc	nc	nc	1450 0	nc	nc
08	p	0.268	7 9	5 89	17 8	5 50	nc	nc	41.5	nc			1490 0	16 5	nc
09	p	0.328	4	6 07	19 3	4 14	nc	nc	nc	nc	nc	nc	118 0	nc	nc
10	p	0 332	17	5 08	19 1	4 64	95 8	nc	45 7	nc			484 0	13 1	nc
11	p	0.223	14	5 55	18 6	5 18	137 2	nc	nc	nc	nc	nc	352.0	nc	nc
12	p	0 277	6	5 25	20 4	6 49	132 0	nc	nc	nc	nc	nc	297.0	nc	nc
15	p	0 21	10	5 87	19 4	4 88	nc	nc	nc	nc	nc	nc	1070 0	nc	nc
29	p	0 434	10	6 05	19 5	4 78	nc	nc	nc	nc	nc	nc	463.0	nc	nc
31	p	0 327	7 3	5 97	18 2	4 42	115 7	nc	49 3	nc			4190 0	16 8	
32	ND	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
35	p	0.246	9	4 92	19 3	4 85	147 0	nc	23 0	nc			128 0	14 2	nc
44	p	0 257	0 8	5 64	19 2	8 33	137 5	nc	nc	nc	nc	nc	nc	nc	
51	p	0 307	0.5	5 79	18 7	4 58	nc	nc	nc	nc	nc	nc		nc	
54	p	0 194	9	6 34	18 4	7 03	140 0	nc	nc	nc	nc	nc			
02	b	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	43200 0	nc	nc
13	p	0.235	14 3	5 95	19 5	6 17	nc	nc	29 4	nc			522 0	13 4	nc
14	p	0 214	41 1	5 70	19 8	6 02	159 7	nc	42 1	nc			1580.0	7.8	nc
28	p	0 179	42 7	5 65	20 1	3 99	nc	nc	nc	nc	nc	nc	3230 0	nc	nc
30	p	0 278	2 7	6 13	18 2	4 30	145 2	nc	27 5	nc			152 0	19 0	
33	p	0 178	20 7	5 77	18 5	7 65	156 2	nc	nc	nc	nc	nc	833 0	nc	
34	ND	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
36	p	0 268	23	6 61	21 8	0 51	-71 0	nc	nc	nc	nc	nc	2420 0	nc	nc
37	ND	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
40	p	0 688	4 3	6 63	20 9	0 77	123 2	nc	40 8	nc	2 5	3 2	113 0	40 6	4 1
42	b	0 71	49 4	6 07	17 7	3 50	nc	nc	nc	nc	nc	nc	nc	nc	
45	p	0 321	10	6 29	20 1	2 85	131 0	nc	nc	nc	nc	nc	374 0	nc	nc
46	p	0 278	1 9	5 87	19 9	10 40	nc	nc	nc	nc	nc	nc	552 0	nc	nc
49	p	0 216	4	5 76	20 5	4 74	nc	nc	nc	nc	nc	nc	150 0	nc	nc
43	p	0 439	1	6 71	19 1	1 09	-378 0	0 2	53 0	144 0	nc	nc	14800 0	18 2	nc
43	p	0 333	-10	6 14	18 6	8 01	nc	nc	nc	nc	nc	nc	6730 0	nc	12 7
62	b	0 185	>100	7 90	18 8	8 38	123 0	1 4	16 0	63 0	nc	nc	8670 0	5 1	nc
63	p	0 354	2 9	6 07	19 2	3 32	22 0	4 5	68 6	55 0	nc	nc	1300 0	18 9	nc
64	b	0.324	20	6 82	18 4	6 87	105 0	1 4	29 7	87 0	nc	nc	902.0	29 3	nc
65								0 57	1 80	229 00	nc	nc	3400 0	6 04	nc
66								nc	nc	nc	nc	nc	1280 0	nc	nc

Notes

Shaded areas represent wells containing concentrations of dissolved VOCs

Blank cells represent undetected parameters

nc = not collected

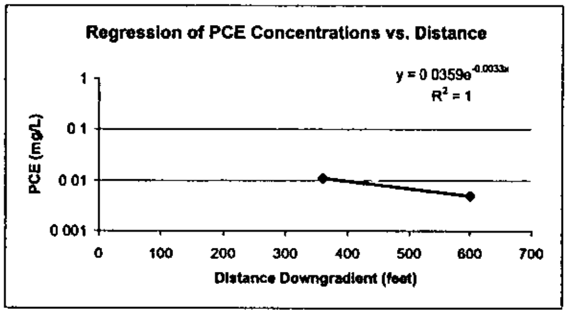
b = bailed

p = pumped

Wells MW34, MW35, and MW37 are deep wells that are not completed in the fluvial aquifer where the source of VOC contamination has been confirmed

Table 15-3A
PCE Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source	Sample Date	January/February 2001			
Monitoring Well	MW-73	MW-77	MW-76	MW-79		
Concentration (mg/L)		0 011	0 005			
Distance Down-gradient (feet)		360	600			


Regression of PCE Concentrations vs. Distance

__Calculation of First Order Decay__

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient.	0 0085	ft/ft	(MW-73 to MW-79)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0.3		
Seepage Velocity	0 24	ft/day	

*2)Retarded Velocity of PCE (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(PCE) Koc.	106 8	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content:	0.0046	g/g	
Bulk Density	1 67	g/cm3	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	3 75		

3) PCE velocity (v_c) = V_x / R

PCE velocity (v_c)	0 0643	ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs. distance downgradient along flow path (m)

Slope of Line (m)	-0 0033	(mg/l) / ft	($y=be^{mx}$)

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x)	150	ft

6) First-Order Biological Rate Constant for PCE (λ) = ((v_c/(4 α_x))*([1-2* α_x *(m)]^2 -1))*

λ	3.17E-04	per day
λ	1 16E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/ λ)

$t_{1/2}$	2186	days
$t_{1/2}$	6 0	years

TOC Values for Fluvial Aquifer Dunn Field

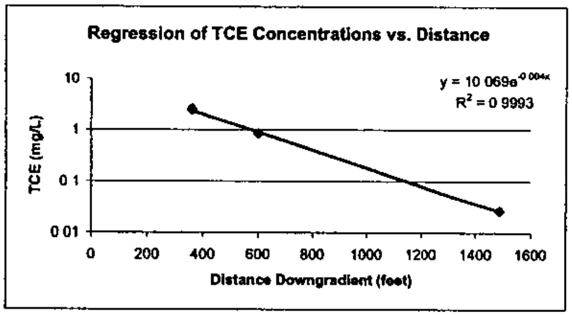
Sample Location	TOC (mg/kg Dry Weight)		
MW-40	4,760		
MW-42	2,220		
RW-1	5,400		
RW-2	4,000		
RW-1b	2,400		
RW-1a	1,200		
SBLCA-SB-2-90	900		
SBLCA-SB-3-87	3,600		
SBLCA-SB-5-88	< 60 U	30	*
SBLCA-SB-9-87	< 200 U	100	*
SBLCA-SB-12-80 5	30,600		
SBLEE-SB-1-74	< 500 U	250	*

* Assume concentration is 1/2 of detection limit.

Average	4,622	mg/kg
	0 0046	g/g

Table 16-38
TCE Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source	Sample Date	January/February 2001			
Monitoring Well	MW-73	MW-77	MW-76	MW-79		
Concentration (mg/L)		2 5	0 84	0 026		
Distance Down-gradient (feet)		360	600	1485		



Calculation of First Order Decay

1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)

Hydraulic Gradient	0 0085	ft/ft	(MW-73 to MW-79)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0 24	ft/day	

2) Retarded Velocity of TCE (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)

(TCE) Koc	67.7	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	2 74		

3) TCE velocity (v_c) = V_x / R

TCE velocity (v_c)	0 0878	ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs distance downgradient along flow path (m)

Slope of Line (m)	-0 0040	(mg/l / ft)	($y=be^{mx}$)

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x)	150	(ft)

6) First-Order Biological Rate Constant for TCE (λ) = $((v_c/(4*\alpha_x))*([1-2*\alpha_x*(m)]^2-1))$

λ	5 62E-04	per day
λ	2 05E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/λ)

$t_{1/2}$	1233	days
$t_{1/2}$	3 4	years

TOC Values for Fluvial Aquifer Dunn Field

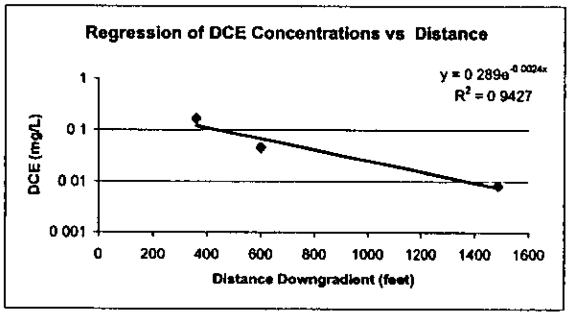
Sample Location	TOC (mg/kg Dry Weight)	
MW-40	4,760	
MW-42	2,220	
RW-1	5,400	
RW-2	4,000	
RW-1b	2,400	
RW-1a	1,200	
SBLCA-SB-2-90	900	
SBLCA-SB-3-87	3,600	
SBLCA-SB-5-88	< 60 U	30 *
SBLCA-SB-9-87	< 200 U	100 *
SBLCA-SB-12-80 5	30,600	
SBLEE-SB-1-74	< 500 U	250 *

* Assume concentration is 1/2 of detection limit

Average	4,622	mg/kg
	0 0046	g/g

Table 16-3C
1,2-DCE Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source			Sample Date January/February 2001		
Monitoring Well	MW-73	MW-77	MW-76	MW-79		
Concentration (mg/L)		0 163	0 045	0 0083		
Distance Down-gradient (feet)		360	600	1485		


Regression of DCE Concentrations vs Distance

Calculation of First Order Decay

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient	0 0085	ft/ft	(MW-73 to MW-79)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0.24	ft/day	

*2)Retarded Velocity of DCE (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(DCE) Koc	43 79	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	2 13		

3) DCE velocity (v_c) = V_x / R

DCE velocity (v_c)	0 1132	ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs distance downgradient along flow path (m)

Slope of Line (m)	-0 0024	(mg/l / ft)	($y=be^{mx}$)

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x)	150	(ft)

6) First-Order Biological Rate Constant for DCE (λ) = $((v_c/(4*\alpha_x))*([1-2*\alpha_x*(m)]^2-1))$

λ	3 70E-04	per day
λ	1 35E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/λ)

$t_{1/2}$	1875	days
$t_{1/2}$	5 1	years

TOC Values for Fluvial Aquifer Dunn Field

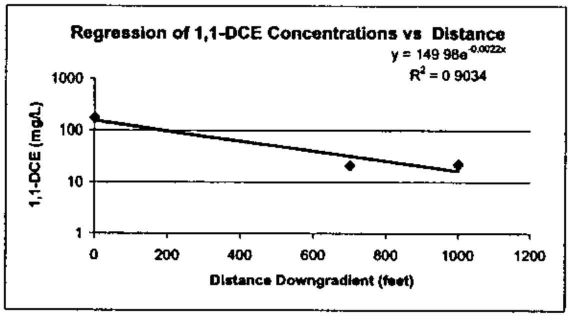
Sample Location	TOC (mg/kg Dry Weight)		
MW-40	4,760		
MW-42	2,220		
RW-1	5,400		
RW-2	4,000		
RW-1b	2,400		
RW-1a	1,200		
SBLCA-SB-2-90	900		
SBLCA-SB-3-87	3,600		
SBLCA-SB-5-88	< 60 U	30	*
SBLCA-SB-9-87	< 200 U	100	*
SBLCA-SB-12-80 5	30,600		
SBLEE-SB-1-74	< 500 U	250	*

* Assume concentration is 1/2 of detection limit

Average	4,622	mg/kg
	0 0046	g/g

Table 16-3D
1,1-DCE Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source	Sample Date	January/February 1996			
Monitoring Well	PZ-02	MW-29	MW-08			
Concentration (mg/L)	170	21	22			
Distance Down-gradient (feet)	0	700	1000			



<u>Calculation of First Order Decay</u>

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient	0 0085	ft/ft	(MW-73 to MW-79)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0 24	ft/day	

*2)Retarded Velocity of 1,1-DCE (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(1,1-DCE) Koc:	43 79	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	2 13		

3) 1,1-DCE velocity (v_c) = V_x / R

1,1-DCE velocity (v_c).	0 1132	ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs distance downgradient along flow path (m)

Slope of Line (m)	-0 0022	(mg/l / ft)	(y=be^{mx})

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x)	300	(ft)

6) First-Order Biological Rate Constant for 1,1-DCE (λ) = ((v_c/(4 α_x))*([1-2* α_x * (m)]^2 -1))*

λ.	4 14E-04	per day
λ.	1 51E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/ λ)

$t_{1/2}$	1676	days
$t_{1/2}$	4 6	years

TOC Values for Fluvial Aquifer Dunn Field

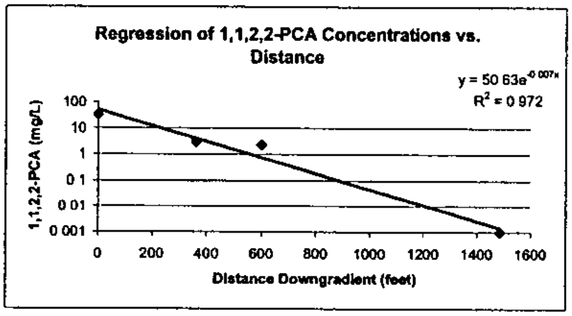
Sample Location	TOC (mg/kg Dry Weight)		
MW-40	4,760		
MW-42	2,220		
RW-1	5,400		
RW-2	4,000		
RW-1b	2,400		
RW-1a	1,200		
SBLCA-SB-2-90	900		
SBLCA-SB-3-87	3,600		
SBLCA-SB-5-88	< 60 U	30	*
SBLCA-SB-9-87	< 200 U	100	*
SBLCA-SB-12-80 5	30,600		
SBLEE-SB-1-74	< 500 U	250	*

* Assume concentration is 1/2 of detection limit.

Average	4,622	mg/kg
	0 0046	g/g

Table 16-3E
1,1,2,2-PCA Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source	Sample Date	January/February 2001			
Monitoring Well	MW-73	MW-77	MW-76	MW-79		
Concentration (mg/L)	33	2 9	2 3	0 001		
Distance Down-gradient (feet)	0	360	600	1485		


Regression of 1,1,2,2-PCA Concentrations vs. Distance

Calculation of First Order Decay

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient	0 0085	ft/ft	(MW-73 to MW-79)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0.24	ft/day	

*2)Retarded Velocity of 1,1,2,2-PCA (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(1,1,2,2-PCA) Koc.	106 8	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	3 75		

3) 1,1,2,2-PCA velocity (v_c) = V_x / R

1,1,2,2-PCA velocity (v_c)	0 0643	ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs distance downgradient along flow path (m)

Slope of Line (m)	-0 0070	(mg/l / ft)	($y=be^{mx}$)

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x)	210	(ft)

6) First-Order Biological Rate Constant for 1,1,2,2-PCA (λ) = $((v_c/(4*\alpha_x))*([1-2*\alpha_x*(m)]^2-1))$

λ	1 11E-03	per day
λ	4 06E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/λ)

$t_{1/2}$	624	days
$t_{1/2}$	1 7	years

TOC Values for Fluvial Aquifer Dunn Field

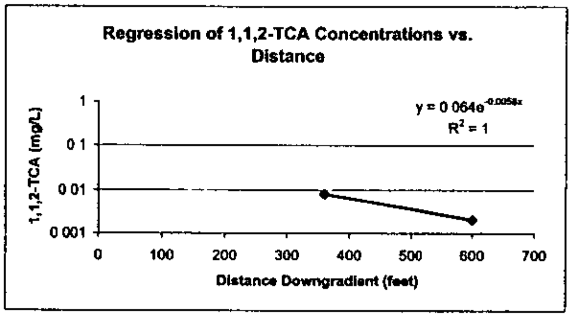
Sample Location	TOC (mg/kg Dry Weight)	
MW-40	4,760	
MW-42	2,220	
RW-1	5,400	
RW-2	4,000	
RW-1b	2,400	
RW-1a	1,200	
SBLCA-SB-2-90	900	
SBLCA-SB-3-87	3 600	
SBLCA-SB-5-88	< 60 U	30 *
SBLCA-SB-9-87	< 200 U	100 *
SBLCA-SB-12-80 5	30,600	
SBLEE-SB-1-74	< 500 U	250 *

* Assume concentration is 1/2 of detection limit

Average	4,622	mg/kg
	0 0046	g/g

Table 16-3F
1,1,2-TCA Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source		Sample Date	January/February 2001		
Monitoring Well	MW-73	MW-77	MW-76	MW-79		
Concentration (mg/L)		0 008	0 002			
Distance Down-gradient (feet)		360	600			



Regression of 1,1,2-TCA Concentrations vs. Distance

Calculation of First Order Decay

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient	0 011	ft/ft	(MW-15 to MW-54)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0 31	ft/day	

*2)Retarded Velocity of 1,1,2-TCA (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(1,1,2-TCA) Koc	67 7	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content.	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	2 74		

3) 1,1,2-TCA velocity (v_c) = V_x / R

1,1,2-TCA velocity (v_c) 0 1137 ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs distance downgradient along flow path (m)

Slope of Line (m) -0 0058 (mg/l / ft) ($y=be^{mx}$)

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x) 60 (ft)

6) First-Order Biological Rate Constant for TCE (λ) = ((v_c/(4 α_x))*([1-2* α_x * (m)]^2 -1))*

λ	8 89E-04	per day
λ	3.24E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/ λ)

$t_{1/2}$	780	days
$t_{1/2}$	2 1	years

TOC Values for Fluvial Aquifer Dunn Field

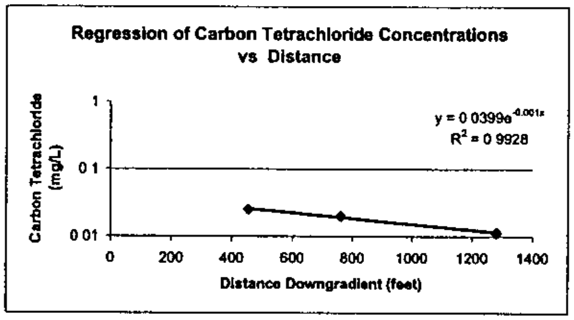
Sample Location	TOC (mg/kg Dry Weight)		
MW-40	4,760		
MW-42	2,220		
RW-1	5,400		
RW-2	4,000		
RW-1b	2,400		
RW-1a	1,200		
SBLCA-SB-2-90	900		
SBLCA-SB-3-87	3,600		
SBLCA-SB-5-88	< 60 U	30	*
SBLCA-SB-9-87	< 200 U	100	*
SBLCA-SB-12-80 5	30,600		
SBLEE-SB-1-74	< 500 U	250	*

* Assume concentration is 1/2 of detection limit

Average	4,622	mg/kg
	0 0046	g/g

Table 16-3G
Carbon Tetrachloride Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

	Source	Sample Date	February 2001			
Monitoring Well	MW-57	MW-71	MW-32	MW-54		
Concentration (mg/L)		0 0249	0 0197	0 0112		
Distance Down-gradient (feet)		455	760	1280		



Calculation of First Order Decay

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient	0 011	ft/ft	(MW-15 to MW-54)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0 31	ft/day	

*2)Retarded Velocity of CT (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(CT) Koc.	48 64	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	2 25		

3) CT velocity (v_c) = V_x / R

CT velocity (v_c) 0 1384 ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs. distance downgradient along flow path (m)

Slope of Line (m) -0 0010 (mg/l / ft) ($y=be^{mx}$)

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x) 128 (ft)

6) First-Order Biological Rate Constant for CT (λ) = ((v_c/(4 α_x))*([1-2* α_x *(m)]^2-1))*

λ.	1 56E-04	per day
λ.	5 70E-02	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/ λ)

$t_{1/2}$	4439	days
$t_{1/2}$	12 2	years

TOC Values for Fluvial Aquifer Dunn Field

Sample Location	TOC (mg/kg Dry Weight)		
MW-40	4,760		
MW-42	2,220		
RW-1	5,400		
RW-2	4,000		
RW-1b	2,400		
RW-1a	1,200		
SBLCA-SB-2-90	900		
SBLCA-SB-3-87	3,600		
SBLCA-SB-5-88	< 60 U	30	*
SBLCA-SB-9-87	< 200 U	100	*
SBLCA-SB-12-80 5	30,600		
SBLEE-SB-1-74	< 500 U	250	*

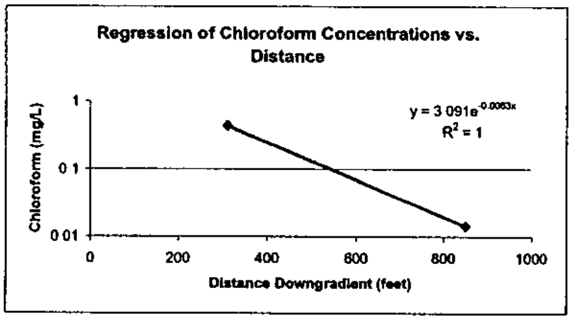
* Assume concentration is 1/2 of detection limit

Average	4,622	mg/kg
	0 0046	g/g

Table 16-3H
Chloroform Biodegradation Rates for Dunn Field
Buscheck and Alcantar Method
Rev 0 Memphis Depot Dunn Field RI

Sample Date February 2001

Monitoring Well	MW-71	MW-32	MW-54			
Concentration (mg/L)		0 434	0 0142			
Distance Down-gradient (feet)		310	850			



Regression of Chloroform Concentrations vs. Distance

Calculation of First Order Decay

*1) Seepage Velocity (V_x) = ((Hydraulic Gradient * Hydraulic Conductivity)/Effective Porosity)*

Hydraulic Gradient	0 011	ft/ft	(MW-15 to MW-54)
Hydraulic Conductivity	8 5	ft/day	(Geometric Mean slug test data at Dunn Field (Figure 2-13))
Effective Porosity	0 3		
Seepage Velocity	0 31	ft/day	

*2) Retarded Velocity of Chloroform (R) = 1+ K_{oc} (ml/g) * Organic Matter Content (g/g) * Bulk Density (g/cm^3) / porosity (ml/ml)*

(chloroform) Koc	35 04	ml/g	(Estimated using PCKOCWIN v1 66 software (2000 U S EPA))
Organic Matter Content	0 0046	g/g	
Bulk Density	1 67	(g/cm3)	
Effective Porosity	0 3	ml/ml	
Retarded Velocity (R)	1 90		

3) Chloroform velocity (v_c) = V_x / R

Chloroform velocity (v_c)	0 1639	ft/day

4) Slope of line formed by the ln-linear plot of contaminant concentration vs distance downgradient along flow path (m)

Slope of Line (m)	-0 0063	(ft)	(y=be^{mx})

5) Dispersivity (α_x) Assume 10% of the plume length

Dispersivity (α_x)	85	(ft)

6) First-Order Biological Rate Constant for Chloroform (λ) = $((v_c/(4*\alpha_x))*([1-2*\alpha_x*(m)]^2-1))$

λ	1 59E-03	per day
λ	5 79E-01	per year

7) Calculating half-life ($t_{1/2}$) = (ln 2/λ)

$t_{1/2}$	437	days
$t_{1/2}$	1 2	years

TOC Values for Fluvial Aquifer Dunn Field

Sample Location	TOC (mg/kg Dry Weight)		
MW-40	4,760		
MW-42	2,220		
RW-1	5,400		
RW-2	4,000		
RW-1b	2,400		
RW-1a	1,200		
SBLCA-SB-2-90	900		
SBLCA-SB-3-87	3 600		
SBLCA-SB-5-88	< 60 U	30	*
SBLCA-SB-9-87	< 200 U	100	*
SBLCA-SB-12-80 5	30,600		
SBLEE-SB-1-74	< 500 U	250	*

* Assume concentration is 1/2 of detection limit.

Average	4,622	mg/kg
	0 0046	g/g

Figures

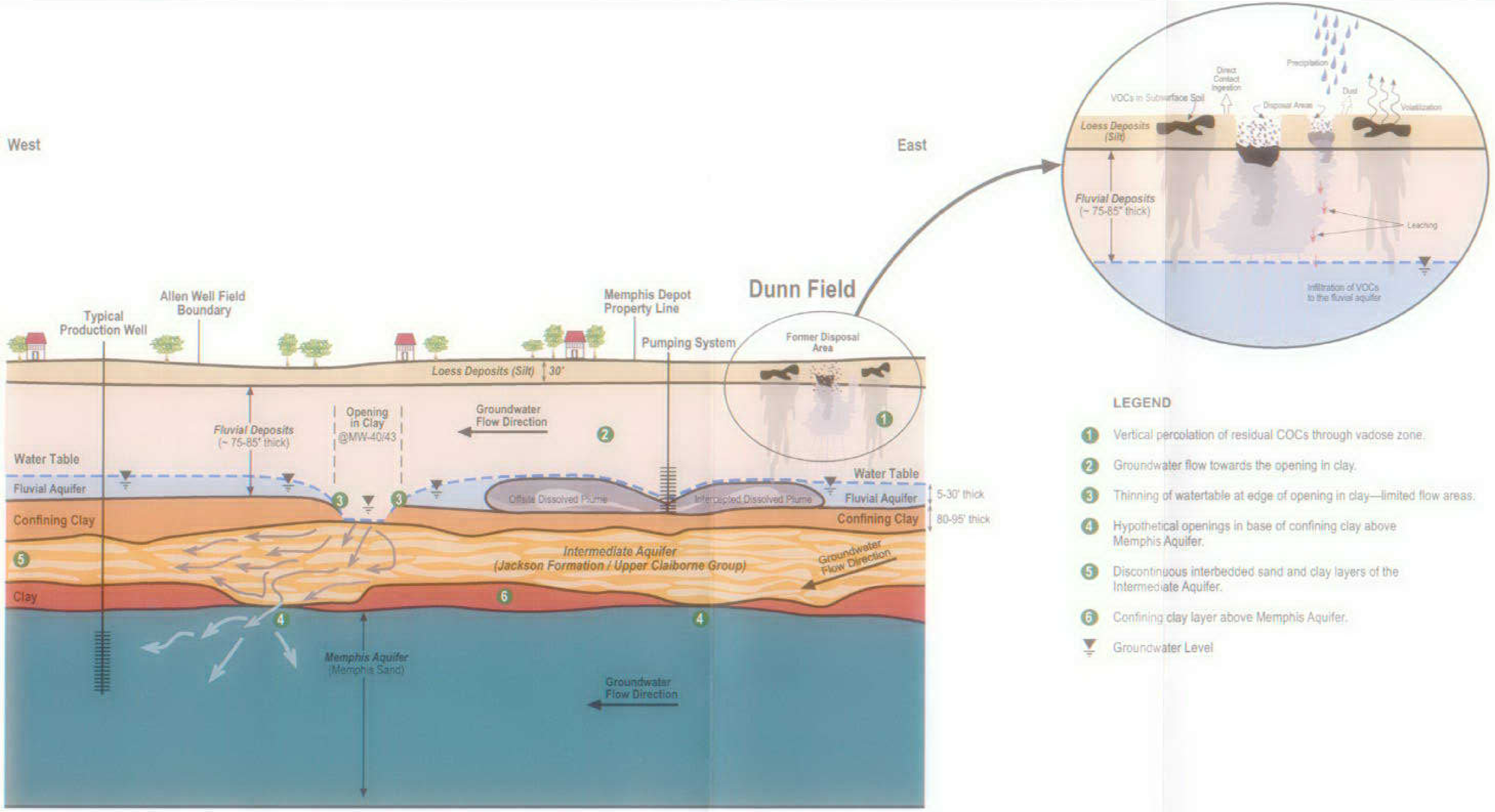
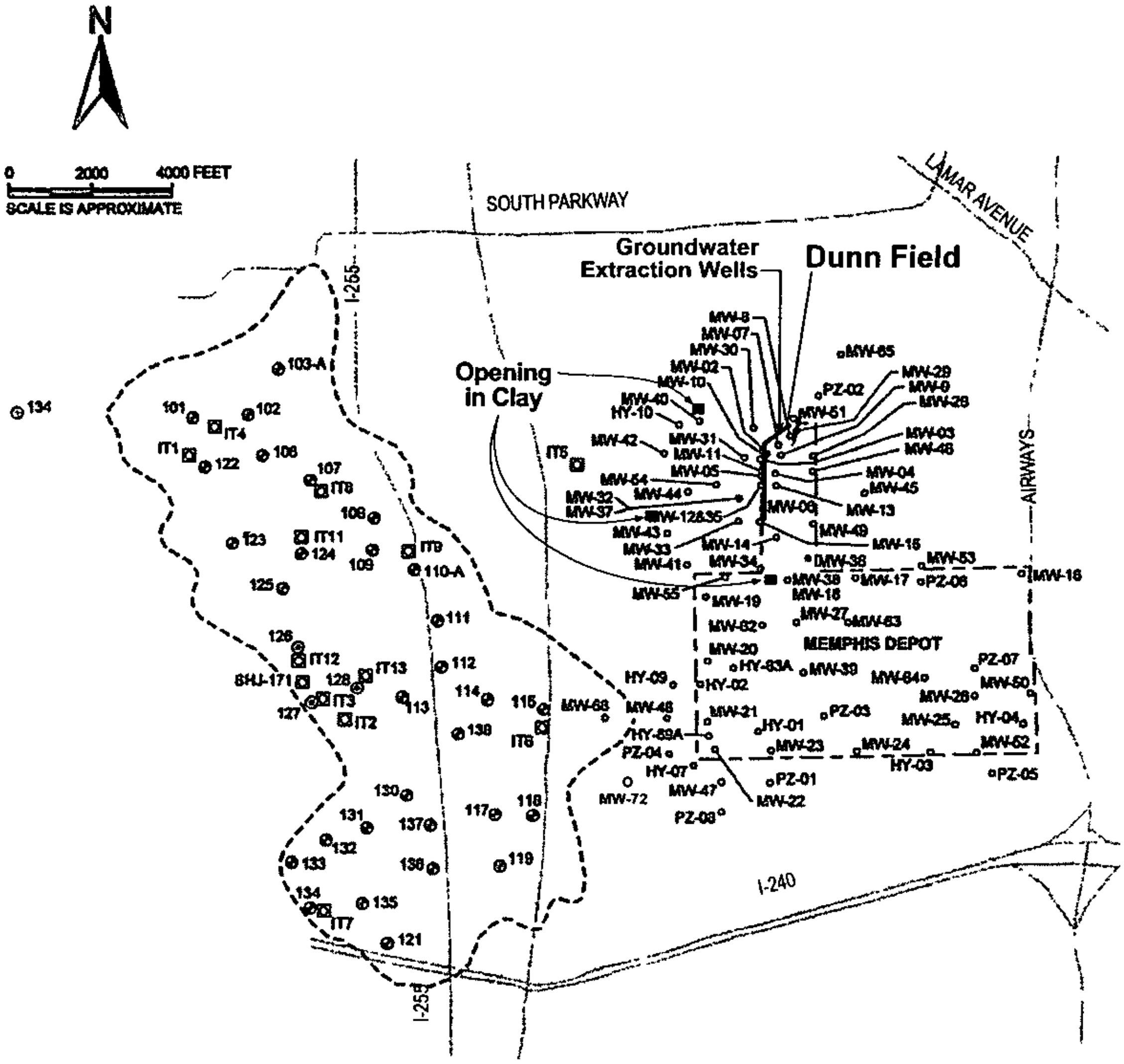


FIGURE 16-1
MOST CONSERVATIVE CONCEPTUAL MODEL
OF CONTAMINANT MIGRATION FROM DUNN FIELD
REV. 2 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL



LEGEND

- ⊕ MEMPHIS LIGHT, GAS AND WATER (MLGW) PRODUCTION WELL; ALL WELLS ARE LOCATED IN THE ALLEN WELL FIELD
- ⊠ MLGW MONITORING WELL
- ○ MLGW WELL CLOSED DUE TO CONTAMINATION
- ▫ MONITORING WELL IN THE FLUVIAL DEPOSITS (RI/FS)
- • MONITORING WELL IN THE DEEPER AQUIFER (RI/FS) (POSSIBLY THE MEMPHIS SAND)
- ⬚ APPROXIMATE EXTENT OF ALLEN WELL FIELD CAPTURE ZONE WITHIN THE MEMPHIS SAND. (FROM UNIVERSITY OF MEMPHIS GROUND WATER INSTITUTE TECHNICAL BRIEF #6; NOV., 1994)

FIGURE 16-2
WELLS AT ALLEN WELL FIELD
AND THE MEMPHIS DEPOT
REV 2 MEMPHIS DEPOT DUNN FIELD RI

CH2MHILL

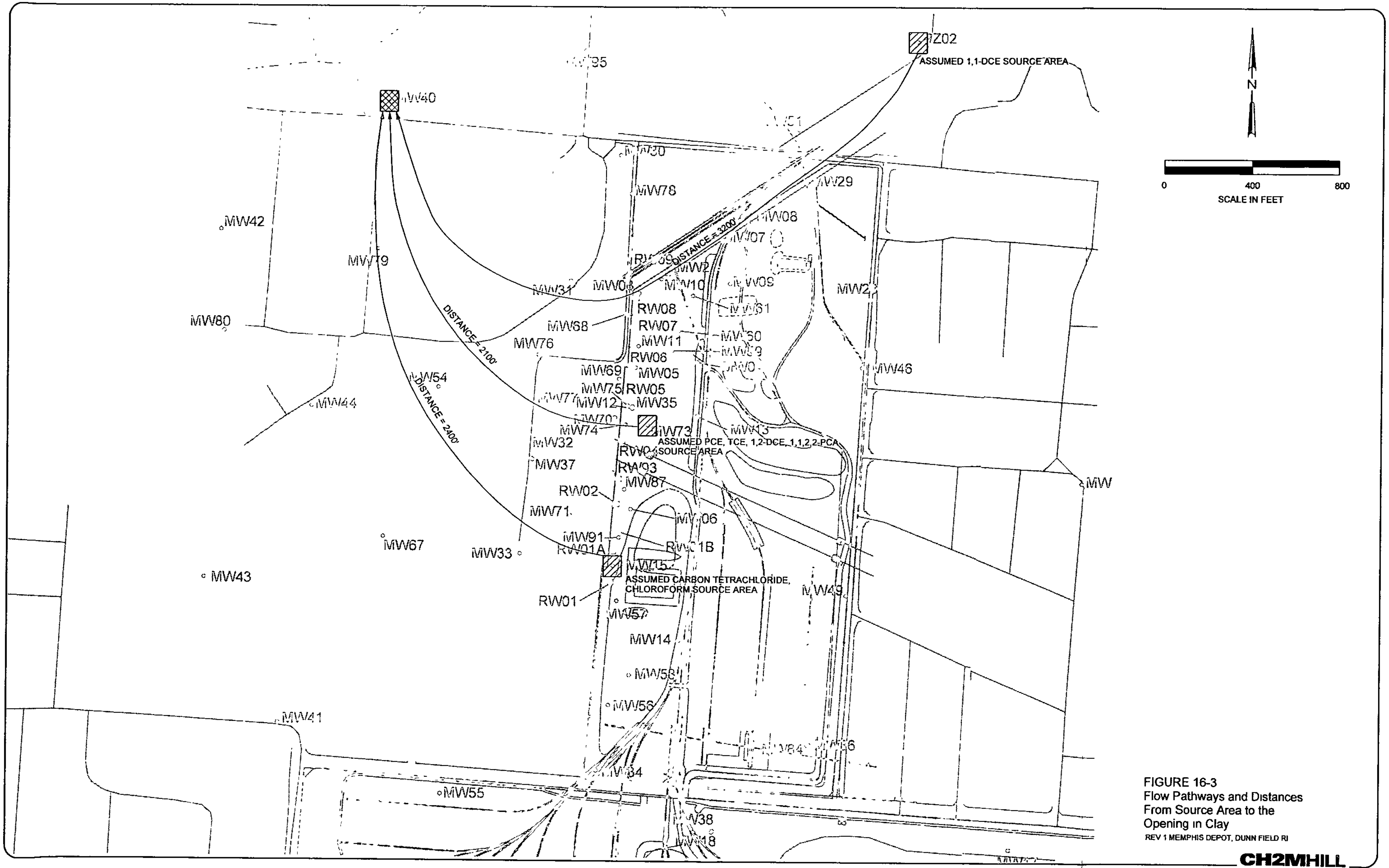
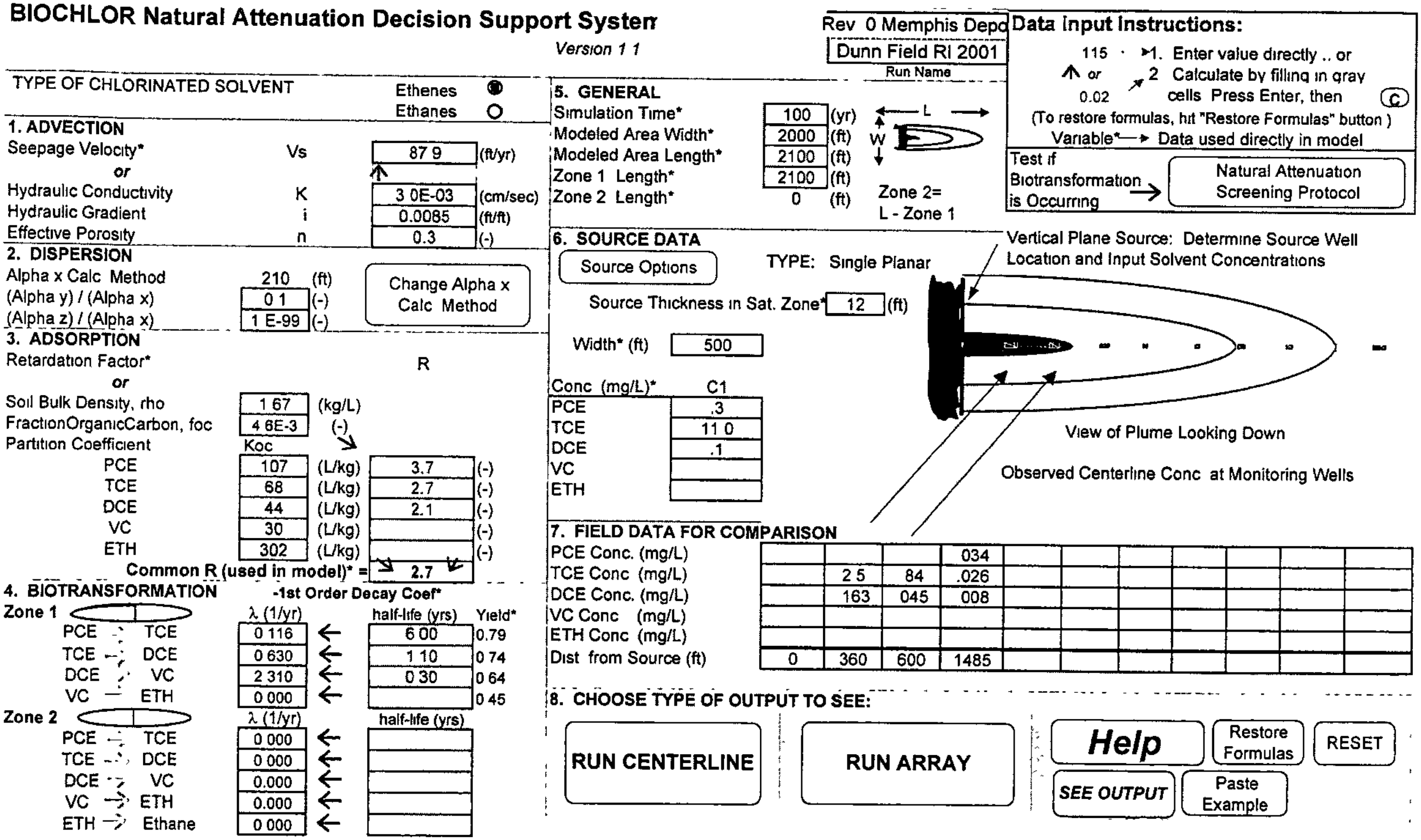


FIGURE 16-3
Flow Pathways and Distances
From Source Area to the
Opening in Clay
REV 1 MEMPHIS DEPOT, DUNN FIELD RI

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD RI 2001 29-OCT-2001



BIOCHLOR Natural Attenuation Decision Support Systen

Version 1 1

Rev 0 Memphis Depo

Dunn Field RI 2001

Run Name

Data Input Instructions:

115 · 1. Enter value directly .. or
or 0.02 2 Calculate by filling in gray cells Press Enter, then Ⓒ
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ● Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	87 9	(ft/yr)
or			
Hydraulic Conductivity	K	3 0E-03	(cm/sec)
Hydraulic Gradient	i	0.0085	(ft/ft)
Effective Porosity	n	0.3	(-)

2. DISPERSION

Alpha x Calc Method	210	(ft)
(Alpha y) / (Alpha x)	0 1	(-)
(Alpha z) / (Alpha x)	1 E-99	(-)

Change Alpha x Calc Method

3. ADSORPTION

Retardation Factor* R

or

Soil Bulk Density, rho	1 67	(kg/L)
FractionOrganicCarbon, foc	4 6E-3	(-)

Partition Coefficient	Koc		R	
PCE	107	(L/kg)	3.7	(-)
TCE	68	(L/kg)	2.7	(-)
DCE	44	(L/kg)	2.1	(-)
VC	30	(L/kg)		(-)
ETH	302	(L/kg)		(-)

Common R (used in model)* = 2.7

4. BIOTRANSFORMATION -1st Order Decay Coef*

Zone 1	λ (1/yr)	half-life (yrs)	Yield*
PCE → TCE	0 116	6 00	0.79
TCE → DCE	0 630	1 10	0 74
DCE → VC	2 310	0 30	0 64
VC → ETH	0 000		0 45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0 000	
TCE → DCE	0 000	
DCE → VC	0.000	
VC → ETH	0.000	
ETH → Ethane	0 000	

5. GENERAL

Simulation Time*	100	(yr)
Modeled Area Width*	2000	(ft)
Modeled Area Length*	2100	(ft)
Zone 1 Length*	2100	(ft)
Zone 2 Length*	0	(ft)

Zone 2= L - Zone 1

6. SOURCE DATA

Source Options

TYPE: Single Planar

Source Thickness in Sat. Zone* 12 (ft)

Width* (ft) 500

Conc (mg/L)*	C1
PCE	.3
TCE	11 0
DCE	.1
VC	
ETH	

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

View of Plume Looking Down

Observed Centerline Conc at Monitoring Wells

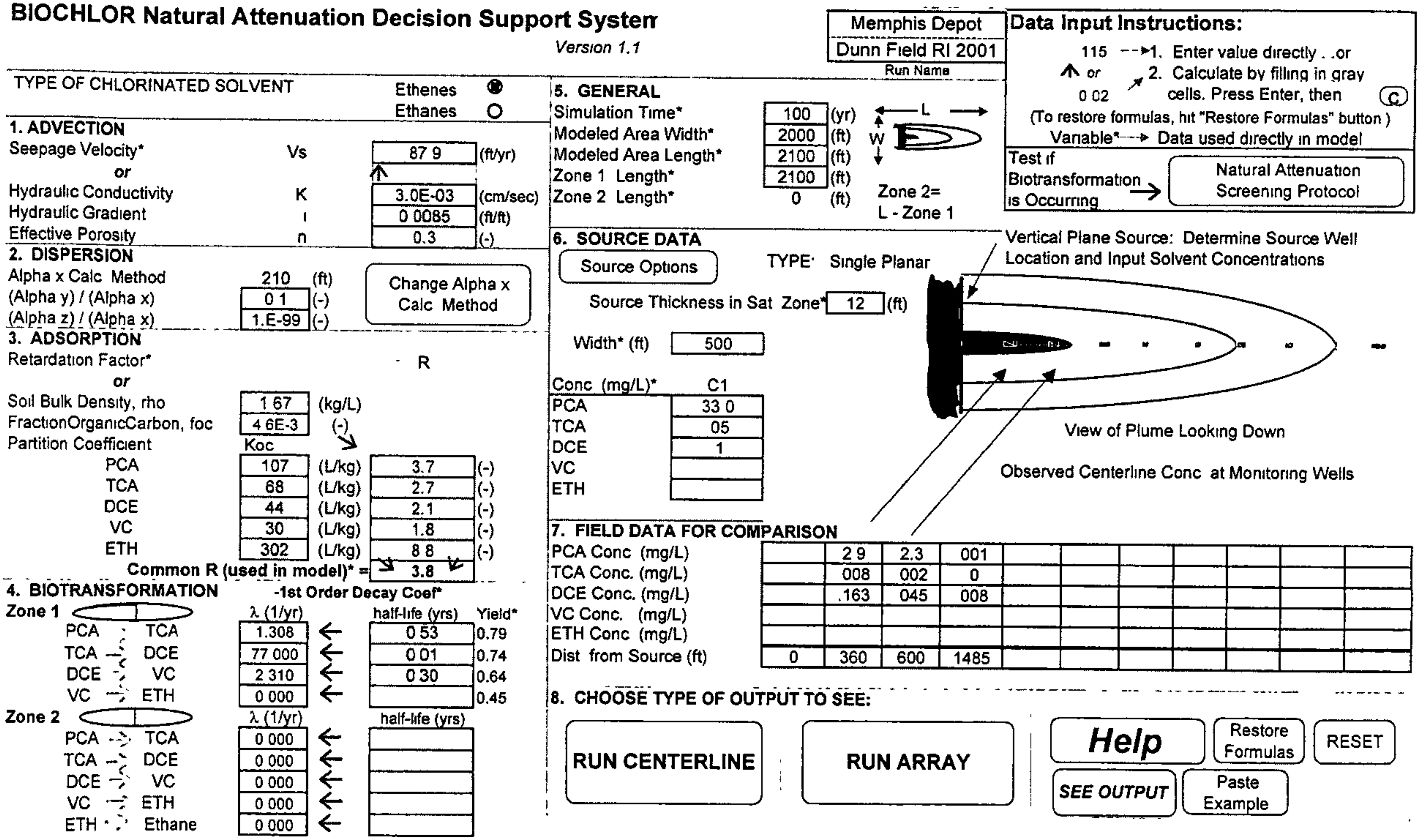
7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)				034							
TCE Conc (mg/L)		2 5	84	.026							
DCE Conc. (mg/L)		163	045	008							
VC Conc (mg/L)											
ETH Conc (mg/L)											
Dist from Source (ft)	0	360	600	1485							

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure 16-4A. BIOCHLOR Simulation of PCE, TCE, and DCE Concentrations within the Fluvial Aquifer Breakthrough to the Theoretical Breach near MW-40 at 100 Years

Rev 0 Memphis Depot Dunn Field RI



BIOCHLOR Natural Attenuation Decision Support System

Version 1.1

Memphis Depot
Dunn Field RI 2001
Run Name

Data Input Instructions:
115 --▸1. Enter value directly . .or
or 2. Calculate by filling in gray
0 02 cells. Press Enter, then (C)
(To restore formulas, hit "Restore Formulas" button)
Variable* ▸ Data used directly in model

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ● Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	87 9	(ft/yr)
or			
Hydraulic Conductivity	K	3.0E-03	(cm/sec)
Hydraulic Gradient	i	0 0085	(ft/ft)
Effective Porosity	n	0.3	(-)

2. DISPERSION

Alpha x Calc Method	210	(ft)
(Alpha y) / (Alpha x)	0 1	(-)
(Alpha z) / (Alpha x)	1.E-99	(-)

Change Alpha x Calc Method

3. ADSORPTION

Retardation Factor* R

or

Soil Bulk Density, rho	1 67	(kg/L)
FractionOrganicCarbon, foc	4 6E-3	(-)

Partition Coefficient

	Koc		R	
PCA	107	(L/kg)	3.7	(-)
TCA	68	(L/kg)	2.7	(-)
DCE	44	(L/kg)	2.1	(-)
VC	30	(L/kg)	1.8	(-)
ETH	302	(L/kg)	8 8	(-)

Common R (used in model)* = 3.8

4. BIOTRANSFORMATION -1st Order Decay Coef*

Zone 1

	λ (1/yr)	half-life (yrs)	Yield*
PCA → TCA	1.308	0 53	0.79
TCA → DCE	77 000	0 01	0.74
DCE → VC	2 310	0 30	0.64
VC → ETH	0 000		0.45

Zone 2

	λ (1/yr)	half-life (yrs)
PCA → TCA	0 000	
TCA → DCE	0 000	
DCE → VC	0 000	
VC → ETH	0 000	
ETH → Ethane	0 000	

5. GENERAL

Simulation Time*	100	(yr)
Modeled Area Width*	2000	(ft)
Modeled Area Length*	2100	(ft)
Zone 1 Length*	2100	(ft)
Zone 2 Length*	0	(ft)

Zone 2= L - Zone 1

6. SOURCE DATA

Source Options   TYPE: Single Planar

Source Thickness in Sat Zone* 12 (ft)

Width* (ft) 500

Conc (mg/L)*	C1
PCA	33 0
TCA	05
DCE	1
VC	
ETH	

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

View of Plume Looking Down

Observed Centerline Conc at Monitoring Wells

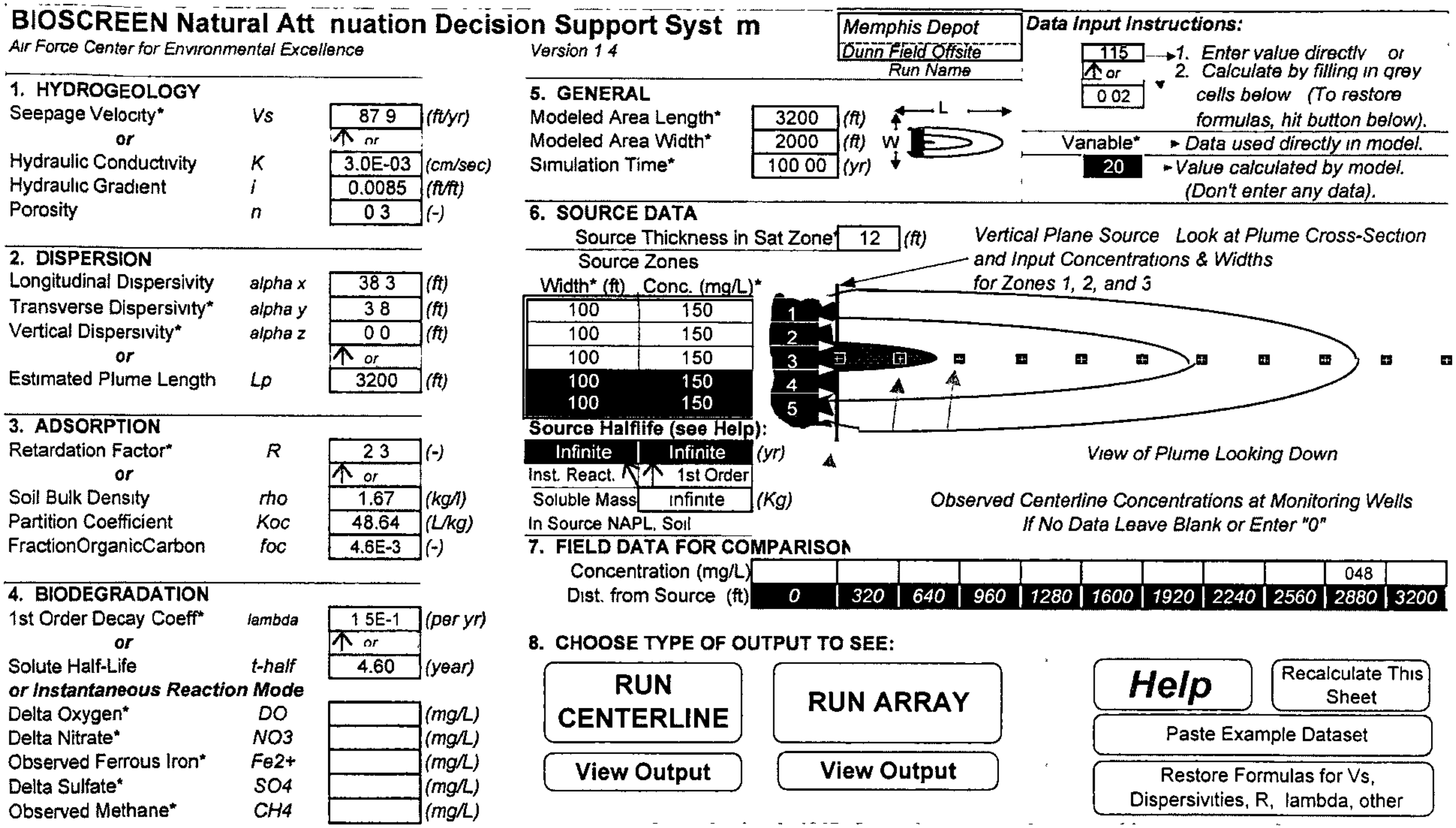
7. FIELD DATA FOR COMPARISON

PCA Conc (mg/L)		2 9	2.3	001							
TCA Conc. (mg/L)		008	002	0							
DCE Conc. (mg/L)		.163	045	008							
VC Conc. (mg/L)											
ETH Conc (mg/L)											
Dist from Source (ft)	0	360	600	1485							

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure 16-4B. **BIOCHLOR Simulation of PCA, TCA, and DCE Concentrations within the Fluvial Aquifer Breakthrough to the Theoretical Breach near MW-40 at 100 Years**

Rev 0Memphis Depot Dunn Field RI



BIOSCREEN Natural Att nuation Decision Support Syst m

Air Force Center for Environmental Excellence

Version 1 4

Memphis Depot
Dunn Field Offsite
Run Name

Data Input Instructions:

115	1. *Enter value directly or*
↑ or	2. *Calculate by filling in grey*
0 02	*cells below (To restore formulas, hit button below).*
Variable*	▸ *Data used directly in model.*
20	▸ *Value calculated by model. (Don't enter any data).*

1. HYDROGEOLOGY

Seepage Velocity*	*Vs*	87 9	*(ft/yr)*
or		↑ *or*	
Hydraulic Conductivity	*K*	3.0E-03	*(cm/sec)*
Hydraulic Gradient	*i*	0.0085	*(ft/ft)*
Porosity	*n*	0 3	*(-)*

2. DISPERSION

Longitudinal Dispersivity	*alpha x*	38 3	*(ft)*
Transverse Dispersivity*	*alpha y*	3 8	*(ft)*
Vertical Dispersivity*	*alpha z*	0 0	*(ft)*
or		↑ *or*	
Estimated Plume Length	*Lp*	3200	*(ft)*

3. ADSORPTION

Retardation Factor*	*R*	2 3	*(-)*
or		↑ *or*	
Soil Bulk Density	*rho*	1.67	*(kg/l)*
Partition Coefficient	*Koc*	48.64	*(L/kg)*
FractionOrganicCarbon	*foc*	4.6E-3	*(-)*

4. BIODEGRADATION

1st Order Decay Coeff*	*lambda*	1 5E-1	*(per yr)*
or		↑ *or*	
Solute Half-Life	*t-half*	4.60	*(year)*
or Instantaneous Reaction Mode			
Delta Oxygen*	*DO*		*(mg/L)*
Delta Nitrate*	*NO3*		*(mg/L)*
Observed Ferrous Iron*	*Fe2+*		*(mg/L)*
Delta Sulfate*	*SO4*		*(mg/L)*
Observed Methane*	*CH4*		*(mg/L)*

5. GENERAL

Modeled Area Length*	3200	*(ft)*
Modeled Area Width*	2000	*(ft)*
Simulation Time*	100 00	*(yr)*

6. SOURCE DATA

Source Thickness in Sat Zone* 12 *(ft)*

Source Zones

Width* (ft)	Conc. (mg/L)*
100	150
100	150
100	150
100	150
100	150

Vertical Plane Source Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

View of Plume Looking Down

Source Halflife (see Help):

Infinite	Infinite	*(yr)*
Inst. React. ↑	↑ 1st Order	
Soluble Mass	infinite	*(Kg)*
In Source NAPL, Soil		

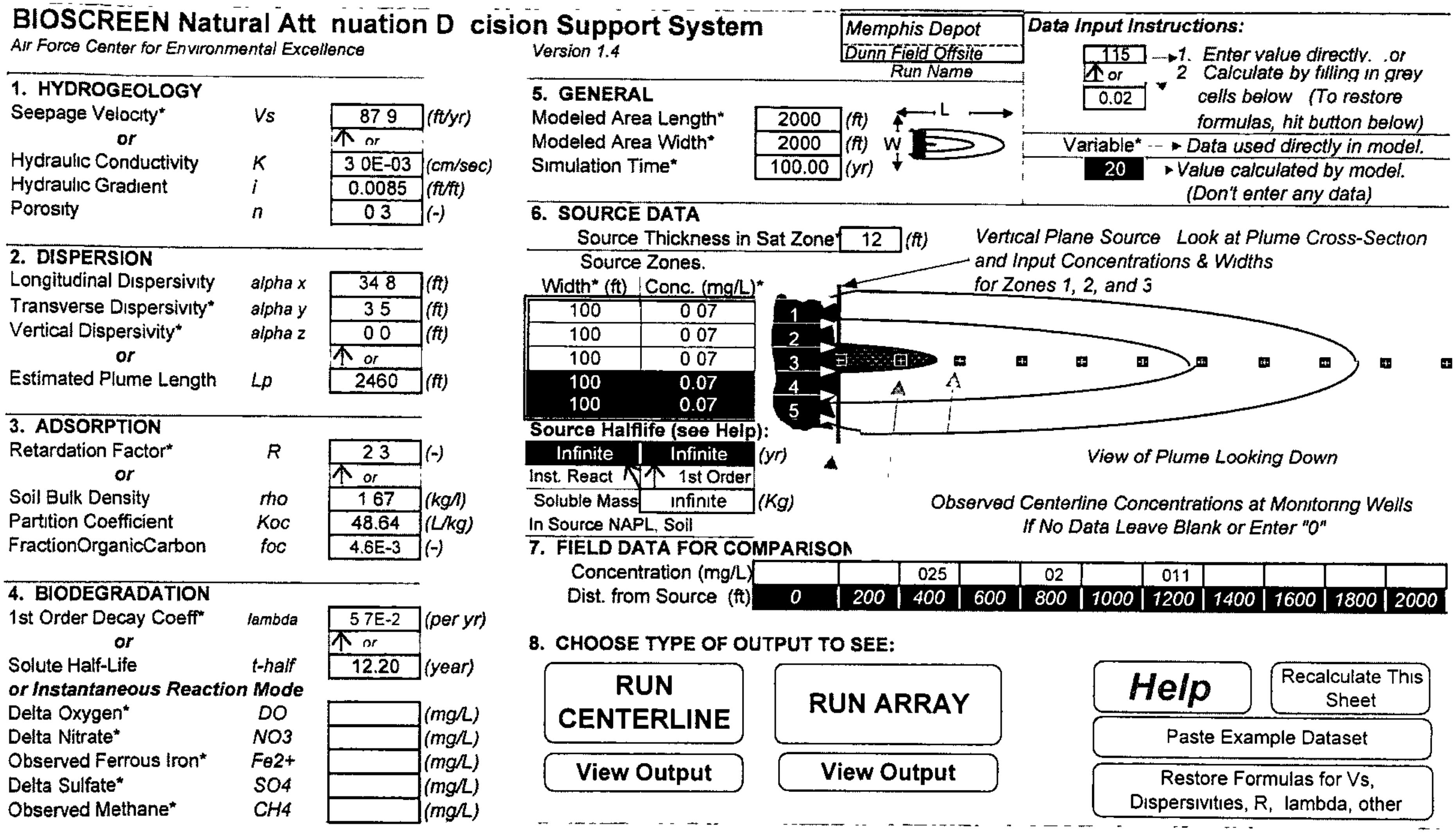
Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)										048	
Dist. from Source (ft)	0	320	640	960	1280	1600	1920	2240	2560	2880	3200

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure 16-4C. BIOSCREEN Simulation of 1,1-DCE Concentrations within the Fluvial Aquifer Breakthrough to the Theoretical Breach near MW-40 at 100 Years



BIOSCREEN Natural Att nuation D cision Support System
Air Force Center for Environmental Excellence
Version 1.4

Memphis Depot
Dunn Field Offsite
Run Name

Data Input Instructions:

115 ↑ or 0.02	1. Enter value directly. .or 2 Calculate by filling in grey cells below (To restore formulas, hit button below)
Variable*	Data used directly in model.
20	Value calculated by model. (Don't enter any data)

1. HYDROGEOLOGY

Seepage Velocity*	Vs	87.9	(ft/yr)
or		↑ or	
Hydraulic Conductivity	K	3.0E-03	(cm/sec)
Hydraulic Gradient	i	0.0085	(ft/ft)
Porosity	n	0.3	(-)

2. DISPERSION

Longitudinal Dispersivity	alpha x	34.8	(ft)
Transverse Dispersivity*	alpha y	3.5	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		↑ or	
Estimated Plume Length	Lp	2460	(ft)

3. ADSORPTION

Retardation Factor*	R	2.3	(-)
or		↑ or	
Soil Bulk Density	rho	1.67	(kg/l)
Partition Coefficient	Koc	48.64	(L/kg)
FractionOrganicCarbon	foc	4.6E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	5.7E-2	(per yr)
or		↑ or	
Solute Half-Life	t-half	12.20	(year)
or Instantaneous Reaction Mode			
Delta Oxygen*	DO		(mg/L)
Delta Nitrate*	NO3		(mg/L)
Observed Ferrous Iron*	Fe2+		(mg/L)
Delta Sulfate*	SO4		(mg/L)
Observed Methane*	CH4		(mg/L)

5. GENERAL

Modeled Area Length*	2000	(ft)
Modeled Area Width*	2000	(ft)
Simulation Time*	100.00	(yr)

6. SOURCE DATA

Source Thickness in Sat Zone* 12 (ft)

Source Zones.

Width* (ft)	Conc. (mg/L)*
100	0.07
100	0.07
100	0.07
100	0.07
100	0.07

Vertical Plane Source Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

View of Plume Looking Down

Source Halflife (see Help):

Infinite	Infinite	(yr)
Inst. React ↑	↑ 1st Order	
Soluble Mass	infinite	(Kg)
In Source NAPL, Soil		

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

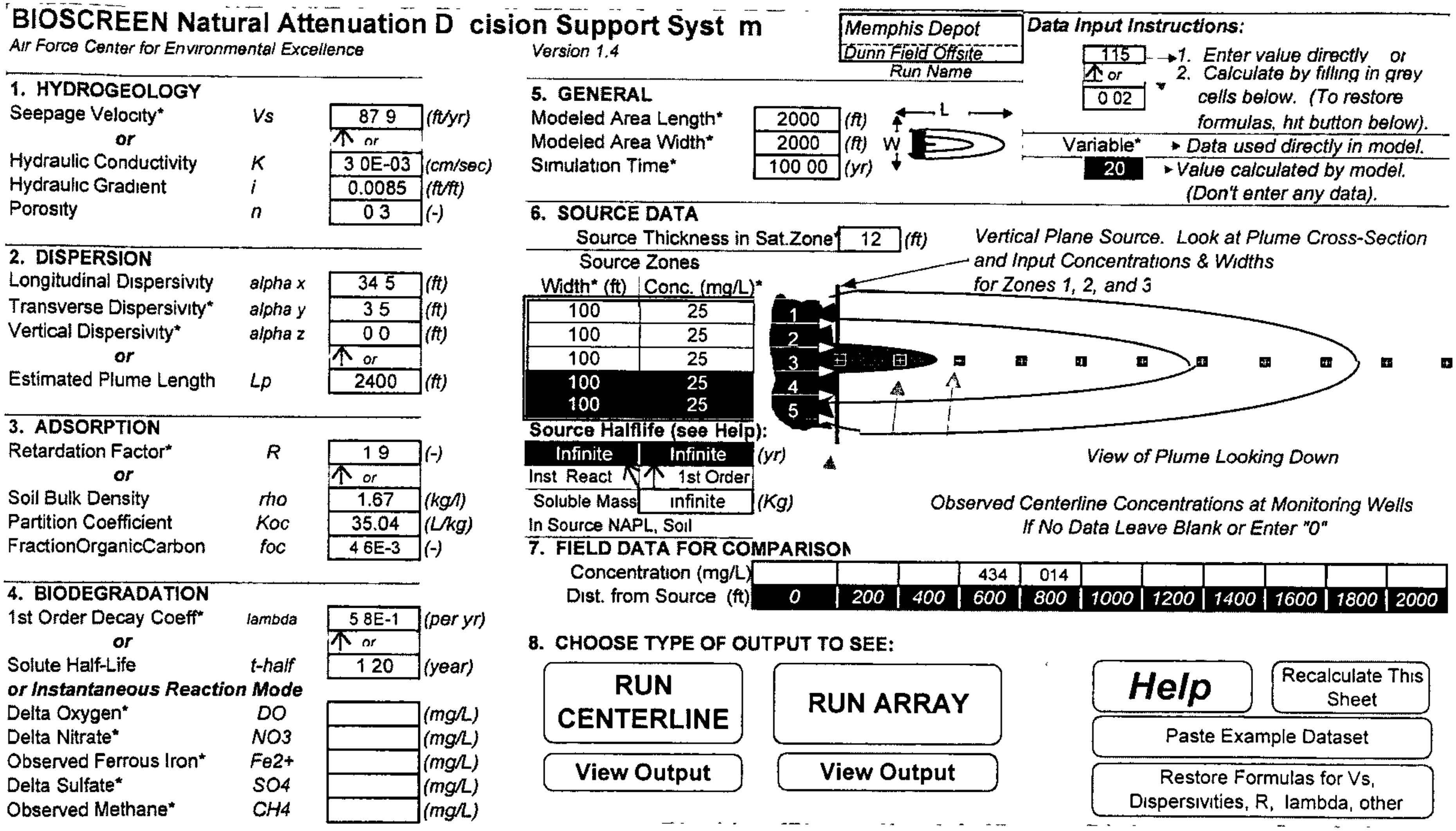
Concentration (mg/L)			.025		.02		.011				
Dist. from Source (ft)	0	200	400	600	800	1000	1200	1400	1600	1800	2000

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE
View Output
RUN ARRAY
View Output
Help
Recalculate This Sheet
Paste Example Dataset
Restore Formulas for Vs, Dispersivities, R, lambda, other

Figure 16-4D. BIOSCREEN Simulation of Carbon Tetrachloride Concentrations within the Fluvial Aquifer Breakthrough to the Theoretical Breach near MW-40 at 100 Years

Rev 0 Memphis Depot Dunn Field RI



BIOSCREEN Natural Attenuation D cision Support Syst m
Air Force Center for Environmental Excellence
Version 1.4

Memphis Depot
Dunn Field Offsite
Run Name

Data Input Instructions:
115 → 1. Enter value directly or
or 0 02 → 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
Variable* ▸ Data used directly in model.
20 ▸ Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	87 9	(ft/yr)
or		or	
Hydraulic Conductivity	K	3 0E-03	(cm/sec)
Hydraulic Gradient	i	0.0085	(ft/ft)
Porosity	n	0 3	(-)

2. DISPERSION

Longitudinal Dispersivity	alpha x	34 5	(ft)
Transverse Dispersivity*	alpha y	3 5	(ft)
Vertical Dispersivity*	alpha z	0 0	(ft)
or		or	
Estimated Plume Length	Lp	2400	(ft)

3. ADSORPTION

Retardation Factor*	R	1 9	(-)
or		or	
Soil Bulk Density	rho	1.67	(kg/l)
Partition Coefficient	Koc	35.04	(L/kg)
FractionOrganicCarbon	foc	4 6E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	5 8E-1	(per yr)
or		or	
Solute Half-Life	t-half	1 20	(year)
or Instantaneous Reaction Mode			
Delta Oxygen*	DO		(mg/L)
Delta Nitrate*	NO3		(mg/L)
Observed Ferrous Iron*	Fe2+		(mg/L)
Delta Sulfate*	SO4		(mg/L)
Observed Methane*	CH4		(mg/L)

5. GENERAL

Modeled Area Length*	2000	(ft)
Modeled Area Width*	2000	(ft)
Simulation Time*	100 00	(yr)

6. SOURCE DATA

Source Thickness in Sat.Zone* 12 (ft)

Source Zones

Width* (ft)	Conc. (mg/L)*
100	25
100	25
100	25
100	25
100	25

Vertical Plane Source. Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

View of Plume Looking Down

Source Halflife (see Help):

	Infinite	Infinite	(yr)
	Inst React	1st Order	
Soluble Mass In Source NAPL, Soil		infinite	(Kg)

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)				434	014						
Dist. from Source (ft)	0	200	400	600	800	1000	1200	1400	1600	1800	2000

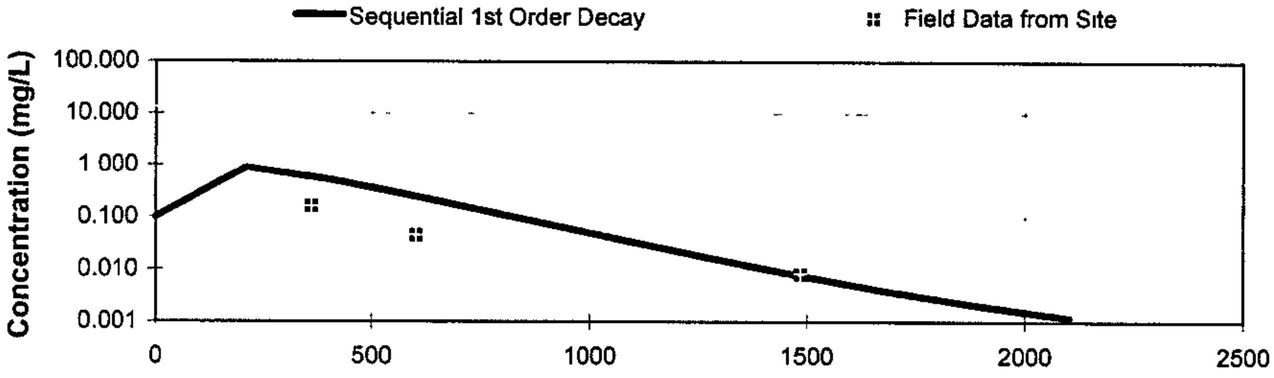
8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure 16-4E. BIOSCREEN Simulation of Chloroform Concentrations within the Fluvial Aquifer Breakthrough to the Theoretical Breach Near MW-40 at 100 Years

DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

DCE	Distance from Source (ft)										
	0	210	420	630	840	1050	1260	1470	1680	1890	2100
No Degradation	0.100	0.099	0.094	0.087	0.081	0.076	0.071	0.066	0.062	0.057	0.053
Biotransformation	0.100	0.890	0.492	0.220	0.094	0.040	0.018	0.008	0.004	0.002	0.001

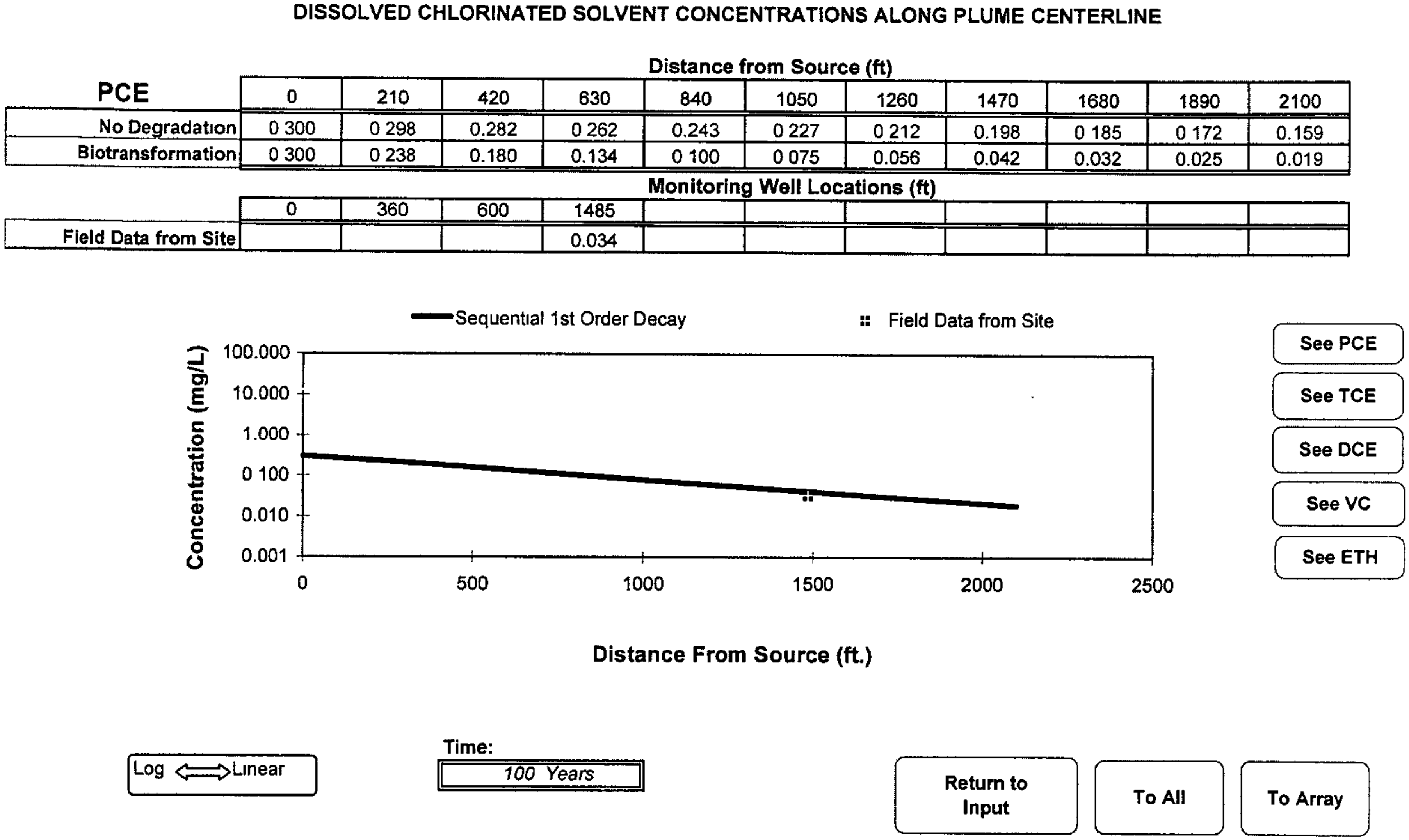
	Monitoring Well Locations (ft)										
	0	360	600	1485							
Field Data from Site		0.163	0.045	0.008							



Distance From Source (ft.)

Time: 100 Years

Figure 16-5A
Simulation of Dissolved PCE, TCE, and DCE Plume History within the Fluvial Aquifer - 100 Years After Initial Release
Rev 0 Memphis Depot Dunn Field RI



DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

PCE	Distance from Source (ft)										
	0	210	420	630	840	1050	1260	1470	1680	1890	2100
No Degradation	0.300	0.298	0.282	0.262	0.243	0.227	0.212	0.198	0.185	0.172	0.159
Biotransformation	0.300	0.238	0.180	0.134	0.100	0.075	0.056	0.042	0.032	0.025	0.019

	Monitoring Well Locations (ft)										
	0	360	600	1485							
Field Data from Site				0.034							

Time: 100 Years

Figure 16-5A
Simulation of Dissolved PCE, TCE, and DCE Plume History within the Fluvial Aquifer - 100 Years After Initial Release
Rev 0 Memphis Depot Dunn Field RI

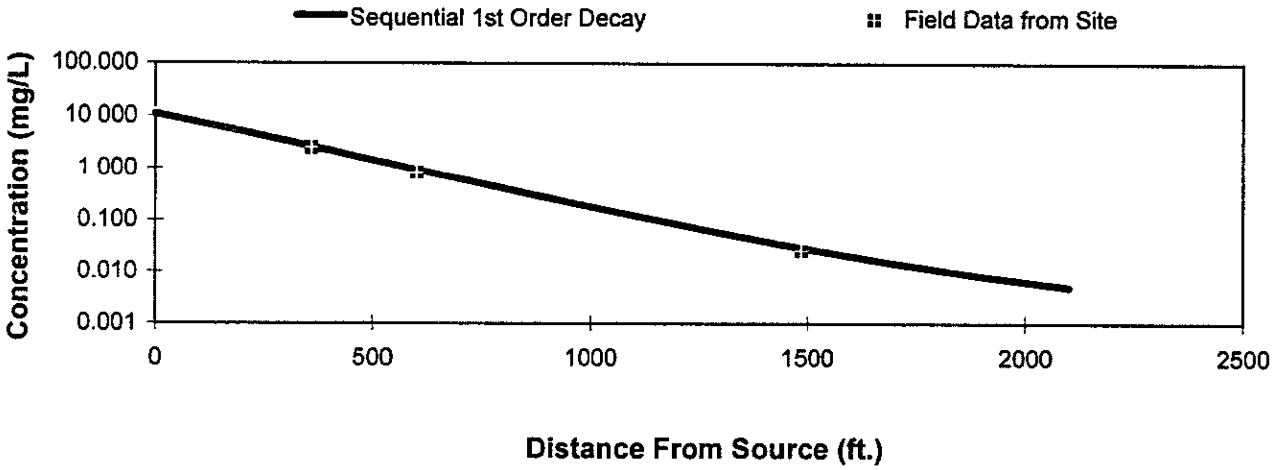
DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

Distance from Source (ft)

TCE	0	210	420	630	840	1050	1260	1470	1680	1890	2100
No Degradation	11.000	10.909	10.326	9.597	8.919	8.315	7.770	7.266	6.783	6.308	5.829
Biotransformation	11.000	4.805	2.011	0.832	0.348	0.149	0.066	0.031	0.016	0.008	0.005

Monitoring Well Locations (ft)

	0	360	600	1485							
Field Data from Site		2.500	0.840	0.026							



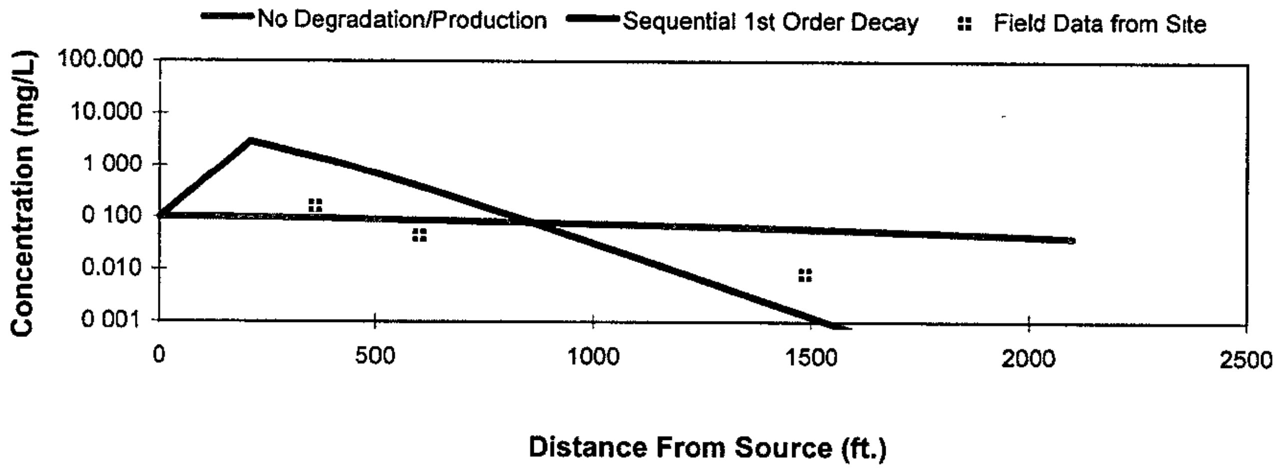
Time: 100 Years

Figure 16-5A
Simulation of Dissolved PCE, TCE, and DCE Plume History within the Fluvial Aquifer - 100 Years After Initial Release
Rev 0 Memphis Depot Dunn Field RI

DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

DCE	Distance from Source (ft)										
	0	210	420	630	840	1050	1260	1470	1680	1890	2100
No Degradation	0.100	0.099	0.093	0.086	0.079	0.073	0.066	0.060	0.054	0.047	0.041
Biotransformation	0.100	2.858	1.124	0.332	0.089	0.023	0.006	0.001	0.000	0.000	0.000

	Monitoring Well Locations (ft)										
	0	360	600	1485							
Field Data from Site		0.163	0.045	0.008							



See PCA

See TCA

See DCE

See VC

See ETH

Log ⟺ Linear

Time: 100 Years

Return to Input

To All

To Array

Figure 16-5B
Simulation of Dissolved PCA, TCA, and DCE Plume History within the Fluvial Aquifer - 100 Years After Initial Release
Rev. 0 Memphis Depot Dunn Field RI

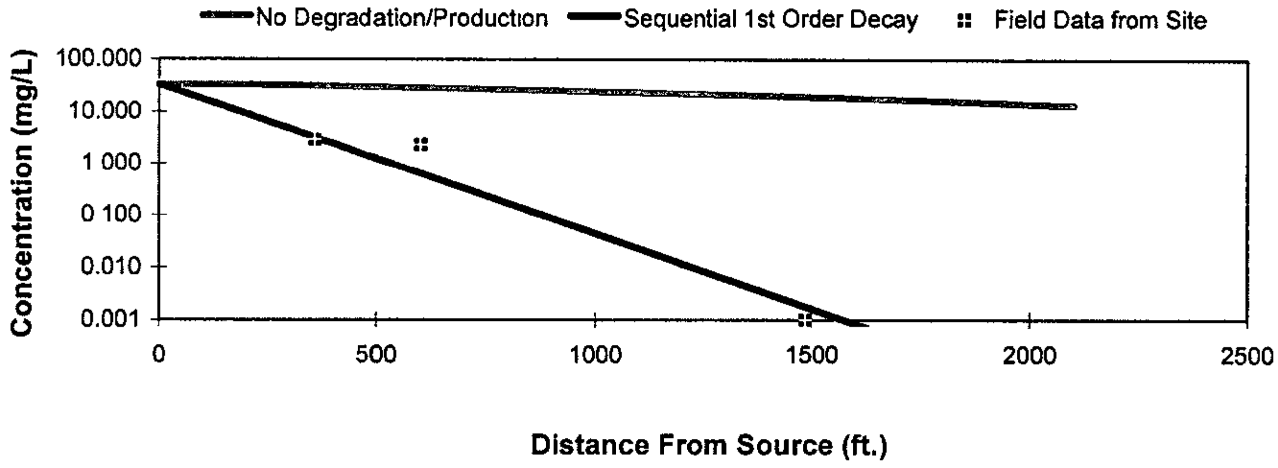
DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

Distance from Source (ft)

PCA	0	210	420	630	840	1050	1260	1470	1680	1890	2100
No Degradation	33 000	32.675	30 825	28 474	26 190	24 028	21.934	19 852	17 748	15 613	13 470
Biotransformation	33 000	8 605	2 143	0.524	0 129	0 032	0 008	0.002	0.000	0.000	0 000

Monitoring Well Locations (ft)

	0	360	600	1485							
Field Data from Site		2.900	2 300	0.001							



See PCA

See TCA

See DCE

See VC

See ETH

Log ⟺ Linear

Time: 100 Years

Return to Input

To All

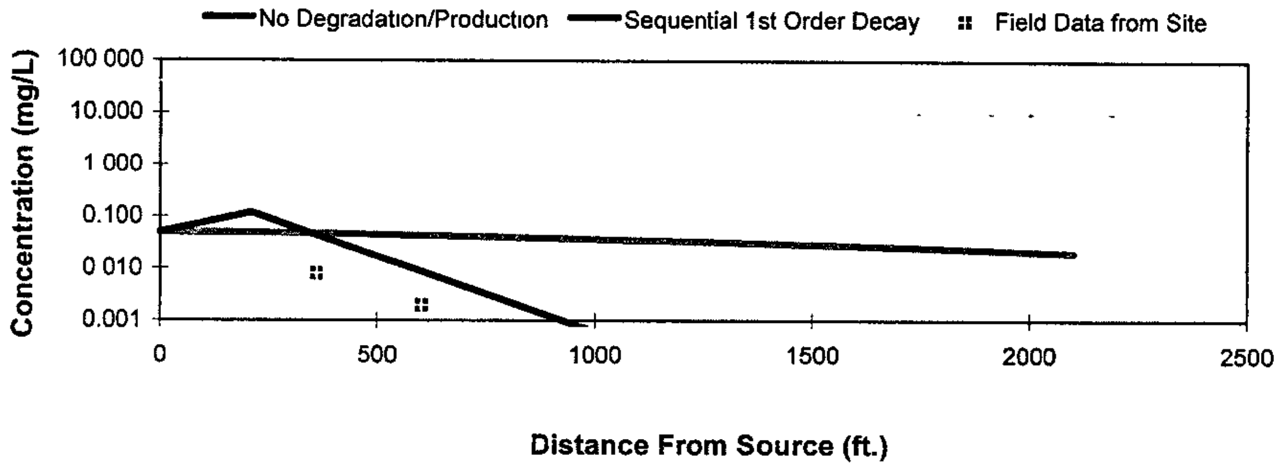
To Array

Figure 16-5B
Simulation of Dissolved PCA, TCA, and DCE Plume History within the Fluvial Aquifer - 100 Years After Initial Release
Rev 0 Memphis Depot Dunn Field RI

DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

TCA	Distance from Source (ft)										
	0	210	420	630	840	1050	1260	1470	1680	1890	2100
No Degradation	0.050	0.050	0.047	0.043	0.040	0.036	0.033	0.030	0.027	0.024	0.020
Biotransformation	0.050	0.118	0.029	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000

	Monitoring Well Locations (ft)										
	0	360	600	1485							
Field Data from Site		0.008	0.002	0.000							



See PCA

See TCA

See DCE

See VC

See ETH

Log ⟺ Linear

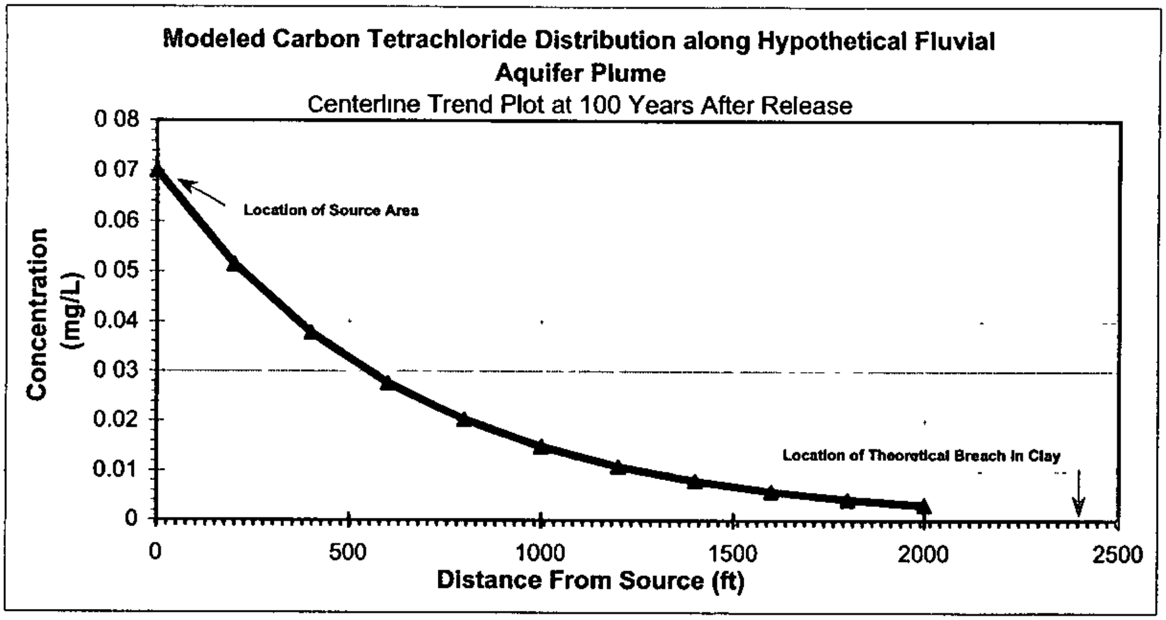
Time:
100 Years

Return to Input

To All

To Array

Figure 16-5B
Simulation of Dissolved PCA, TCA, and DCE Plume History within the Fluvial Aquifer - 100 Years After Initial Release
Rev 0 Memphis Depot Dunn Field RI



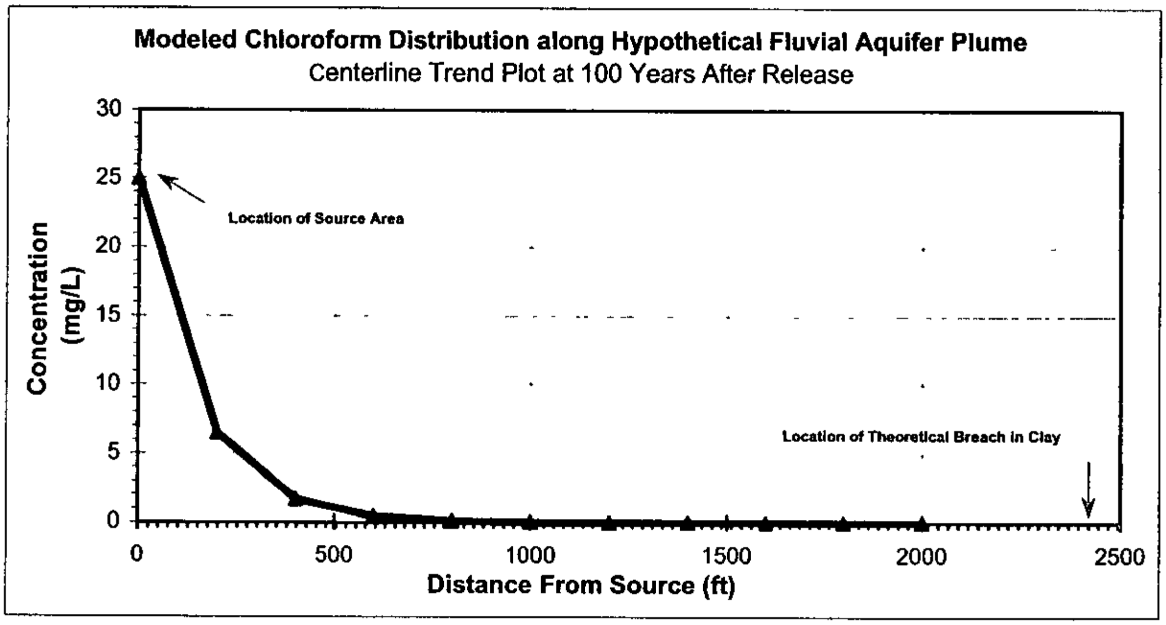
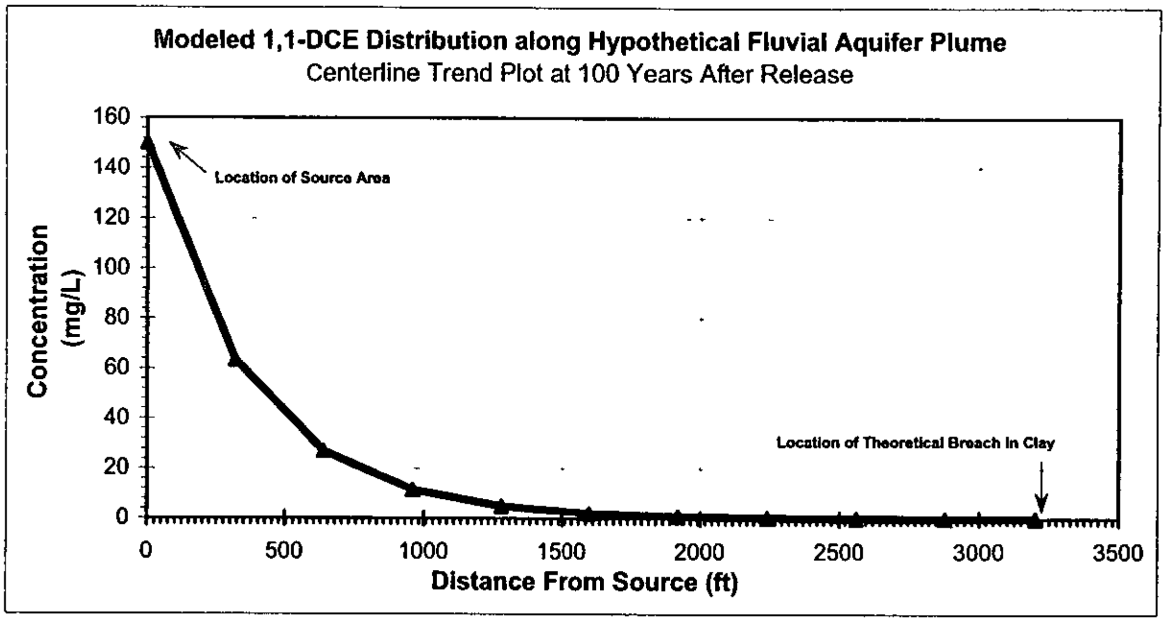


Figure 16-5C
Conservative Prediction of Carbon Tetrachloride and Chloroform Plume Growth within the Fluvial Aquifer
Rev. 0 Memphis Depot Dunn Field RI



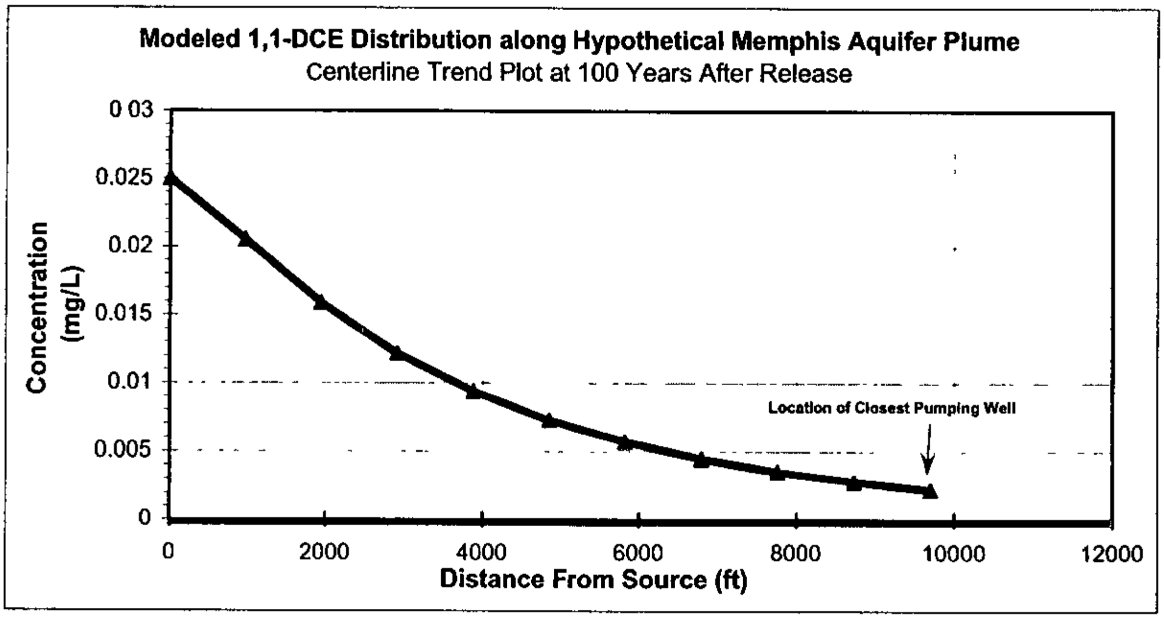
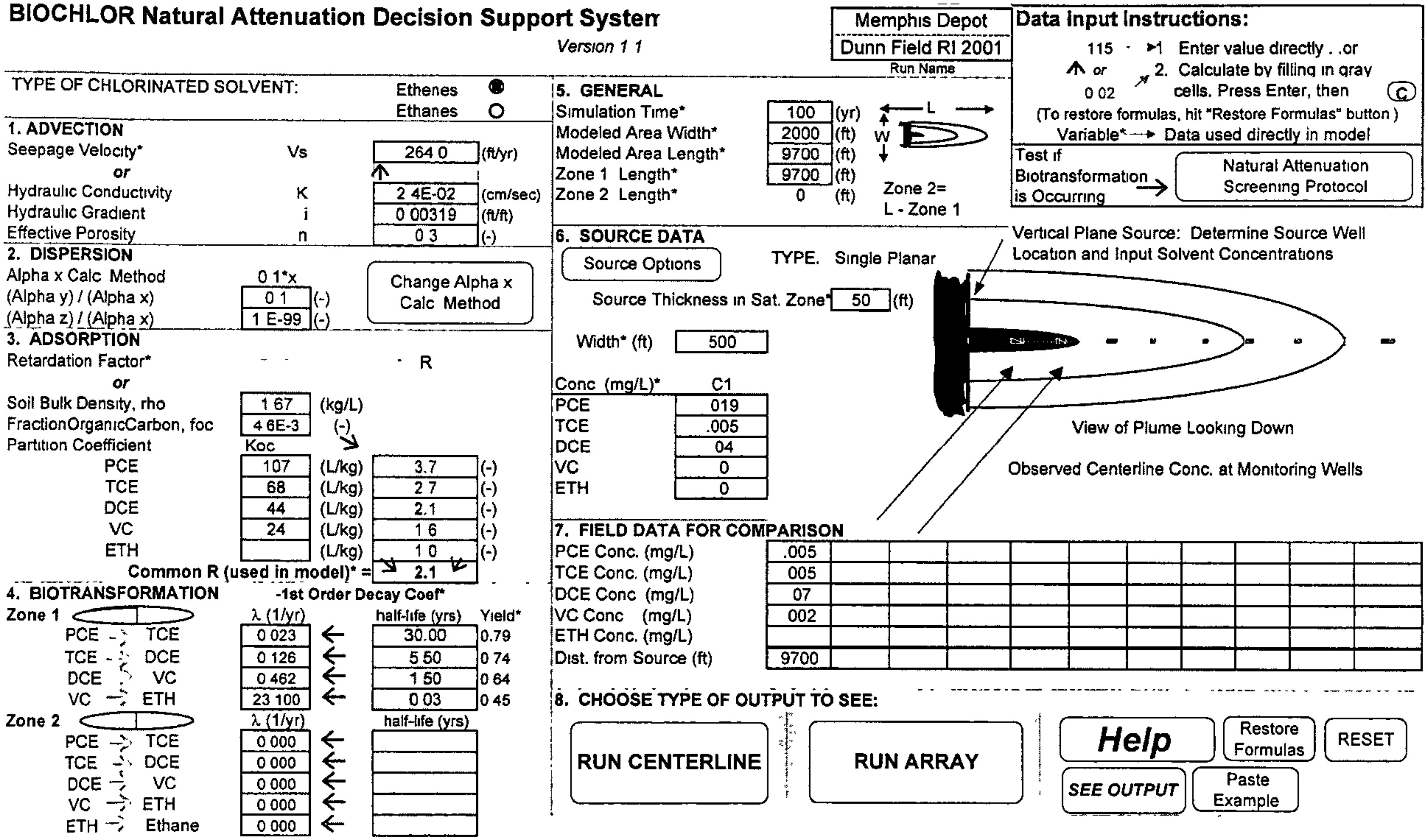


Figure 16-5D
Conservative Prediction of 1,1-DCE Plume Growth within the Fluvial and Memphis Aquifers
Rev. 0 Memphis Depot Dunn Field RI



BIOCHLOR Natural Attenuation Decision Support System

Version 1 1

Memphis Depot
Dunn Field RI 2001
Run Name

Data Input Instructions:

115 · ▸1 Enter value directly . .or
↑ or ↗ 2. Calculate by filling in gray
0 02 cells. Press Enter, then Ⓒ
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ● Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	264 0	(ft/yr)
or			
Hydraulic Conductivity	K	2 4E-02	(cm/sec)
Hydraulic Gradient	i	0 00319	(ft/ft)
Effective Porosity	n	0 3	(-)

2. DISPERSION

Alpha x Calc Method	0 1*x	
(Alpha y) / (Alpha x)	0 1	(-)
(Alpha z) / (Alpha x)	1 E-99	(-)

Change Alpha x Calc Method

3. ADSORPTION

Retardation Factor* · R

or

Soil Bulk Density, rho	1 67	(kg/L)
FractionOrganicCarbon, foc	4 6E-3	(-)

Partition Coefficient

	Koc			
PCE	107	(L/kg)	3.7	(-)
TCE	68	(L/kg)	2 7	(-)
DCE	44	(L/kg)	2.1	(-)
VC	24	(L/kg)	1 6	(-)
ETH		(L/kg)	1 0	(-)

Common R (used in model)* = 2.1

4. BIOTRANSFORMATION -1st Order Decay Coef*

Zone 1	λ (1/yr)		half-life (yrs)	Yield*
PCE → TCE	0 023	←	30.00	0.79
TCE → DCE	0 126	←	5 50	0 74
DCE → VC	0 462	←	1 50	0 64
VC → ETH	23 100	←	0 03	0 45

Zone 2	λ (1/yr)		half-life (yrs)
PCE → TCE	0 000	←	
TCE → DCE	0 000	←	
DCE → VC	0 000	←	
VC → ETH	0 000	←	
ETH → Ethane	0 000	←	

5. GENERAL

Simulation Time*	100	(yr)
Modeled Area Width*	2000	(ft)
Modeled Area Length*	9700	(ft)
Zone 1 Length*	9700	(ft)
Zone 2 Length*	0	(ft)

Zone 2= L - Zone 1

6. SOURCE DATA

Source Options

TYPE. Single Planar

Source Thickness in Sat. Zone* 50 (ft)

Width* (ft) 500

Conc (mg/L)*	C1
PCE	019
TCE	.005
DCE	04
VC	0
ETH	0

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

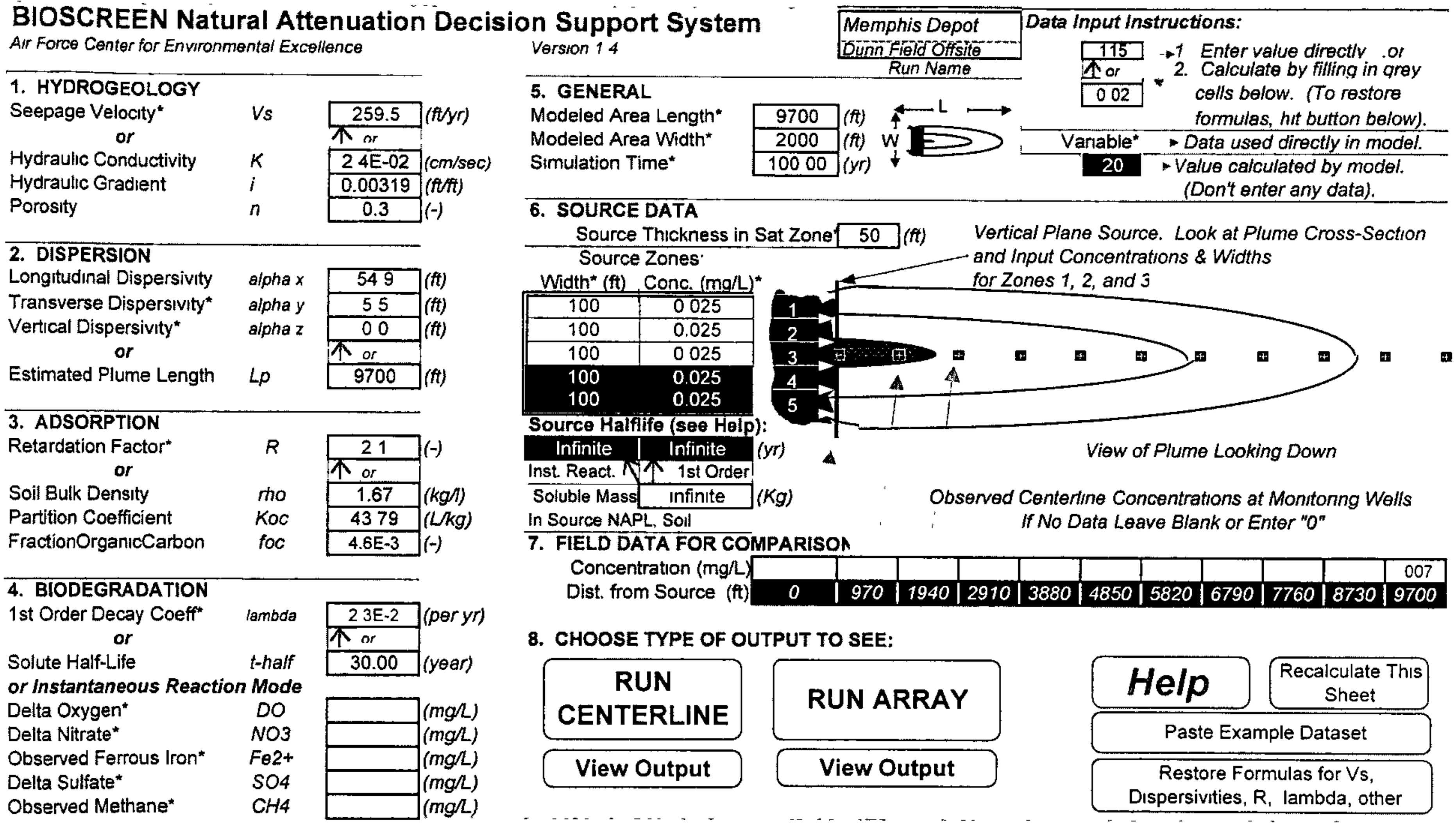
7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	.005									
TCE Conc. (mg/L)	005									
DCE Conc (mg/L)	07									
VC Conc (mg/L)	002									
ETH Conc. (mg/L)										
Dist. from Source (ft)	9700									

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure 16-6A. BIOCHLOR Simulation of PCE, TCE, and DCE Concentrations within the Memphis Aquifer Breakthrough to Closest Allen Well Field Pumping Well at 100 Years

Rev 0 Memphis Depot Dunn Field RI



BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence *Version 1 4*

Memphis Depot
Dunn Field Offsite
Run Name

Data Input Instructions:

115	→1	*Enter value directly .or*
↑ or	2.	*Calculate by filling in grey cells below. (To restore formulas, hit button below).*
0 02		
Variable*	▸	*Data used directly in model.*
20	▸	*Value calculated by model. (Don't enter any data).*

1. HYDROGEOLOGY

Seepage Velocity*	*Vs*	259.5	*(ft/yr)*
or		↑ *or*	
Hydraulic Conductivity	*K*	2 4E-02	*(cm/sec)*
Hydraulic Gradient	*i*	0.00319	*(ft/ft)*
Porosity	*n*	0.3	*(-)*

2. DISPERSION

Longitudinal Dispersivity	*alpha x*	54 9	*(ft)*
Transverse Dispersivity*	*alpha y*	5 5	*(ft)*
Vertical Dispersivity*	*alpha z*	0 0	*(ft)*
or		↑ *or*	
Estimated Plume Length	*Lp*	9700	*(ft)*

3. ADSORPTION

Retardation Factor*	*R*	2 1	*(-)*
or		↑ *or*	
Soil Bulk Density	*rho*	1.67	*(kg/l)*
Partition Coefficient	*Koc*	43 79	*(L/kg)*
FractionOrganicCarbon	*foc*	4.6E-3	*(-)*

4. BIODEGRADATION

1st Order Decay Coeff*	*lambda*	2 3E-2	*(per yr)*
or		↑ *or*	
Solute Half-Life	*t-half*	30.00	*(year)*
or Instantaneous Reaction Mode			
Delta Oxygen*	*DO*		*(mg/L)*
Delta Nitrate*	*NO3*		*(mg/L)*
Observed Ferrous Iron*	*Fe2+*		*(mg/L)*
Delta Sulfate*	*SO4*		*(mg/L)*
Observed Methane*	*CH4*		*(mg/L)*

5. GENERAL

Modeled Area Length*	9700	*(ft)*
Modeled Area Width*	2000	*(ft)*
Simulation Time*	100 00	*(yr)*

6. SOURCE DATA

Source Thickness in Sat Zone* 50 *(ft)*

Source Zones:

Width* (ft)	Conc. (mg/L)*
100	0 025
100	0.025
100	0 025
100	0.025
100	0.025

Vertical Plane Source. Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

View of Plume Looking Down

Source Halflife (see Help):

Infinite	Infinite	*(yr)*
Inst. React.	1st Order	
Soluble Mass	infinite	*(Kg)*
In Source NAPL, Soil		

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

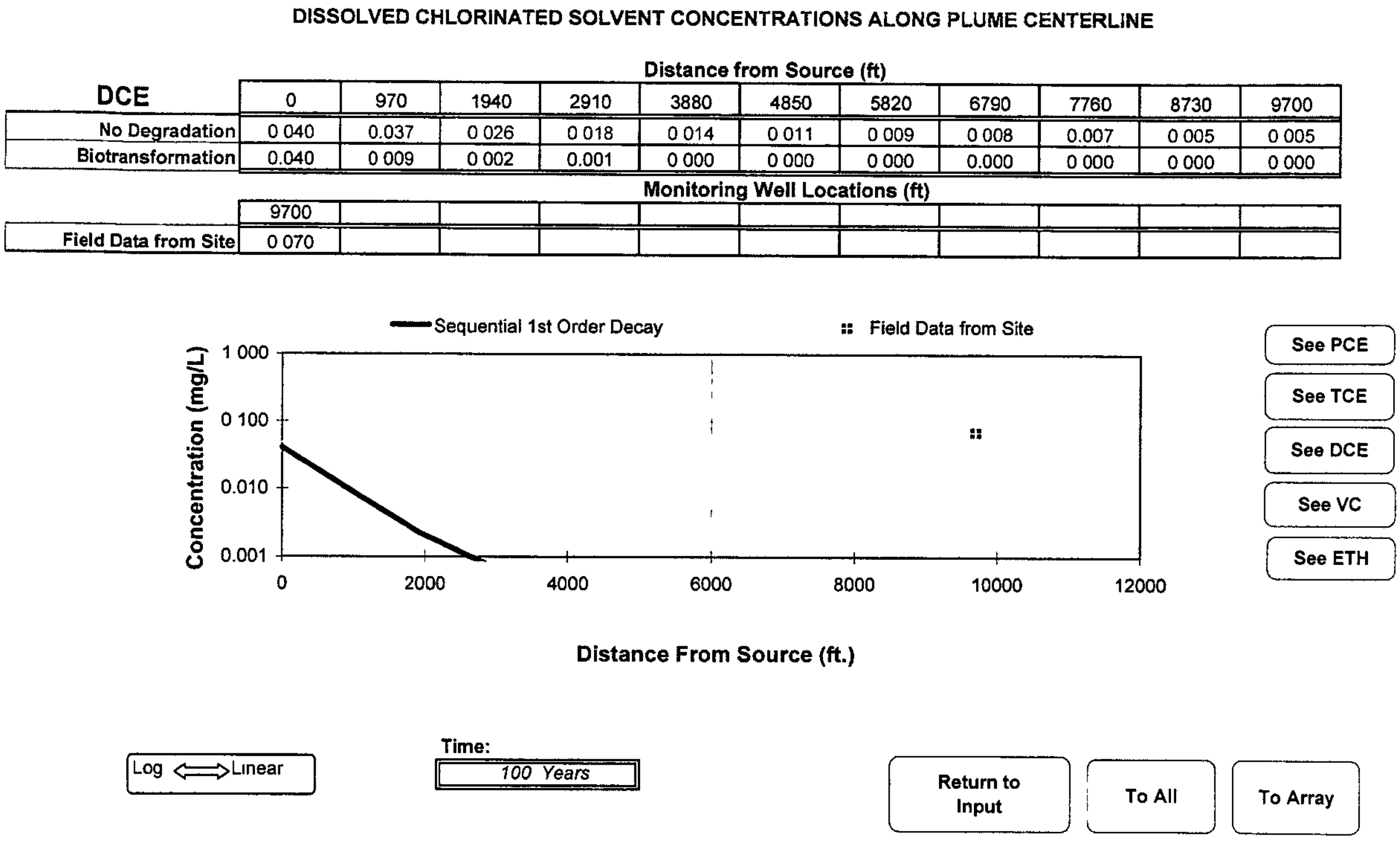
7. FIELD DATA FOR COMPARISON

Concentration (mg/L)											007
Dist. from Source (ft)	0	970	1940	2910	3880	4850	5820	6790	7760	8730	9700

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure 16-6B. BIOSCREEN Simulation of 1,1-DCE Concentrations within the Memphis Sand Aquifer Breakthrough to Closest Allen Well Field Pumping Well at 100 Years

Rev 0 Memphis Depot Dunn Field RI



DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

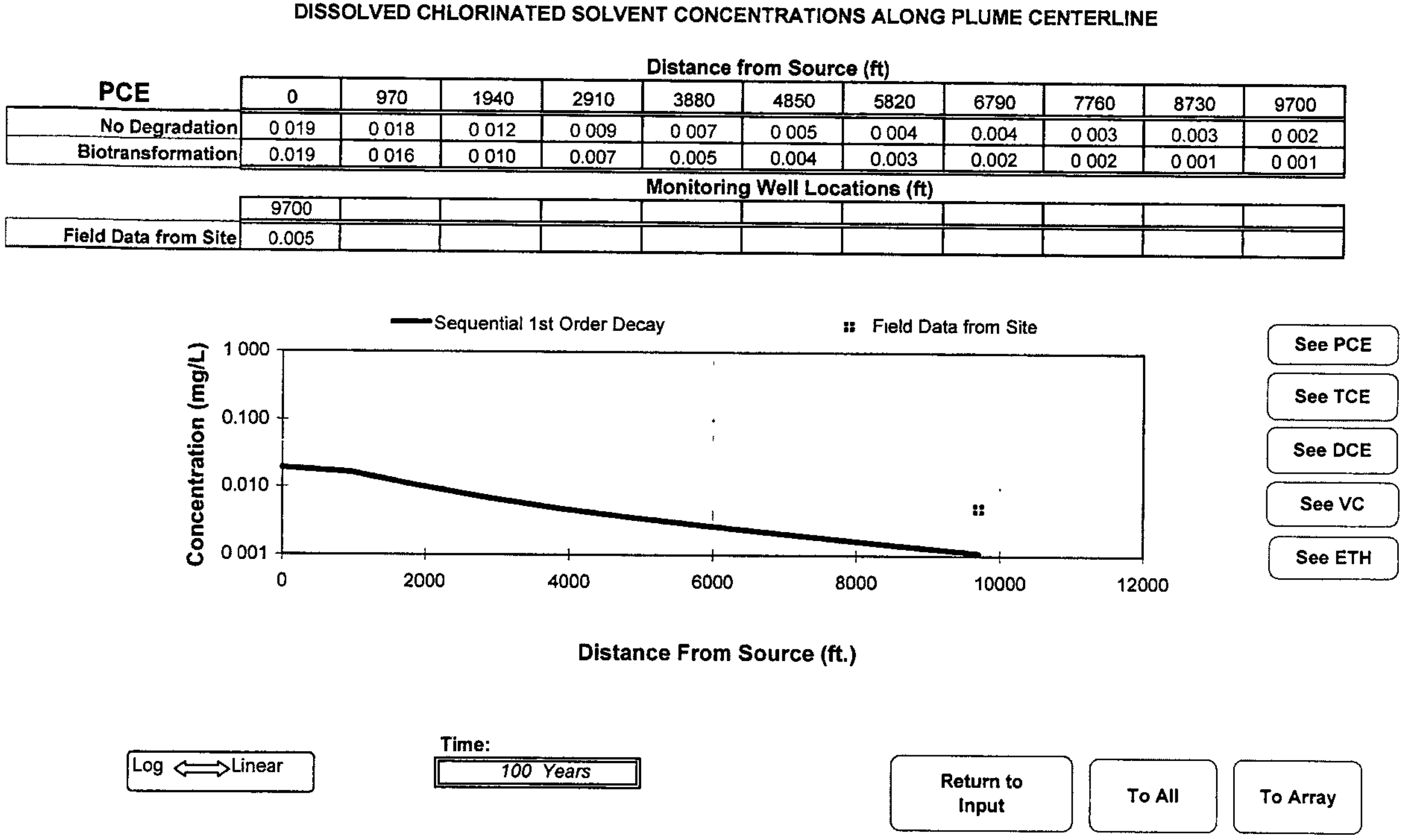
Distance from Source (ft)

DCE	0	970	1940	2910	3880	4850	5820	6790	7760	8730	9700
No Degradation	0.040	0.037	0.026	0.018	0.014	0.011	0.009	0.008	0.007	0.005	0.005
Biotransformation	0.040	0.009	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Monitoring Well Locations (ft)

	9700										
Field Data from Site	0.070										

Figure 16-7A
Simulation of Dissolved PCE, TCE, and DCE Plume History within the Memphis Aquifer - 100 Years After Inital Release
Rev 0 Memphis Depot Dunn Field RI



DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

PCE	Distance from Source (ft)										
	0	970	1940	2910	3880	4850	5820	6790	7760	8730	9700
No Degradation	0.019	0.018	0.012	0.009	0.007	0.005	0.004	0.004	0.003	0.003	0.002
Biotransformation	0.019	0.016	0.010	0.007	0.005	0.004	0.003	0.002	0.002	0.001	0.001

	Monitoring Well Locations (ft)										
	9700										
Field Data from Site	0.005										

Time: 100 Years

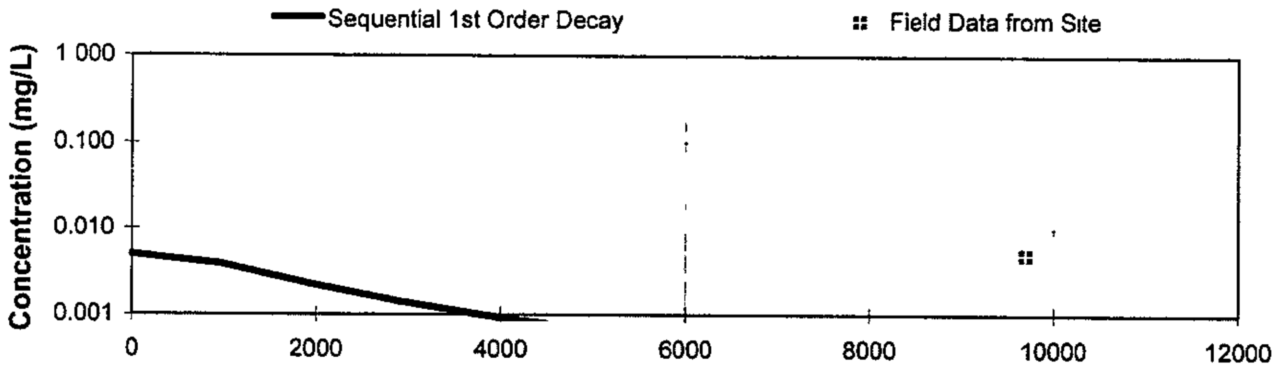
Figure 16-7A
Simulation of Dissolved PCE, TCE, and DCE Plume History within the Memphis Aquifer - 100 Years After Inital Release
Rev 0 Memphis Depot Dunn Field RI

DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE

TCE

	Distance from Source (ft)										
	0	970	1940	2910	3880	4850	5820	6790	7760	8730	9700
No Degradation	0.005	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Biotransformation	0.005	0.004	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000

	Monitoring Well Locations (ft)										
	9700										
Field Data from Site	0.005										



Distance From Source (ft.)

See PCE

See TCE

See DCE

See VC

See ETH

Log ⟺ Linear

Time: 100 Years

Return to Input

To All

To Array

Figure 16-7A
Simulation of Dissolved PCE, TCE, and DCE Plume History within the Memphis Aquifer - 100 Years After Inital Release
Rev 0 Memphis Depot Dunn Field RI

TAB

Section 17

17.0 Findings of the Dunn Field RI

This section summarizes the key components of the RI and presents the findings for the Northeast Open Area, Disposal Area, Stockpile Area, and onsite and offsite groundwater of Dunn Field.

17.1 Northeast Open Area

During the RI field investigation effort, surface and subsurface soil, surface water, and sediment were collected from within the Northeast Open Area and analyzed for explosives, metals, pesticides/PCBs, SVOCs, and VOCs to assess the nature and extent of contamination. Table 17-1 presents those compounds detected above background levels. Based on the results of this investigation, the key findings for the Northeast Open Area are as follows:

- Metals were revealed above background concentrations in surface and sediment samples. The relatively high lead levels detected in surface soils are attributed to the former Pistol Range;
- Pesticides were revealed above background concentrations in samples from surface and sediment samples. A majority of these values, however, were reported with a J-qualifier. Much of the pesticides are not related to specific source releases but rather persistent use across the site, especially within the area of the former Pistol Range;
- SVOCs were detected above background concentrations in surface water, subsurface soil, and sediments. All SVOCs revealed in surface water and subsurface soil were reported with a J-qualifier. The detection of SVOCs in sediments were either J-qualified or was a common laboratory contaminant;
- PCBs were detected in sediment samples although there were no background concentrations established; and
- VOCs were detected in surface and subsurface soils. Detection of CVOCs , such as PCE and TCE, in soil are likely related to past broadcast surface disposal of solvents rather than subsurface excavation and disposal practices.

The potential risks to human health and ecological receptors from exposures to contaminants in impacted media in the Northeast Open Area were also evaluated. The key findings from the risk analysis are as follows:

- Many COPCs for the Northeast Open Area, such as PAHs and metals, were also detected in background soils. Dieldrin was not used in the pistol range operations; however, it was applied as part of routine maintenance of the grassy areas, which are not directly related to the site operations within Dunn Field. Likewise, site-wide data statistical evaluations indicate that contaminants were similarly distributed in the background samples;

- The surface water COPCs were dieldrin and phenanthrene, both of which have low solubility, indicating they may be associated with suspended particulates;
- The risk evaluations under future land use conditions included potential exposures of maintenance, industrial, and utility workers within the Northeast Open Area based on activities observed to be applicable to the site. Offsite residential exposures to volatiles and dust from the site were also evaluated. None of these exposure scenarios resulted in risks above acceptable levels. Therefore, site-specific risk-based RGOs were not calculated for the site;
- The carcinogenic risks for industrial worker exposures to Sites 60/85 surface soil resulted in an estimated risk of 9×10^{-6} and a noncarcinogenic HI of 0.03. The carcinogenic risks are from dieldrin. The resulting risks are well within the acceptable limits for cancer risks of 1 to 100 in one million and an HI of 1.0. Thus, the overall Sites 60/85 surface soils do not pose a health threat to future industrial workers;
- Overall risks and HIs to future residents are well within acceptable limits for the Surrogate Site 60/85;
- Lead detected at sample Location 60/85 is reported at 2,100 mg/kg. This particular sample concentration is well above a residential screening concentration of 400 mg/kg, and is also above the Memphis Depot industrial worker target value of 1,536 mg/kg. However, based on the sample results, the average for the Northeast Open Area is not above these target levels. Since there is a potential for the Northeast Open Area to be used for residential purposes in the future, an Engineering Evaluation/Cost Analysis leading to an early removal of the lead-contaminated soil will be completed as part of the remedial design;
- Dieldrin and chromium were the only surface soil COPCs identified in the ecological risk assessment for the Northeast Open Area. Based on further refinement of the risk assumptions of dieldrin and chromium on the American robin as target receptor, along with the other site-specific characteristics and uncertainties, dieldrin and chromium will not be considered further as a COPCs at this site; and
- No further assessment of ecological risk associated with contaminants at the Northeast Open Area was found to be warranted.

17.2 Disposal Area

During the RI field investigation effort, surface and subsurface soil, surface water, and sediment were collected from within the Disposal Area and analyzed for explosives, metals, dioxins, pesticides/PCBs, SVOCs, and VOCs to assess the nature and extent of contamination. Table 17-2 presents those compounds detected above background levels. Based on the results of this investigation, the key findings for the Disposal Area are as follows:

- Metals were detected above background levels in surface and subsurface soils. These levels are attributable to storage of mineral resources on site as well as waste disposal at

Dunn Field. Variation in the concentration in areas detected is most likely the result of subsequent spreading by activities at the site;

- Arsenic was also detected in one sample above background concentrations in Dunn Field sediments. Aluminum, beryllium, cadmium, and lead were detected in surface water above background values. The detection of these metals is reflective of the concentrations in site surface and subsurface soils;
- Pesticides were detected in surface and subsurface soils at levels above background values. In most cases, the level of pesticides in the subsurface was either at the same or one order of magnitude greater than the background concentration. Concentrations in the surface soils were typically revealed at one or two orders of magnitude greater than the background level. The surface soil concentrations may reflect disposal as well as use practices in the Disposal Area. Sediment samples collected from the Disposal Area were also found to contain pesticides reflective of concentrations in surface soils;
- Explosive compounds possibly disposed of in pits at the Disposal Area were analyzed for in surface and subsurface soil and were detected albeit at J-qualified levels;
- PAHs were detected in surface and subsurface soil, sediments, and surface water samples. Background values were uncommon for subsurface soil and surface water, therefore, many of the levels detected could not be compared to a standard value. All of the PAH compounds that were detected appear to be related to the use of liquid creosote as a wood-treating product on cross ties of the numerous railroad tracks that crossed Dunn Field in the past as well possible waste disposal practices at the site;
- PCBs were detected in samples of surface and subsurface soils and sediments. However, background levels could not be established for subsurface soil and sediment. In the surface soils, two detections were found-one at a J-qualifier level and the other at 0.01 mg/kg greater than background,
- SVOCs were detected in all matrices sampled. Background values could not be established for the majority of compounds detected in subsurface soils and surface water. Where detected above background, a J-qualifier was typically associated with each reported value. The highest and most frequently detected SVOC was carbazole, which ranged in surface soil samples from 0.049 to 2 mg/kg;
- Of the VOCs detected in subsurface soil samples from the Disposal Area, significant levels of the following chlorinated VOCs were detected: 1,1,2,2-PCA, 1,1,2-TCA, CCl4, chloroform, PCE, TCE, 1,2-DCE, and vinyl chloride. To a lesser extent cis- and trans-1,2-DCE were also detected in several samples of subsurface soils,
- Relatively high levels of VOCs were also detected in surface soils in the Disposal Area, especially along the northern boundary. These VOCs included acetone, 1,2-DCE, TCE, and vinyl chloride;
- Based on information generated by the Archives Search Report, approximately 15 disposal sites are known to exist in the Disposal Area Information concerning the materials buried in each disposal site is limited and the exact position of each site is unclear. These sites were not investigated during the RI because of unknown hazards

and the potential for CWM in the Disposal Area at that time. These sites have been given priority level rankings based on qualitative risk evaluations and remedial action objectives by the Memphis Depot BCT and will be subject to removal or other appropriate disposition as required as part of the remedial design.

- VOCs in soils correlate well with the extent of VOCs in the subsurface as defined by the passive soil gas survey;
- The apparent clustering of the higher VOC concentrations correlates well with the historical information indicating that the disposal pits and trenches were relatively small and separate;
- Based on soil samples collected from ground surface to just above the top of potentiometric surface of the fluvial aquifer, there appears to be a complete migration pathway from surface soil to subsurface soil and then to groundwater for several CVOCs, including TCE, PCE, 1,1,2,2-PCA, chloroform, vinyl chloride, 1,2-DCE, and CCl4;
- In comparison to SSLs for protection of groundwater, detection of 1,1,2,2-PCA, TCE, and vinyl chloride in surface soil were found to be above criteria in 2, 5, and 1 location(s), respectively. Detection of 1,1,2,2-TCA, 1,1,2-TCA, 1,2-DCA, CCl4, chloroform, PCE, TCE, and vinyl chloride exceeded criteria in 53, 6, 2, 5, 6, 7, 45, and 9 locations, respectively. This is further indication of the relatively high concentrations present in subsurface soils beneath the Disposal Area;

The potential risks to human health and ecological receptors from exposures to contaminants in impacted media at the Disposal Area were also evaluated. The key findings from the risk analysis are as follows:

- Twenty-one carcinogenic and 10 noncarcinogenic inorganic and organic chemicals were identified as COPCs at the Disposal Area. All of the chemicals were analyzed for their potential toxicity contribution to represent the combined effect of all site-related chemicals;
- Combined risks from soil, sediment, and surface water exposure pathways for the maintenance worker resulted in a total ELCR of 4×10^{-6} and a total HI of 0.008. The cumulative surface media exposure is within acceptable limits;
- Exposures to ambient air VOCs from subsurface soils to future industrial workers in the area are estimated to be 2×10^{-5}, and the HI is at 0.3;
- The potential risks to a future industrial worker from potable use of site groundwater from the North plume is estimated to include an ELCR of 1×10^{-4} and an HI of 0.9 (mostly from inorganic chemicals). Contribution to indoor air presents negligible risks;
- Combined risks from soil, sediment, and surface water exposure pathways for the industrial worker resulted in a total ELCR of 4×10^{-5} and a total HI of 0.4. The cumulative surface media exposure is within acceptable limits, as stated above;

- The indoor air risk estimates for an industrial worker assumed to spend the workday indoors at Site E exceeded the acceptable HI of 1.0. This slight exceedance of the acceptable HI at Site E is predominantly due to total-1,2-dichloroethene;
- The risk estimates for inhalation of air originating from the Disposal Area subsurface groundwater to an onsite worker are well within acceptable limits (<1 in a million);
- The risk assessment for the Disposal Area included potential residential scenarios for a residential adult and child. The risks were found to be greater than an HI of 1.0 for surface soil and indoor air (soil to indoor air). Therefore, remediation efforts would be necessary to remove the risk prior to the Disposal Area being permitted for residential occupation.
- Results from the Site 61 surrogate study suggest that site arsenic, antimony, PAH, and CVOC levels render Site 61 unusable as a residential site under current contamination conditions. Both cancer risks and non-cancer hazards are unacceptable for indoor air exposures to a future onsite resident (adult/child). Thus, the landfilled areas are not suitable for housing under current conditions. In addition, the disposal sites are not suited for utility workers because of possible disturbance of buried wastes;
- RGOs were estimated for the subsurface soil in order to reduce indoor air VOC levels for future unlimited land use; and
- Given the poor quality of onsite habitat at the Disposal Area and the lack of surface soil COPCs, ecological impacts are expected to be negligible and are not expected to change in the foreseeable future.

17.3 Stockpile Area

During the RI field investigation effort, surface and subsurface soil was collected from within the Stockpile Area and analyzed for metals, herbicides/pesticides/PCBs, SVOCs, and VOCs to assess the nature and extent of contamination Table 17-3 presents those compounds detected above background levels. Based on the results of this investigation, the key findings for the Stockpile Area are as follows:

- Metals were detected above background concentrations in surface and subsurface soil at the Stockpile Area. Lead values ranged from 1.1 to 143 mg/kg. Metals concentrations are associated with ore storage and, in general, are close to background levels;
- Pesticides were detected above background in surface soils. However, concentrations tended to be relatively low or were at J-qualified levels. The distribution of pesticides across the Stockpile Area is similar to that at the MI, indicating widespread surficial pesticide application rather than releases;
- PAH compounds were detected in almost all surface soil samples collected and analyzed. Concentrations ranged from 0.78 to 6.2 mg/kg;
- VOCs above background levels were detected in surface and subsurface soils. However, many of the compounds detected were at J-qualified levels or are common laboratory contaminants; and

- There is no indication that VOCs or SVOCs were disposed of at the Stockpile Area;
- Based on information generated by the Archives Search Report, one (a CC-2 disposal area) disposal site is known to exist in the Stockpile Area. Information concerning the materials buried in this site is limited and the exact position of the site is unclear. This site was not investigated during the RI because of unknown hazards and the potential for CWM at Dunn Field at that time. The site, along with others in the Disposal Area, has been given a priority level ranking based on qualitative risk evaluations and remedial action objectives by the Memphis Depot BCT and will be subject to removal or other appropriate disposition as required as part of the remedial design.

The potential risks to human health and ecological receptors from exposures to contaminants in impacted media at the Stockpile Area were also evaluated. The key findings from the risk analysis are as follows:

- The COPCs identified for the Stockpile Area included some inorganic chemicals, dieldrin, and PAHs. The inorganic chemicals could be from the minerals stored, or naturally occurring in soils. The PAHs and dieldrin were detected at concentrations similar to those detected elsewhere across the Depot and are not specific to the Stockpile Area. Dieldrin is likely from historical maintenance applications across the Depot. PAHs are thought to be associated with vehicle exhausts, asphalt pavements, and the railroad tracks. Inorganic chemicals are COPCs for subsurface soils, and no organic chemicals were identified as COPCs;
- No significant risks of adverse health impacts exist at the Stockpile Area for maintenance workers from exposure to surface soil;
- No significant risks of adverse health impacts exist at the Stockpile Area for future industrial/commercial workers from exposure to soil;
- The COPC selection for the surrogate site SSLFF indicated that surface soils at the site had aluminum and arsenic exceeding background levels and comparison criteria;
- SSLFF soils do not pose a health threat to future industrial workers outdoors;
- Analysis of SSLFF risk scenario results suggest that site arsenic levels are unacceptable to future hypothetical onsite adult and child residents; however, arsenic levels within this sample location are similar to those detected elsewhere within Shelby County
- Based on a WoE, as well as the poor quality of ecological habitat, current and future ecological impacts are probably negligible.

17.4 Groundwater

Groundwater samples were collected during 16 sampling events from January 1996 through February 2001.Samples were analyzed for explosives, metals (total), pesticides, PCBs, SVOCs (including PAHs), and VOCs and lesser known analytes, including thiodiglycol, 1,4-oxathiane, and 1,4-dithiane. Of these groups of chemicals, explosives, pesticides, and PAHs were all reported with J-qualifiers.

Thirty VOCs were detected in the 444 groundwater samples analyzed over the 5-year sampling period. Of these 30 compounds, 9 chlorinated hydrocarbon compounds have been frequently detected, including 1,1,1,2-PCA, CCl4, 1,1,2-TCA, chloroform, PCE, cis- and trans-1,2-DCE, total 1,2-DCE, and TCE. Plumes of these contaminants are found in groundwater underlying the southwest, west central, and northern portions of Dunn Field. The plumes have also been detected offsite southwest, west, northwest, and north of Dunn Field. Concentrations of VOCs ranged from less than 0.0001 mg/L to 33 mg/L.

Based on comparisons between surface and subsurface soil sample data and VOC plume configuration, there appears to be direct correlation between contaminant levels in soil and groundwater indicating that a direct pathway exists for contaminants migrating from ground surface to the fluvial aquifer. The priority disposal sites identified by the Memphis Depot BCT may also act as source areas and any future groundwater remediation plans should include treatment of the sites to render them inert.

Twenty-three metals and other inorganics were detected in groundwater samples collected from 30 wells located within Dunn Field and offsite. A total of 248 samples were collected during 5 sampling periods from first quarter 1996 to fourth quarter 1998. The detection frequencies of metals exceeding background levels are higher in on site wells. The magnitude of the difference is highest for lead, nickel, and chromium, suggesting some input of these metals to groundwater from Dunn Field operations. Other metals were found to occur at frequencies and locations suggesting that their occurrences could also be related to waste management practices at the Depot. These metals include (from highest to lowest FOD above background) aluminum, vanadium, iron, lead, beryllium, and manganese.

Potential risks from future groundwater use within Dunn Field were estimated for two separate areas representing organic chemicals that occur as plumes: one plume underlying the Northeast Open Area (Northern Plume) and a second plume underlying the Disposal Area and portions of the Stockpile Area (Western Plume). This plume is further divided into two portions: the Northwest Plume and Southwest plume.

Groundwater under the site, and offsite near the property boundary in downgradient locations, is contaminated in the shallow aquifer and is unfit for potable use. General response actions should consist of actions to prevent use, further migration, and/or remediation to drinking water standards. Additional monitoring wells will be required to monitor migration and configuration of the plume to the northeast and north-northwest. In addition, monitoring wells will be required to define the potential offsite source of the VOC plume along the northeastern boundary of Dunn Field.

Overall, risks to a future industrial worker or hypothetical resident from exposure to maximum concentrations of onsite groundwater are above the acceptable range of 1 to 100 in a million (10^{-6} to 10^{-4}). Although there is no intent to use groundwater as potable water in the future, any plans for future use would have to be carefully evaluated. There are no unacceptable risks or hazards to future onsite workers or residents due to exposure of VOCs volatilizing from subsurface groundwater to indoor air. Table 17-4 summarizes the risks and health hazards for receptors evaluated for exposure to the groundwater plumes COPCs.

Since contamination has been detected in selected offsite wells, indoor air exposures are the most pertinent exposure pathway. Risks through this pathway to the offsite residents are well within the acceptable limits, presenting negligible risks and HI. Although there is no intent to use offsite groundwater as a potable water source, any plans for future use would have to be carefully evaluated. The groundwater contaminant plume, which has crossed the property boundary to the west of Dunn Field, could diminish in concentration with distance and time as a result of the extraction system currently in operation. Table 17-5 summarizes the risks and health hazards for receptors evaluated for exposure to the groundwater plumes COPCs.

17.5 Fate and Transport

The migration pathway that appears to be the most viable exposure route includes the potential for migration of groundwater to downgradient offsite locations and receptors. The potential groundwater receptors are members of the offsite public who may drink water from an offsite groundwater source. There are no known receptors for the site groundwater within the site or in the immediate vicinity of Dunn Field. Among potential receptors considered are members of the offsite public who receive drinking water through the public water supply system, which withdraws from the Allen Well Field located 1.5 miles to the west of the western perimeter of Dunn Field.

VOCs were detected throughout soil in the Disposal Area and along the southwest–northeast trending perimeter of the Northeast Open Area. 1,1,2,2-PCA, 1,1,2-TCA, CCl4, chloroform, PCE, TCE, 1,2-DCE, and vinyl chloride were detected in samples from soil within or upgradient of groundwater contamination, indicating that the configuration of the groundwater plume is somewhat controlled by the distribution of VOCs throughout the soil. Maximum VOC concentrations in soil were not always from samples collected within or upgradient of the centroids of the groundwater plumes, indicating that additional soil sources are likely present. However, given the widespread nature of the VOC soil contamination across the Disposal Area, additional subsurface characterization to identify specific sources and other heterogeneities of the subsurface VOC distribution is not warranted. Soil remediation for the purpose of reducing groundwater contamination will take into account the distributed nature of the soil sources.

The subsurface soils at Dunn Field appear to be a continuing source of groundwater chlorinated solvents. Organic contaminants either continue to migrate from onsite sources, related to past waste disposal, or are transported advectively by groundwater from offsite sources located northeast of Dunn Field.

Of the two distinct VOC plumes present at Dunn Field, the West Plume (western side) is the larger. The chlorinated solvents within the West Plume extend beyond the boundary of Dunn Field. An assessment of natural attenuation indicates that biodegradation is not a dominant physical process in the fluvial aquifer. The potential for natural attenuation of chlorinated hydrocarbon compounds in the fluvial aquifer is low.

Evaluation of groundwater quality and flow parameters has been developed based on the first 2 years of groundwater extraction. This data indicates that water level elevations decreased in all wells associated with Dunn Field with water level changes ranging from -1.34 feet (MW-41) to -7.13 feet (MW-54). Prior to startup of the extraction system, groundwater fluctuations were found to be considerably less. Potentiometric surface contours developed from the extraction system data suggest groundwater is captured in the immediate vicinity of each recovery well. However, capture zones are not completely connected between RW-01 to RW-1A, RW-02 to RW-03, RW-03 to RW-04, RW-04 to RW-05, and RW-06 to RW-07. Therefore, areas between these recovery wells could allow contaminates to pass through the recovery system. Contaminant data developed from system monitoring activity indicates that PCE, TCE, and 1,1,2,2-PCA concentrations in offsite monitoring wells near the northwest corner of the extraction system have dropped by factors of 7 to 10 from pre-extraction concentrations. This demonstrates significant reductions in offsite flux of VOCs in the northwest portion of Dunn Field. Although concentrations have decreased in the northwest portion, concentrations of TCE and 1,1,2,2-PCA have increased near the west-central part of Dunn Field. These concentration increases in downgradient monitoring wells indicate significant portions of the west-central plumes are beyond the influence of the capture zone from the extraction system.

Tables

TABLE 17-1
Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Metals								
Sediments								
SDLHA	DJA169	0 0 to 1 0	COPPER	68	=	MG/KG	58	X
SDLHA	DJA169	0 0 to 1 0	LEAD	76 5	=	MG/KG	35 2	X
SDLHB	DJA171	0 0 to 1 0	LEAD	82 3	=	MG/KG	35 2	X
Surface Soils								
SBLGA	DJA142	0 0 to 1 0	CHROMIUM, TOTAL	239	=	MG/KG	24 8	X
SBLGA	DJA142	0 0 to 1 0	COPPER	54 5	=	MG/KG	33 5	X
SBLGA	DJA142	0 0 to 1 0	LEAD	47 7	=	MG/KG	30	X
SBLGA	DJA142	0 0 to 1 0	THALLIUM	0 63	J	MG/KG		
SBLGB	DJA145	0 0 to 1 0	LEAD	143	=	MG/KG	30	X
SBLGB	DJA145	0 0 to 1 0	THALLIUM	0 44	J	MG/KG		
SBLGC	DJA148	0 0 to 1 0	THALLIUM	0 5	J	MG/KG		
SBLGD	DJA151	0 0 to 1 0	LEAD	72.1	=	MG/KG	30	X
SBLGD	DJA151	0 0 to 1 0	THALLIUM	0 44	J	MG/KG		
SBLGE	DJA154	0 0 to 1 0	ANTIMONY	24 2	J	MG/KG	7	X
SBLGE	DJA154	0 0 to 1 0	CADMIUM	2 1	=	MG/KG	1 4	X
SBLGE	DJA154	0 0 to 1 0	CHROMIUM, TOTAL	71 2	=	MG/KG	24 8	X
SBLGE	DJA154	0 0 to 1 0	COPPER	146	=	MG/KG	33 5	X
SBLGE	DJA154	0 0 to 1 0	LEAD	102	=	MG/KG	30	X
SBLGE	DJA154	0 0 to 1 0	NICKEL	33 3	=	MG/KG	30	X
SBLGE	DJA154	0 0 to 1 0	THALLIUM	0 53	J	MG/KG		
SBLGE	DJA154	0 0 to 1 0	ZINC	711	=	MG/KG	126	X
SBLHA	DJA160	0 0 to 1 0	THALLIUM	0 52	J	MG/KG		
SBLHA	DJA239FD	0 0 to 1 0	THALLIUM	0 23	J	MG/KG		
SBLHB	DJA163	0 0 to 1 0	THALLIUM	0 58	J	MG/KG		
SBLHC	DJA168	0 0 to 1 0	THALLIUM	0 53	J	MG/KG		
SS6085A	DJA185	0 0 to 1 0	LEAD	44.2	=	MG/KG	30	X
SS6085B	DJA186	0 0 to 1 0	BERYLLIUM	1 2	=	MG/KG	1 1	X
SS6085B	DJA186	0 0 to 1 0	ZINC	884	J	MG/KG	126	X
SS6085C	DJA187	0 0 to 1 0	CHROMIUM, TOTAL	25	=	MG/KG	24 8	X
SS6085C	DJA187	0 0 to 1 0	COPPER	43 9	J	MG/KG	33 5	X
SS6085C	DJA187	0 0 to 1 0	LEAD	45 7	=	MG/KG	30	X
SS6085D	DJA188	0 0 to 1 0	CADMIUM	4 8	=	MG/KG	1 4	X
SS6085D	DJA188	0 0 to 1 0	COPPER	115	J	MG/KG	33 5	X
SS6085D	DJA188	0 0 to 1 0	LEAD	2100	=	MG/KG	30	X
SS6085D	DJA188	0 0 to 1 0	ZINC	1780	J	MG/KG	126	X
SS6085E	DJA189	0 0 to 1 0	LEAD	39 2	=	MG/KG	30	X
SS6085F	DJA190	0 0 to 1 0	LEAD	40 4	=	MG/KG	30	X
SS6085F	DJA288FD	0 0 to 1 0	LEAD	39 3	=	MG/KG	30	X
SS-8	DDMT-081098-SS8	0 0 to 1 0	LEAD	41 4	=	MG/KG	30	X
SS-8	DDMT-081098-SS8	0 0 to 1 0	POTASSIUM	2200	=	MG/KG	1820	X
OC Pesticides								
Sediments								
SDLHA	DJA169	0 0 to 1 0	ALPHA-CHLORDANE	0 0309	J	MG/KG	0 0052	X
SDLHA	DJA169	0 0 to 1 0	DIELDRIN	0 152	=	MG/KG	0 011	X
SDLHB	DJA171	0 0 to 1 0	ALPHA-CHLORDANE	0 0076	J	MG/KG	0 0052	X
SDLHB	DJA171	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2 2 2-TRICHLOR	0 028	J	MG/KG		
SDLHB	DJA171	0 0 to 1 0	DIELDRIN	0 0807	=	MG/KG	0 011	X
Surface Soils								
SBLGA	DJA142	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHLOR	0 155	J	MG/KG	0 074	X
SBLGB	DJA145	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROE	0 0068	J	MG/KG	0 0067	X
SBLGB	DJA145	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2 2-DICHLOROE	0 232	=	MG/KG	0 16	X
SBLGB	DJA145	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2 2 2-TRICHLOR	0 296	J	MG/KG	0 074	X
SBLGC	DJA148	0 0 to 1 0	DIELDRIN	0 68	=	MG/KG	0 086	X
SBLGD	DJA151	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROE	0.219	=	MG/KG	0 16	X
SBLGD	DJA151	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOR	0 223	J	MG/KG	0 074	X
SBLGD	DJA151	0 0 to 1 0	DIELDRIN	0 118	=	MG/KG	0 086	X
SS6085B	DJA186	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROE	0 007	J	MG/KG	0 0067	X
SS6085B	DJA186	0 0 to 1 0	DIELDRIN	0 607	=	MG/KG	0 086	X
SS6085B	DJA186	0 0 to 1 0	ENDRIN	0 0055	J	MG/KG		
SS6085C	DJA187	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOROE	0 0543	J	MG/KG	0 0067	X
SS6085C	DJA187	0 0 to 1 0	DIELDRIN	0 101	=	MG/KG	0 086	X
SS6085D	DJA188	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHLOR	0 0819	J	MG/KG	0 074	X
SS6085D	DJA188	0 0 to 1 0	DIELDRIN	4 75	=	MG/KG	0 086	X
SS6085E	DJA189	0 0 to 1 0	DIELDRIN	0 552	=	MG/KG	0 086	X
Surface Water								
SWLHB	DJA172	Not Applicable	DIELDRIN	0 000065	J	MG/L		
SWLHB	DJA172	Not Applicable	GAMMA-CHLORDANE	0 0000027	J	MG/L		
Polynuclear Aromatic Hydrocarbons								
Surface Water								
SWLHA	DJA170	Not Applicable	FLUORANTHENE	0 00055	J	MG/L		
SWLHA	DJA170	Not Applicable	PHENANTHRENE	0 00046	J	MG/L		
SWLHA	DJA170	Not Applicable	PYRENE	0 00042	J	MG/L		
SWLHB	DJA172	Not Applicable	FLUORANTHENE	0 0002	J	MG/L		

TABLE 17-1

Analytical Results Above Background for All Media (except Groundwater) in the Northeast Open Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Polchlorinated Biphenyls								
Sediments								
SDLHA	DJA169	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0436	=	MG/KG		
SDLHB	DJA171	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0116	J	MG/KG		
Semivolatile Organics								
Subsurface Soils								
SB21C	DJA180	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0.24	J	MG/KG		
Sediments								
SDLHA	DJA169	0 0 to 1 0	BENZYL BUTYL PHTHALATE	0 15	J	MG/KG		
SDLHA	DJA169	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	1 6	=	MG/KG	0 48	X
Volatile Organics								
Subsurface Soils								
SBLGB	DJA146	3 0 to 5 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PEN	0 003	J	MG/KG		
SBLGB	DJA147	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG		
SBLGC	DJA149	3 0 to 5 0	TETRACHLOROETHYLENE(PCE)	0 011	=	MG/KG		
SBLGC	DJA150	8 0 to 10 0	1,1,2,2-TETRACHLOROETHANE	0 011	=	MG/KG		
SBLGC	DJA150	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 008	J	MG/KG		
SBLGC	DJA150	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 02	=	MG/KG		
SBLGC	DJA150	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 094	=	MG/KG		
SBLGC	DJA238FD	3 0 to 5 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PEN	0 002	J	MG/KG		
SBLGC	DJA238FD	3 0 to 5 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLGD	DJA152	3 0 to 5 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PEN	0 002	J	MG/KG		
SBLGD	DJA153	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SBLGD	DJA153	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	ETHYLBENZENE	1.2	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	METHYLENE CHLORIDE	0 068	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	TOLUENE	0 12	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	TRICHLOROETHYLENE (TCE)	0 11	J	MG/KG		
SBLGE	DJA155	3 0 to 5 0	XYLENES, TOTAL	1.3	J	MG/KG	0 002	X
SBLGE	DJA156	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 0004	J	MG/KG		
SBLGF	DJA158	3 0 to 5 0	METHYL ETHYL KETONE (2-BUTANONE)	0 014	J	MG/KG		
SBLGF	DJA158	3 0 to 5 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLGF	DJA158	3 0 to 5 0	TRICHLOROETHYLENE (TCE)	0 001	J	MG/KG		
SBLGF	DJA159	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 006	=	MG/KG		
SBLHB	DJA164	3 0 to 5 0	TRICHLOROETHYLENE (TCE)	0 0007	J	MG/KG		
SBLHB	DJA165	8 0 to 10 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PEN	0 003	J	MG/KG		
Surface Soils								
SBLGA	DJA142	0 0 to 1 0	1,1,2,2-TETRACHLOROETHANE	0 001	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	BENZENE	0 004	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 016	J	MG/KG	0 002	X
SBLGA	DJA142	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLGA	DJA142	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 004	J	MG/KG		
SBLGB	DJA145	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 009	J	MG/KG	0 002	X
SBLGC	DJA148	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SBLGC	DJA148	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 006	=	MG/KG		
SBLGD	DJA151	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 021	=	MG/KG	0 002	X
SBLGE	DJA154	0 0 to 1 0	BENZENE	0 004	J	MG/KG		
SBLGE	DJA154	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG	0 002	X
SBLHA	DJA160	0 0 to 1 0	1,1,2 2-TETRACHLOROETHANE	0 005	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0.22	=	MG/KG		
SBLHA	DJA160	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 7	J	MG/KG		
SBLHA	DJA160	0 0 to 1 0	VINYL CHLORIDE	0 008	=	MG/KG		
SBLHA	DJA239FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 01	J	MG/KG	0 002	X
SBLHB	DJA163	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 014	J	MG/KG	0 002	X
SBLHC	DJA166	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 011	J	MG/KG	0 002	X

(=) Definite detection

J = Estimated detection. Contaminant detected at or below laboratory detection limit.

MG/KG = milligrams per kilogram

MG/L = milligrams per liter

TABLE 17-2

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are:

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
General Chemistry								
Subsurface Soils								
SBLCA	SBLCA-SB-12-80 5	80 5 to 80 5	TOTAL ORGANIC CARBON	30600	=	MG/KG		
SBLCA	SBLCA-SB-3-12 5	12 5 to 12 5	TOTAL ORGANIC CARBON	1200	=	MG/KG		
SBLCA	SBLCA-SB-3-36	36 0 to 36 0	TOTAL ORGANIC CARBON	500	=	MG/KG		
SBLCA	SBLCA-SB-4-18 5	18 5 to 18 5	TOTAL ORGANIC CARBON	2100	=	MG/KG		
SBLCA	SBLCA-SB2-12	12 0 to 12 0	TOTAL ORGANIC CARBON	3000	=	MG/KG		
SBLCA	SBLCA-SB2-47	47 0 to 47 0	TOTAL ORGANIC CARBON	1500	=	MG/KG		
SBLCA	SBLCA-SB2-73CAS	73 0 to 73 0	TOTAL ORGANIC CARBON	900	=	MG/KG		
SBLCA	SBLCA-SB2-90	90 0 to 90 0	TOTAL ORGANIC CARBON	900	=	MG/KG		
SBLCA	SBLCA-SB3-87	87 0 to 87 0	TOTAL ORGANIC CARBON	3600	=	MG/KG		
SBLCA	SBLCASB542 5	42 5 to 42 5	TOTAL ORGANIC CARBON	600	=	MG/KG		
SBLEE	SBLEESB118 5	18 5 to 18.5	TOTAL ORGANIC CARBON	5300	=	MG/KG		
SBLEE	SBLEESB164 5	64 5 to 64 5	TOTAL ORGANIC CARBON	2700	=	MG/KG		
Metals								
Subsurface Soils								
SB-1	DDMT-080598-SB1-11-13 -06	11 0 to 13 0	SODIUM	297	=	MG/KG		
SB-1	DDMT-080598-SB1-13-15'-07	13 0 to 15 0	SODIUM	340	=	MG/KG		
SB-1	DDMT-080598-SB1-15-17'-08	13 0 to 15 0	SODIUM	304	=	MG/KG		
SB-1	DDMT-080598-SB1-3-5'-02	3.0 to 5 0	ALUMINUM	32200	=	MG/KG	21829	X
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	CALCIUM	4700	=	MG/KG	2432	X
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	CHROMIUM, TOTAL	28 5	=	MG/KG	26 4	X
SB-1	DDMT-080598-SB1-3-5'-02	3.0 to 5 0	LEAD	27 3	J	MG/KG	23 9	X
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5 0	POTASSIUM	3190	=	MG/KG	1800	X
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5.0	SODIUM	200	=	MG/KG		
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5.0	VANADIUM	64 6	=	MG/KG	51 3	X
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	POTASSIUM	1930	=	MG/KG	1800	X
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9 0	SODIUM	243	=	MG/KG		
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	CALCIUM	2460	=	MG/KG	2432	X
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	POTASSIUM	2150	=	MG/KG	1800	X
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	SODIUM	258	=	MG/KG		
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	ALUMINUM	25200	=	MG/KG	21829	X
SB-2	DDMT-080698-SB2-11-13'-06	11 0 to 13 0	POTASSIUM	2210	J	MG/KG	1800	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	ALUMINUM	26200	=	MG/KG	21829	X
SB-2	DDMT-080698-SB2-13-15 -07	13 0 to 15 0	CALCIUM	2600	=	MG/KG	2432	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	CHROMIUM, TOTAL	36 5	=	MG/KG	26 4	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	LEAD	46 2	J	MG/KG	23 9	X
SB-2	DDMT-080698-SB2-13-15'-07	13 0 to 15 0	POTASSIUM	2550	=	MG/KG	1800	X
SB-2	DDMT-080698-SB2-15-17'-08	11 0 to 13 0	ANTIMONY	1 3	J	MG/KG		
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	ANTIMONY	1 2	J	MG/KG		
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	COPPER	69 9	=	MG/KG	32 7	X
SB-2	DDMT-080698-SB2-3-5'-02	3 0 to 5 0	SELENIUM	1 4	=	MG/KG	0 6	X
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-2	DDMT-080698-SB2-5-7'-03	5 0 to 7 0	CALCIUM	2680	=	MG/KG	2432	X
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	ANTIMONY	1 2	J	MG/KG		
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	CALCIUM	2530	=	MG/KG	2432	X
SB-2	DDMT-080698-SB2-7-9'-04	7 0 to 9 0	LEAD	34 2	=	MG/KG	23 9	X
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	CALCIUM	3440	=	MG/KG	2432	X
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	CHROMIUM TOTAL	53 9	=	MG/KG	26 4	X
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	LEAD	95 6	=	MG/KG	23 9	X
SB-3	DDMT-080698-SB3-1-3'-01	1 0 to 3 0	SODIUM	137	=	MG/KG		
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	ALUMINUM	22500	=	MG/KG	21829	X
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-11-13'-06	11 0 to 13 0	POTASSIUM	2230	=	MG/KG	1800	X
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	POTASSIUM	1820	=	MG/KG	1800	X
SB-3	DDMT-080798-SB3-13-15'-07	13 0 to 15 0	SODIUM	152	=	MG/KG		
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	CHROMIUM, TOTAL	74 6	J	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-15-17'-08	9 0 to 11 0	LEAD	180	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	ALUMINUM	24900	=	MG/KG	21829	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	CALCIUM	2490	=	MG/KG	2432	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	CHROMIUM TOTAL	26 8	=	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-3-5'-02	3 0 to 5 0	LEAD	34 9	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-3-5-02	3 0 to 5 0	POTASSIUM	2410	=	MG/KG	1800	X
SB-3	DDMT-080798-SB3-3-5 -02	3 0 to 5 0	SODIUM	139	=	MG/KG		
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	ANTIMONY	1 1	J	MG/KG		
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	CALCIUM	3560	=	MG/KG	2432	X
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	CHROMIUM TOTAL	59 6	=	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	LEAD	160	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-7-9'-04	7 0 to 9 0	SODIUM	160	=	MG/KG		
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	ANTIMONY	1 2	J	MG/KG		
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	CHROMIUM, TOTAL	32 8	J	MG/KG	26 4	X
SB-3	DDMT-080798-SB3-9-11'-05	9 0 to 11 0	LEAD	45 5	J	MG/KG	23 9	X
SB-3	DDMT-080798-SB3-9-11-05	9 0 to 11 0	POTASSIUM	1970	=	MG/KG	1800	X
SB-3	DDMT-082198-SB3-69-70 5 -08	69 0 to 70 5	SELENIUM	1 2	J	MG/KG	0 6	X
SB-4	DDMT-081198-SB4-11-13'-06	11 0 to 13 0	CALCIUM	2640	J	MG/KG	2432	X
SB-4	DDMT-081198-SB4-11-13 -06	11 0 to 13 0	SODIUM	142	=	MG/KG		
SB-4	DDMT-081198-SB4-13-15'-07	13 0 to 15 0	CALCIUM	2760	J	MG/KG	2432	X
SB-4	DDMT-081198-SB4-15-17'-08	7 0 to 9 0	SODIUM	136	=	MG/KG		
SB-4	DDMT-081198-SB4-3 5 -02	3 0 to 5 0	ALUMINUM	23000	J	MG/KG	21829	X
SB-4	DDMT-081198-SB4-3-5 -02	3 0 to 5 0	POTASSIUM	1860	=	MG/KG	1800	X
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	BARIUM	312	=	MG/KG	300	X
SB-4	DDMT-081198-SB4-5-7'-03	5 0 to 7 0	SODIUM	160	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	ARSENIC	35 6	=	MG/KG	17	X

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TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB61A	DJA192	3.0 to 5.0	LEAD	90.4	=	MG/KG	23.9	X
SB61A	DJA192	3.0 to 5.0	SILVER	1.2	J	MG/KG	1	X
SBLAA	DJA002	8.0 to 10.0	ANTIMONY	5.9	J	MG/KG		
SBLAA	DJA002	8.0 to 10.0	SODIUM	96	J	MG/KG		
SBLBA	DJA055	8.0 to 10.0	SODIUM	77	J	MG/KG		
SBLCA	DJA075	8.0 to 10.0	SODIUM	627	J	MG/KG		
SBLCB	DJA079	8.0 to 10.0	SODIUM	328	J	MG/KG		
SBLCB	DJA234FD	8.0 to 10.0	SODIUM	307	J	MG/KG		
SBLCF	DJA220	8.0 to 10.0	SODIUM	152	J	MG/KG		
SBLDA	DJA095	8.0 to 10.0	SODIUM	95.3	J	MG/KG		
SBLDA	DJA095	8.0 to 10.0	THALLIUM	0.32	J	MG/KG		
SBLDB	DJA099	8.0 to 10.0	ANTIMONY	5.6	J	MG/KG		
SBLDB	DJA099	8.0 to 10.0	CALCIUM	2540	=	MG/KG	2432	X
SBLDB	DJA099	8.0 to 10.0	SODIUM	82.3	J	MG/KG		
SBLDB	DJA099	8.0 to 10.0	THALLIUM	0.64	J	MG/KG		
SBLDG	DJA212	8.0 to 10.0	LEAD	33.2	=	MG/KG	23.9	X
SBLDG	DJA212	8.0 to 10.0	SODIUM	66.4	J	MG/KG		
SBLDH	DJA216	8.0 to 10.0	SODIUM	131	J	MG/KG		
SBLEA	DJA119	8.0 to 10.0	SODIUM	64.7	J	MG/KG		
SBLEA	DJA119	8.0 to 10.0	THALLIUM	0.31	J	MG/KG		
SBLEB	DJA123	8.0 to 10.0	THALLIUM	0.32	J	MG/KG		
SBLED	DJA131	8.0 to 10.0	ANTIMONY	5.7	J	MG/KG		
SBLED	DJA131	8.0 to 10.0	SODIUM	37.5	J	MG/KG		
SBLED	DJA131	8.0 to 10.0	THALLIUM	0.45	J	MG/KG		
SBLEG	DJA200	8.0 to 10.0	SODIUM	92.5	J	MG/KG		
SBLEG	DJA200	8.0 to 10.0	THALLIUM	0.37	J	MG/KG		
SBLEH	DJA208	8.0 to 10.0	CALCIUM	2670	=	MG/KG	2432	X
SBLEH	DJA208	8.0 to 10.0	LEAD	72.5	=	MG/KG	23.9	X
SBLEH	DJA208	8.0 to 10.0	SODIUM	71.8	J	MG/KG		
SBLFA (1)	DJA020	8.0 to 10.0	CALCIUM	3640	=	MG/KG	2432	X
SBLFA (1)	DJA020	8.0 to 10.0	SODIUM	108	J	MG/KG		
SBLFC (1)	DJA028	8.0 to 10.0	ANTIMONY	5.7	J	MG/KG		
SBLFC (1)	DJA028	8.0 to 10.0	CHROMIUM, TOTAL	30	=	MG/KG	26.4	X
SBLFC (1)	DJA028	8.0 to 10.0	LEAD	89	=	MG/KG	23.9	X
SBLFC (1)	DJA028	8.0 to 10.0	SELENIUM	0.77	J	MG/KG	0.6	X
SBLFC (1)	DJA028	8.0 to 10.0	SODIUM	62.4	J	MG/KG		
SBLFD (1)	DJA032	8.0 to 10.0	ANTIMONY	5.8	J	MG/KG		
SBLFD (1)	DJA032	8.0 to 10.0	SODIUM	56.5	J	MG/KG		
SBLFE (1)	DJA036	8.0 to 10.0	ANTIMONY	5.7	J	MG/KG		
SBLFE (1)	DJA036	8.0 to 10.0	SODIUM	63.5	J	MG/KG		
SBLFE (1)	DJA036	8.0 to 10.0	THALLIUM	0.51	J	MG/KG		
SBLFF (1)	DJA040	8.0 to 10.0	SODIUM	59.7	J	MG/KG		
SBLFG	DJA204	8.0 to 10.0	SODIUM	119	J	MG/KG		
SBLFG	DJA204	8.0 to 10.0	THALLIUM	0.31	J	MG/KG		
SBLFG	DJA204	8.0 to 10.0	ZINC	2650	=	MG/KG	114	X
Sediments								
SD61A	DJA194	0.0 to 1.0	ARSENIC	14.1	=	MG/KG	12	X
Surface Soils								
SB61A	DJA191	0.0 to 1.0	ARSENIC	43.7	=	MG/KG	20	X
SB61A	DJA191	0.0 to 1.0	BERYLLIUM	1.3	J	MG/KG	1.1	X
SB61A	DJA191	0.0 to 1.0	COPPER	46.2	=	MG/KG	33.5	X
SB61A	DJA191	0.0 to 1.0	LEAD	107	=	MG/KG	30	X
SB61A	DJA191	0.0 to 1.0	ZINC	146	=	MG/KG	126	X
SBLAA	DJA001	0.0 to 1.0	MERCURY	0.77	=	MG/KG	0.4	X
SBLAB	DJA005	0.0 to 1.0	ZINC	221	=	MG/KG	126	X
SBLAC	DJA009	0.0 to 1.0	SODIUM	58.2	J	MG/KG		
SBLAC	DJA009	0.0 to 1.0	THALLIUM	0.22	J	MG/KG		
SBLAD	DJA013	0.0 to 1.0	ANTIMONY	25.3	J	MG/KG	7	X
SBLAD	DJA013	0.0 to 1.0	MERCURY	1.3	=	MG/KG	0.4	X
SBLBA	DJA054	0.0 to 1.0	LEAD	122	=	MG/KG	30	X
SBLBB	DJA058	0.0 to 1.0	CHROMIUM, TOTAL	30.4	=	MG/KG	24.8	X
SBLBB	DJA058	0.0 to 1.0	LEAD	52.2	=	MG/KG	30	X
SBLBC	DJA062	0.0 to 1.0	CHROMIUM, TOTAL	40	=	MG/KG	24.8	X
SBLBC	DJA062	0.0 to 1.0	COPPER	48.1	=	MG/KG	33.5	X
SBLBC	DJA062	0.0 to 1.0	LEAD	59.1	=	MG/KG	30	X
SBLBC	DJA062	0.0 to 1.0	ZINC	141	=	MG/KG	126	X
SBLBD	DJA066	0.0 to 1.0	LEAD	54.3	=	MG/KG	30	X
SBLBE	DJA070	0.0 to 1.0	CHROMIUM, TOTAL	33.3	=	MG/KG	24.8	X
SBLBE	DJA070	0.0 to 1.0	COPPER	80.6	=	MG/KG	33.5	X
SBLBE	DJA070	0.0 to 1.0	LEAD	256	=	MG/KG	30	X
SBLBE	DJA070	0.0 to 1.0	ZINC	935	=	MG/KG	126	X
SBLBE	DJA237FD	0.0 to 1.0	ALUMINUM	26700	=	MG/KG	23810	X
SBLBE	DJA237FD	0.0 to 1.0	CHROMIUM, TOTAL	45.7	=	MG/KG	24.8	X
SBLCA	DJA074	0.0 to 1.0	THALLIUM	0.33	J	MG/KG		
SBLCB	DJA078	0.0 to 1.0	THALLIUM	0.3	J	MG/KG		
SBLCD	DJA086	0.0 to 1.0	COPPER	55.2	=	MG/KG	33.5	X
SBLCE	DJA090	0.0 to 1.0	CHROMIUM, TOTAL	50.3	=	MG/KG	24.8	X
SBLCE	DJA090	0.0 to 1.0	LEAD	192	=	MG/KG	30	X
SBLCE	DJA235FD	0.0 to 1.0	CHROMIUM, TOTAL	40.9	=	MG/KG	24.8	X
SBLCE	DJA235FD	0.0 to 1.0	COPPER	42	=	MG/KG	33.5	X
SBLCE	DJA235FD	0.0 to 1.0	LEAD	131	=	MG/KG	30	X
SBLDA	DJA094	0.0 to 1.0	CHROMIUM, TOTAL	53.6	=	MG/KG	24.8	X
SBLDA	DJA094	0.0 to 1.0	COPPER	71.5	=	MG/KG	33.5	X
SBLDA	DJA094	0.0 to 1.0	LEAD	161	=	MG/KG	30	X
SBLDA	DJA094	0.0 to 1.0	ZINC	130	=	MG/KG	126	X
SBLDB	DJA098	0.0 to 1.0	CHROMIUM, TOTAL	36.9	=	MG/KG	24.8	X

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLDB	DJA098	0 0 to 1 0	COPPER	43 9	=	MG/KG	33 5	X
SBLDB	DJA098	0 0 to 1 0	LEAD	72 4	=	MG/KG	30	X
SBLDB	DJA098	0 0 to 1 0	THALLIUM	0 62	J	MG/KG		
SBLDC	DJA102	0 0 to 1 0	LEAD	35 5	=	MG/KG	30	X
SBLDC	DJA102	0 0 to 1 0	THALLIUM	0 6	J	MG/KG		
SBLDD	DJA106	0 0 to 1 0	THALLIUM	0 6	J	MG/KG		
SBLDG	DJA211	0 0 to 1 0	COPPER	40 8	J	MG/KG	33 5	X
SBLDG	DJA211	0 0 to 1 0	LEAD	61 6	=	MG/KG	30	X
SBLDG	DJA211	0 0 to 1 0	ZINC	136	J	MG/KG	126	X
SBLDG	DJA286FD	0 0 to 1 0	CHROMIUM, TOTAL	26 3	=	MG/KG	24 8	X
SBLDG	DJA286FD	0 0 to 1 0	COPPER	73 3	J	MG/KG	33 5	X
SBLDG	DJA286FD	0 0 to 1 0	LEAD	62 3	=	MG/KG	30	X
SBLEA	DJA118	0 0 to 1 0	CHROMIUM TOTAL	109	=	MG/KG	24 8	X
SBLEA	DJA118	0 0 to 1 0	COPPER	171	=	MG/KG	33 5	X
SBLEA	DJA118	0 0 to 1 0	LEAD	487	=	MG/KG	30	X
SBLEA	DJA118	0 0 to 1 0	THALLIUM	0 33	J	MG/KG		
SBLEA	DJA118	0 0 to 1 0	ZINC	306	=	MG/KG	126	X
SBLEB	DJA122	0 0 to 1 0	CHROMIUM, TOTAL	33	=	MG/KG	24 8	X
SBLEB	DJA122	0 0 to 1 0	COPPER	72 5	=	MG/KG	33 5	X
SBLEB	DJA122	0 0 to 1 0	LEAD	142	=	MG/KG	30	X
SBLEB	DJA122	0 0 to 1 0	THALLIUM	0 47	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	ZINC	139	=	MG/KG	126	X
SBLEB	DJA229FD	0 0 to 1 0	LEAD	41	=	MG/KG	30	X
SBLEB	DJA229FD	0 0 to 1 0	THALLIUM	0 36	J	MG/KG		
SBLEC	DJA126	0 0 to 1 0	CHROMIUM TOTAL	27 1	=	MG/KG	24 8	X
SBLEC	DJA126	0 0 to 1 0	LEAD	39 1	=	MG/KG	30	X
SBLEC	DJA126	0 0 to 1 0	THALLIUM	0 6	J	MG/KG		
SBLED	DJA130	0 0 to 1 0	THALLIUM	0 61	J	MG/KG		
SBLEE	DJA134	0 0 to 1 0	ANTIMONY	355	J	MG/KG	7	X
SBLEE	DJA134	0 0 to 1 0	COPPER	70 1	=	MG/KG	33 5	X
SBLEE	DJA134	0 0 to 1 0	LEAD	211	=	MG/KG	30	X
SBLEE	DJA134	0 0 to 1 0	THALLIUM	0 62	J	MG/KG		
SBLEF	DJA138	0 0 to 1 0	ALUMINUM	25100	=	MG/KG	23810	X
SBLEF	DJA138	0 0 to 1 0	CHROMIUM TOTAL	38 1	=	MG/KG	24 8	X
SBLEF	DJA138	0 0 to 1 0	COPPER	37 2	=	MG/KG	33 5	X
SBLEF	DJA138	0 0 to 1 0	LEAD	789	=	MG/KG	30	X
SBLEF	DJA138	0 0 to 1 0	THALLIUM	0 68	J	MG/KG		
SBLEF	DJA138	0 0 to 1 0	ZINC	144	=	MG/KG	126	X
SBLEG	DJA199	0 0 to 1.0	THALLIUM	0 43	J	MG/KG		
SBLEH	DJA207	0 0 to 1 0	LEAD	63 1	=	MG/KG	30	X
SBLFC (1)	DJA027	0 0 to 1 0	CHROMIUM TOTAL	36 4	=	MG/KG	24 8	X
SBLFC (1)	DJA027	0 0 to 1 0	LEAD	112	=	MG/KG	30	X
SBLFC (1)	DJA027	0 0 to 1 0	THALLIUM	0 29	J	MG/KG		
SBLFD (1)	DJA031	0 0 to 1 0	CHROMIUM TOTAL	43	=	MG/KG	24 8	X
SBLFD (1)	DJA031	0 0 to 1 0	COPPER	126	=	MG/KG	33 5	X
SBLFD (1)	DJA031	0 0 to 1 0	LEAD	179	=	MG/KG	30	X
SBLFD (1)	DJA031	0 0 to 1 0	THALLIUM	0 29	J	MG/KG		
SBLFD (1)	DJA031	0 0 to 1 0	ZINC	169	=	MG/KG	126	X
SBLFE (1)	DJA035	0 0 to 1 0	COPPER	48 9	=	MG/KG	33 5	X
SBLFE (1)	DJA035	0 0 to 1 0	LEAD	64	=	MG/KG	30	X
SBLFE (1)	DJA035	0 0 to 1 0	THALLIUM	0 56	J	MG/KG		
SBLFF (1)	DJA039	0 0 to 1 0	THALLIUM	0 36	J	MG/KG		
SBLFF (1)	DJA049FD	0 0 to 1 0	THALLIUM	0 38	J	MG/KG		
SBLFG	DJA203	0 0 to 1 0	THALLIUM	0 5	J	MG/KG		
SS-1	DDMT-080598-SS1	0 0 to 1 0	CALCIUM	6710	=	mg/Kg	5840	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	CHROMIUM TOTAL	25 3	=	mg/Kg	24 8	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	LEAD	73 8	J	mg/Kg	30	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	POTASSIUM	2390	=	mg/Kg	1820	X
SS-1	DDMT-080598-SS1	0 0 to 1 0	SODIUM	126	=	mg/Kg		
SS-2	DDMT-080698-SS2	0 0 to 1 0	ALUMINUM	23900	=	mg/Kg	23810	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	ANTIMONY	12 9	J	mg/Kg	7	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	ARSENIC	25 9	=	mg/Kg	20	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	BARIUM	423	=	mg/Kg	234	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	CALCIUM	17700	=	mg/Kg	5840	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	CHROMIUM TOTAL	212	=	mg/Kg	24 8	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	COPPER	796	=	mg/Kg	33 5	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	IRON	51000	=	mg/Kg	37040	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	LEAD	1020	=	mg/Kg	30	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	NICKEL	37 1	=	mg/Kg	30	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	POTASSIUM	3000	=	mg/Kg	1820	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	SELENIUM	1 3	=	mg/Kg	0 8	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	SILVER	8 4	=	mg/Kg	2	X
SS-2	DDMT-080698-SS2	0 0 to 1 0	SODIUM	391	=	mg/Kg		
SS-2	DDMT-080698-SS2	0 0 to 1 0	ZINC	662	=	mg/Kg	126	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	CHROMIUM, TOTAL	37 5	=	mg/Kg	24 8	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	LEAD	128	J	mg/Kg	30	X
SS-3	DDMT-080698-SS3	0 0 to 1 0	POTASSIUM	2580	=	mg/Kg	1820	X
SS-4	DDMT-081098-SS4	0 0 to 1 0	ALUMINUM	31100	J	mg/Kg	23810	X
SS-4	DDMT-081098-SS4	0 0 to 1 0	CHROMIUM, TOTAL	31 6	=	mg/Kg	24 8	X
SS-4	DDMT-081098-SS4	0 0 to 1 0	VANADIUM	53 8	=	mg/Kg	48 4	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	CALCIUM	61200	=	mg/Kg	5840	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	CHROMIUM TOTAL	53 7	=	mg/Kg	24 8	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	LEAD	101	=	mg/Kg	30	X
SS-7	DDMT-081098 SS7	0 0 to 1 0	POTASSIUM	2540	=	mg/Kg	1820	X
SS-7	DDMT-081098-SS7	0 0 to 1 0	SODIUM	400	=	mg/Kg		

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Surface Water								
SW61A	DJA195	Not Applicable	ALUMINUM	17.8	=	MG/L	5.077	X
SW61A	DJA195	Not Applicable	BERYLLIUM	0 0011	J	MG/L		
SW61A	DJA195	Not Applicable	LEAD	0 0256	=	MG/L	0 0186	X
SWLAA	DJA018	Not Applicable	ALUMINUM	11 7	=	MG/L	5 077	X
SWLAA	DJA018	Not Applicable	BERYLLIUM	0 0007	J	MG/L		
SWLAA	DJA018	Not Applicable	CADMIUM	0 0036	J	MG/L		
SWLAA	DJA018	Not Applicable	LEAD	0 0336	=	MG/L	0 0186	X
OC Pesticides								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	TOXAPHENE	0 167	J	MG/KG		
SB61A	DJA193	8.0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 002	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0038	=	MG/KG	0 0015	X
SBLCE	DJA091	8 0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0016	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0074	J	MG/KG		
SBLEE	DJA135	8 0 to 10.0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0456	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 004	=	MG/KG	0 0015	X
SBLEG	DJA200	8 0 to 10 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0041	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	HEPTACHLOR	0 00011	J	MG/KG		
SBLEH	DJA208	8.0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0.0786	=	MG/KG		
SBLEH	DJA208	8.0 to 10 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0086	J	MG/KG	0 0015	X
SBLFA (1)	DJA020	8 0 to 10 0	HEPTACHLOR EPOXIDE	0 0326	J	MG/KG	0 0021	X
SBLFA (1)	DJA020	8 0 to 10 0	METHOXYCHLOR	0 0502	J	MG/KG		
SBLFC (1)	DJA028	8.0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0305	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0221	=	MG/KG	0 0015	X
SBLFC (1)	DJA028	8 0 to 10 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 0164	J	MG/KG	0 0072	X
SBLFD (1)	DJA032	8.0 to 10 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 00078	J	MG/KG		
SBLFD (1)	DJA032	8.0 to 10 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0019	J	MG/KG	0 0015	X
Sediments								
SD61A	DJA194	0 0 to 1.0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0062	J	MG/KG	0 0061	X
SD61A	DJA194	0 0 to 1.0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0.0392	=	MG/KG	0 0072	X
SD61A	DJA194	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 0282	J	MG/KG		
SD61A	DJA194	0 0 to 1.0	DIELDRIN	0 0617	=	MG/KG	0 011	X
SD61A	DJA194	0 0 to 1.0	METHOXYCHLOR	0 0682	J	MG/KG		
Surface Soils								
SBLAD	DJA013	0 0 to 1 0	METHOXYCHLOR	0 0042	J	MG/KG		
SBLBD	DJA066	0 0 to 1 0	DIELDRIN	0 177	=	MG/KG	0 086	X
SBLCA	DJA074	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0655	J	MG/KG	0 0067	X
SBLCA	DJA074	0 0 to 1 0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 212	=	MG/KG	0 16	X
SBLCA	DJA074	0 0 to 1.0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 234	J	MG/KG	0 074	X
SBLCA	DJA074	0 0 to 1 0	DIELDRIN	0 964	=	MG/KG	0.086	X
SBLCA	DJA074	0 0 to 1.0	ENDRIN	0 0036	J	MG/KG		
SBLCA	DJA074	0 0 to 1 0	ENDRIN KETONE	0 003	=	MG/KG		
SBLCC	DJA082	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0839	J	MG/KG	0 0067	X
SBLCC	DJA082	0.0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0.294	=	MG/KG	0 16	X
SBLCC	DJA082	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	1 46	J	MG/KG	0 074	X
SBLCC	DJA082	0 0 to 1 0	DIELDRIN	0 174	=	MG/KG	0.086	X
SBLDA	DJA094	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0363	J	MG/KG	0 0067	X
SBLDA	DJA094	0 0 to 1 0	DDE (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 236	=	MG/KG	0 16	X
SBLDA	DJA094	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 408	J	MG/KG	0 074	X
SBLDA	DJA094	0 0 to 1.0	ENDOSULFAN SULFATE	0 0259	J	MG/KG		
SBLDB	DJA098	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0274	J	MG/KG	0 0067	X
SBLDB	DJA098	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 246	J	MG/KG	0 074	X
SBLDB	DJA098	0 0 to 1 0	ENDOSULFAN SULFATE	0 0084	J	MG/KG		
SBLDC	DJA102	0 0 to 1 0	ENDOSULFAN SULFATE	0 0043	J	MG/KG		
SBLDD	DJA106	0 0 to 1.0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0104	J	MG/KG	0 0067	X
SBLDD	DJA106	0 0 to 1.0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 132	J	MG/KG	0 074	X
SBLEA	DJA118	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0435	J	MG/KG	0 0067	X
SBLEA	DJA118	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 179	J	MG/KG	0 074	X
SBLEA	DJA118	0 0 to 1 0	ENDOSULFAN SULFATE	0 0799	=	MG/KG		
SBLEB	DJA122	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0091	=	MG/KG	0 0067	X
SBLEB	DJA229FD	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0226	J	MG/KG	0 0067	X
SBLEB	DJA229FD	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 0971	J	MG/KG	0 074	X
SBLEH	DJA207	0 0 to 1 0	DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 126	J	MG/KG	0 0067	X
SBLEH	DJA207	0 0 to 1.0	DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 6	=	MG/KG	0 16	X
SBLEH	DJA207	0 0 to 1.0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	1 04	J	MG/KG	0 074	X
SBLFA (1)	DJA019	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0094	J	MG/KG	0 0067	X
SBLFA (1)	DJA019	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 0978	J	MG/KG	0 074	X
SBLFA (1)	DJA019	0 0 to 1 0	DIELDRIN	0 094	=	MG/KG	0 086	X
SBLFA (1)	DJA019	0 0 to 1 0	HEPTACHLOR EPOXIDE	0 029	J	MG/KG	0 0045	X
SBLFA (1)	DJA019	0 0 to 1 0	METHOXYCHLOR	0 0543	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1.0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0248	J	MG/KG	0 0067	X
SBLFA (1)	DJA046FD	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 173	J	MG/KG	0 074	X
SBLFA (1)	DJA046FD	0 0 to 1.0	DIELDRIN	0 209	=	MG/KG	0 086	X
SBLFA (1)	DJA046FD	0 0 to 1 0	ENDOSULFAN SULFATE	0 0911	=	MG/KG		
SBLFC (1)	DJA027	0 0 to 1 0	DDD (1 1-bis(CHLOROPHENYL)-2,2-DICHLOR	0 0095	J	MG/KG	0 0067	X
SBLFC (1)	DJA027	0 0 to 1 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2-TRICHL	0 329	J	MG/KG	0 074	X
SBLFC (1)	DJA027	0 0 to 1 0	ENDOSULFAN SULFATE	0 0052	J	MG/KG		
SBLFG	DJA203	0 0 to 1.0	DDT (1 1-bis(CHLOROPHENYL)-2,2 2-TRICHL	0 132	=	MG/KG	0.074	X
Organics								
Subsurface Soils								
SB-1	DDMT-080598-SB1-3-5 -02	3 0 to 5.0	1,4-Dithiane	0 0018	J	MG/KG		
SB-1	DDMT-080598-SB1-3-5'-02	3 0 to 5.0	1,4-Oxathiane	0 001	J	MG/KG		
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9.0	1,4-Dithiane	0 0019	J	MG/KG		
SB-1	DDMT-080598-SB1-7-9'-04	7 0 to 9.0	1 4-Oxathiane	0 0011	J	MG/KG		
SB-1	DDMT-080598-SB1-9-11 -05	9 0 to 11 0	1 4-Dithiane	0 0019	J	MG/KG		

TABLE 17-2

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SB-1	DDMT-080598-SB1-9-11'-05	9 0 to 11 0	1 4-Oxathiane	0 0011	J	MG/KG		
Surface Soils								
SS-1	DDMT-080598-SS1	0 0 to 1 0	1,4-Dithiane	0 0017	J	MG/KG		
SS-1	DDMT-080598-SS1	0 0 to 1 0	1,4-Oxathiane	0 001	J	MG/KG		
Polyaromatic Hydrocarbons								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	2-METHYLNAPHTHALENE	0 12	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	ACENAPHTHYLENE	0 079	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	ANTHRACENE	0 11	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(a)ANTHRACENE	0 74	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(a)PYRENE	0 97	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(b)FLUORANTHENE	1 2	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(g,h i)PERYLENE	0 57	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	BENZO(k)FLUORANTHENE	0 95	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	CHRYSENE	0 91	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	DIBENZ(a,h)ANTHRACENE	0 2	J	MG/KG		
SB61A	DJA192	3 0 to 5.0	FLUORANTHENE	1 2	=	MG/KG	0 045	X
SB61A	DJA192	3 0 to 5 0	INDENO(1,2,3-c,d)PYRENE	0 69	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	NAPHTHALENE	0 082	J	MG/KG		
SB61A	DJA192	3 0 to 5 0	PHENANTHRENE	0 56	=	MG/KG		
SB61A	DJA192	3 0 to 5 0	PYRENE	1 6	=	MG/KG	0.042	X
SB61A	DJA193	8 0 to 10 0	BENZO(a)ANTHRACENE	0 095	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(a)PYRENE	0 13	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 15	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(g h,i)PERYLENE	0 14	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 13	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	CHRYSENE	0 11	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	DIBENZ(a h)ANTHRACENE	0 1	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	FLUORANTHENE	0 15	J	MG/KG	0 045	X
SB61A	DJA193	8 0 to 10 0	INDENO(1 2,3-c,d)PYRENE	0 15	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	PYRENE	0 16	J	MG/KG	0 042	X
SBLAA	DJA002	8 0 to 10 0	ANTHRACENE	0 0083	J	MG/KG		
SBLAA	DJA002	8 0 to 10 0	BENZO(a)ANTHRACENE	0 0061	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	BENZO(a)ANTHRACENE	0 0041	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	BENZO(a)PYRENE	0 0042	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	ANTHRACENE	0 0045	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	BENZO(a)PYRENE	0 0034	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12 0	BENZO(a)ANTHRACENE	0 0051	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(a)ANTHRACENE	0 18	J	MG/KG		
SBLEE	DJA135	8.0 to 10 0	BENZO(a)PYRENE	0 24	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 21	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(g,h,I)PERYLENE	0 18	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 22	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	CHRYSENE	0 21	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	DIBENZ(a,h)ANTHRACENE	0 041	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	FLUORANTHENE	0 23	J	MG/KG	0 045	X
SBLEE	DJA135	8 0 to 10 0	INDENO(1,2 3-c,d)PYRENE	0 17	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	PHENANTHRENE	0 11	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	PYRENE	0 2	J	MG/KG	0 042	X
SBLEH	DJA208	8 0 to 10 0	BENZO(a)ANTHRACENE	0 12	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(a)PYRENE	0 13	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 14	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(g h,I)PERYLENE	0 12	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 14	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	CHRYSENE	0 15	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	DIBENZ(a,h)ANTHRACENE	0 07	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	FLUORANTHENE	0 28	J	MG/KG	0 045	X
SBLEH	DJA208	8 0 to 10 0	INDENO(1 2,3-c,d)PYRENE	0 13	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	NAPHTHALENE	0 069	J	MG/KG		
SBLEH	DJA208	8 0 to 10 0	PHENANTHRENE	0 18	J	MG/KG		
SBLEH	DJA208	8.0 to 10 0	PYRENE	0 29	J	MG/KG	0 042	X
SBLFA (1)	DJA020	8 0 to 10 0	ACENAPHTHENE	0 055	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	ANTHRACENE	0 1	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(a)ANTHRACENE	0 3	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(a)PYRENE	0 3	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 3	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(g h I)PERYLENE	0 22	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 32	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	CHRYSENE	0 33	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	DIBENZ(a h)ANTHRACENE	0 053	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	FLUORANTHENE	0 84	=	MG/KG	0 045	X
SBLFA (1)	DJA020	8 0 to 10 0	FLUORENE	0 042	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	INDENO(1,2,3-c,d)PYRENE	0 22	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	PHENANTHRENE	0 52	=	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	PYRENE	0 56	=	MG/KG	0 042	X
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(a)ANTHRACENE	0 019	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(a)PYRENE	0 017	J	MG/KG		
SBLFB (1)	DJA024	8.0 to 10 0	BENZO(b)FLUORANTHENE	0 02	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(g h i)PERYLENE	0 017	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 02	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	CHRYSENE	0 024	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	FLUORANTHENE	0 052	J	MG/KG	0 045	X
SBLFB (1)	DJA024	8 0 to 10 0	INDENO(1,2,3-c,d)PYRENE	0 014	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	PHENANTHRENE	0 041	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(a)ANTHRACENE	0 1	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(a)PYRENE	0 11	J	MG/KG		

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TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(b)FLUORANTHENE	0 12	J	MG/KG		
SBLFC (1)	DJA028	8.0 to 10 0	BENZO(g h,i)PERYLENE	0 091	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	BENZO(k)FLUORANTHENE	0 11	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	CHRYSENE	0 12	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	FLUORANTHENE	0 28	J	MG/KG	0 045	X
SBLFC (1)	DJA028	8.0 to 10 0	INDENO(1 2,3-c,d)PYRENE	0 09	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	PHENANTHRENE	0 13	J	MG/KG		
SBLFC (1)	DJA028	8.0 to 10 0	PYRENE	0 2	J	MG/KG	0 042	X
SBLFD (1)	DJA032	8 0 to 10 0	FLUORANTHENE	0 15	J	MG/KG	0 045	X
SBLFD (1)	DJA032	8 0 to 10 0	PHENANTHRENE	0 1	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	PYRENE	0 11	J	MG/KG	0 042	X
Sediments								
SD61A	DJA194	0 0 to 1 0	2-METHYLNAPHTHALENE	0 16	J	MG/KG		
SD61A	DJA194	0 0 to 1 0	ACENAPHTHENE	0 94	=	MG/KG	0 77	X
SD61A	DJA194	0 0 to 1 0	ACENAPHTHYLENE	0.24	J	MG/KG		
SD61A	DJA194	0 0 to 1.0	BENZO(a)ANTHRACENE	5 4	=	MG/KG	2.9	X
SD61A	DJA194	0 0 to 1 0	BENZO(a)PYRENE	5 9	=	MG/KG	2.5	X
SD61A	DJA194	0 0 to 1 0	BENZO(b)FLUORANTHENE	7 4	=	MG/KG	2.21605	X
SD61A	DJA194	0 0 to 1 0	BENZO(g h,i)PERYLENE	4 6	=	MG/KG	1.8	X
SD61A	DJA194	0 0 to 1 0	BENZO(k)FLUORANTHENE	5	=	MG/KG	2.3	X
SD61A	DJA194	0 0 to 1 0	CHRYSENE	5 8	=	MG/KG	3.2	X
SD61A	DJA194	0 0 to 1 0	DIBENZ(a,h)ANTHRACENE	1 6	=	MG/KG	0 7	X
SD61A	DJA194	0 0 to 1.0	FLUORANTHENE	9 7	=	MG/KG	7 1	X
SD61A	DJA194	0 0 to 1.0	INDENO(1 2,3-c,d)PYRENE	5 1	=	MG/KG	1 7	X
SD61A	DJA194	0 0 to 1.0	NAPHTHALENE	0 19	J	MG/KG	0 13	X
SD61A	DJA194	0 0 to 1.0	PHENANTHRENE	7 3	=	MG/KG	6.9	X
SD61A	DJA194	0 0 to 1.0	PYRENE	7 9	=	MG/KG	2.882	X
SDLAA	DJA017	0 0 to 1.0	ACENAPHTHYLENE	0 16	J	MG/KG		
Surface Soils								
SB61A	DJA191	0 0 to 1 0	2-METHYLNAPHTHALENE	0 34	=	MG/KG		
SB61A	DJA191	0 0 to 1 0	ACENAPHTHENE	0.38	=	MG/KG		
SB61A	DJA191	0 0 to 1 0	ANTHRACENE	0 9	=	MG/KG	0.096	X
SB61A	DJA191	0 0 to 1 0	BENZO(a)ANTHRACENE	5 8	=	MG/KG	0 71	X
SB61A	DJA191	0 0 to 1 0	BENZO(a)PYRENE	6 7	=	MG/KG	0 96	X
SB61A	DJA191	0 0 to 1 0	BENZO(b)FLUORANTHENE	8 2	=	MG/KG	0 9	X
SB61A	DJA191	0 0 to 1 0	BENZO(g,h,i)PERYLENE	3 8	=	MG/KG	0 62	X
SB61A	DJA191	0 0 to 1 0	BENZO(k)FLUORANTHENE	6 3	=	MG/KG	0 78	X
SB61A	DJA191	0 0 to 1.0	CHRYSENE	6 3	=	MG/KG	0 94	X
SB61A	DJA191	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	1 6	=	MG/KG	0 26	X
SB61A	DJA191	0 0 to 1 0	FLUORANTHENE	6 5	=	MG/KG	1.6	X
SB61A	DJA191	0 0 to 1 0	FLUORENE	0.32	=	MG/KG		
SB61A	DJA191	0 0 to 1 0	INDENO(1,2,3-c,d)PYRENE	4 6	=	MG/KG	0 7	X
SB61A	DJA191	0 0 to 1.0	NAPHTHALENE	0.25	J	MG/KG		
SB61A	DJA191	0 0 to 1.0	PHENANTHRENE	4 3	=	MG/KG	0 61	X
SB61A	DJA191	0 0 to 1.0	PYRENE	12	=	MG/KG	1 5	X
SBLBA	DJA054	0 0 to 1.0	ACENAPHTHENE	0 18	J	MG/KG		
SBLBA	DJA054	0 0 to 1.0	ANTHRACENE	0 31	=	MG/KG	0 096	X
SBLBA	DJA054	0 0 to 1.0	BENZO(a)ANTHRACENE	1 1	=	MG/KG	0 71	X
SBLBA	DJA054	0 0 to 1.0	BENZO(a)PYRENE	1	=	MG/KG	0 96	X
SBLBA	DJA054	0 0 to 1.0	BENZO(b)FLUORANTHENE	1 2	=	MG/KG	0 9	X
SBLBA	DJA054	0 0 to 1 0	BENZO(k)FLUORANTHENE	1 1	=	MG/KG	0 78	X
SBLBA	DJA054	0 0 to 1.0	CHRYSENE	1 2	=	MG/KG	0 94	X
SBLBA	DJA054	0 0 to 1 0	FLUORANTHENE	2 4	=	MG/KG	1 6	X
SBLBA	DJA054	0 0 to 1 0	FLUORENE	0 14	J	MG/KG		
SBLBA	DJA054	0 0 to 1.0	PHENANTHRENE	1 8	=	MG/KG	0 61	X
SBLBA	DJA054	0 0 to 1.0	PYRENE	2 4	=	MG/KG	1 5	X
SBLBC	DJA062	0 0 to 1 0	ACENAPHTHENE	0 2	J	MG/KG		
SBLBC	DJA062	0 0 to 1.0	ANTHRACENE	0 32	J	MG/KG	0 096	X
SBLBC	DJA062	0 0 to 1.0	BENZO(a)ANTHRACENE	0 86	J	MG/KG	0 71	X
SBLBC	DJA062	0 0 to 1.0	BENZO(a)PYRENE	0 99	J	MG/KG	0 96	X
SBLBC	DJA062	0 0 to 1.0	BENZO(b)FLUORANTHENE	1 1	J	MG/KG	0 9	X
SBLBC	DJA062	0 0 to 1.0	BENZO(k)FLUORANTHENE	1	J	MG/KG	0 78	X
SBLBC	DJA062	0 0 to 1 0	CHRYSENE	0 95	J	MG/KG	0 94	X
SBLBC	DJA062	0 0 to 1.0	FLUORANTHENE	2 1	J	MG/KG	1 6	X
SBLBC	DJA062	0 0 to 1.0	FLUORENE	0 13	J	MG/KG		
SBLBC	DJA062	0 0 to 1 0	PHENANTHRENE	1 6	J	MG/KG	0 61	X
SBLBC	DJA062	0 0 to 1 0	PYRENE	3	J	MG/KG	1 5	X
SBLEB	DJA122	0 0 to 1.0	ACENAPHTHENE	0 026	J	MG/KG		
SBLEB	DJA229FD	0 0 to 1.0	ACENAPHTHENE	0 074	J	MG/KG		
SBLEB	DJA229FD	0 0 to 1.0	ANTHRACENE	0 12	J	MG/KG	0 096	X
SBLEB	DJA229FD	0 0 to 1 0	FLUORENE	0 07	J	MG/KG		
SBLFA (1)	DJA019	0 0 to 1.0	ACENAPHTHENE	0 014	J	MG/KG		
SBLFA (1)	DJA019	0 0 to 1 0	FLUORENE	0 01	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	ACENAPHTHENE	0 18	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1.0	ANTHRACENE	0 29	J	MG/KG	0 096	X
SBLFA (1)	DJA046FD	0 0 to 1.0	BENZO(a)ANTHRACENE	0 76	=	MG/KG	0 71	X
SBLFA (1)	DJA046FD	0 0 to 1.0	BENZO(k)FLUORANTHENE	0 83	=	MG/KG	0 78	X
SBLFA (1)	DJA046FD	0 0 to 1.0	FLUORANTHENE	2	=	MG/KG	1 6	X
SBLFA (1)	DJA046FD	0 0 to 1.0	FLUORENE	0 13	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1.0	NAPHTHALENE	0 041	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1.0	PHENANTHRENE	1 4	=	MG/KG	0 61	X
SBLFB (1)	DJA023	0 0 to 1 0	2-METHYLNAPHTHALENE	0 11	J	MG/KG		
SBLFB (1)	DJA023	0 0 to 1.0	ACENAPHTHENE	1.3	=	MG/KG		
SBLFB (1)	DJA023	0 0 to 1.0	ANTHRACENE	1 8	=	MG/KG	0 096	X
SBLFB (1)	DJA023	0 0 to 1.0	BENZO(a)ANTHRACENE	4 7	=	MG/KG	0 71	X
SBLFB (1)	DJA023	0 0 to 1.0	BENZO(a)PYRENE	4 9	=	MG/KG	0 96	X

TABLE 17-2

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(b)FLUORANTHENE	5 8	=	MG/KG	0 9	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(g h,i)PERYLENE	3 7	=	MG/KG	0 82	X
SBLFB (1)	DJA023	0 0 to 1 0	BENZO(k)FLUORANTHENE	3 6	=	MG/KG	0 78	X
SBLFB (1)	DJA023	0 0 to 1 0	CHRYSENE	5 1	=	MG/KG	0 94	X
SBLFB (1)	DJA023	0 0 to 1 0	DIBENZ(a h)ANTHRACENE	1 4	=	MG/KG	0 26	X
SBLFB (1)	DJA023	0 0 to 1.0	FLUORANTHENE	17	=	MG/KG	1 6	X
SBLFB (1)	DJA023	0 0 to 1 0	FLUORENE	0 86	=	MG/KG		
SBLFB (1)	DJA023	0 0 to 1 0	INDENO(1 2,3-c,d)PYRENE	4 1	=	MG/KG	0 7	X
SBLFB (1)	DJA023	0 0 to 1.0	NAPHTHALENE	0 26	J	MG/KG		
SBLFB (1)	DJA023	0 0 to 1 0	PHENANTHRENE	13	=	MG/KG	0 61	X
SBLFB (1)	DJA023	0 0 to 1 0	PYRENE	7 2	=	MG/KG	1 5	X
Surface Water								
SW61A	DJA195	Not Applicable	BENZO(b)FLUORANTHENE	0.00035	J	MG/L		
SW61A	DJA195	Not Applicable	CHRYSENE	0.00046	J	MG/L		
SW61A	DJA195	Not Applicable	FLUORANTHENE	0 00068	J	MG/L		
SW61A	DJA195	Not Applicable	INDENO(1,2,3-c,d)PYRENE	0 00027	J	MG/L		
SW61A	DJA195	Not Applicable	PHENANTHRENE	0 0003	J	MG/L		
SW61A	DJA195	Not Applicable	PYRENE	0 0004	J	MG/L		
SWLAA	DJA018	Not Applicable	BENZO(b)FLUORANTHENE	0 00026	J	MG/L		
SWLAA	DJA018	Not Applicable	CHRYSENE	0 00032	J	MG/L		
SWLAA	DJA018	Not Applicable	FLUORANTHENE	0 00066	J	MG/L		
SWLAA	DJA018	Not Applicable	PHENANTHRENE	0 00034	J	MG/L		
SWLAA	DJA018	Not Applicable	PYRENE	0 00052	J	MG/L		
Polychlorinated Biphenyls								
Subsurface Soils								
SBLEE	DJA135	8 0 to 10 0	PCB-1260 (AROCHLOR 1260)	0 0201	=	MG/KG		
SBLEH	DJA208	8 0 to 10 0	PCB-1260 (AROCHLOR 1260)	0 008	J	MG/KG		
Sediments								
SD61A	DJA194	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 0553	=	MG/KG		
Surface Soils								
SBLCC	DJA082	0 0 to 1.0	PCB-1254 (AROCHLOR 1254)	0 0121	J	MG/KG		
SBLCC	DJA082	0 0 to 1 0	PCB-1260 (AROCHLOR 1260)	0 12	=	MG/KG	0 11	X
Semivolatile Organics								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	CARBAZOLE	0 096	J	MG/KG		
SBLAA	DJA002	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 021	J	MG/KG		
SBLAA	DJA002	8.0 to 10 0	DI-n-BUTYL PHTHALATE	0 012	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 022	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 035	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12.0	bis(2-ETHYLHEXYL) PHTHALATE	0 035	J	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 35 0	HEXACHLOROBUTADIENE	0 00309	=	MG/KG		
SBLDG	DJA212	8 0 to 10 0	DIETHYL PHTHALATE	0 16	J	MG/KG		
SBLFA (1)	DJA020	8 0 to 10 0	CARBAZOLE	0 097	J	MG/KG		
SBLFA (1)	DJA020	8.0 to 10 0	DIETHYL PHTHALATE	0 0087	J	MG/KG		
SBLFB (1)	DJA024	8 0 to 10 0	DI-n-BUTYL PHTHALATE	0 035	J	MG/KG		
SBLFC (1)	DJA028	8 0 to 10 0	bis(2-ETHYLHEXYL) PHTHALATE	0 16	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	1 2 4-TRICHLOROBENZENE	0 094	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	2,4 6-TRICHLOROPHENOL	0 27	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	PENTACHLOROPHENOL	0 22	J	MG/KG		
Sediments								
SD61A	DJA194	0 0 to 1 0	CARBAZOLE	1 6	=	MG/KG	1 1	X
Surface Soils								
SB61A	DJA191	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 1	J	MG/KG		
SB61A	DJA191	0 0 to 1 0	CARBAZOLE	0 92	=	MG/KG	0 067	X
SBLAA	DJA001	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 016	J	MG/KG		
SBLAA	DJA001	0 0 to 1 0	DI-n-BUTYL PHTHALATE	0 01	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 12	J	MG/KG		
SBLBA	DJA054	0 0 to 1 0	CARBAZOLE	0 36	=	MG/KG	0 067	X
SBLBC	DJA062	0 0 to 1 0	CARBAZOLE	0 35	J	MG/KG	0 067	X
SBLCD	DJA086	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 12	J	MG/KG		
SBLDH	DJA215	0 0 to 1 0	DIETHYL PHTHALATE	0 15	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 17	J	MG/KG		
SBLEB	DJA122	0 0 to 1 0	DI-n-BUTYL PHTHALATE	0 018	J	MG/KG		
SBLEB	DJA229FD	0 0 to 1 0	CARBAZOLE	0 11	J	MG/KG	0 067	X
SBLEB	DJA229FD	0 0 to 1 0	DIETHYL PHTHALATE	0 0044	J	MG/KG		
SBLEH	DJA207	0 0 to 1 0	bis(2-ETHYLHEXYL) PHTHALATE	0 13	J	MG/KG		
SBLFA (1)	DJA046FD	0 0 to 1 0	CARBAZOLE	0 27	J	MG/KG	0 067	X
SBLFB (1)	DJA023	0 0 to 1 0	CARBAZOLE	2	=	MG/KG	0 067	X
Surface Water								
SW61A	DJA195	Not Applicable	DI-n-BUTYL PHTHALATE	0 00042	J	MG/L		
SW61A	DJA195	Not Applicable	DIETHYL PHTHALATE	0 00046	J	MG/L		
SWLAA	DJA018	Not Applicable	2-NITROPHENOL	0 00035	J	MG/L		
Volatile Organics								
Subsurface Soils								
SB61A	DJA192	3 0 to 5 0	METHYL ETHYL KETONE (2-BUTANONE)	0 007	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SB61A	DJA193	8 0 to 10 0	METHYLENE CHLORIDE	0 004	J	MG/KG		
SBLAA	DJA003	14 0 to 16 0	CARBON TETRACHLORIDE	0 003	J	MG/KG		
SBLAA	DJA003	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	CARBON TETRACHLORIDE	0 13	=	MG/KG		
SBLAB	DJA006	8 0 to 10 0	CHLOROFORM	0 56	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	METHYLENE CHLORIDE	0 001	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 041	=	MG/KG		
SBLAB	DJA006	8.0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 004	J	MG/KG		
SBLAB	DJA006	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 1	=	MG/KG		
SBLAB	DJA007	14 0 to 16 0	CARBON TETRACHLORIDE	0 57	J	MG/KG		

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are:
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLAB	DJA007	14 0 to 16 0	CHLOROFORM	2 4	=	MG/KG		
SBLAB	DJA007	14 0 to 16 0	METHYLENE CHLORIDE	0 004	J	MG/KG		
SBLAB	DJA007	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 14	J	MG/KG		
SBLAB	DJA007	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 033	=	MG/KG		
SBLAB	DJA007	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	1 1,2,2-TETRACHLOROETHANE	0 009	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	CARBON TETRACHLORIDE	0 35	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	CHLOROFORM	1 7	=	MG/KG		
SBLAB	DJA008	28 0 to 30 0	METHYLENE CHLORIDE	0 0007	J	MG/KG		
SBLAB	DJA008	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 089	=	MG/KG		
SBLAB	DJA008	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 022	=	MG/KG		
SBLAB	DJA008	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 33	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	CARBON TETRACHLORIDE	0 003	J	MG/KG		
SBLAC	DJA010	8 0 to 10 0	CHLOROFORM	0 002	J	MG/KG		
SBLAC	DJA010	8.0 to 10 0	METHYLENE CHLORIDE	0.0008	J	MG/KG		
SBLAC	DJA011	14 0 to 16 0	CARBON TETRACHLORIDE	0 01	J	MG/KG		
SBLAC	DJA011	14 0 to 16 0	CHLOROFORM	0 003	J	MG/KG		
SBLAC	DJA011	14 0 to 16 0	METHYLENE CHLORIDE	0 003	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12 0	CARBON TETRACHLORIDE	0 004	J	MG/KG		
SBLAC	DJA045FD	10 0 to 12.0	CHLOROFORM	0 002	J	MG/KG		
SBLAD	DJA015	14 0 to 16 0	CARBON TETRACHLORIDE	0 001	J	MG/KG		
SBLAD	DJA015	14 0 to 16 0	CHLOROFORM	0 0008	J	MG/KG		
SBLBA	DJA056	14 0 to 16 0	METHYLENE CHLORIDE	0 0008	J	MG/KG		
SBLBB	DJA060	14 0 to 16 0	BENZENE	0 001	J	MG/KG		
SBLBB	DJA060	14 0 to 16 0	METHYLENE CHLORIDE	0 0009	J	MG/KG		
SBLBB	DJA060	14 0 to 16 0	TOLUENE	0 001	J	MG/KG		
SBLBC	DJA063	8 0 to 10.0	TOTAL 1,2-DICHLOROETHENE	0 027	=	MG/KG		
SBLBC	DJA063	8.0 to 10 0	VINYL CHLORIDE	0 018	=	MG/KG		
SBLBC	DJA064	14 0 to 16 0	CHLOROFORM	0 001	J	MG/KG		
SBLBC	DJA064	14 0 to 16 0	STYRENE	0 0003	J	MG/KG		
SBLBC	DJA064	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 24	J	MG/KG		
SBLBC	DJA064	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 023	=	MG/KG		
SBLBC	DJA064	14 0 to 16 0	VINYL CHLORIDE	0 066	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 055	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	1,1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	BENZENE	0 0003	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	CARBON TETRACHLORIDE	0 003	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	CHLOROFORM	0 008	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	METHYLENE CHLORIDE	0 0009	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	STYRENE	0 0004	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLBC	DJA065	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 088	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 031	=	MG/KG		
SBLBC	DJA065	28 0 to 30 0	VINYL CHLORIDE	0 011	=	MG/KG		
SBLBD	DJA067	8 0 to 10.0	CARBON DISULFIDE	0 004	J	MG/KG	0 002	X
SBLBD	DJA068	14 0 to 16 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	CHLOROFORM	0 004	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	METHYLENE CHLORIDE	0 0005	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	STYRENE	0 0003	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 001	J	MG/KG		
SBLBD	DJA068	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 017	=	MG/KG		
SBLBD	DJA069	28 0 to 30 0	1 1 2,2-TETRACHLOROETHANE	0 005	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	CHLOROFORM	0 006	J	MG/KG		
SBLBD	DJA069	28 0 to 30.0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 001	J	MG/KG		
SBLBD	DJA069	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 017	=	MG/KG		
SBLBE	DJA071	8 0 to 10 0	METHYLENE CHLORIDE	0 002	J	MG/KG		
SBLBE	DJA071	8 0 to 10 0	VINYL CHLORIDE	0 006	=	MG/KG		
SBLBE	DJA072	14 0 to 16 0	METHYLENE CHLORIDE	0 0006	J	MG/KG		
SBLBE	DJA072	14 0 to 16 0	STYRENE	0 0002	J	MG/KG		
SBLBE	DJA072	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 001	J	MG/KG		
SBLCA	DJA075	8.0 to 10 0	1,1,2,2-TETRACHLOROETHANE	0 24	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	2-HEXANONE	0 035	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	ACETONE	0 36	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	CHLOROFORM	0 002	J	MG/KG		
SBLCA	DJA075	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 13	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	1 9	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 083	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	6 8	=	MG/KG		
SBLCA	DJA075	8 0 to 10 0	VINYL CHLORIDE	0 005	J	MG/KG		
SBLCA	DJA076	14 0 to 16 0	1 1,2,2-TETRACHLOROETHANE	8 6	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	1 1 2-TRICHLOROETHANE	0 003	J	MG/KG		
SBLCA	DJA076	14 0 to 16 0	1 1-DICHLOROETHENE	0 0004	J	MG/KG		
SBLCA	DJA076	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	1 9	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 072	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	9 5	=	MG/KG		
SBLCA	DJA076	14 0 to 16 0	VINYL CHLORIDE	0 007	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	1 1,2,2-TETRACHLOROETHANE	33	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	1,1,2-TRICHLOROETHANE	0 027	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	1 1-DICHLOROETHENE	0 002	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	CHLOROFORM	0 007	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 31	J	MG/KG		
SBLCA	DJA077	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 55	=	MG/KG		
SBLCA	DJA077	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	18	=	MG/KG		

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCA	DJA077	28 0 to 30 0	VINYL CHLORIDE	0 047	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	1,1 2,2-TETRACHLOROETHANE	0.0157	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	ACETONE	0 933	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	cis-1 2-DICHLOROETHYLENE	0 00534	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	TETRACHLOROETHYLENE(PCE)	0 00572	=	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	trans-1,2-DICHLOROETHENE	0 00189	J	MG/KG		
SBLCA	SBLCA-SB-1-33	33 0 to 33 0	TRICHLOROETHYLENE (TCE)	0 132	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	1 1,2,2-TETRACHLOROETHANE	0 0121	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	1,1,2-TRICHLOROETHANE	0 0026	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	cis-1,2-DICHLOROETHYLENE	0 0155	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	trans-1,2-DICHLOROETHENE	0 00246	=	MG/KG		
SBLCA	SBLCA-SB-1-64	64 0 to 64 0	TRICHLOROETHYLENE (TCE)	0 0748	=	MG/KG		
SBLCA	SBLCA-SB-1-74	74 0 to 74 0	1,1,2,2-TETRACHLOROETHANE	0 0083	=	MG/KG		
SBLCA	SBLCA-SB-1-74	74 0 to 74 0	TRICHLOROETHYLENE (TCE)	0 00978	=	MG/KG		
SBLCA	SBLCA-SB-10-12 5	12 5 to 12 5	cis-1,2-DICHLOROETHYLENE	0 00596	=	MG/KG		
SBLCA	SBLCA-SB-10-12 55	12 5 to 12 5	cis-1,2-DICHLOROETHYLENE	0 00691	=	MG/KG		
SBLCA	SBLCA-SB-10-37 5	37 5 to 37 5	cis-1,2-DICHLOROETHYLENE	0 00566	=	MG/KG		
SBLCA	SBLCA-SB-10-37 5	37 5 to 37 5	TRICHLOROETHYLENE (TCE)	0 0584	=	MG/KG		
SBLCA	SBLCA-SB-10-57 5	57 5 to 57 5	1 1 2,2-TETRACHLOROETHANE	0 265	=	MG/KG		
SBLCA	SBLCA-SB-10-57 5	57 5 to 57 5	cis-1,2-DICHLOROETHYLENE	0 00533	=	MG/KG		
SBLCA	SBLCA-SB-10-57 5	57 5 to 57 5	TRICHLOROETHYLENE (TCE)	0 0447	=	MG/KG		
SBLCA	SBLCA-SB-10-72 5	72.5 to 72 5	1 1 2,2-TETRACHLOROETHANE	0 0999	=	MG/KG		
SBLCA	SBLCA-SB-10-72 5	72 5 to 72.5	TRICHLOROETHYLENE (TCE)	0 0083	=	MG/KG		
SBLCA	SBLCA-SB-11-27 5	27 5 to 27 5	TRICHLOROETHYLENE (TCE)	0 00935	=	MG/KG		
SBLCA	SBLCA-SB-11-27 55	27 5 to 27 5	METHYLENE CHLORIDE	0 001	J	MG/KG		
SBLCA	SBLCA-SB-11-27 55	27 5 to 27 5	TRICHLOROETHYLENE (TCE)	0 009	=	MG/KG		
SBLCA	SBLCA-SB-11-37 5	37 5 to 37 5	cis-1,2-DICHLOROETHYLENE	0.00226	=	MG/KG		
SBLCA	SBLCA-SB-11-37 5	37 5 to 37 5	TRICHLOROETHYLENE (TCE)	0 059	=	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	1,1 2,2-TETRACHLOROETHANE	5 98	=	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	1,1,2-TRICHLOROETHANE	0 00121	J	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	cis-1,2-DICHLOROETHYLENE	0 0122	=	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	trans-1,2-DICHLOROETHENE	0 0016	J	MG/KG		
SBLCA	SBLCA-SB-11-81	81 0 to 81 0	TRICHLOROETHYLENE (TCE)	0 0888	=	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	1,1,2,2-TETRACHLOROETHANE	2 22	=	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	cis-1,2-DICHLOROETHYLENE	0 00639	=	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	trans-1,2-DICHLOROETHENE	0 00069	J	MG/KG		
SBLCA	SBLCA-SB-11-811	81 0 to 81 0	TRICHLOROETHYLENE (TCE)	0 0485	=	MG/KG		
SBLCA	SBLCA-SB-12-46 5	46 5 to 46 5	1,1 2,2-TETRACHLOROETHANE	0 131	=	MG/KG		
SBLCA	SBLCA-SB-12-46 5	46 5 to 46 5	cis-1,2-DICHLOROETHYLENE	0 0104	=	MG/KG		
SBLCA	SBLCA-SB-12-46 5	46 5 to 46 5	TRICHLOROETHYLENE (TCE)	0 055	=	MG/KG		
SBLCA	SBLCA-SB-12-74	74 0 to 74 0	1,1,2,2-TETRACHLOROETHANE	0 203	=	MG/KG		
SBLCA	SBLCA-SB-12-74	74 0 to 74 0	cis-1 2-DICHLOROETHYLENE	0.00408	=	MG/KG		
SBLCA	SBLCA-SB-12-74	74 0 to 74 0	trans-1,2-DICHLOROETHENE	0 0009	J	MG/KG		
SBLCA	SBLCA-SB-12 74	74 0 to 74 0	TRICHLOROETHYLENE (TCE)	0 043	=	MG/KG		
SBLCA	SBLCA-SB-12 74 5	74 0 to 74 0	1 1 2,2-TETRACHLOROETHANE	0 033	J	MG/KG		
SBLCA	SBLCA-SB-12-74 5	74 0 to 74 0	cis-1,2-DICHLOROETHYLENE	0 002	J	MG/KG		
SBLCA	SBLCA-SB-12-74 5	74 0 to 74 0	TRICHLOROETHYLENE (TCE)	0 036	=	MG/KG		
SBLCA	SBLCA-SB-13-77	77 0 to 77 0	1 1 2 2-TETRACHLOROETHANE	0 365	=	MG/KG		
SBLCA	SBLCA-SB-13-77	77 0 to 77 0	cis-1,2-DICHLOROETHYLENE	0 00425	=	MG/KG		
SBLCA	SBLCA-SB-13-77	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 0379	=	MG/KG		
SBLCA	SBLCA-SB-14-83	83 0 to 83 0	1,1,2,2-TETRACHLOROETHANE	0 00842	=	MG/KG		
SBLCA	SBLCA-SB-15-80	80 0 to 80 0	1 1 2 2-TETRACHLOROETHANE	0 204	=	MG/KG		
SBLCA	SBLCA-SB-15-80	80 0 to 80 0	TRICHLOROETHYLENE (TCE)	0 0118	=	MG/KG		
SBLCA	SBLCA-SB-15-80 5	80 0 to 80 0	1,1,2,2-TETRACHLOROETHANE	0 21	J	MG/KG		
SBLCA	SBLCA-SB-15-80 5	80 0 to 80 0	cis-1 2-DICHLOROETHYLENE	0 0007	J	MG/KG		
SBLCA	SBLCA-SB-15-80 5	80 0 to 80 0	TRICHLOROETHYLENE (TCE)	0 011	=	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	1,1 2,2-TETRACHLOROETHANE	22 6	=	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	1,1,2-TRICHLOROETHANE	0 00157	J	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	cis-1,2-DICHLOROETHYLENE	0 0402	=	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 00352	=	MG/KG		
SBLCA	SBLCA-SB-2-44	44 0 to 44 0	trans-1,2-DICHLOROETHENE	0 0138	=	MG/KG		
SBLCA	SBLCA SB-2-44	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 176	=	MG/KG		
SBLCA	SBLCA-SB-2-444	44 0 to 44 0	1 1 2,2-TETRACHLOROETHANE	13 9	=	MG/KG		
SBLCA	SBLCA-SB-2-444	44 0 to 44 0	1,1 2-TRICHLOROETHANE	0 00261	=	MG/KG		
SBLCA	SBLCA SB 2-444	44 0 to 44 0	cis-1 2-DICHLOROETHYLENE	0 0616	=	MG/KG		
SBLCA	SBLCA-SB 2-444	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 00636	=	MG/KG		
SBLCA	SBLCA-SB-2-444	44 0 to 44 0	trans-1,2-DICHLOROETHENE	0 0184	=	MG/KG		
SBLCA	SBLCA-SB 2-444	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 309	=	MG/KG		
SBLCA	SBLCA-SB-2-68	68 0 to 68 0	1 1,2,2-TETRACHLOROETHANE	15 1	=	MG/KG		
SBLCA	SBLCA-SB-2-68	68 0 to 68 0	cis-1 2-DICHLOROETHYLENE	0 00371	=	MG/KG		
SBLCA	SBLCA SB-2-68	68 0 to 68 0	TRICHLOROETHYLENE (TCE)	0 0412	=	MG/KG		
SBLCA	SBLCA SB-2-73	73 0 to 73 0	1 1,2,2-TETRACHLOROETHANE	13 6	=	MG/KG		
SBLCA	SBLCA SB-2-73	73 0 to 73 0	1,1 2-TRICHLOROETHANE	0 00256	=	MG/KG		
SBLCA	SBLCA-SB-2-73	73 0 to 73 0	cis-1 2-DICHLOROETHYLENE	0 0111	=	MG/KG		
SBLCA	SBLCA-SB-2-73	73 0 to 73 0	TETRACHLOROETHYLENE(PCE)	0 00145	J	MG/KG		
SBLCA	SBLCA-SB-2-73	73 0 to 73 0	trans-1,2-DICHLOROETHENE	0 0022	=	MG/KG		
SBLCA	SBLCA-SB-2 73	73 0 to 73 0	TRICHLOROETHYLENE (TCE)	0 145	=	MG/KG		
SBLCA	SBLCA-SB-3-44	44 0 to 44 0	1,1,2,2-TETRACHLOROETHANE	0 0173	=	MG/KG		
SBLCA	SBLCA-SB-3-44	44 0 to 44 0	cis-1,2-DICHLOROETHYLENE	0 0073	=	MG/KG		
SBLCA	SBLCA-SB-3-44	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0.00112	J	MG/KG		
SBLCA	SBLCA SB-3-44	44 0 to 44 0	trans-1 2-DICHLOROETHENE	0 00142	J	MG/KG		
SBLCA	SBLCA SB-3-44	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 0747	=	MG/KG		
SBLCA	SBLCA-SB-3-53	53 0 to 53 0	1 1 2,2-TETRACHLOROETHANE	0 0869	=	MG/KG		
SBLCA	SBLCA SB-3-53	53 0 to 53 0	cis-1,2-DICHLOROETHYLENE	0 00285	=	MG/KG		
SBLCA	SBLCA-SB-3-53	53 0 to 53 0	TETRACHLOROETHYLENE(PCE)	0.00122	J	MG/KG		
SBLCA	SBLCA-SB-3-53	53 0 to 53 0	TRICHLOROETHYLENE (TCE)	0 0536	=	MG/KG		

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	1,1,2,2-TETRACHLOROETHANE	1 07	=	MG/KG		
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	cis-1,2-DICHLOROETHYLENE	0 00477	=	MG/KG		
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	TETRACHLOROETHYLENE(PCE)	0 00096	J	MG/KG		
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	trans-1,2-DICHLOROETHENE	0 00096	J	MG/KG		
SBLCA	SBLCA-SB-3-67	67 0 to 67 0	TRICHLOROETHYLENE (TCE)	0 0633	=	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42.0	cis-1,2-DICHLOROETHYLENE	0 00756	=	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42 0	TETRACHLOROETHYLENE(PCE)	0 00121	J	MG/KG		
SBLCA	SBLCA-SB-4-42	42 0 to 42.0	trans-1,2-DICHLOROETHENE	0 00288	=	MG/KG		
SBLCA	SBLCA-SB-4-42	42.0 to 42.0	TRICHLOROETHYLENE (TCE)	0 089	=	MG/KG		
SBLCA	SBLCA-SB-4-52	52 0 to 52 0	1 1 2,2-TETRACHLOROETHANE	0 0223	=	MG/KG		
SBLCA	SBLCA-SB-4-52	52 0 to 52 0	cis-1,2-DICHLOROETHYLENE	0 00492	=	MG/KG		
SBLCA	SBLCA-SB-4-52	52 0 to 52 0	TRICHLOROETHYLENE (TCE)	0 055	=	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	1 1,2,2-TETRACHLOROETHANE	2 03	=	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	1,1,2-TRICHLOROETHANE	0 00177	J	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	cis-1,2-DICHLOROETHYLENE	0 0169	=	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	TETRACHLOROETHYLENE(PCE)	0 00147	J	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	trans-1,2-DICHLOROETHENE	0 00198	J	MG/KG		
SBLCA	SBLCA-SB-4-75	75 0 to 75 0	TRICHLOROETHYLENE (TCE)	0 164	=	MG/KG		
SBLCA	SBLCA-SB-4-75.5S	75 0 to 75 0	1,1,2,2-TETRACHLOROETHANE	0 96	=	MG/KG		
SBLCA	SBLCA-SB-4-75.5S	75 0 to 75 0	1,1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	cis-1,2-DICHLOROETHYLENE	0 006	=	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	trans-1,2-DICHLOROETHENE	0 0007	J	MG/KG		
SBLCA	SBLCA-SB-4-75 5S	75 0 to 75 0	TRICHLOROETHYLENE (TCE)	0 068	=	MG/KG		
SBLCA	SBLCA-SB-5-44	44 0 to 44 0	1,1,2,2-TETRACHLOROETHANE	0 914	=	MG/KG		
SBLCA	SBLCA-SB-5-44	44 0 to 44 0	cis-1,2-DICHLOROETHYLENE	0 00499	=	MG/KG		
SBLCA	SBLCA-SB-5-44	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 0609	=	MG/KG		
SBLCA	SBLCA-SB-5-54	54 0 to 54 0	1 1,2,2-TETRACHLOROETHANE	3 42	=	MG/KG		
SBLCA	SBLCA-SB-5-54	54 0 to 54 0	cis-1,2-DICHLOROETHYLENE	0 0228	=	MG/KG		
SBLCA	SBLCA-SB-5-54	54 0 to 54 0	trans-1,2-DICHLOROETHENE	0 00604	=	MG/KG		
SBLCA	SBLCA-SB-5-54	54 0 to 54 0	TRICHLOROETHYLENE (TCE)	0 0992	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	1 1 2,2-TETRACHLOROETHANE	0 159	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	cis-1,2-DICHLOROETHYLENE	0 0105	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	TETRACHLOROETHYLENE(PCE)	0 00194	J	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	trans-1,2-DICHLOROETHENE	0 00352	=	MG/KG		
SBLCA	SBLCA-SB-5-77	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 179	=	MG/KG		
SBLCA	SBLCA-SB-8-47	47 0 to 47 0	TRICHLOROETHYLENE (TCE)	0 00568	=	MG/KG		
SBLCA	SBLCA-SB-8-52	52.0 to 52 0	1,1,2,2-TETRACHLOROETHANE	0 021	=	MG/KG		
SBLCA	SBLCA-SB-8-52	52.0 to 52.0	cis-1,2-DICHLOROETHYLENE	0 011	=	MG/KG		
SBLCA	SBLCA-SB-8-52	52 0 to 52.0	TETRACHLOROETHYLENE(PCE)	0 00171	J	MG/KG		
SBLCA	SBLCA-SB-8-52	52 0 to 52.0	trans-1,2-DICHLOROETHENE	0 00323	=	MG/KG		
SBLCA	SBLCA-SB-8-52	52 0 to 52.0	TRICHLOROETHYLENE (TCE)	0 161	=	MG/KG		
SBLCA	SBLCA-SB-8-522	52 0 to 52 0	1,1,2,2-TETRACHLOROETHANE	0 0145	=	MG/KG		
SBLCA	SBLCA-SB-8-522	52.0 to 52.0	cis-1,2-DICHLOROETHYLENE	0 00656	=	MG/KG		
SBLCA	SBLCA-SB-8-522	52 0 to 52.0	trans-1,2-DICHLOROETHENE	0.00182	J	MG/KG		
SBLCA	SBLCA-SB-8-522	52 0 to 52.0	TRICHLOROETHYLENE (TCE)	0 0941	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	1,1,2,2-TETRACHLOROETHANE	0 399	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72.0	1,1,2-TRICHLOROETHANE	0 0102	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72.0 to 72 0	CHLOROFORM	0 00531	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72.0 to 72 0	cis-1,2-DICHLOROETHYLENE	0 132	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72.0	TETRACHLOROETHYLENE(PCE)	0 0657	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	trans-1,2-DICHLOROETHENE	0 0444	=	MG/KG		
SBLCA	SBLCA-SB-8-72	72 0 to 72 0	TRICHLOROETHYLENE (TCE)	0 322	=	MG/KG		
SBLCA	SBLCA-SB-9-22	22 0 to 22.0	cis-1 2-DICHLOROETHYLENE	0 00204	=	MG/KG		
SBLCA	SBLCA-SB-9-42	42 0 to 42 0	cis-1,2-DICHLOROETHYLENE	0.00095	J	MG/KG		
SBLCA	SBLCA-SB-9-42	42.0 to 42.0	TRICHLOROETHYLENE (TCE)	0 0208	=	MG/KG		
SBLCA	SBLCA-SB-9-56	56 0 to 56 0	TRICHLOROETHYLENE (TCE)	0 0115	=	MG/KG		
SBLCA	SBLCA-SB-9-56 5	56 0 to 56 0	1,1,2,2-TETRACHLOROETHANE	0 082	=	MG/KG		
SBLCA	SBLCA-SB-9-56 5	56 0 to 56 0	cis-1,2-DICHLOROETHYLENE	0 008	=	MG/KG		
SBLCA	SBLCA-SB-9-56 5	56 0 to 56 0	TRICHLOROETHYLENE (TCE)	0 074	=	MG/KG		
SBLCA	SBLCA-SB-9-77	77 0 to 77 0	1 1 2,2-TETRACHLOROETHANE	0 124	=	MG/KG		
SBLCA	SBLCA-SB-9-77	77 0 to 77 0	cis-1,2-DICHLOROETHYLENE	0 00391	=	MG/KG		
SBLCA	SBLCA-SB-9-77	77 0 to 77 0	TRICHLOROETHYLENE (TCE)	0 0652	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	1,1,2,2-TETRACHLOROETHANE	6 7	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	1,1,2-TRICHLOROETHANE	0 002	J	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	CHLOROFORM	0 0008	J	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	TETRACHLOROETHYLENE(PCE)	0 009	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	TOTAL 1,2-DICHLOROETHENE	0 056	=	MG/KG		
SBLCA	SBLCA-SB244S	44 0 to 44 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	1 1,2,2-TETRACHLOROETHANE	1 8	=	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	1,1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	cis-1,2-DICHLOROETHYLENE	0 012	=	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLCA	SBLCA-SB4755	75 0 to 75 0	trans-1,2-DICHLOROETHENE	0 001	J	MG/KG		
SBLCA	SBLCA-SB8475	47 0 to 47 0	1,1,2,2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLCA	SBLCA-SB8475	47 0 to 47 0	cis-1,2-DICHLOROETHYLENE	0 002	J	MG/KG		
SBLCA	SBLCA-SB8475	47 0 to 47 0	TRICHLOROETHYLENE (TCE)	0 027	=	MG/KG		
SBLCB	DJA079	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 015	=	MG/KG		
SBLCB	DJA079	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 021	=	MG/KG		
SBLCB	DJA079	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 68	=	MG/KG		
SBLCB	DJA080	14 0 to 16 0	1 1,2,2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLCB	DJA080	14 0 to 16 0	CHLOROFORM	0.0009	J	MG/KG		
SBLCB	DJA080	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 017	=	MG/KG		
SBLCB	DJA080	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 044	=	MG/KG		
SBLCB	DJA080	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 96	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 027	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	1 1 2-TRICHLOROETHANE	0 002	J	MG/KG		

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
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Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLCB	DJA081	28 0 to 30 0	CHLOROFORM	0 002	J	MG/KG		
SBLCB	DJA081	28 0 to 30 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 004	J	MG/KG		
SBLCB	DJA081	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 013	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 084	=	MG/KG		
SBLCB	DJA081	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	1 3	=	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 011	=	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 014	=	MG/KG		
SBLCB	DJA234FD	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 47	=	MG/KG		
SBLCC	DJA083	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLCC	DJA084	14 0 to 16 0	1 1,2,2-TETRACHLOROETHANE	0 007	J	MG/KG		
SBLCC	DJA084	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 006	J	MG/KG		
SBLCD	DJA087	8 0 to 10 0	1,1,2,2-TETRACHLOROETHANE	1 6	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	1,1,2-TRICHLOROETHANE	0 034	=	MG/KG		
SBLCD	DJA087	8.0 to 10 0	BENZENE	0 003	J	MG/KG		
SBLCD	DJA087	8 0 to 10 0	CHLOROFORM	0 007	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	ETHYLBENZENE	0 004	J	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 007	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TOLUENE	0 008	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 11	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	1 9	=	MG/KG		
SBLCD	DJA087	8 0 to 10 0	XYLENES, TOTAL	0 006	=	MG/KG	0 002	X
SBLCD	DJA088	14 0 to 16 0	1,1,2,2-TETRACHLOROETHANE	2.5	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,1,2-TRICHLOROETHANE	0 075	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,1-DICHLOROETHENE	0 001	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,2-DICHLOROETHANE	0 001	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	1,2-DICHLOROPROPANE	0 0004	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	BENZENE	0 001	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	CHLOROFORM	0 03	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 025	=	MG/KG		
SBLCD	DJA088	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 33	J	MG/KG		
SBLCD	DJA088	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	4 9	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1 1,2,2-TETRACHLOROETHANE	0 91	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1,1,2-TRICHLOROETHANE	0 1	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1,2-DICHLOROETHANE	0 003	J	MG/KG		
SBLCD	DJA089	28 0 to 30 0	1,2-DICHLOROPROPANE	0 0003	J	MG/KG		
SBLCD	DJA089	28 0 to 30 0	CHLOROFORM	0 032	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 007	J	MG/KG		
SBLCD	DJA089	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 16	=	MG/KG		
SBLCD	DJA089	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	3 9	=	MG/KG		
SBLCE	DJA092	14 0 to 16 0	METHYLENE CHLORIDE	0 0006	J	MG/KG		
SBLCE	DJA092	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 0008	J	MG/KG		
SBLCF	DJA220	8.0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 007	J	MG/KG		
SBLCF	DJA220	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 006	=	MG/KG		
SBLCF	DJA221	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 025	=	MG/KG		
SBLCF	DJA222	28 0 to 30 0	CHLOROFORM	0 002	J	MG/KG		
SBLCF	DJA222	28 0 to 30 0	METHYLENE CHLORIDE	0 002	J	MG/KG		
SBLCF	DJA222	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 006	=	MG/KG		
SBLCF	DJA222	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 027	=	MG/KG		
SBLCF	DJA222	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	1 1	=	MG/KG		
SBLCF	DJA287FD	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG		
SBLCF	DJA287FD	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 025	=	MG/KG		
SBLDA	DJA095	8 0 to 10 0	CHLOROBENZENE	0 007	J	MG/KG		
SBLDA	DJA095	8 0 to 10 0	TOLUENE	0 0006	J	MG/KG		
SBLDA	DJA095	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 12	=	MG/KG		
SBLDA	DJA096	14 0 to 16 0	CHLOROBENZENE	0 002	J	MG/KG		
SBLDA	DJA096	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 04	=	MG/KG		
SBLDA	DJA097	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 004	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	CHLOROBENZENE	0 002	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	METHYLENE CHLORIDE	0 0006	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 005	J	MG/KG		
SBLDA	DJA097	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 028	=	MG/KG		
SBLDA	DJA097	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLDB	DJA099	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	1 1 2 2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	CARBON DISULFIDE	0 003	J	MG/KG	0 002	X
SBLDB	DJA100	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0008	J	MG/KG		
SBLDB	DJA100	14 0 to 16 0	TOTAL 1 2-DICHLOROETHENE	0 012	=	MG/KG		
SBLDB	DJA100	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 007	J	MG/KG		
SBLDC	DJA103	8 0 to 10 0	CHLOROFORM	0 001	J	MG/KG		
SBLDC	DJA103	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 0009	J	MG/KG		
SBLDC	DJA103	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	0 12	=	MG/KG		
SBLDC	DJA103	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 073	=	MG/KG		
SBLDC	DJA104	14 0 to 16 0	1 1 2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLDC	DJA104	14 0 to 16 0	CHLOROFORM	0 004	J	MG/KG		
SBLDC	DJA104	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLDC	DJA104	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 65	=	MG/KG		
SBLDC	DJA104	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 47	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	1,1 2-TRICHLOROETHANE	0 0003	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	CHLOROFORM	0 003	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLDC	DJA105	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 68	=	MG/KG		
SBLDC	DJA105	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 59	=	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	1 1 2-TRICHLOROETHANE	0 0003	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	1 1-DICHLOROETHENE	0 0004	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	CHLOROFORM	0 004	J	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 008	J	MG/KG		

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLDC	DJA232FD	28 0 to 30 0	TOTAL 1 2-DICHLOROETHENE	0 6	=	MG/KG		
SBLDC	DJA232FD	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 56	=	MG/KG		
SBLDD	DJA107	8.0 to 10 0	CHLOROFORM	0 098	=	MG/KG		
SBLDD	DJA107	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 012	=	MG/KG		
SBLDD	DJA108	14 0 to 16 0	CHLOROFORM	0 72	=	MG/KG		
SBLDD	DJA108	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLDD	DJA108	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 002	J	MG/KG		
SBLDD	DJA108	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLDD	DJA109	28 0 to 30 0	CHLOROFORM	0 65	=	MG/KG		
SBLDD	DJA109	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 0007	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	CHLOROFORM	0 002	J	MG/KG		
SBLDE	DJA111	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 003	J	MG/KG		
SBLDE	DJA111	8.0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLDE	DJA111	8.0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 003	J	MG/KG		
SBLDE	DJA111	8.0 to 10 0	TRICHLOROETHYLENE (TCE)	0 009	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	CARBON TETRACHLORIDE	0 0005	J	MG/KG		
SBLDE	DJA112	14 0 to 16.0	CHLOROFORM	0 002	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 008	J	MG/KG		
SBLDE	DJA112	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0.021	=	MG/KG		
SBLDE	DJA113	28 0 to 30 0	CHLOROFORM	0 003	J	MG/KG		
SBLDE	DJA113	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLDE	DJA113	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 025	=	MG/KG		
SBLDE	DJA113	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 043	=	MG/KG		
SBLDF	DJA115	8.0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG		
SBLDF	DJA115	8.0 to 10 0	TRICHLOROETHYLENE (TCE)	0 0005	J	MG/KG		
SBLDF	DJA116	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0.004	J	MG/KG		
SBLDF	DJA116	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0006	J	MG/KG		
SBLDF	DJA117	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLDF	DJA117	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 003	J	MG/KG		
SBLDF	DJA117	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 093	=	MG/KG		
SBLDF	DJA233FD	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLDF	DJA233FD	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLDF	DJA233FD	14 0 to 16 0	TOLUENE	0 0004	J	MG/KG		
SBLDG	DJA212	8 0 to 10.0	1 1-DICHLOROETHENE	0 004	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	17	=	MG/KG		
SBLDG	DJA212	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 003	J	MG/KG		
SBLDG	DJA212	8 0 to 10 0	VINYL CHLORIDE	0 006	=	MG/KG		
SBLDG	DJA213	14 0 to 16 0	1,1,2,2-TETRACHLOROETHANE	0 003	J	MG/KG		
SBLDG	DJA213	14 0 to 16 0	1 1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLDG	DJA213	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 003	J	MG/KG		
SBLDG	DJA213	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	1 5	=	MG/KG		
SBLDG	DJA213	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 11	=	MG/KG		
SBLDG	DJA214	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 071	=	MG/KG		
SBLEA	DJA119	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 005	J	MG/KG		
SBLEA	DJA120	14 0 to 16.0	STYRENE	0 0006	J	MG/KG		
SBLEA	DJA120	14 0 to 16.0	TETRACHLOROETHYLENE(PCE)	0 0006	J	MG/KG		
SBLEA	DJA120	14 0 to 16 0	TOLUENE	0 0007	J	MG/KG		
SBLEB	DJA123	8.0 to 10 0	STYRENE	0 0007	J	MG/KG		
SBLEB	DJA123	8 0 to 10 0	TOLUENE	0 0007	J	MG/KG		
SBLEB	DJA124	14 0 to 16 0	STYRENE	0 0004	J	MG/KG		
SBLEC	DJA127	8.0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SBLEC	DJA127	8 0 to 10 0	STYRENE	0 0003	J	MG/KG		
SBLEC	DJA128	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 002	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1 1 2,2-TETRACHLOROETHANE	160	=	MG/KG		
SBLEE	DJA135	8 0 to 10.0	1,1,2-TRICHLOROETHANE	2	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1 1-DICHLOROETHENE	0 04	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	1,2-DICHLOROETHANE	0 028	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	BROMODICHLOROMETHANE	0 003	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	CHLOROBENZENE	0 004	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	ETHYLBENZENE	0 0005	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 001	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	METHYLENE CHLORIDE	0 031	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	4 4	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TOLUENE	0 008	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TOTAL 1,2-DICHLOROETHENE	120	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	460	=	MG/KG		
SBLEE	DJA135	8 0 to 10 0	VINYL CHLORIDE	2	J	MG/KG		
SBLEE	DJA135	8 0 to 10 0	XYLENES TOTAL	0 02	=	MG/KG	0 002	X
SBLEE	DJA136	14 0 to 16 0	1,1,2,2-TETRACHLOROETHANE	46	=	MG/KG		
SBLEE	DJA136	14 0 to 16.0	1,1 2-TRICHLOROETHANE	2.2	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1,1-DICHLOROETHENE	0 06	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1 2-DICHLOROETHANE	0 046	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	1 2-DICHLOROPROPANE	0 005	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	CARBON DISULFIDE	0 003	J	MG/KG	0 002	X
SBLEE	DJA136	14 0 to 16 0	CHLOROBENZENE	0 0004	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	CHLOROFORM	0 049	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	METHYL ISOBUTYL KETONE (4-METHYL-2-PE	0 002	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	METHYLENE CHLORIDE	0 039	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 056	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TOLUENE	0 006	J	MG/KG		
SBLEE	DJA136	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	190	=	MG/KG		
SBLEE	DJA136	14 0 to 16.0	TRICHLOROETHYLENE (TCE)	210	=	MG/KG		
SBLEE	DJA136	14 0 to 16 0	VINYL CHLORIDE	7	=	MG/KG		

TABLE 17-2

Analytical Results Above Background for All Media (except Groundwater) in the Disposal Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLEE	DJA137	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 009	J	MG/KG		
SBLEE	DJA137	28 0 to 30 0	1,1-DICHLOROETHENE	0 0007	J	MG/KG		
SBLEE	DJA137	28 0 to 30 0	STYRENE	0 0003	J	MG/KG		
SBLEE	DJA137	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 19	=	MG/KG		
SBLEE	DJA137	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 027	=	MG/KG		
SBLEE	DJA137	28 0 to 30 0	VINYL CHLORIDE	0 3	J	MG/KG		
SBLEE	SBLEE-SB-1-34	34 0 to 34 0	ACETONE	0 0793	=	MG/KG		
SBLEE	SBLEE-SB-1-5	5 0 to 5 0	ACETONE	0 0651	=	MG/KG		
SBLEE	SBLEE-SB-1-5	5 0 to 5 0	cis-1 2-DICHLOROETHYLENE	0 00375	=	MG/KG		
SBLEE	SBLEE-SB-1-5	5 0 to 5 0	trans-1,2-DICHLOROETHENE	0 00256	=	MG/KG		
SBLEE	SBLEE-SB-1-5	5 0 to 5 0	VINYL CHLORIDE	0 0552	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	1 1 2,2-TETRACHLOROETHANE	0 153	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	1 1,2-TRICHLOROETHANE	0 00228	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	cis-1 2-DICHLOROETHYLENE	0 0192	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	trans-1 2-DICHLOROETHENE	0 00259	=	MG/KG		
SBLEE	SBLEE-SB-1-67	67 0 to 67 0	TRICHLOROETHYLENE (TCE)	0 0111	=	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	1,2-DICHLOROETHANE	0 001	J	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	cis-1,2-DICHLOROETHYLENE	0 009	=	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	trans-1,2-DICHLOROETHENE	0 004	J	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLEE	SBLEE-SB1345	34 0 to 34 0	VINYL CHLORIDE	0 074	=	MG/KG		
SBLEF	DJA139	8 0 to 10 0	METHYL ETHYL KETONE (2 BUTANONE)	0 004	J	MG/KG		
SBLEF	DJA140	14 0 to 16 0	1 1 2,2-TETRACHLOROETHANE	0 032	=	MG/KG		
SBLEF	DJA140	14 0 to 16 0	1,1,2-TRICHLOROETHANE	0 001	J	MG/KG		
SBLEF	DJA140	14 0 to 16 0	TOTAL 1,2-DICHLOROETHENE	0 083	=	MG/KG		
SBLEF	DJA140	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 033	=	MG/KG		
SBLEF	DJA140	14 0 to 16 0	VINYL CHLORIDE	0 002	J	MG/KG		
SBLEF	DJA141	28 0 to 30 0	1,1,2,2-TETRACHLOROETHANE	0 004	J	MG/KG		
SBLEF	DJA141	28 0 to 30 0	TOTAL 1,2-DICHLOROETHENE	0 0006	J	MG/KG		
SBLEF	DJA141	28 0 to 30 0	TRICHLOROETHYLENE (TCE)	0 004	J	MG/KG		
SBLEF	DJA231FD	8 0 to 10 0	STYRENE	0 0003	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	TOTAL 1 2-DICHLOROETHENE	0 002	J	MG/KG		
SBLEG	DJA200	8 0 to 10 0	VINYL CHLORIDE	0 008	=	MG/KG		
SBLEG	DJA201	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG		
SBLEG	DJA285FD	14 0 to 16 0	METHYL ETHYL KETONE (2-BUTANONE)	0 011	J	MG/KG		
SBLEH	DJA209	14 0 to 16 0	CARBON DISULFIDE	0 004	J	MG/KG	0 002	X
SBLFC (1)	DJA028	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLFD (1)	DJA032	8 0 to 10 0	CHLOROFORM	0 003	J	MG/KG		
SBLFD (1)	DJA033	14 0 to 16 0	CHLOROFORM	0 009	J	MG/KG		
SBLFD (1)	DJA033	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 0005	J	MG/KG		
SBLFD (1)	DJA033	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 0007	J	MG/KG		
SBLFE (1)	DJA036	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 031	=	MG/KG		
SBLFE (1)	DJA037	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 018	=	MG/KG		
SBLFE (1)	DJA038	28 0 to 30 0	TETRACHLOROETHYLENE(PCE)	0 006	J	MG/KG		
SBLFF (1)	DJA040	8 0 to 10 0	TOLUENE	0 0008	J	MG/KG		
SBLFF (1)	DJA041	14 0 to 16 0	CARBON TETRACHLORIDE	0 001	J	MG/KG		
SBLFF (1)	DJA041	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 0006	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	BROMODICHLOROMETHANE	0 011	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	CARBON TETRACHLORIDE	6 8	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	CHLOROETHANE	0 003	J	MG/KG		
SBLFG	DJA204	8.0 to 10 0	CHLOROFORM	14	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	METHYLENE CHLORIDE	0 036	=	MG/KG		
SBLFG	DJA204	8 0 to 10 0	TETRACHLOROETHYLENE(PCE)	0 005	J	MG/KG		
SBLFG	DJA204	8 0 to 10 0	TRICHLOROETHYLENE (TCE)	0 025	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	BROMODICHLOROMETHANE	0 006	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	CARBON TETRACHLORIDE	0 36	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	CHLOROFORM	14	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	METHYLENE CHLORIDE	0 012	=	MG/KG		
SBLFG	DJA205	14 0 to 16 0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLFG	DJA205	14 0 to 16 0	TRICHLOROETHYLENE (TCE)	0 006	=	MG/KG		
SBLFG	DJA206	28 0 to 30 0	BROMODICHLOROMETHANE	0 001	J	MG/KG		
SBLFG	DJA206	28 0 to 30 0	CARBON TETRACHLORIDE	0 018	=	MG/KG		
SBLFG	DJA206	28 0 to 30 0	CHLOROFORM	0 34	=	MG/KG		
Surface Soils								
SB61A	DJA191	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 007	J	MG/KG	0 002	X
SBLAB	DJA005	0 0 to 1 0	ACETONE	0 44	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	CARBON TETRACHLORIDE	0.039	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	CHLOROFORM	0 069	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 042	=	MG/KG		
SBLAB	DJA005	0 0 to 1 0	TOTAL 1,2-DICHLOROETHENE	0 0009	J	MG/KG		
SBLAB	DJA005	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 04	=	MG/KG		
SBLAC	DJA009	0 0 to 1 0	CHLOROFORM	0 001	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	BENZENE	0 028	=	MG/KG		
SBLBB	DJA058	0 0 to 1 0	CARBON DISULFIDE	0 015	=	MG/KG	0 002	X
SBLBB	DJA058	0 0 to 1 0	CHLOROFORM	0 002	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	ETHYLBENZENE	0 006	=	MG/KG		
SBLBB	DJA058	0 0 to 1 0	METHYL ETHYL KETONE (2 BUTANONE)	0 016	J	MG/KG	0 002	X
SBLBB	DJA058	0 0 to 1 0	TOLUENE	0 026	=	MG/KG	0 002	X
SBLBB	DJA058	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 002	J	MG/KG		
SBLBB	DJA058	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 004	J	MG/KG		
SBLBB	DJA058	0 0 to 1.0	XYLENES TOTAL	0 011	=	MG/KG	0 009	X
SBLBC	DJA062	0 0 to 1 0	BENZENE	0 002	J	MG/KG		
SBLBD	DJA066	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 022	=	MG/KG	0 002	X
SBLBE	DJA070	0 0 to 1.0	BENZENE	0 002	J	MG/KG		
SBLBE	DJA070	0 0 to 1.0	METHYL ETHYL KETONE (2 BUTANONE)	0 005	J	MG/KG	0 002	X

TABLE 17-2
Analytical Results Above Background for All Media (except Groundwater) in the Disposal Are
Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SBLBE	DJA237FD	0 0 to 1.0	BENZENE	0 003	J	MG/KG		
SBLBE	DJA237FD	0 0 to 1 0	CHLOROFORM	0 002	J	MG/KG		
SBLBE	DJA237FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 004	J	MG/KG	0 002	X
SBLBE	DJA237FD	0.0 to 1 0	TOLUENE	0 003	J	MG/KG	0 002	X
SBLBE	DJA237FD	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLCA	DJA074	0 0 to 1 0	ACETONE	0 2	=	MG/KG		
SBLCA	DJA074	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 019	=	MG/KG		
SBLCA	DJA074	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 077	=	MG/KG		
SBLCB	DJA078	0 0 to 1 0	1,1,2,2-TETRACHLOROETHANE	0 007	=	MG/KG		
SBLCB	DJA078	0 0 to 1 0	1,1,2-TRICHLOROETHANE	0 002	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	1 2-DICHLOROPROPANE	0 002	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0.015	J	MG/KG	0 002	X
SBLCB	DJA078	0 0 to 1 0	TOTAL 1 2-DICHLOROETHENE	0 87	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 61	J	MG/KG		
SBLCB	DJA078	0 0 to 1 0	VINYL CHLORIDE	0 11	=	MG/KG		
SBLCC	DJA082	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 016	J	MG/KG	0 002	X
SBLCD	DJA086	0 0 to 1 0	1,1-DICHLOROETHENE	0 002	J	MG/KG		
SBLCD	DJA086	0 0 to 1.0	CHLOROFORM	0 007	=	MG/KG		
SBLCD	DJA086	0 0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SBLCD	DJA086	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 003	J	MG/KG		
SBLCD	DJA086	0 0 to 1 0	TOTAL 1,2-DICHLOROETHENE	0 14	=	MG/KG		
SBLCD	DJA086	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 85	=	MG/KG		
SBLCE	DJA090	0.0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 014	J	MG/KG	0.002	X
SBLCE	DJA235FD	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 019	J	MG/KG	0 002	X
SBLCF	DJA219	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 023	=	MG/KG	0 002	X
SBLDA	DJA094	0 0 to 1.0	STYRENE	0 0006	J	MG/KG		
SBLDB	DJA098	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 019	=	MG/KG	0.002	X
SBLDC	DJA102	0 0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0 039	=	MG/KG	0.002	X
SBLDC	DJA102	0 0 to 1.0	TETRACHLOROETHYLENE(PCE)	0 0009	J	MG/KG		
SBLDC	DJA102	0 0 to 1 0	TOTAL 1,2-DICHLOROETHENE	0 051	=	MG/KG		
SBLDC	DJA102	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 054	=	MG/KG		
SBLDD	DJA106	0 0 to 1 0	CHLOROFORM	0 003	J	MG/KG		
SBLDD	DJA106	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 012	=	MG/KG	0 002	X
SBLDE	DJA110	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 012	=	MG/KG	0 002	X
SBLDE	DJA110	0 0 to 1 0	METHYLENE CHLORIDE	0 0007	J	MG/KG		
SBLDE	DJA110	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0009	J	MG/KG		
SBLDE	DJA110	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 002	J	MG/KG		
SBLDF	DJA114	0 0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0 017	=	MG/KG	0 002	X
SBLDG	DJA211	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 017	J	MG/KG	0 002	X
SBLDG	DJA266FD	0 0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0 022	=	MG/KG	0 002	X
SBLDH	DJA215	0 0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0 013	J	MG/KG	0 002	X
SBLEA	DJA118	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 005	J	MG/KG	0 002	X
SBLEB	DJA122	0 0 to 1 0	STYRENE	0 0008	J	MG/KG		
SBLEC	DJA126	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 008	J	MG/KG	0 002	X
SBLEC	DJA126	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0003	J	MG/KG		
SBLED	DJA130	0 0 to 1 0	STYRENE	0 0003	J	MG/KG		
SBLEE	DJA134	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 008	J	MG/KG	0.002	X
SBLEE	DJA134	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 0004	J	MG/KG		
SBLEE	DJA134	0 0 to 1 0	TOTAL 1,2-DICHLOROETHENE	0 05	=	MG/KG		
SBLEE	DJA134	0 0 to 1 0	TRICHLOROETHYLENE (TCE)	0 028	=	MG/KG		
SBLEF	DJA138	0 0 to 1.0	1 1 2,2-TETRACHLOROETHANE	0 083	=	MG/KG		
SBLEF	DJA138	0 0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0 015	=	MG/KG	0 002	X
SBLEF	DJA138	0 0 to 1.0	TETRACHLOROETHYLENE(PCE)	0 002	J	MG/KG		
SBLEF	DJA138	0 0 to 1.0	TOTAL 1 2-DICHLOROETHENE	0 024	=	MG/KG		
SBLEF	DJA138	0 0 to 1.0	TRICHLOROETHYLENE (TCE)	0 067	=	MG/KG		
SBLEG	DJA199	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 011	J	MG/KG	0 002	X
SBLEH	DJA207	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 017	J	MG/KG	0 002	X
SBLFA (1)	DJA046FD	0 0 to 1 0	STYRENE	0 0002	J	MG/KG		
SBLFE (1)	DJA035	0 0 to 1 0	TETRACHLOROETHYLENE(PCE)	0 049	=	MG/KG		
SBLFE (1)	DJA035	0 0 to 1.0	TRICHLOROETHYLENE (TCE)	0 0009	J	MG/KG		
SBLFG	DJA203	0 0 to 1.0	CARBON TETRACHLORIDE	0 001	J	MG/KG		
SBLFG	DJA203	0 0 to 1 0	CHLOROFORM	0 008	=	MG/KG		
SBLFG	DJA203	0 0 to 1 0	METHYL ETHYL KETONE (2-BUTANONE)	0 019	J	MG/KG	0 002	X

TABLE 17-3

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
Metals									
Subsurface Soils									
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	ANTIMONY	1 1	J	MG/KG		
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	CALCIUM	6680	J	MG/KG	2432	X
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	CHROMIUM, TOTAL	35 8	=	MG/KG	26 4	X
SB-5	DDMT-081198-SB5-1-3'-01	08/12/1998	1 0 to 3 0	LEAD	143	=	MG/KG	23 9	X
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-5	DDMT-081198-SB5-15-17'-08	08/12/1998	5 0 to 7 0	SELENIUM	1 2	J	MG/KG	0 6	X
SB-5	DDMT-081198-SB5-5-7'-03	08/12/1998	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	ANTIMONY	1 3	J	MG/KG		
SB-5	DDMT-081298-SB5-11-13'-06	08/12/1998	11 0 to 13 0	SODIUM	165	=	MG/KG		
SB-5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	ANTIMONY	1 3	J	MG/KG		
SB-5	DDMT-081298-SB5-13-15'-07	08/12/1998	13 0 to 15 0	SODIUM	152	=	MG/KG		
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	ANTIMONY	1 3	J	MG/KG		
SB-5	DDMT-081298-SB5-17-19'-09	08/12/1998	13 0 to 15 0	SODIUM	170	=	MG/KG		
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	ANTIMONY	1 3	J	MG/KG		
SB-5	DDMT-081298-SB5-7-9'-04	08/12/1998	7 0 to 9 0	SODIUM	141	=	MG/KG		
SB-6	DDMT-081298-SB6-11-13'-06	08/12/1998	11 0 to 13 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-11-13'-06	08/12/1998	11 0 to 13 0	SODIUM	129	=	MG/KG		
SB-6	DDMT-081298-SB6-13-15'-07	08/12/1998	13 0 to 15 0	ANTIMONY	1 2	J	MG/KG		
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-15-17'-08	08/12/1998	9 0 to 11 0	SODIUM	130	=	MG/KG		
SB-6	DDMT-081298-SB6-17-19'-09	08/12/1998	11 0 to 13 0	ANTIMONY	1.2	J	MG/KG		
SB-6	DDMT-081298-SB6-17-19'-09	08/12/1998	11 0 to 13 0	SODIUM	145	=	MG/KG		
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	ANTIMONY	1 2	J	MG/KG		
SB-6	DDMT-081298-SB6-5-7'-03	08/12/1998	5 0 to 7 0	SODIUM	126	=	MG/KG		
SB-6	DDMT-081298-SB6-7-9'-04	08/12/1998	7 0 to 9 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-9-11'-05	08/12/1998	9 0 to 11 0	ANTIMONY	1 3	J	MG/KG		
SB-6	DDMT-081298-SB6-9-11'-05	08/12/1998	9 0 to 11 0	CALCIUM	2530	=	MG/KG	2432	X
SB-6	DDMT-081298-SB6-9-11'-05	08/12/1998	9 0 to 11 0	SODIUM	150	=	MG/KG		
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	SODIUM	72 4	J	MG/KG		
SBLFC (2)	SBLFC1415	10/06/1999	14 0 to 15 0	THALLIUM	0 15	J	MG/KG		
SBLFC (2)	SBLFC2830	10/06/1999	28 0 to 30 0	SODIUM	30 3	J	MG/KG		
SBLFC (2)	SBLFC8-10	10/06/1999	8 0 to 10 0	SODIUM	60 5	J	MG/KG		
SBLFC (2)	SBLFC8-10	10/06/1999	8 0 to 10 0	THALLIUM	0 28	J	MG/KG		
SBLFD (2)	SBLFD1415	10/05/1999	14 0 to 15 0	SODIUM	54 5	J	MG/KG		
SBLFD (2)	SBLFD1415	10/05/1999	14 0 to 15 0	THALLIUM	0 14	J	MG/KG		
SBLFD (2)	SBLFD2830	10/05/1999	28 0 to 30 0	SODIUM	23 7	J	MG/KG		
SBLFD (2)	SBLFD8-10	10/05/1999	8 0 to 10 0	SODIUM	62 3	J	MG/KG		
SBLFD (2)	SBLFD8-10	10/05/1999	8 0 to 10 0	THALLIUM	0 19	J	MG/KG		
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	ARSENIC	19	=	MG/KG	17	X
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	SODIUM	67 2	J	MG/KG		
SBLFE (2)	SBLFE3-5	10/06/1999	3 0 to 5 0	THALLIUM	0 48	J	MG/KG		
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	SODIUM	84 5	J	MG/KG		
SBLFF (2)	SBLFF3-5	10/06/1999	3 0 to 5 0	THALLIUM	0 42	J	MG/KG		
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	ALUMINUM	25100	=	MG/KG	21829	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	COPPER	37 2	=	MG/KG	32 7	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	IRON	40400	=	MG/KG	38480	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	MANGANESE	1610	=	MG/KG	1540	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	POTASSIUM	1910	=	MG/KG	1800	X
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	SODIUM	134	J	MG/KG		
SBLFF (2)	SBLFF3-5D	10/06/1999	3 0 to 5 0	THALLIUM	0 42	J	MG/KG		
Surface Soils									
SS-5	DDMT-081098-SS5		0 0 to 1 0	CALCIUM	58400	=	mg/Kg	5840	X
SS-5	DDMT-081098-SS5		0 0 to 1 0	CHROMIUM, TOTAL	28 5	=	mg/Kg	24 8	X
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	CALCIUM	9900	J	MG/KG	5840	X
SBLFA (2)	SBLFA0-1	10/05/1999	0 0 to 1 0	SODIUM	32 3	J	MG/KG		
SBLFB (2)	SBLFB0-1	10/05/1999	0 0 to 1 0	SODIUM	28 7	J	MG/KG		
SBLFC (2)	SBLFC0-1	10/06/1999		CALCIUM	15100	J	MG/KG	5840	X
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	LEAD	38 9	=	MG/KG	30	X
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	SODIUM	141	J	MG/KG		
SBLFC (2)	SBLFC0-1	10/06/1999	0 0 to 1 0	THALLIUM	0 24	J	MG/KG		
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	SODIUM	67 2	J	MG/KG		
SBLFD (2)	SBLFD0-1	10/05/1999	0 0 to 1 0	THALLIUM	0 26	J	MG/KG		
SBLFE (2)	SBLFE0-1	10/06/1999	0 0 to 1 0	SODIUM	53 7	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	CALCIUM	20500	J	MG/KG	5840	X
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	MAGNESIUM	10100	=	MG/KG	4600	X
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	SODIUM	146	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0 0 to 1 0	THALLIUM	0 29	J	MG/KG		
SSLFA	DJA292	10/14/1999	0 0 to 1 0	CALCIUM	22400	=	MG/KG	5840	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	THALLIUM	0 18	J	MG/KG		
SSLFA	DJA293	10/14/1999	1 0 to 2 0	CALCIUM	6450	=	MG/KG	5840	X
SSLFA	DJA293	10/14/1999	1 0 to 2 0	THALLIUM	0 39	J	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ALUMINUM	31100	=	MG/KG	23810	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ARSENIC	24 8	J	MG/KG	20	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	BARIUM	237	=	MG/KG	234	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	CALCIUM	14200	=	MG/KG	5840	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	CHROMIUM, TOTAL	28	=	MG/KG	24 8	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	LEAD	54 3	=	MG/KG	30	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	POTASSIUM	3420	=	MG/KG	1820	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	SODIUM	122	J	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	THALLIUM	0 42	J	MG/KG		

TABLE 17-3

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFB	DJA294	10/14/1999	0 0 to 1 0	VANADIUM	59 2	=	MG/KG	48 4	X
SSLFB	DJA295	10/14/1999	1 0 to 2 0	COBALT	20 3	=	MG/KG	18 3	X
SSLFB	DJA295	10/14/1999	1 0 to 2 0	THALLIUM	0 4	J	MG/KG		
SSLFB	DJA296	10/14/1999	1 0 to 2 0	POTASSIUM	1950	=	MG/KG	1820	X
SSLFB	DJA296	10/14/1999	1 0 to 2 0	THALLIUM	0 42	J	MG/KG		
SSLFC	DJA297	10/14/1999	0 0 to 1 0	THALLIUM	0.25	J	MG/KG		
SSLFC	DJA298	10/14/1999	1 0 to 2 0	THALLIUM	0 4	J	MG/KG		
SSLFD	DJA299	10/14/1999	0 0 to 1 0	BARIUM	297	=	MG/KG	234	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	CALCIUM	101000	=	MG/KG	5840	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	POTASSIUM	4810	=	MG/KG	1820	X
SSLFD	DJA299	10/14/1999	0 0 to 1 0	SODIUM	2440	=	MG/KG		
SSLFD	DJA300	10/14/1999	1 0 to 2.0	CALCIUM	19200	=	MG/KG	5840	X
SSLFD	DJA300	10/14/1999	1 0 to 2 0	LEAD	44 3	=	MG/KG	30	X
SSLFD	DJA300	10/14/1999	1 0 to 2 0	SODIUM	116	J	MG/KG		
SSLFE	DJA301	10/14/1999	0 0 to 1 0	CALCIUM	9290	=	MG/KG	5840	X
SSLFE	DJA301	10/14/1999	0 0 to 1 0	LEAD	40 8	=	MG/KG	30	X
SSLFE	DJA301	10/14/1999	0 0 to 1 0	THALLIUM	0 32	J	MG/KG		
SSLFE	DJA302	10/14/1999	1 0 to 2 0	SODIUM	103	J	MG/KG		
SSLFE	DJA302	10/14/1999	1 0 to 2.0	THALLIUM	0 38	J	MG/KG		
SSLFF	DJA303	10/14/1999	0 0 to 1 0	ALUMINUM	31300	=	MG/KG	23810	X
SSLFF	DJA303	10/14/1999	0 0 to 1 0	ARSENIC	25 5	J	MG/KG	20	X
SSLFF	DJA303	10/14/1999	0 0 to 1 0	THALLIUM	0 33	J	MG/KG		
SSLFF	DJA304	10/14/1999	1.0 to 2 0	THALLIUM	0.2	J	MG/KG		
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ALUMINUM	52600	=	MG/KG	23810	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	CALCIUM	9770	=	MG/KG	5840	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	CHROMIUM, TOTAL	55 7	=	MG/KG	24 8	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	LEAD	75 6	=	MG/KG	30	X
SSLFG	DJA305	10/14/1999	0 0 to 1 0	SODIUM	103	J	MG/KG		
SSLFG	DJA306	10/14/1999	1 0 to 1 5	CHROMIUM, TOTAL	28 9	=	MG/KG	24 8	X
SSLFG	DJA306	10/14/1999	1 0 to 1 5	LEAD	90 1	=	MG/KG	30	X
SSLFG	DJA306	10/14/1999	1 0 to 1 5	SODIUM	89 1	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	CALCIUM	162000	J	MG/KG	5840	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	LEAD	32.1	=	MG/KG	30	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	MAGNESIUM	5060	=	MG/KG	4600	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	SODIUM	105	J	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2.0	CALCIUM	108000	J	MG/KG	5840	X
SSLFH	DJA313	10/15/1999	1 0 to 2.0	LEAD	57 6	=	MG/KG	30	X
SSLFH	DJA313	10/15/1999	1 0 to 2 0	SODIUM	127	J	MG/KG		
SSLFI	DJA310	10/15/1999	0 0 to 1 0	ALUMINUM	42000	=	MG/KG	23810	X
SSLFI	DJA310	10/15/1999	0 0 to 1 0	CHROMIUM, TOTAL	34 2	=	MG/KG	24.8	X
SSLFI	DJA310	10/15/1999	0 0 to 1 0	SODIUM	46	J	MG/KG		
SSLFI	DJA310	10/15/1999	0 0 to 1 0	THALLIUM	0 32	J	MG/KG		
SSLFI	DJA310	10/15/1999	0 0 to 1 0	VANADIUM	96 6	=	MG/KG	48 4	X
SSLFI	DJA311	10/15/1999	1 0 to 2 0	ALUMINUM	28100	=	MG/KG	23810	X
SSLFI	DJA311	10/15/1999	1 0 to 2 0	CHROMIUM TOTAL	25 2	=	MG/KG	24 8	X
SSLFI	DJA311	10/15/1999	1 0 to 2.0	POTASSIUM	1850	=	MG/KG	1820	X
SSLFI	DJA311	10/15/1999	1 0 to 2 0	SODIUM	71 4	J	MG/KG		
SSLFI	DJA311	10/15/1999	1 0 to 2.0	THALLIUM	0 37	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	CALCIUM	26800	J	MG/KG	5840	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	CHROMIUM, TOTAL	33 9	=	MG/KG	24 8	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	LEAD	107	=	MG/KG	30	X
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	SODIUM	288	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	THALLIUM	0 15	J	MG/KG		
SSLFJ	DJA308	10/15/1999	1 0 to 2.0	SODIUM	99 5	J	MG/KG		
SSLFJ	DJA308	10/15/1999	1 0 to 2 0	THALLIUM	0 32	J	MG/KG		
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	SODIUM	87 8	J	MG/KG		
SSLFJ	DJA309	10/15/1999	1 0 to 2 0	THALLIUM	0 26	J	MG/KG		
OC Pesticides									
Surface Soils									
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ALDRIN	0 0015	J	MG/KG		
SSLFA	DJA292	10/14/1999	0 0 to 1 0	ENDRIN KETONE	0 033	=	MG/KG		
SSLFA	DJA293	10/14/1999	1 0 to 2 0	ALPHA ENDOSULFAN (ENDOSULFAN I)	0 00031	J	MG/KG		
SSLFA	DJA293	10/14/1999	1.0 to 2 0	ENDRIN KETONE	0 0079	=	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	DIELDRIN	0 13	=	MG/KG	0 086	X
SSLFB	DJA294	10/14/1999	0 0 to 1 0	ENDRIN KETONE	0 0015	J	MG/KG		
SSLFB	DJA294	10/14/1999	0 0 to 1 0	METHOXYCHLOR	0 003	J	MG/KG		
SSLFF	DJA303	10/14/1999	0 0 to 1 0	METHOXYCHLOR	0 0018	J	MG/KG		
SSLFG	DJA305	10/14/1999	0 0 to 1 0	ENDRIN KETONE	0 013	J	MG/KG		
SSLFG	DJA306	10/14/1999	1 0 to 1 5	ENDRIN KETONE	0 0026	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICH	0.27	=	MG/KG	0 074	X
SSLFH	DJA312	10/15/1999	0 0 to 1 0	ENDRIN KETONE	0 025	J	MG/KG		
SSLFH	DJA312	10/15/1999	0 0 to 1 0	METHOXYCHLOR	0 06	=	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2 0	DDT (1 1-bis(CHLOROPHENYL)-2,2,2-TRICH	0 3	=	MG/KG	0 074	X
SSLFH	DJA313	10/15/1999	1 0 to 2.0	ENDRIN KETONE	0 028	J	MG/KG		
SSLFH	DJA313	10/15/1999	1 0 to 2.0	METHOXYCHLOR	0 068	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ENDRIN	0 00046	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	ENDRIN KETONE	0 009	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0 0 to 1 0	METHOXYCHLOR	0 018	J	MG/KG		
Polynuclear Aromatic Hydrocarbons									
Surface Soils									
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZO(a)ANTHRACENE	1 7	=	MG/KG	0 71	X
SSLFA	DJA292	10/14/1999	0 0 to 1 0	BENZO(a)PYRENE	2	=	MG/KG	0.96	X

TABLE 17-3

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFA	DJA292	10/14/1999	0.0 to 1.0	BENZO(b)FLUORANTHENE	2.8	=	MG/KG	0.9	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	BENZO(g,h,i)PERYLENE	1.4	=	MG/KG	0.82	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	CHRYSENE	2.3	=	MG/KG	0.94	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	DIBENZ(a,h)ANTHRACENE	0.78	=	MG/KG	0.26	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	FLUORANTHENE	4.1	=	MG/KG	1.6	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	INDENO(1,2,3-c,d)PYRENE	1.7	=	MG/KG	0.7	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	PHENANTHRENE	2.5	=	MG/KG	0.61	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	PYRENE	4.1	=	MG/KG	1.5	X
SSLFA	DJA293	10/14/1999	1.0 to 2.0	BENZO(b)FLUORANTHENE	0.98	=	MG/KG	0.9	X
SSLFA	DJA293	10/14/1999	1.0 to 2.0	FLUORANTHENE	1.7	=	MG/KG	1.6	X
SSLFA	DJA293	10/14/1999	1.0 to 2.0	PHENANTHRENE	0.99	=	MG/KG	0.61	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	BENZO(a)ANTHRACENE	0.86	=	MG/KG	0.71	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	BENZO(b)FLUORANTHENE	1.4	=	MG/KG	0.9	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	CHRYSENE	1.1	=	MG/KG	0.94	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	FLUORANTHENE	2.5	=	MG/KG	1.6	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	INDENO(1,2,3-c,d)PYRENE	0.81	=	MG/KG	0.7	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	PHENANTHRENE	1.5	=	MG/KG	0.61	X
SSLFG	DJA305	10/14/1999	0.0 to 1.0	PYRENE	2	=	MG/KG	1.5	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	BENZO(a)ANTHRACENE	2.6	=	MG/KG	0.71	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	BENZO(a)PYRENE	3.2	=	MG/KG	0.96	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	BENZO(b)FLUORANTHENE	4.8	=	MG/KG	0.9	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	BENZO(g,h,i)PERYLENE	2.4	=	MG/KG	0.82	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	BENZO(k)FLUORANTHENE	1.8	=	MG/KG	0.78	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	CHRYSENE	3.9	=	MG/KG	0.94	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	DIBENZ(a,h)ANTHRACENE	0.83	=	MG/KG	0.26	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	FLUORANTHENE	5.1	=	MG/KG	1.6	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	INDENO(1,2,3-c,d)PYRENE	2.9	=	MG/KG	0.7	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	PHENANTHRENE	2.1	=	MG/KG	0.61	X
SSLFH	DJA312	10/15/1999	0.0 to 1.0	PYRENE	4.6	=	MG/KG	1.5	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	BENZO(a)ANTHRACENE	3	=	MG/KG	0.71	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	BENZO(a)PYRENE	3.8	=	MG/KG	0.96	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	BENZO(b)FLUORANTHENE	5.8	=	MG/KG	0.9	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	BENZO(g,h,i)PERYLENE	3.1	=	MG/KG	0.82	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	BENZO(k)FLUORANTHENE	2.3	=	MG/KG	0.78	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	CHRYSENE	5	=	MG/KG	0.94	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	DIBENZ(a,h)ANTHRACENE	1.1	=	MG/KG	0.26	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	FLUORANTHENE	6.2	=	MG/KG	1.6	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	INDENO(1,2,3-c,d)PYRENE	3.6	=	MG/KG	0.7	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	PHENANTHRENE	2.6	=	MG/KG	0.61	X
SSLFH	DJA313	10/15/1999	1.0 to 2.0	PYRENE	6	=	MG/KG	1.5	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	BENZO(a)ANTHRACENE	1	=	MG/KG	0.71	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	BENZO(a)PYRENE	1.2	=	MG/KG	0.96	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	BENZO(b)FLUORANTHENE	1.8	=	MG/KG	0.9	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	BENZO(g,h,i)PERYLENE	0.92	=	MG/KG	0.82	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	CHRYSENE	1.8	=	MG/KG	0.94	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	FLUORANTHENE	2.9	=	MG/KG	1.6	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	INDENO(1,2,3-c,d)PYRENE	1	=	MG/KG	0.7	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	PHENANTHRENE	1.4	=	MG/KG	0.61	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	PYRENE	2.4	=	MG/KG	1.5	X
Volatile Organics									
Subsurface Soils									
SBLFA (2)	SBLFA8-10	10/05/1999	8.0 to 10.0	METHYLENE CHLORIDE	0.002	J	MG/KG		
SBLFB (2)	SBLFB1415	10/05/1999	14.0 to 15.0	METHYLENE CHLORIDE	0.003	J	MG/KG		
SBLFB (2)	SBLFB8-10	10/05/1999	8.0 to 10.0	XYLENES, TOTAL	0.004	J	MG/KG	0.002	X
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	TOLUENE	0.003	J	MG/KG		
SBLFD (2)	SBLFD2830	10/05/1999	28.0 to 30.0	XYLENES, TOTAL	0.014	J	MG/KG	0.002	X
Surface Soils									
SBLFD (2)	SBLFD0-1	10/05/1999	0.0 to 1.0	ACETONE	0.044	J	MG/KG		
SBLFD (2)	SBLFD0-1	10/05/1999	0.0 to 1.0	METHYLENE CHLORIDE	0.0009	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0.0 to 1.0	BENZENE	0.005	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0.0 to 1.0	ETHYLBENZENE	0.005	J	MG/KG		
SBLFF (2)	SBLFF0-1	10/06/1999	0.0 to 1.0	TOLUENE	0.012	J	MG/KG	0.002	X
SBLFF (2)	SBLFF0-1	10/06/1999	0.0 to 1.0	XYLENES, TOTAL	0.01	J	MG/KG	0.009	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	BENZENE	0.002	J	MG/KG		
SSLFA	DJA292	10/14/1999	0.0 to 1.0	CARBON DISULFIDE	0.003	J	MG/KG	0.002	X
SSLFA	DJA292	10/14/1999	0.0 to 1.0	ETHYLBENZENE	0.0009	J	MG/KG		
SSLFA	DJA293	10/14/1999	1.0 to 2.0	ACETONE	0.18	=	MG/KG		
SSLFA	DJA293	10/14/1999	1.0 to 2.0	METHYL ETHYL KETONE (2-BUTANONE)	0.024	J	MG/KG	0.002	X
SSLFB	DJA294	10/14/1999	0.0 to 1.0	ACETONE	0.23	=	MG/KG		
SSLFB	DJA294	10/14/1999	0.0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0.013	J	MG/KG	0.002	X
SSLFB	DJA295	10/14/1999	1.0 to 2.0	ACETONE	0.22	=	MG/KG		
SSLFB	DJA295	10/14/1999	1.0 to 2.0	METHYL ETHYL KETONE (2-BUTANONE)	0.013	J	MG/KG	0.002	X
SSLFB	DJA296	10/14/1999	1.0 to 2.0	ACETONE	0.12	=	MG/KG		
SSLFB	DJA296	10/14/1999	1.0 to 2.0	METHYL ETHYL KETONE (2-BUTANONE)	0.008	J	MG/KG	0.002	X
SSLFC	DJA297	10/14/1999	0.0 to 1.0	ACETONE	0.22	=	MG/KG		
SSLFC	DJA297	10/14/1999	0.0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0.013	J	MG/KG	0.002	X
SSLFC	DJA298	10/14/1999	1.0 to 2.0	ACETONE	0.12	=	MG/KG		
SSLFC	DJA298	10/14/1999	1.0 to 2.0	METHYL ETHYL KETONE (2-BUTANONE)	0.008	J	MG/KG	0.002	X
SSLFD	DJA299	10/14/1999	0.0 to 1.0	ACETONE	0.12	=	MG/KG		
SSLFD	DJA299	10/14/1999	0.0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0.007	J	MG/KG	0.002	X
SSLFF	DJA303	10/14/1999	0.0 to 1.0	ACETONE	0.26	=	MG/KG		
SSLFF	DJA303	10/14/1999	0.0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0.02	J	MG/KG	0.002	X

TABLE 17-3

Analytical Results Above Background for All Media (except Groundwater) in the Stockpile Area

Rev 0 Memphis Depot Dunn Field RI

Station	Sample	Date Collected	Depth Range	Parameter Name	Concentration	Qualifier	Units	Background Value	Background Exceedance Flag
SSLFF	DJA303	10/14/1999	0.0 to 1.0	METHYLENE CHLORIDE	0.001	J	MG/KG		
SSLFF	DJA304	10/14/1999	1.0 to 2.0	ACETONE	0.26	=	MG/KG		
SSLFG	DJA305	10/14/1999	0.0 to 1.0	ACETONE	0.15	=	MG/KG		
SSLFG	DJA306	10/14/1999	1.0 to 1.5	ACETONE	0.12	=	MG/KG		
SSLFH	DJA312	10/15/1999	0.0 to 1.0	ACETONE	0.036	=	MG/KG		
SSLFH	DJA312	10/15/1999	0.0 to 1.0	BENZENE	0.001	J	MG/KG		
SSLFH	DJA313	10/15/1999	1.0 to 2.0	ACETONE	0.023	=	MG/KG		
SSLFH	DJA313	10/15/1999	1.0 to 2.0	BENZENE	0.002	J	MG/KG		
SSLFH	DJA313	10/15/1999	1.0 to 2.0	ETHYLBENZENE	0.001	J	MG/KG		
SSLFH	DJA313	10/15/1999	1.0 to 2.0	XYLENES, TOTAL	0.01	=	MG/KG	0.009	X
SSLFI	DJA310	10/15/1999	0.0 to 1.0	ACETONE	0.28	=	MG/KG		
SSLFI	DJA311	10/15/1999	1.0 to 2.0	ACETONE	0.21	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	ACETONE	0.19	=	MG/KG		
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	BENZENE	0.004	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	ETHYLBENZENE	0.003	J	MG/KG		
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	METHYL ETHYL KETONE (2-BUTANONE)	0.043	=	MG/KG	0.002	X
SSLFJ	DJA307	10/15/1999	0.0 to 1.0	XYLENES, TOTAL	0.015	=	MG/KG	0.009	X
SSLFJ	DJA308	10/15/1999	1.0 to 2.0	ACETONE	0.14	=	MG/KG		
SSLFJ	DJA308	10/15/1999	1.0 to 2.0	METHYL ETHYL KETONE (2-BUTANONE)	0.015	=	MG/KG	0.002	X
SSLFJ	DJA309	10/15/1999	1.0 to 2.0	ACETONE	0.072	=	MG/KG		

J = Estimated detection. Contaminant detected at or below laboratory detection limit.

(=) Definite detection.

MG/KG = milligrams per kilogram

Table 17-4

Summary of Risks and Hazards at Onsite Plumes

Rev 0 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Groundwater	Indoor Air	Total ELCR	Groundwater	Indoor Air	Total HI	COPCs of Concern
	Total	Inhalation		Total	Inhalation		
North Plume.							
Industrial Worker	1 E-04 (N)	7 E-08 (N)	**1E_04 (N)**	0 88 (N)	4 76E-05 (N)	**0 88 (N)**	As, dieldrin, PCA1122, DCA12, DCE11, CCl4, PCE, Chloroform, TCE
Residential Adult	5 E-04 (N)	2 E-07 (N)	**5E-04 (N)**	2 5 (U)	6 66E-05 (N)	**2 5 (U)**	As, dieldrin, PCA1122, TCA112, DCE11, DCA12, Bromodichloromethane, CCl4, Chloroform, PCE, TCE
Residential Child				5 7 (U)	2 33E-04 (N)	**5.7 (U)**	TCE, Manganese
Northwest Plume:							
Industrial Worker	3 E-03 (U)	8 E-08 (N)	**3E-03 (N)**	5 3 (U)	2 04E-04 (N)	**5.3 (U)**	As, PCA1122, TCA112, DCE11, DCA12, DCP12, Benzene, CCl4, Chloroform, PCE, TCE, VC
Residential Adult	1 E-02 (U)	2 E-07 (N)	**1.E-02 (U)**	15 (U)	2 86E-04 (N)	**15 (U)**	As, PCA1122, TCA112, DCE11, DCA12, DCP12, Benzene, CCl4, Chloroform, PCE, TCE, VC
Residential Child				34 (U)	0 0010 (N)	**34 (U)**	TCE
Southwest Plume:							
Industrial Worker	3 E-04 (N)	2 E-08 (N)	**3E-04 (N)**	1 6 (U)	2 02E-05 (N)	**1.6 (U)**	As, PCA1122, TCA112, CCl4, Chloroform, PCE, TCE
Residential Adult	1 E-03 (U)	4 E-08 (N)	**1E-03 (U)**	4 6 (U)	2 82E-05 (N)	**4 6 (U)**	As, PCA1122, TCA112, Bromodichloromethane, CCl4, Chloroform, PCE, TCE
Residential Child				11 (U)	9 87E-05 (N)	**11 (U)**	CCl4, Chloroform, TCE

HI = Hazard indices

ELCR = Excess Lifetime Cancer Risk

Total includes ingestion, dermal, and inhalation exposure routes

(N) = Negligible risk

(U) = Unacceptable risk

Table 17-5
Summary of Risks and Hazards at Offsite Plumes
Rev 0 Memphis Depot Dunn Field RI

Exposure Route/Receptors	Groundwater	Indoor Air	Total ELCR	Groundwater	Indoor Air	Total HI	COPCs of Concern
	Total	Inhalation		Total	Inhalation		
MW30							
Residential Adult	5 E-05 (N)		**5 E-05 (N)**	0 81 (N)		**0 81 (N)**	As
Residential Child				1 9 (U)		**1.9 (U)**	As
MW31.							
Residential Adult	8 E-04 (N)	1 E-07 (N)	**8 E-04 (N)**	3 1 (U)	5 29E-05 (N)	**3 1 (U)**	Chlorinated solvents
Residential Child				7 2 (U)	1 85E-04 (N)	**7.2 (U)**	Chlorinated solvents
MW32							
Residential Adult	2 E-03 (U)	4 E-08 (N)	**2 E-03 (U)**	5 0 (U)	1 52E-05 (N)	**5 0 (U)**	Chlorinated solvents
Residential Child				12 (U)	5 31E-05 (N)	**12 (U)**	Chlorinated solvents
MW33.							
Residential Adult	2 0E-04 (N)	5 E-10 (N)	**2 0E-04 (N)**	1 4 (U)	0 (N)	**1.4 (U)**	Chlorinated solvents
Residential Child				3 2 (U)	0 (N)	**3.2 (U)**	Chlorinated solvents
MW40							
Residential Adult	3 E-05 (N)	6 E-08 (N)	**3 E-05 (N)**	0 35 (U)	0 (N)	**0 35 (U)**	1,1-Dichloroethene
Residential Child				0 83 (N)	0 (N)	**0.83 (N)**	
MW44:							
Residential Adult	2 E-04 (N)	4 E-08 (N)	**2 E-04 (N)**	2 2 (U)	3 09E-06 (N)	**2.2 (U)**	As, Chlorinated solvents
Residential Child				5 2 (U)	1 08E-05 (N)	**5 2 (U)**	As, Fe, Chlorinated solvents
MW54.							
Residential Adult	1 E-04 (N)	5 E-08 (N)	**1.E-04 (N)**	1 2 (U)	1 3E-04 (N)	**1.2 (U)**	Chlorinated solvents
Residential Child				2 8 (U)	4 54E-04 (N)	**2 8 (U)**	Chlorinated solvents
MW51·							
Residential Adult	2 E-04 (N)	2 E-07(N)	**2 E-04 (N)**	0 42 (N)	4 22E-06 (N)	**0.42 (N)**	Chlorinated solvents
Residential Child				0 97 (U)	1 48E-05 (N)	**0.97 (U)**	As
MW71:							
Residential Adult	2 E-03 (U)	5 E-08 (N)	**2 E-03 (U)**	5 0 (U)	1 91E-05 (N)	**5.0 (U)**	Chlorinated solvents
Residential Child				12 (U)	6 68E-05 (N)	**12 (U)**	Chlorinated solvents
MW76/77·							
Residential Adult	1 E-02 (U)	5 E-08 (N)	**1 E-02 (U)**	9 3 (U)	0 0016 (N)	**9.3 (U)**	Chlorinated solvents
Residential Child				22 (N)	5 26E-04 (N)	**22 (N)**	Chlorinated solvents
MW79·							
Residential Adult	5 E-04 (N)	1 E-07 (N)	**5.E-04 (N)**	0 36 (U)	1 37E-04 (N)	**0.36 (U)**	Chlorinated solvents
Residential Child				0 83 (U)	4 8E-04 (N)	**0 83 (U)**	Chlorinated solvents

HI = Hazard Indices
ELCR = Excess Lifetime Cancer Risk
COPC = Chemicals of Potential Concern
(N) = Negligible risk
(U) = Unacceptable risk
Total includes ingestion, dermal, and inhalation exposure routes

TAB

Section 18

18.0 References

AFCEE. 1997.BIOSCREEN v1.4. EPA Center for Subsurface Modeling.

AFCEE. 2000 BIOCHLOR v1.1. EPA Center for Subsurface Modeling

Air Force Center for Environmental Excellence. 1997. BIOSCREEN v1.4. EPA Center for Subsurface Modeling - http://www.epa.gov/ada/kerrlab html

American Society for Testing and Materials. 1998. *Visual-Manual Procedures for Description and Identification of Soils.* Publication D2488-24.

ATSDR. 1990. *Toxicological Profile for Copper.* U. S. Dept. of Health & Human Services, Public Health Service, Atlanta, GA.

ATSDR. 1992. *Toxicological Profiles for Arsenic, Benzo (g,h,i)perylene, Benzo(k)fluoranthene, Cyanide, Dieldrin, Manganese, Phenanthrene.* U S Dept. of Health & Human Services, Public Health Service, Atlanta, GA.

ATSDR. 1993. *Toxicological Profiles for Chromium, Mercury.* U.S Dept. of Health & Human Services, Public Health Service, Atlanta, GA.

ATSDR. 1994. *Toxicological Profile for Kepone (Chlordecone).* U S. Dept. of Health & Human Services, Public Health Service, Atlanta, GA.

ATSDR. November 1995. *Public Health Assessment for USA Defense Depot Memphis, Memphis, Shelby County, Tennessee.* CERCLIS No. TN4210020570. USDOH.

Baes III, C. F., and R. D. Sharpe, et al. 1984. "Predicating radionuclide leaching from root zone soil for assessment applications " *Trans. Am. Nucl. Soc* 38 111-112

Bast, C. B and H. T. Borges. March 1996."Derivation of toxicity values for dermal exposure " *The Toxicologist* Volume 30, Number 1, Part 2.

Beyer, W. N. 1990. *Evaluating Soil Contamination.* U.S. Fish and Wildlife Service. Biological Report 90 (2).

Beyer, W. N , E. Conner, and S. Gerould 1994. Survey of soil ingestion by wildlife. *J. Wildl Mgmt.* 58: 375-382.

C Tech Development Corporation. 1999. "Environmental Visualization Software." 16091 Santa Barbara Lane, Huntington Beach, CA 92649. (714) 840-2778, www.ctech.com.

Center for Environmental and Human Toxicology. April 30, 1998. *Technical Report: Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F.A.C. Final Report.*

Center for Environmental and Human Toxicology. June 18, 1997 *Technical Report: Development of Soil Cleanup Target Levels for Chapter 62-770, F A.C. Final Report*

CH2M HILL. February 1995a. *Final Generic Quality Assurance Project Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the United States Army Engineering Support Center, Huntsville, AL.

CH2M HILL. February 1995b. *Final Generic Health and Safety Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the United States Army Engineering Support Center, Huntsville, AL.

CH2M HILL. August 1995c. *Final Generic Remedial Investigation/Feasibility Work Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. August 1995d. *Screening Sites Field Sampling Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. September 1995e. *Operable Unit 1 Field Sampling Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. September 1995f. *Operable Unit 2 Field Sampling Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. September 1995g. *Operable Unit 3 Field Sampling Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL

CH2M HILL September 1995h. *Operable Unit 4 Field Sampling Plan.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. November 1995 *Technical Memorandum – Summary of Information Inventory* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. January 1996a. Record of Decision for the Interim Remedial Action of the Groundwater at Dunn Field (OU-1) at the Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. March 1996b. *Quarterly Groundwater Monitoring Report (February 1996).* Prepared for the U.S. Army Corps of Engineers, Huntsville Division.

CH2M HILL. August 1997a. *Final Groundwater Characterization Data Report.* Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. September 1997b. *Quarterly Groundwater Monitoring Report (June 1997).* Prepared for the U.S Army Corps of Engineers, Huntsville Division.

CH2M HILL. November 1997c. *Quarterly Groundwater Monitoring Report (September 1997).* Prepared for the U.S. Army Corps of Engineers, Huntsville Division

CH2M HILL 1998a *Final Preliminary Risk Evaluation* Prepared for the U S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL, Inc. March 1998b. *Final Screening Site Letter Reports.* Defense Distribution Depot Memphis, Tennessee.

CH2M HILL. May 1998c. *Final Background Sampling Program Report, Defense Distribution Memphis, Tennessee.* Prepared for the U.S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL May 1998d. *Groundwater Interim Remedial Action, Defense Depot, Memphis, Tennessee: Operation and Maintenance Plan.* Prepared for the U.S. Army Corps of Engineers, Huntsville Division and Defense Logistics Agency.

CH2M HILL. June 1998e. *Groundwater Monitoring Report March 1998.* Prepared for the U S. Army Corps of Engineers, Huntsville Division.

CH2M HILL. September 1998f. *OUs 2, 3, and 4 and Screening Sites Field Sampling Plan Addendums.* Prepared for the U. S. Army Engineering Support Center, Huntsville, AL.

CH2M HILL. September 1998g. *Basis for No Further Action Recommendations Report.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S. Army Corps of Engineers Huntsville Division.

CH2M HILL. August 1999. *Groundwater Interim Remedial Action, Defense Depot, Memphis, Tennessee: Updated Operation and Maintenance Plan.* Prepared for the U.S. Army Corps of Engineers, Huntsville Division and Defense Logistics Agency.

CH2M HILL. January 2001. *Final Memphis Depot Main Installation Remedial Investigation Report.* Prepared for the U.S. Army Corps of Engineering and Support Center, Huntsville.

Conover, W. L. 1980. *Practical Nonparametric Statistics.* Second Edition. New York: John Wiley and Sons.

D & B Donnelly Demographics. 1989. Dialog Information Services, Inc. 1988. Search of Defense Distribution Depot Memphis, Tennessee, zip codes and city of Memphis census data performed April and May 1989.

Dawson, K. J. and Istok, J. D. 1991. *Aquifer Testing Design and Analysis of Pumping and Slug Tests.* Lewis Publishers

Department of the Air Force. October 1985. *The Installation Restoration Program (IRP) Toxicology Guide, Volume I.* Arthur D. Little, Inc. Cambridge, MA.

Department of the Air Force. May 1987. *The Installation Restoration Program (IRP) Toxicology Guide, Volume II* Arthur D. Little, Inc. Cambridge, MA.

Dominico, P. A. and Schwartz, F. W. 1990. *Physical and Chemical Hydrogeology.* John Wiley & Sons, Inc.

EDAW, Inc. January 1996. *Sediment Sampling Analysis Report* Defense Distribution Depot Memphis, Tennessee, Sediment Sampling Program.

Efroymson, R. A., M. E. Will, and G. W. Suter. 1997b. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants. 1997 Revision.* Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-85/R3.

Eisler, R. 1987. *Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.*

Engineering Science. July 1994. *Engineering Report Removal Action for Groundwater for Defense Distribution Region Central Memphis, Tennessee* Prepared for the U.S. Army Corps of Engineers Huntsville Division.

Environmental Law Reporter. 1996. *Tennessee Environmental.*

Environmental Science and Engineering, Inc. 1994. *Groundwater Monitoring Results at the Defense Depot Memphis, Tennessee.*

Florida Department of Environmental Protection. December 1998. *Brownfield Rule. Table 1, Groundwater Contaminant Target Levels for Chapter 62-777, F.A C.*

Graham, D. D and W. S. Parks. 1986. *Potential for Leakage Among Principal Aquifers in the Memphis Area, Tennessee.* U.S. Geological Survey Water Resources Investigations Report 85-4295. 1986.

GSI. 1998. RBCA Toolkit for Chemical Releases. Version 1.0a. Groundwater Services, Inc.

Harland, Bartholomew, and Associates, Inc. 1988. *Master Plan Report.* Defense Distribution Depot Memphis, Tennessee

Hazardous Substance Data Bank (HSDB). 1994. Online Search for Specified Chemicals.

Howard, P. H., ed. 1990. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Vol. 2. Solvents.* Lewis Publishers, Inc , Chelsa, MI.

IEPA, 1997. *Use of Tritium in Assessing Aquifer Vulnerability,* Illinois Environmental Protection Agency, October 1997. http://www.epa.state.il.us/water/tritium.html

IT Corporation May 2000. *Quarterly Groundwater Quality Report (Year Two, Quarter One) Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee.* Prepared for Sverdrup Civil, Inc.

IT Corporation. July 2000. *Quarterly Groundwater Quality Report (Year Two, Quarter Two) Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee.* Prepared for Sverdrup Civil, Inc.

J. Webb (Memphis Light, Gas, and Water) November 29, 1999. Personal communication to CH2M HILL.

Jacobs-Sverdrup. October 2000. *Quarterly Groundwater Quality Report (Year Two, Quarter Three) Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee.* Prepared for the U.S. Army Corps of Engineers, Mobile District.

Jacobs Engineering Group. January 2001a. *Semi-annual Groundwater Quality Report (Year Two, Quarter Four) Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee.* Prepared for the U.S. Army Corps of Engineers, Mobile District.

Jacobs Engineering Group. June 2001b *Semi-annual Groundwater Quality Report (Year Three, First Half) Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee.* Prepared for the U.S. Army Corps of Engineers, Mobile District.

Jacobs Federal Group. February 2002. *Semi-annual Groundwater Quality Report (Year Three, Second Half) and Annual Operation and Maintenance Summary Report for year 2001 (Rev. 1) Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee.* Prepared for the U S. Army Corps of Engineers, Mobile District.

Johnston, A. C. and S. J. Nava. 1985. "Recurrent Rates and Probability Estimates for the New Madrid Seismic Zone." *J. Geophys. Res.* 90, 6, 737-6, 753.

Kingsbury, J. A. and W. S. Parks. 1993. *Hydrogeology of the Principal Aquifers and Relation of Faults to Interaquifer Leakage in the Memphis Area, Tennessee.* U.S. Geological Survey Water-Resources Investigations Report 93-4075.

Law Environmental, Inc. August 1990a. *Final Remedial Investigation for the Defense Distribution Depot Memphis, Tennessee*

Law Environmental, Inc. September 1990b. *Final Feasibility Study for the Defense Distribution Depot Memphis, Tennessee.*

Lockheed Martin Energy Systems, Inc. (LMES). January 1997. *Integrated Remedial Investigation/Feasibility Study Work Plan for Waste Area Grouping 6 at Paducah Gaseous Diffusion Plant, Paducah, Kentucky.* DOE/OR/07-1586&D4.

Lyman, W. J , W F. Reehl, and D. H. Rosenblatt. 1982. *Handbook of Chemical Property Estimation Methods, Environmental Behavior of Organic Compounds.* McGraw-Hill, New York.

MacKay, D., Shiu, W., and Kuo, C 1992. *Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals Volume II: Polynuclear Aromatic Hydrocarbons, Polychlorinated Dioxins, and Dibenzofurans* Lewis Publishers. Boca Raton, FL

Malmborg, P.K. and M.F. Willson. 1988 Foraging ecology of avian frugivores and some consequences for seed dispersal in an Illinois woodlot. Condor 90:173-186

Martin, A.C., H.S. Zim, and A.L Nelson. 1951. American wildlife and plants. New York, NY: McGraw-Hill Book Company, Inc.

McMaster, B. W. and W. S. Parks. 1988. *Concentrations of Selected Trace Inorganic Constituents and Synthetic Organic Compounds in the Water-Table Aquifers in the Memphis Area, Tennessee.* U.S. Geological Survey Open-File Report 88-485.

Memphis Depot Caretaker. October 1998. *BRAC Cleanup Plan Version 2 Final Report* Memphis Depot Caretaker Environmental Division.

Memphis Light, Gas, and Water. 1988 and 1989. Personal communication and documents supplied by Fred von Hofe to Law Environmental, Inc., staff. Memphis, Tennessee.

Memphis/Shelby County Groundwater Control Board Meeting. August 10, 1993.

Mendenhall, V.M., E.E. Klaas, and M.A.R. McLane. 1983. Breeding success of barn owls (Tyto alba) fed low levels of DDE and dieldrin. *Arch. Environ. Contam. Toxicol.* 12: 235-240.

Ministry of Housing, Spatial Planning and Environment (MHSPE). *Intervention Values and Target Values–Soil Quality Standards.* Directorate-General for Environmental Protection, Department of Soil Protection, The Hague, The Netherlands.

Moore, Barry. 1988 and 1989. Water Quality Department of Memphis-Shelby County Health Department. Personal communication with Law Environmental, Inc., staff.

Moore, G. K. 1965. *Geology and Hydrology of the Claiborne Group in Western Tennessee.* U.S. Geological Survey Water-Supply Paper 1809-F.

National Oceanic and Atmospheric Administration. 1983. *Climatic Atlas of the United States.* Asheville, North Carolina.

National Research Council. 1987. *Drinking Water and Health: Disinfectants and Disinfectant By-Products.* National Academy Press.

Nyman, D. J. 1985. *Predicted Hydrologic Effects of Pumping from the Lichterman Well Field in the Memphis Area, Tennessee.* U.S. Geological Survey Water-Supply Paper 1819-B.

O. H. Materials Company. February 1986. *Summary Report: Onsite Remedial Activities at the Defense Depot Memphis, Tennessee.*

OHM Remediation Services Corporation. May 2000. *Annual Operations Report Groundwater Interim Remedial Action, Dunn Field, Memphis Defense Depot, Tennessee* Prepared for the U.S Army Corps of Engineers, Mobile District.

Parks, W.S. 1990. *Hydrogeology and Preliminary Assessment of the Potential for Contamination of the Memphis Aquifer in the Memphis Area, Tennessee.* U S. Geological Survey Water-Resources Investigations Report 90-4092.

Parks, W. S. and J. K. Carmichael. 1988. *Geology and Ground-water Resources of the Cockfield Formation in Western Tennessee.* U.S. Geological Survey Water-Resources Investigations Report 88-4181.

Parks, W.S. and J.K. Carmichael. 1990. *Geology and Ground-Water Resources of the Memphis Sand in Western Tennessee.* U.S. Geological Survey Water-Resources Investigations Report 88-4182.

Parsons Engineering Science, Inc. June 1999. *Engineering Evaluation/Cost Analysis for the Removal of Chemical Warfare Materiel, Former Defense Distribution Depot, Memphis, Tennessee.* Prepared for the U.S. Army Corps of Engineers, Huntsville Center.

Pickering Environmental. June 1994. Lake Daniel Water Samples Analytical Results.

Radian International LLC. May 1997 *Baseline Risk Assessment for the Golf Course Impoundments.* Defense Distribution Depot Memphis, Tennessee. Prepared for the U.S Army Corps of Engineers Mobile District.

Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. *Toxicological benchmarks for wildlife· 1996 revision.* Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-86/R3.

Sample, Brad. December 1999. Personal Communications with L. Saban. CH2M HILL.

Saucier, R. T 1974. *Quaternary Geology of the Lower Mississippi Valley.* Arkansas Archeological Survey Research Series No. 6

Selley, R. C. 1982. *Ancient Sedimentary Environments.* Second Edition Cornell University Press.

Suarez, M.P., and H.S. Rifai. 1999. Biodegradation Rates for Fuel Hydrocarbons and Chlorinated Solvents in Groundwater. Battelle Memorial Institute, Bioremediation Journal 3(4):337-362 (1999).

TEC. 1998. See FSPs.

Terry, J. E., R. L. Hosman, and C. T. Bryant. 1979. *Summary Appraisals of the Nation's Groundwater Resources, Lower Mississippi Region.* U.S. Geological Survey Professional Paper 813-N.

The Pathfinders Woolpert ETI Toles and Associates Trust Marketing Verner, Liipfert, Bernhard, McPherson and Hand. May 1997. *Memphis Depot Redevelopment Plan.*

Thibault, D. H., M. I. Shepard, and P. A. Smith. 1990. *Review of Default Soil Solid/Liquid Partition Coefficients, Kd for Use in Environmental Assessments.* Atomic Energy of Canada Limited. AECL-10125

U.S. Army Corps of Engineers 1975. *Selected Protected Animals* COE Technical Report M-75-2.

U S Army Corps of Engineers, St. Louis District. January 1995. *Archives Search Report*

U S. Army Corps of Engineers, Waterways Experiment Station. March 1994 *Electromagnetic and Magnetic Surveys at Dunn Field, Defense Depot, Memphis, Tennessee.* Technical Report GL-94-8.

U.S. Army Environmental Hygiene Agency. 21 June – 2 July 1982. *Geohydrologic Study No. 38-26-1095-83.* Defense Depot Memphis, Memphis Tennessee.

U.S. Army Environmental Hygiene Agency. 8-18 July 1985 *Environmental Audit No.43-21-1387-86.* Defense Depot Memphis, Memphis Tennessee.

U.S. Army Environmental Hygiene Agency. 1986.*Water Quality Biological Study No. 32-24-0733-86.* Investigation of the Fire Reservoir at the Defense Distribution Depot Memphis, Tennessee.

U.S. Army Toxic and Hazardous Materials Agency. July 1992. *Installation Assessment of the Defense Depot Memphis, Tennessee.*

U.S. Census Data. 1990. Shelby County, Tennessee.

U.S. Department of Agriculture. 1970. *Soil Survey, Shelby County, Tennessee.* Soil Conservation Service.

U.S. Department of Commerce. May 1961. *Rainfall Frequency Atlas of the United States.* Technical Paper 40.

U.S. Department of the Interior. March 1981 (1987). National Wetlands Inventory Maps. Southeast Memphis, Tenn. Aerial Photography.

U.S. Department of the Interior. February 1984 (1988). National Wetlands Inventory Maps. Southwest Memphis, Tenn.-Ark. Aerial Photography.

U.S. Environmental Protection Agency (USEPA). *Ambient Water Quality Criteria Documents for [chemical specific].* (Note: estimated steady state BCFs from AWQCs are based on 7.6 percent lipids.)

U.S. Environmental Protection Agency. 1986a. *Superfund Public Health Evaluation Manual. EPA 540 1-86 060.* Washington, D.C.

U.S. Environmental Protection Agency. September 1986b. *Guidelines for Carcinogen Risk Assessment.* 51 Federal Register 33992.

U.S. Environmental Protection Agency. March 1987. *Drinking Water Health Advisories.* Office of Water.

U.S. Environmental Protection Agency. October 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.* Office of Emergency and Remedial Response, U.S. Environmental Protection Agency. Washington, D.C.

U.S. Environmental Protection Agency. December 1989. *Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A (Interim Final).* Office of Emergency and Remedial Response. EPA/540-1-89/002.

U.S. Environmental Protection Agency. January 1990. *RCRA Facility Assessment Plus RCRA Permit Portions* Defense Depot Memphis, Tennessee.

U.S. Environmental Protection Agency 1991a *Health Effects Assessment Summary Tables Fiscal Year 1991.* Office of Emergency and Remedial Response and Environmental Criteria and Assessments Office.

U.S. Environmental Protection Agency. 1991b. *Risk Assessment Guidance for Superfund, Part B.*

U.S. Environmental Protection Agency. March 25, 1991c. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.* OSWER Directive 9285.6-03.

U.S. Environmental Protection Agency. January 1992a. *Dermal Exposure Assessment: Principles and Applications, Interim Report.* EPA/600/8-91/011B. Washington, D.C.

U.S. Environmental Protection Agency. April 1992b. *Drinking Water Health Advisories.* Office 'of Water.

U.S. Environmental Protection Agency. September 1992c. *Handbook of RCRA Groundwater Monitoring Constituents: Chemical and Physical Properties.* (40 CFR Part 264, Appendix IX). Washington, D.C.

U. S. Environmental Protection Agency. 1993. *Wildlife Exposure Factors Handbook.* Vol. I and II. Office of Research and Development. EPA/600/R-93/187a & b December 1993.

U. S. Environmental Protection Agency. 1994a. Development of Ecological Exit Criteria for the Hazardous Waste Identification Project. Review Draft Office of Solid Waste.

U.S. Environmental Protection Agency. 1994b. *EPA Region IV Supplemental Guidance to RAGS*

U.S. Environmental Protection Agency. February 1994c. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.*

U.S. Environmental Protection Agency. July 1994d. *Technical Background Document for Soil Screening Guidance, Review Draft.* Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency. 1995a. *EPA Region 4 Supplemental Guidance to RAGS: Region 4 Bulletins, Freshwater Surface Water Screening Values for Hazardous Waste Sites.*

U.S. Environmental Protection Agency. 1995b. *EPA Region 4 Supplemental Guidance to RAGS: Region 4 Bulletins, Sediment Screening Values for Hazardous Waste Sites.*

U.S. Environmental Protection Agency. 1995c. *Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife: DDT, Mercury, 2,3,7,8-TCDD, PCBs.* Washington, D.C.: Office of Water EPA/820/B-95/008.

U.S. Environmental Protection Agency. November 1995d. *Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment, Interim.*

U. S. Environmental Protection Agency. November 1995e. *Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment.* Waste Management Division.

U S. Environmental Protection Agency. 1996a. *Interim Approach to Assessing Risk Associated with Adult Exposures to Lead in Soil.*

U.S Environmental Protection Agency. February 1996b. *Drinking Water Regulations and Health Advisories.* Office of Water

U.S. Environmental Protection Agency. May 1996c. *Soil Screening Guidance: Technical Background Document.* Office of Solid Waste and Emergency Response. Washington, D.C EPA/540/R-95/128.

U.S. Environmental Protection Agency. 1997a. *Health Effects Assessment Summary Tables, Fiscal Year 1997.* Office of Emergency and Remedial Response, and Environmental Criteria and Assessments Office.

U S. Environmental Protection Agency. 1997b. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments.*

U.S. Environmental Protection Agency. August 1997c. *Exposure Factors Handbook.*

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

U.S. Environmental Protection Agency. 1997e. User's Guide for the Johnson-Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings. USEPA Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency. 1998a. Guidelines for Ecological Risk Assessment. 630R95002F. *Federal Register*, Part II, Environmental Protection Agency: Notice, May 14, 1998.

U.S. Environmental Protection Agency. May 7, 1998b. *Risk Assessment Guidance for Superfund, Volume I. Human Health Evaluation Manual. Supplemental Guidance. Dermal Risk Assessment (Interim Guidance).*

U.S. Environmental Protection Agency. October 1998c. *Region III Risk-Based Concentrations Table.*

U.S. Environmental Protection Agency. September 1998. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water.* EPA/600/R-98/128.

U.S. Environmental Protection Agency. December 22, 1998d. *EPA Region 4, Draft Ecological Screening Levels for Soils from Memorandum – Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders.*

U.S. Environmental Protection Agency. 1999. *Integrated Risk Information System Database.* Environmental Criteria and Assessments Office.

UXB International, Inc. December 2001. *Final Report Chemical Warfare Materiel Investigation/Removal Action Dunn Field, Former Defense Depot Memphis, Tennessee.* Prepared for the U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville.

Veith, G. D., D. L DeFoe, and B V. Bergstedt. 1979 "Measuring and estimating the bioconcentration factor of chemicals in fish." *J. Fish. Res Board Can.* 36·1040-1048.

Vogel, T.M. 1994. Natural Bioremediation of Chlorinated Solvents. In *Handbook of Bioremediation*: (Norris, R.D., Hinchee, R.E., Brown, R., McCarty, P.L., Semprini, L., Wilson, J.T., Kampbell, D.H., Reinhard, M., Bouwer, E J., Borden, R.C., Vogel, T.M., Thomas, J.M., and Ward, C.H., Eds). Lewis Publishers, Boca Raton, FL.Wiedemeier, T.H , Swanson, M.A., Moutoux, D.E., Wilson, J.T., Kampbell, D.H., Hansen, J.E , and Haas, P. 1996. Overview of the Technical Protocol for Natural Attenuation of Chlorinated Aliphatic Hydrocarbons in Ground Water Under Development for the U.S. Air Force Center for Environmental Excellence: In *Symposium on Natural Attenuation of Chlorinated Organics in Ground Water, Dallas, TX, September 11-13, 1996*: EPA/540/R-96/509.

Wells, F. G. 1933. *Groundwater Resources of Western Tennessee.* With a discussion of the chemical character of the water by F. G. Wells and M. D. Foster. U.S. Geological Survey Water-Supply Paper 656.

Wheelwright, N.T. 1986. The diet of American robins: an analysis of U.S. Biological Survey records. Auk 103:710-725.

Wiedemeier, T. H., Swanson, M. A., Moutoux, D. E., Wilson, J. T., Kampbell, D. H., Hansen, J. E., and Haas, J. 1996. *Overview of the Technical Protocol for Natural Attenuation of Chlorinated*

Aliphatic Hydrocarbons in Ground Water Under Development for the U.S. Air Force Center of Environmental Excellence. San Antonio, TX.: U S. Center for Environmental Excellence

Wiedemeier, T.H., Rifai, H.S., Newell, C.J., and Wilson, J T. *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface.* JT Wiley and Sons. New York. 1999.

Woodward-Clyde. November 6, 1996. *U.S. Army Base Realignment and Closure 95 Program Environmental Baseline Survey Report.* Defense Distribution Depot Memphis, Tennessee. Prepared for the USACE Seattle District Mobile District.

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