2012 SITE MANAGEMENT PLAN

Defense Depot Memphis, Tennessee

Prepared for:

Department of the Army

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USACE Contract No. W9126G-09-D-0069
Task Order No. 0019

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Prepared for:

U.S. Army Corps of Engineers, Fort Worth District
Contract No. W9126G-09-D-0069
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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
AS/SVE	Air Sparging with Soil Vapor Extraction
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Chloroform
COC	chemical of concern
CT	Carbon Tetrachloride
CVOC	Chlorinated Volatile Organic Compound
CWM	Chemical Warfare Material
CWN	Compliance Well Network
CY	cubic yard
DA	Department of the Army
DDMT	Defense Depot Memphis, Tennessee
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
e^2M	engineering-environmental Management, Inc
EBT	Enhanced Bioremediation Treatment
EE/CA	Engineering Evaluation and Cost Analysis
EISR	Early Implementation of Selected Remedy
ERP	Environmental Restoration Program
ET&D	Excavation, Transportation and Disposal
FFA	Federal Facilities Agreement
FOST	Findings of Suitability to Transfer
FSVE	Fluvial Soil Vapor Extraction
FU	Functional Unit
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendment
IAQ	Intermediate Aquifer
IC	Institutional Control
IRA	Interim Remedial Action
IRACR	Interim Remedial Action Completion Report

LIST OF ACRONYMS AND ABBREVIATIONS
CONTINUED

lb/hr	pounds per hour
LTM	Long-Term Monitoring
LUC	Land Use Controls
LUCIP	Land Use Control Implementation Plan
MAQ	Memphis Aquifer
MCL	Maximum Contaminant Level
µg/L	micrograms per liter
MI	Main Installation
MLGW	Memphis Light Gas & Water
MNA	Monitoring Natural Attenuation
MSCHD	Memphis Shelby County Health Department
MW	Monitoring Well
NPL	National Priorities List
OPS	Operating Properly and Successfully
OU	Operable Unit
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PCP	pentachlrophenol
PDB	Passive Diffusion Bag
PID	Photoionization Detector
PLC	Programmable Logic Controller
PMW	Performance Monitoring Well
POL	petroleum/oil/lubricants
ppm	parts per million
PRB	Permeable Reactive Barrier
PVC	polyvinyl chloride
RA	Remedial Action
RAO	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment

LIST OF ACRONYMS AND ABBREVIATIONS

CONTINUED

RG	Remediation Goal
RI	Remedial Investigation
RL	Reporting Limit
ROD	Record of Decision
RW	Recovery Well
SMP	Site Management Plan
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
SWMU	Solid Waste Management Unit
TA	Treatment Area
TC	Target Concentration
TCE	Trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TeCA	1,1,2,2 tetrachloroethane
TSVE	Thermal Soil Vapor Extraction
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
UXB	UXB International, Inc.
VC	Vinyl Chloride
VI	vapor intrusion
VMP	Vapor Monitoring Point
VOC	Volatile Organic Compound
ZVI	Zero Valent Iron

1.0 INTRODUCTION

HDR has prepared this 2012 Site Management Plan (SMP) for Defense Depot Memphis, Tennessee (DDMT) under Contract W9216G-09-D-0069, Task Order 0019 to the United States Army Corps of Engineers (USACE), Ft. Worth District. The environmental restoration program (ERP) at DDMT is directed by the Department of the Army (DA), Office of the Chief of Staff for Installation Management, Base Realignment and Closure (BRAC) Division (DAIM-ODB).

This SMP has been prepared in accordance with the *Management Guidance for the Defense Environmental Restoration Program* (DERP) (Office of the Deputy Under Secretary of Defense-Installations and Environment [ODUSD{I&E}], 2001), and fulfills a requirement of the *Federal Facilities Agreement at the Defense Distribution Depot Memphis* (FFA) signed by U.S. Defense Logistics Agency (DLA), U.S. Environmental Protection Agency (USEPA) and Tennessee Department of Environment and Conservation (TDEC) in 1995.

In accordance with the DERP Guidance, the SMP describes a coordinated approach for environmental restoration activities and includes all required activities by year until the expected completion of environmental restoration at DDMT. The SMP will be updated annually, made available for public review in the information repository and included in the Administrative Record. This SMP is updated with information available as of 1 October 2011.

2.0 SUMMARY OF SITE CONDITIONS

2.1 SITE LOCATION AND DESCRIPTION

DDMT is located in southeastern Memphis, Shelby County, Tennessee approximately 5 miles east of the Mississippi River and just northeast of Interstate 240 (Figure 1). DDMT originated as a military facility in the early 1940s to provide stock control, material storage, and maintenance services for the U.S. Army. In 1995, DDMT was placed on the list of Department of Defense facilities to be closed under BRAC. Storage and distribution activities continued until DDMT closed in September 1997.

DDMT covers approximately 642 acres and includes the Main Installation (MI) and Dunn Field. The MI contains approximately 578 acres with open storage areas, warehouses, former military family housing, and outdoor recreational areas. Dunn Field, which is located across Dunn Avenue from the north-northwest portion of the MI, contains approximately 64 acres and includes former mineral storage and waste disposal areas.

2.2 REGULATORY STATUS

The Depot was a Resource Conservation and Recovery Act (RCRA) hazardous waste generator, TN 4210020570. The majority of hazardous wastes generated by the Depot consisted of hazardous substances that reached shelf-life expiration dates and could no longer be used by the military services and vehicle maintenance wastes. The Depot also generated hazardous wastes from the cleanup of small hazardous substance spills.

On 28 September 1990, USEPA Region 4 and TDEC issued the Depot a RCRA Part B permit for storage of hazardous waste. The Hazardous and Solid Waste Amendment (HSWA) portion of the permit issued by USEPA included requirements for the identification and, if necessary, corrective action of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). A RCRA Facility Assessment (RFA) completed in 1990 identified 49 SWMUs and 8 AOCs.

Subsequent to issuing the RCRA permit, and in accordance with Section 120(d)(2) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Title 42, Section 9620(d)(2), of the United States Code, USEPA prepared a final Hazard Ranking System (HRS) Scoring Package for the facility. On 14 October 1992, based on the final HRS score of 58.06, USEPA added the Depot to the National Priorities List (NPL) (57 Federal Register 47180 No. 199).

On 6 March 1995, USEPA, TDEC, and the Depot entered into a FFA (USEPA, 1995) under CERCLA, Section 120, and RCRA, Sections 3008(h) and 3004(u) and (v). The FFA outlines the process for investigation and cleanup of the Depot sites under CERCLA. The parties agreed that investigation and cleanup of releases from the sites (including formerly identified SWMUs/AOCs) would satisfy any RCRA corrective action obligation.

The RCRA Part B permit for hazardous waste storage was terminated by TDEC in October 1998 upon request of DDMT because the storage unit was not constructed or operated. The HSWA portion of the permit for corrective action remained in effect. DDMT submitted a corrective action permit renewal application in March 2004. In January 2005, TDEC issued a Denial to Reissue the Hazardous Waste Corrective Action Permit, which terminated the requirement to perform corrective action under RCRA, and noted that all corrective action activities shall continue to be performed under CERCLA authority.

2.3 SITE DESIGNATIONS

Site designations were developed for overlapping environmental programs and for facility reuse. Environmental restoration sites were first identified during the 1990 RFA, and additional sites were added over time. During FFA negotiations after DDMT was placed on the NPL, the Depot was divided into four Operable Units (OUs): Dunn Field, OU 1; Southwest Quadrant MI, OU 2; Southeastern Watershed and Golf Course, OU 3; and North-Central Area MI, OU 4.

During preparation of the environmental baseline survey after DDMT was selected for closure under BRAC, the property was divided into 36 parcels based on planned reuse. Areas of environmental concern within each parcel were broken into subparcels and represent buildings, spill locations, burial locations, former pistol ranges, open land areas, and other sites. This system allowed investigation results to be compared directly to BRAC parcels for reuse purposes facilitating sampling/analysis and decisions regarding environmental condition of property for leasing and transfer.

During the MI remedial investigation (RI), the parcels were combined in functional units (FUs) in order to evaluate risk to human health and the environment. Each FU represented an area where human health exposure was generally uniform based on operational history, expected use, location, and generally uniform human health exposure. The MI was divided into six FUs with groundwater under the MI being FU 7. Dunn Field was divided into three Areas for conducting baseline risk assessments based on similar historical use and proposed reuse: Northeast Open Area, Stockpile Area, and Disposal Area. The FUs/areas are described on Table 1 and the boundaries are shown on Figure 2 for the MI and Figure 3 for Dunn Field.

Environmental restoration sites were first identified during the 1990 RFA, and additional sites were added over time. The 1990 RFA identified 57 SWMUs and AOCs. An appendix to the FFA increased the number of sites to 89 based on additional site investigations. Two of the 89 sites consisted of multiple disposal locations that were later separated, bringing the number of sites to 93. The environmental restoration sites within each OU are listed on Table 2 and the sites are shown on Figures 4, 5, 6 and 7.

2.4 GEOLOGY AND HYDROGEOLOGY

The geologic units of interest at Dunn Field are (from youngest to oldest): loess, including surface soil; fluvial deposits; Jackson Formation/Upper Claiborne Group; and Memphis Sand.

The loess consists of wind-blown and deposited, brown to reddish-brown, low plasticity clayey silt to silty clay. The loess deposits are about 20 to 30 feet thick and are continuous throughout the Dunn Field area.

The fluvial (terrace) deposits consist of two general layers. The upper layer is a silty, sandy clay that transitions to a clayey sand and ranges from about 10 to 36 feet thick. The lower layer is composed of interlayered sand, sandy gravel, and gravelly sand, and has an average thickness of approximately 40 feet. The uppermost aquifer is the unconfined fluvial aquifer, consisting of saturated sands and gravelly sands in the lower portion of the deposits. The saturated thickness of the fluvial aquifer ranges from 0 to 50 feet and is controlled by the configuration of the uppermost clay in the Jackson Formation/Upper Claiborne Group. The groundwater in the fluvial aquifer is not a drinking water source for area residents.

The Jackson Formation/Upper Claiborne Group consists of clays, silts, and sands. The uppermost clay unit appears to be continuous at DDMT, except in the southwestern area of Dunn Field and the adjacent portion of the MI. Off site, to the west and northwest of Dunn Field, there are possible gaps in the clay. Where present, these gaps create connections to the underlying intermediate aquifer (IAQ) from the fluvial deposits. The IAQ is locally developed in deposits of the Jackson Formation/Upper Claiborne Group.

The Memphis Sand primarily consists of thick bedded, white to brown or gray, very fine grained to gravelly, partly argillaceous and micaceous sand. The Memphis Sand ranges from 500 to 890 feet in thickness, and begins at a depth below ground surface (bgs) of approximately 120 to 300 feet. The top of the Memphis Sand was identified at 255 feet bgs (elevation of 21 feet above mean sea level) in monitoring well (MW)-67, the first monitoring well completed in the Memphis Sand at DDMT. The Memphis aquifer (MAQ) is confined by overlying clays and silts in the Cook Mountain Formation (part

of the Jackson/Upper Claiborne Group) and contains groundwater under artesian (confined) conditions regionally. The City of Memphis obtains the majority of its drinking water from this unit. The Allen Well Field, which is operated by Memphis Light Gas & Water (MLGW), is located approximately two miles west of Dunn Field.

3.0 ENVIRONMENTAL PROGRAM STATUS

The decision documents for DDMT are complete and have been implemented. The *Preliminary Close Out Report* (USEPA, 2010) was approved in May 2010, and the DDMT NPL site status was revised to Construction Complete. Interim remedial action completion reports (IRACRs) have been approved for all actions. USEPA has concurred with operating properly and successfully determinations for the remedies implemented on Federal property.

3.1 MAIN INSTALLATION (OU-2, 3 AND 4)

The MI contains approximately 578 acres with open storage areas, warehouses, former military family housing, and outdoor recreational areas. Investigations from 1989 to 2001 identified contamination in surface soil and ground water. Surface contamination requiring response consisted primarily of metals, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), and a pesticide, dieldrin. Ground water contamination requiring response was limited to chlorinated volatile organic compounds (CVOCs) primarily tetrachloroethene (PCE), trichloroethene (TCE), carbon tetrachloride (CT), and chloroform (CF). The site investigations and evaluation of remedial alternatives are described in the *Final Main Installation Remedial Investigation Report (CH2M Hill, 2000a)*, the *Main Installation Feasibility Study for Groundwater (CH2M Hill, 2000b)*, and the *Main Installation Feasibility Study for Soils (CH2M Hill, 2000c)*.

3.1.1 Prior Removal Activities

The following actions were taken on the MI prior to the Record of Decision (ROD). The locations are shown on Figure 2.

- Approximately 602 cubic yards (CY) of surface and subsurface soil was removed from the pentachlorophenol (PCP) dip vat area (Building 737) because of elevated levels of PCP (completed in 1985).
- Approximately 60,000 gallons of hazardous and petroleum/oil/lubricants materials from damaged drums were reclaimed and repackaged at Building 873 in 1985. Approximately 800 55-gallon drums were recouped in this open storage area and then returned to their original location for storage and distribution.
- Approximately 5,000 tons (3,700 CY) of surface soil in the Housing Area was removed because of the presence of dieldrin (began in June 1998; completed in October 1998). The Housing Area

is an exception to the overall industrial land use for MI and remediation levels were based on residential reuse.

- Approximately 530 tons (400 CY) of surface soil surrounding the cafeteria (Building 274) was removed because of elevated levels of PCBs (began in October 1998; completed in November 1998).
- Approximately 980 CY of surface and subsurface soil from near Buildings 1084, 1085, 1087, 1088, 1089 and 1090 was removed because of elevated levels of metals and polyaromatic hydrocarbons (began in May 2000; completed in August 2000).

3.1.2 Record of Decision

The *Memphis Depot Main Installation Record of Decision* (MI ROD) (CH2M HILL, 2001) was approved in September 2001.

Remedial action objectives (RAOs) are medium-specific goals that the selected remedy is expected to meet to protect human health and the environment. The RAOs were developed to allow the lease and later transfer of the MI for its intended land use (industrial and recreational).

The surface soil RAOs are:

- to prevent direct contact/ ingestion of surface soils contaminated with lead in excess of industrial worker risk-based criteria;
- to prevent direct contact/ ingestion of surface soils contaminated with dieldrin and arsenic in excess of human health risk assessment criteria for residents; and
- to prevent direct contact/ ingestion of surface soils contaminated with lead in excess of risk-based criteria for protection of residential children.

The groundwater RAOs are:

- to prevent human ingestion of water contaminated with volatile organic compounds (VOCs) in excess of maximum contaminant levels (MCLs) from potential future onsite wells;
- to reduce concentrations of chemicals of concern (COCs) to MCLs or lower; and
- to prevent horizontal and vertical offsite migration of groundwater contaminants in excess of MCLs. The MCLs are 5 micrograms per liter (µg/L) for PCE, TCE, and CT; 70 µg/L for cis-1,2-

dichloroethene, and 2 µg/L for vinyl chloride (VC). The MCL for total trihalomethanes, which includes CF, is 80 µg/L.

The selected remedy presented in the MI ROD contained the following components:

- Excavation, transport and offsite disposal of lead contaminated surface soil near Building 949.
- Deed restrictions and site controls in the form of land use controls (LUCs) to prevent residential land use on the MI, except at the existing housing area; daycare restriction controls; production/consumptive use groundwater controls for the fluvial aquifer and for drilling into deeper aquifers on the MI; and elimination of casual access through maintenance of a boundary fence around the golf course.
- Enhanced bioremediation treatment (EBT) of CVOCs in the most contaminated part of the groundwater plume.
- Long-term groundwater monitoring to document changes in plume concentrations and to detect potential plume migration to off-site areas or into deeper aquifers.
- Five-year reviews of the selected remedy.

The area of lead contamination in soil near Building 949 (approximately 300 CY) was excavated and disposed off-site prior to final execution of the ROD. The action was taken under DLA's removal authority under CERCLA Section 104 in order to accommodate the economic redevelopment of the site. The action was documented in *Remediation Report, Removal Action at Building 949* (Jacobs Federal Programs, 2002) and noted as a significant change in the ROD.

3.1.3 Remedial Action

The EBT system was constructed from May to August 2006. Construction included installation of injection wells and performance monitoring wells (PMWs), construction of the lactate-storage and transfer facility, construction of two trailer-mounted injection systems, and baseline groundwater sampling and analysis. Construction was performed in accordance with the *Main Installation Final Remedial Design* (CH2MHILL, 2004a) and the *Main Installation Remedial Action Work Plan* (MACTEC, 2005a).

Sodium lactate was injected in all injection wells on a biweekly schedule during Year One (September 2006 through August 2007) and a monthly schedule during Year Two (September 2007 through February 2009). Changes to injection procedures were made based on field observations and measurements.

Performance monitoring was performed quarterly from October 2006 through March 2009. System operations and monitoring results were described in annual reports. CVOC concentrations for parent compounds (PCE, TCE, CT and CF) were reduced over 90 percent in injection wells and over 80 percent in monitoring wells at locations with baseline concentrations above 100 µg/L.

The *Main Installation Interim Remedial Action Completion Report, Rev. 1* (MI IRACR) (HDR|e^{2}M, 2010a), including an Operating Properly and Successfully (OPS) determination, was submitted to USEPA and TDEC on 26 February 2010. Although EBT did not achieve the goal of reducing concentrations below MCLs, additional field investigation, groundwater modeling and trend analysis presented in the MI IRACR indicated that additional remedial action (RA) was not necessary. Additional monitoring wells in the upper portion of the MAQ were recommended to support the groundwater model results. If consecutive groundwater samples above MCLs are detected in an IAQ well on the property boundary or in a MAQ well, RA in the fluvial aquifer upgradient of the window will be evaluated to reduce those concentrations. The OPS determination and the IRACR were approved by USEPA in March 2010.

3.1.4 Long Term Monitoring

MI long-term monitoring (LTM) is conducted to evaluate progress in meeting the RAOs to restore groundwater to concentrations at or less than MCLs and to prevent contaminant migration horizontally and vertically offsite at concentrations in excess of MCLs. LTM has been performed since 2004 in accordance with the *Long-Term Groundwater Monitoring Plan, Revision 3*, July 2004 (LTM Plan) included in Appendix B of the MI Remedial Design (RD). Recommendations for changes to LTM wells and sample frequency are made in annual LTM reports.

Additional deep monitoring wells to support groundwater modeling results were installed June-August 2010 in accordance with recommendations in the IRACR. The findings were included in the *Main Installation 2010 Annual Long-Term Monitoring Report (HDR, 2011a)*. The hydrogeologic data for the new deep wells supported the conceptual model of a connection between the fluvial and deeper aquifers and indicated the IAQ and MAQ wells were appropriately located to serve as sentinel wells for vertical migration of contaminants. The analytical results were consistent with the groundwater modeling described in the IRACR, which indicated the potential for low CVOC concentrations in the IAQ and MAQ at the MI. The results did not indicate significant impact to the MAQ.

The report also indicated some rebound in concentrations of parent compounds in TTA-1 and TTA-2. In eight LTM wells within the former EBT areas, PCE concentrations were at 20% to 40% of the baseline concentrations (August 2006) in four wells, near or above baseline concentrations at two locations, and

not detected or still declining at two locations. PCE and TCE isoconcentration maps for the October 2010 LTM biennial samples are shown on Figures 8 and 9.

3.1.5 Land Use Controls

LUCs prevent residential use of the majority of the MI and production or consumptive use of groundwater or drilling of groundwater supply wells on the MI. The LUCs consist of institutional controls (ICs) in the form of: lease restrictions; deed restrictions; notice of land use restrictions; zoning restrictions; and groundwater well restrictions. The LUCs will remain in place until concentrations of COCs have been reduced to levels that allow for unlimited exposure and unrestricted use. The *Land Use Control Implementation Plan Revision 1*, (LUCIP) was included as Appendix C of the MI RD.

DA is responsible for monitoring of LUCs, either directly or by delegation. Annual inspections are conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved. The annual inspections describe deficiencies or violations of the land use restrictions and RAs taken.

The LUCs have been implemented in accordance with the LUCIP. The Notice of Land Use Restrictions for the MI was recorded at the City of Memphis/Shelby County Register of Deeds on January 26, 2005. Deed restrictions have been included in property transfers. Annual inspections have been performed since 2005 and reports have been distributed in accordance with the LUCIP. One minor deficiency regarding perimeter fencing was identified and corrected in 2005. No other deficiencies or violations have been identified.

3.2 DUNN FIELD (OU-1)

Dunn Field, which is located across Dunn Avenue from the MI, contains approximately 64 acres and includes former mineral storage and waste disposal areas. Records indicate that chemical warfare material (CWM), chlorinated lime, super tropical bleach, and calcium hypochlorite, food stocks, paints/thinners, petroleum/oil/lubricants (POL), acids, herbicides, mixed chemicals, and medical waste were destroyed or buried in pits and trenches at the Dunn Field disposal sites.

Soil samples collected for the RI showed significant levels of CVOCs: 1,1,2,2 tetrachloroethane (TeCA); 1,2-dichloroethane; total 1,2-dichloroethene; CT; CF; methylene chloride; PCE; TCE; and VC. TCE and TeCA were the CVOCs most frequently detected in soil samples at elevated concentrations. Three contaminant plumes in the fluvial aquifer were identified at Dunn Field. The CVOCs detected in soil samples were also detected most frequently in groundwater sampling events. The individual VOCs with

the highest concentrations were TeCA and TCE. The site investigations and evaluation of remedial alternatives are described in the *Dunn Field Remedial Investigation Report* (CH2M HILL, 2002) and *Dunn Field Feasibility Study Report* (CH2M HILL, 2003a).

3.2.1 Prior Removal and Remedial Activities

The *Record of Decision for Interim Remedial Action of the Groundwater at Dunn Field (OU-1)* (CH2M HILL, 1996) was signed in April 1996, with the objective of hydraulic containment to prevent further contaminant plume migration and reduce contaminant mass in groundwater. The IRA groundwater recovery system included 11 recovery wells (RWs) screened in the fluvial aquifer and located along the western boundary of Dunn Field. The system began operation in November 1998 with groundwater discharge to the city sewer system without treatment under an industrial discharge agreement. Based on reduction of CVOC concentrations in groundwater following implementation of the Source Areas RA, five RWs were shutdown on in June 2008 and the remaining RWs were shutdown in January 2009. Effluent samples from the IRA discharge were used to monitor contaminant mass reduction; approximately 918 pounds of total VOCs, including 369 pounds of trichloroethene, were discharged by the IRA in just over 10 years of operation. The IRA system was removed and the RWs abandoned in July 2010. The final year of IRA groundwater monitoring and closure activities were described in *2009 Operations and Closure Report, Dunn Field Groundwater Interim Remedial Action* (HDR, 2010a).

Following completion of an engineering evaluation and cost analysis (EE/CA), a non-time critical removal action was conducted to reduce or eliminate the potential risk posed by CWM wastes at Sites 1, 24-A, and 24-B. The removal action was completed in March 2001 and documented in the *Final Chemical Warfare Materiel Investigation/Removal Action Report* (UXB International, Inc. [UXB], 2001). Approximately 914 CY of soil contaminated with mustard degradation by-products, and 19 CY of mustard-contaminated soil were excavated, transported, and disposed offsite. Twenty-nine bomb casings were recovered from Site 24-A.

A non-time critical removal action to address lead contaminated surface soil at Site 60, a former pistol range in the Northeast Open Area, was completed in March 2003, pursuant to an EE/CA completed in July 2002. Approximately 930 CY of lead contaminated surface soil was excavated, transported, and disposed offsite at an approved, permitted landfill.

Locations of the IRA and the pre-ROD response actions are shown on Figure 3.

3.2.2 Record of Decision and ROD Amendment

The *Memphis Depot Dunn Field Record of Decision* (Dunn Field ROD) (CH2M HILL, 2004b) was approved in April 2004 and the *Dunn Field Record of Decision Amendment* (ROD Amendment) (e^2M, 2009a) was approved in March 2009.

The RAOs are:

Surface Soil

- Limit use of the surface soil in the Disposal Area to activities consistent with light industrial land use and prevent residential use through land controls

Disposal Sites

- Prevent groundwater impacts from a release of buried containerized hazardous liquids and the leaching of contaminants from buried hazardous solids
- Prevent unacceptable risk of direct contact with buried hazardous liquids and/or solids due to intrusive activities during future land use or site development

Subsurface Soil Impacted with VOCs

- Prevent direct inhalation of indoor air vapors from subsurface soils in excess of industrial worker criteria
- Reduce or eliminate further impacts to the shallow fluvial aquifer from VOCs in the subsurface soil

Groundwater

- Prevent human exposure to contaminated groundwater (i.e., exceeding protective target concentrations [TCs])
- Prevent further off-site migration of VOCs in excess of protective target levels
- Remediate fluvial aquifer groundwater to drinking water quality to be protective of the deeper MAQ

The components of the selected remedy from the Dunn Field ROD are:

- Excavation, transportation, and disposal (ET&D) of soil and material contained within disposal sites based upon results from a pre-design investigation

- Soil vapor extraction (SVE) to reduce VOC concentrations in subsurface soils to levels that are protective of the intended land use and groundwater
- Injection of zero valent iron (ZVI) within Dunn Field to treat CVOCs in the most contaminated part of the groundwater plume, and installation of a permeable reactive barrier (PRB) to remediate CVOCs within the off-site areas of the groundwater plume
- Monitored natural attenuation (MNA) and LTM of groundwater to document changes in plume concentrations, detect potential plume migration to off-site areas or into deeper aquifers, and track progress toward remediation goals (RGs)
- Implementation of LUCs, which consist of the following institutional controls: Deed and/or lease restrictions; Notice of Land Use Restrictions; City of Memphis/Shelby County zoning restrictions and the Memphis and Shelby County Health Department (MSCHD) groundwater well restrictions.

The selected remedies were modified through the ROD Amendment approved in March 2009. The fundamental change was the use of air sparging with soil vapor extraction (AS/SVE) instead of a PRB for the Off Depot groundwater plume. The ROD Amendment also revised the criteria for extent of the AS/SVE system and clarified the treatment objective. The AS/SVE system was selected to cross the core of the plume near the downgradient end and to reduce the individual CVOC concentrations in groundwater to 50 µg/L or less. Groundwater modeling results indicate that the AS/SVE system in combination with natural attenuation processes would reduce groundwater concentrations to MCLs in accordance with the RAOs within a reasonable period of time. The RGs for the contaminants of concern, shown on Table 3, were not changed from the Dunn Field ROD.

3.2.3 Remedial Actions

Three RAs were performed to implement the selected remedies for OU 1, Dunn Field: Disposal Sites RA (ET&D); Source Areas RA (SVE, ZVI injections and LUCs); and Off-Depot Groundwater RA (AS/SVE, MNA, and LTM). Upon completion of the AS/SVE system for Off Depot groundwater in 2009, construction of the selected remedies for DDMT was complete. Locations of the Disposal Sites, Source Areas and Off-Depot Groundwater RAs are shown on Figure 10.

3.2.3.1 Disposal Sites Remedial Action

Soil and debris including potential principal threat wastes (primarily drums and glass bottles) from five disposal sites were excavated and transported for offsite disposal in accordance with the *Dunn Field Disposal Sites Final RD* (CH2M HILL, 2004c), *Dunn Field Disposal Sites Remedial Action Work Plan*

(MACTEC, 2004), and *Dunn Field Disposal Sites Remedial Action Work Plan Addendum 1* (MACTEC, 2006a). The five sites were:

- Disposal Site 3 – Mixed chemical burial site (ortho-toluidine dihydrochloride)
- Disposal Site 4.1 – POL Burial Site (32 55-gallon drums of oil, grease, and paint)
- Disposal Site 10 – Solid Waste Burial Site (metal, glass, and trash)
- Disposal Site 13 – Mixed Chemical Burial (900 pounds of unnamed acid, and 8,100 pounds of unnamed solids)
- Disposal Site 31 – covered by the bauxite storage pile (Site 64), used for burning/disposal of smoke pots, tear gas grenades, and souvenir ordnance

The Disposal Sites RA was performed during two separate mobilizations. During the first mobilization from March 2005 to May 2005, excavations at Sites 4.1, 13, 31, and the majority of Site 10 were completed. Site 3 and the remaining materials from Site 10 were completed during the second mobilization in February and March 2006. Approximately 2,700 CY of non-hazardous materials were transported off-site and disposed of at the BFI South Shelby County Landfill. Approximately 234 CY of hazardous materials from Disposal Site 3 was disposed at the Clean Harbors Lambton Secure Landfill in Canada. The confirmation samples met the RGs at each site. The *Dunn Field Disposal Site RA Completion Report* (MACTEC, 2006b) was approved by USEPA in August 2006.

3.2.3.2 Early Implementation of Selected Remedy

An Early Implementation of Selected Remedy (EISR) using ZVI was performed to reduce contaminant mass downgradient of the planned PRB location in order to ensure that the portion of the plume slated for MNA in the ROD was not unduly extensive or high in concentration. ZVI injections were made from November 2004 to January 2005. Injections were made in 14 borings at 2-foot intervals over the fluvial aquifer thickness, which averaged 21 feet; the injection locations were spaced approximately 60 to 80 feet apart. The depth of injection ranged from approximately 70 to 100 feet bgs. The total mass of ZVI injected was approximately 192,500 pounds. The *EISR Interim Remedial Action Completion Report* (MACTEC, 2005b) noted that the injections did not achieve the goal of 90 percent or greater reduction of TCE and TeCA and the report included recommendations for decreased spacing between injection locations to achieve increased reduction in CVOCs. The report was approved by USEPA on 22 September 2005.

3.2.3.3 Source Areas Remedial Action

The Source Areas RA included conventional SVE in the coarse-grained fluvial soils; ET&D for two shallow areas containing waste materials (treatment area [TA]-1F) and buried drums containing petroleum hydrocarbons (TA-3); thermal SVE (TSVE) (in situ thermal desorption) in the fine grained loess; and ZVI injection in the fluvial aquifer. The RA was performed in accordance with the *Memphis Depot Dunn Field Source Areas Final RD* (Dunn Field RD) (CH2M HILL, 2007) ; the *Dunn Field Source Areas Fluvial Soil Vapor Extraction RAWP, Rev.1* (e²M, 2007a); and the *Dunn Field Source Areas Loess/Groundwater RAWP, Rev.1* (Loess/Groundwater RAWP) (e2M, 2007b).

The Fluvial SVE (FSVE) system was installed to remove CVOCs from the fluvial sands at Dunn Field. The system consists of two blowers connected to seven SVE wells with screened intervals at approximately 30 to 70 feet bgs, 20 vapor monitoring points (VMPs) located 15 to 80 feet from the SVE wells and an equipment building for the blowers, heat exchangers and controls. System operations began in July 2007 and approximately 4,020 pounds of VOCs were removed through July 2011. The VOC concentration in the extracted vapor has decreased asymptotically to less than 1 part per million (ppm).

The initial excavations at TA-1F and TA-3 were performed October 2007 to January 2008. Further excavation was delayed in order to proceed with construction and operation of the TSVE system. The excavations were completed February to June 2009. Approximately 7,400 CY of waste material were disposed as non-hazardous waste at the Waste Management, Inc landfill in Tunica MS, a CERCLA-approved facility. Soil confirmation samples met RGs in both areas.

TSVE treatment was performed in four areas with a total area of about 1.25 acres and a treatment interval of approximately 5 to 30 feet bgs. System components included 367 heater-only wells; 68 vapor extraction wells, 62 multi-level temperature monitoring points, 25 pressure monitoring points and a Shotcrete surface cover to limit water infiltration and improve vapor capture. The system operated continuously from 27 May until the heaters were shutdown on 20 November 2008. The vapor extraction system was shut down on 4 December. Approximately 12,500 pounds of VOCs were removed during treatment. Confirmation soil samples, collected at various depths from 35 soil borings, demonstrated that clean-up standards were met; the average concentration for CVOCs in each TA was below the RG and none of the final samples exceeded an RG by a factor of 10 or more.

ZVI injections were not required because groundwater objectives for the Source Areas remedy were achieved through the subsurface soil remedies.

The memorandum, *Operating Properly and Successfully Demonstration, Source Areas Remedial Action* (e^2M, 2009b), was approved by USEPA in October 2009. The *Source Areas Interim Remedial Action Completion Report, Rev. 1* (HDR|e^2M, 2009) was approved by USEPA and TDEC in November 2009.

CVOC concentrations in ground water began to decrease significantly soon after FSVE operations began, indicating that capture zones of the SVE wells encompassed the contaminated areas. The reduction in ground water concentrations also indicated the ground water plumes resulted from continuing vertical migration of CVOCs from the vadose zone and that a continuing source of contamination, such as pockets of free product below the water table, are not present. Reduction in CVOC concentrations is shown in total CVOC plume maps for April 2007, April 2008, April 2009 and March 2010 on Figure 11.

3.2.3.4 Off Depot Groundwater Remedial Action

The Off Depot RA included installation of an AS/SVE system across the core of the plume near the downgradient end; MNA and long-term groundwater monitoring to document remedy performance and/or changes in the lateral or vertical extent of the CVOC plume; and ICs to prevent access to contaminated groundwater. The RA was performed in accordance with the *Memphis Depot Dunn Field Off Depot Groundwater Final Remedial Design, Revision 1* (Off Depot RD) (CH2M HILL, 2008); and the *Dunn Field Off Depot Groundwater Remedial Action Work Plan* (Off Depot RAWP) (e2M, 2009c).

The goal for groundwater remediation at Dunn Field is to reduce CVOC concentrations on Dunn Field to below 50 µg/L for each constituent, with the combination of AS/SVE and MNA expected to achieve the RGs for groundwater over time. AS/SVE is being conducted near the leading edge of the groundwater plume west of Dunn Field to volatilize CVOCs and prevent further plume migration.

The AS/SVE system consists of 90 AS points, 12 SVE wells, 10 pairs of VMPs and control buildings for the AS compressor, SVE blowers and system controls. AS/SVE operations began 21 December 2009 and approximately 70 pounds of VOCs were removed through December 2010. CVOC concentrations in most PMWs, including all wells downgradient of the TA, have been reduced below 50 µg/L for individual CVOCs as of December 2010. The *Off Depot Groundwater Interim Remedial Action Completion Report, Rev. 1* (HDR, 2011b) was approved by USEPA in August 2011.

Vapor sampling was performed during the Off Depot RA to assess potential vapor intrusion (VI) at residential structures from CVOCs in the Off Depot plume. The initial soil vapor samples were collected before AS/SVE operations began. The primary CVOCs detected in the loess vapor samples were below residential vapor screening values. Vapor concentrations in the loess were orders of magnitude lower than in the fluvial sands and the primary contaminants in the fluvial sands (TeCA and TCE) were not

detected as frequently or at similar relative concentrations in the loess. The results indicated the loess provides a good barrier to vertical migration of soil vapor preventing vapor intrusion problems above the groundwater plume in the Off Depot area. The second round of vapor samples was collected to confirm the baseline samples results and to evaluate the impact of AS/SVE operations on vapor concentrations. The results indicated that AS/SVE operations significantly reduced CVOC concentrations in the fluvial sands and that the CVOCs in the groundwater plume do not present a VI problem for nearby residences. Following approval from USEPA and TDEC, the vapor probes were abandoned in September 2010.

3.2.4 Long Term Monitoring

Groundwater monitoring at Dunn Field is conducted to evaluate effectiveness of the FSVE and AS/SVE systems in meeting the RAOs to prevent further offsite migration of VOCs in groundwater in excess of protective target levels and remediate fluvial aquifer groundwater to drinking water quality to be protective of the deeper MAQ.

IRA groundwater samples were collected regularly since 1999 to evaluate system effectiveness in restricting plume migration. Samples were collected quarterly in 1999 and 2000 and semiannually since 2002; limited sampling was performed in 2001. Groundwater samples were collected using both passive diffusion bags (PDBs) and low-flow sampling methods, and sample analyses were generally limited to VOCs.

Since 2010, groundwater monitoring has been conducted in accordance with the LTM Plan in Appendix C of the Off Depot RD, and the Off Depot RAWP. Groundwater monitoring includes performance monitoring near the AS/SVE system and LTM in the remainder of the plume. There are 36 monitoring wells used for performance monitoring and 58 monitoring wells used for LTM. Another 20 monitoring wells are used for water level measurements during LTM events. Groundwater monitoring during Years 1 and 2 of the Off Depot Groundwater RA was described in the *Work Plan for Off Depot Groundwater Sampling* dated 19 March 2010 (HDR|e^{2}M, 2010b).

The RAs on Dunn Field have resulted in significant reduction of CVOC concentrations in groundwater. All but 4 of the 36 PMWs met the treatment goal of individual CVOCs below 50 µg/L in the April 2011 samples. However, a number of wells still exceed an MCL or the TC for TeCA. All 57 LTM wells were sampled in April 2011 and only 7 wells exceeded an MCL or TC for one or more CVOCs, mainly TeCA or TCE. An MCL or TC was exceeded in 19 PMWs in April 2011, with TeCA and/or TCE exceeded in all 19 PMWs. The total CVOC isoconcentration maps for the April 2011 annual LTM and PMW samples

are shown on Figure 12. Concentrations and isopleths for TeCA and TCE for the April 2011 sample event are shown on Figures 13 and 14.

3.2.5 Land Use Controls

LUCs for Dunn Field are described in the LUCIP in Appendix A of the Off Depot RD: deed and/or lease restrictions, Notice of Land Use Restrictions, City of Memphis/Shelby County zoning restrictions, the MSCHD groundwater well restrictions, fencing and the Dunn Field LUC protocol. The LUCs limit use of the Disposal Area to light industrial land uses, prevent residential use of Dunn Field, and prevent exposure to contaminated groundwater. The LUCs will remain in place until concentrations of contaminants of concern have been reduced to levels that allow for unlimited exposure and unrestricted use. An annual inspection is conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved.

The LUCs have been implemented in accordance with the LUCIP. The Notice of Land Use Restrictions for Dunn Field was recorded at the City of Memphis/Shelby County Register of Deeds on 11 June 2009. Annual inspections have been performed since 2009. No deficiencies have been identified. The reports were prepared and distributed in accordance with the LUCIP.

3.3 PROPERTY TRANSFER

Six Findings of Suitability to Transfer (FOSTs) have been prepared for DDMT. These FOSTs include all property within DDMT; the area covered by each FOST is shown on Figure 15. Following approval of FOST 6, USEPA issued the *Superfund Property Reuse Evaluation Checklist for Reporting the Site Wide Ready for Anticipated Use* (USEPA, 2010b).

Property transfers through deed or letter of assignment have been completed for all FOSTs, except FOST 5. The acreage, type of conveyance, type of transfer, receiving party and date of transfer are listed on Table 4.

4.0 ACTIVITIES REQUIRED FOR SITE COMPLETION

RA operations are continuing for the FSVE and the Off Depot AS/SVE, and LTM is being performed for the MI and Dunn Field. Although EBT on the MI has been discontinued, further RA will be considered if consecutive groundwater samples above MCLs are detected in an IAQ well on the property boundary or in a MAQ well.

4.1 REMEDIAL ACTION OPERATIONS

4.1.1 Fluvial SVE Operations

The FSVE system was installed to remove CVOCs from the fluvial sands at Dunn Field through seven SVE wells (Figure 16). The system operates under MSCHD Permit #01030-01P; permit conditions include maintaining VOC emissions below 5.71 pounds per hour (lb/hr) or 25 tons per year with documentation provided in an annual emissions report. System operation, which began in July 2007, was estimated to continue for five years in order to meet RGs. System shutdown is planned for July 2012 in accordance with the original estimate.

System maintenance includes inspection of all major components and piping for leaks, tears and/or signs of deterioration; cleaning system components; and general housekeeping of the SVE compound. Routine maintenance activities were generally conducted during weekly system monitoring. Maintenance of of the blowers and other equipment is performed in accordance with manufacturer's requirements.

The VOC mass removed from the fluvial soils is estimated from the average total VOC concentrations in the influent sample, system operating hours and flow rates. System flow rates are measured by a mass-flow meter and flow rates at individual wells are measured by vane-type meters at the piping manifold. Influent emission rates have decreased from 17 lb/hr at startup to <0.01 lb/hr in July 2011.

The FSVE system has removed approximately 4,020 pounds of VOCs from start-up through July 2011. The CVOC mass in fluvial soils beneath the Source Areas was estimated at approximately 980 pounds based on soil samples collected during drilling for the SVE wells and the VMPs. The difference between the estimated mass and the mass removed to date is considered to result from the mass being underestimated due to the limited samples and to mass extracted from the overlying loess.

The FSVE RAWP included guidelines for system shutdown based on reduction of VOC concentrations in the effluent, evaluation of system operations, rebound tests and confirmation soil sampling. After VOC

concentrations for the system influent became asymptotic at low levels (less than 0.5 ppm by volume of total VOCs) in 2010, a work plan was developed for a rebound test to determine an appropriate period for pulsed operations and soil confirmation samples to evaluate progress toward achieving RGs for fluvial soils. The *Work Plan for Fluvial Soil Vapor Extraction Confirmation Sampling, Revision 1* (HDR, 2010b) was approved by TDEC and USEPA. The RAO for the fluvial soils will be met when the average concentration in a TA for each CVOC is below the RG, and no individual sample result exceeds the RG by a factor of 10 or more. For samples that are non-detect, the average is calculated using one-half the sample quantitation limit (laboratory reporting limit [RL]).

The FSVE system was shutdown in October 2010. Periodic photoionization detector (PID) measurements were collected at SVE wells and VMPs and samples were collected for laboratory analysis prior to re-starting the system in January 2011. Confirmation soil samples were collected from 20 borings in November 2010 and 10 borings were converted to SVE wells for use as additional extraction wells or passive vent wells. After re-starting the system, conveyance line connections were alternated between initial and new SVE wells with the unused wells in each area opened as vent wells for part of the time.

A preliminary report describing the rebound test and soil sampling was submitted to USEPA and TDEC in February 2011; the final report will be incorporated in the Year 4 annual report. The confirmation samples met the RGs and periodic PID measurements collected at SVE wells and VMPs did not increase significantly during shutdown. However, vapor samples collected prior to re-starting the system showed residual VOCs remain in some areas.

Because the RAO was met, conveyance line connections for five SVE wells (SVE-A through SVE-E) were closed following quarterly sampling on 28 April 2011; the new and existing SVE wells in these areas were opened for passive venting. Wells in the SVE-F and SVE-G areas were operated using a single blower.

Vadose zone modeling (SESOIL) was performed to estimate the time required for migration of CVOCs (TCE and TeCA) from the loess to groundwater and to provide a conservative estimate of the groundwater monitoring period necessary following shutdown of the SVE system. The model indicated impacts to groundwater due to leachate in the fluvial sand would be observed 60 to 90 days after shutdown, but impacts due to leachate from the loess would not be observed for two to four years.

All FSVE wells were connected to conveyance lines on 25 July 2011 following annual sampling. The system will be operated with bi-weekly alternation between SVE wells in each area and weekly opening

and closing of vent wells. The FSVE system will be shutdown completely in July 2012, and groundwater will be monitored for at least four years prior to permanent shutdown and removal.

4.1.2 AS-SVE Operations

AS/SVE system operations are based on pulsed AS operation with 1/3 of the 90 AS points operating and all 12 SVE wells (Figure 17). The AS-SVE system is operated through through programmable logic controllers (PLCs) in the AS and SVE control buildings. The AS PLC operates the solenoids to direct air to the individual AS points for the programmed daily schedule, to monitor operations and to trigger alarms or shut downs as necessary. The SVE PLC monitors blower operations and sends alarm notifications or shuts down the blowers if necessary.

Extracted vapor from the individual wells combine in a single 6-inch header at the piping manifold outside the SVE building. The vapor stream passes through the air/water separator tank to remove entrained vapor and debris from the air stream. No other treatment is performed prior to discharge. AS/SVE operations were incorporated in MSCHD Permit #01030-01P issued for the FSVE with permit conditions applicable to the combined operations.

General preventative maintenance is performed after weekly system readings are recorded: checking the AS compressor oil levels, and checking and cleaning air filter mats and automatic drains. Monthly preventative maintenance includes cleaning the compressor and dryer heat exchange radiators, clearing the compressor vacuum line, checking air intake filters, checking and tightening blower v-belts, and checking SVE blower oil levels. General housekeeping of the AS/SVE compound is performed as needed. Activities and observations are recorded on maintenance and inspection forms.

SVE system flow rates are measured using a pitot tube and flow rates at individual wells are measured by a vane-type meters at the well manifold. Vacuum measurements are made using a digital manometer. Vapor flow rates and vacuum at the SVE well manifold and the system effluent are recorded weekly. The SVE wells are adjusted at the manifold to balance individual flow rates.

Performance monitoring of the AS/SVE operations consists of vacuum measurements at VMPs; PID readings at the system effluent, SVE wells and VMPs; and laboratory analysis of vapor samples from the system effluent. PID readings at the SVE well manifold and the system effluent are recorded weekly; PID readings and vacuum measurements at VMPs are collected monthly; and vapor samples at the system effluent are collected quarterly. The VOC mass removed by the AS/SVE system is estimated from the average VOC concentrations in the effluent sample, system operating hours and flow rates.

Overall effectiveness of the AS/SVE system is evaluated through groundwater samples from 36 PMWs. In April 2011, CVOC concentrations in 32 of the 36 PMWs were below the treatment goal of 50 µg/L for individual CVOCs. The highest total CVOC concentration in the PMWs was 364 µg/L in MW-159, just upgradient of the AS/SVE system; the concentration at this location has decreased 82 percent since April 2009.

Shutdown of the AS/SVE system will be considered when groundwater samples collected upgradient and downgradient of the AS barrier show individual CVOC concentrations at or below 50 µg/L for 12 months. Isolated upgradient outliers may be excluded from consideration if surrounding wells show statistically significant decreasing trends based the nonparametric Mann-Kendall test. Further treatment will not be necessary unless upgradient concentrations rebound.

4.2 GROUNDWATER MONITORING

Groundwater monitoring at DDMT is performed to monitor contaminant migration horizontally and vertically and to evaluate progress toward restoring groundwater to concentrations at or less than MCLs. LTM will continue until CVOC concentrations are at or below MCLs, after which compliance monitoring will be implemented. Compliance well networks (CWNs) will be deemed as demonstrating compliance with RAOs when four consecutive sampling events indicate that concentrations of CVOCs, are below MCLs. Once compliance with RAOs is demonstrated groundwater monitoring in the plume will cease and wells will be proposed for abandonment. Separate CWNs have been proposed for the plumes on the MI, but not at Dunn Field.

4.2.1 Dunn Field LTM

Groundwater monitoring at Dunn Field is conducted to evaluate effectiveness of the FSVE and AS/SVE systems in meeting the RAOs to prevent further offsite migration of VOCs in groundwater in excess of protective target levels and remediate fluvial aquifer groundwater to drinking water quality to be protective of the deeper MAQ. Groundwater monitoring is performed in accordance with the LTM Plan in the Off Depot RD and the Off Depot RAWP. Recommendations for changes to LTM wells and sample frequency are made in annual LTM reports.

Groundwater monitoring includes performance monitoring near the AS/SVE system and LTM in the remainder of the plume. There are 36 PMWs and 60 monitoring wells used for LTM. Another 17 monitoring wells are used for water level measurements during LTM events. PMWs were sampled quarterly during Year 1 (2010) and semiannually during Year 2 (2011); the PMWs will be incorporated in

LTM in Year 3 (2012). Three LTM wells were changed from water level only to sample wells in 2011 to monitor shutdown of the FSVE system.

The LTM plan classified the monitoring wells in three categories:

- Background – wells screened in the fluvial aquifer located along or outside of the Dunn Field boundary; located upgradient to or at a distance from contaminant plumes on Dunn Field; no (or only low-level) previous detections of site contaminants in well samples.
- Sentinel – wells screened within either the fluvial or intermediate aquifers adjacent to or within the window to the IAQ.
- Performance – wells screened in the fluvial aquifer; located within the limits of known contaminant plumes; or repeatedly have contaminants in samples; located in areas targeted for treatment during the RA.

Following addition of the PMWs in 2012, there will be 96 LTM wells classified as background (9), performance (74) or sentinel (13) wells and assigned semiannual (36), annual (34) or biennial (26) sampling frequencies. In addition, 17 wells are used for water level measurements during LTM events. The LTM wells, including those for water levels only, are listed on Table 5 and are shown on Figure 18. Classifications and sample frequencies will be re-evaluated in the 2011 Annual LTM report.

Off Depot groundwater samples are collected from monitoring wells using PDBs where the saturated screened interval is 5 feet or greater and by low-flow sampling with bladder pumps for other wells.

4.2.2 MI LTM

MI LTM is conducted to evaluate progress in meeting the RAOs to restore groundwater to concentrations at or less than MCLs and to prevent contaminant migration horizontally and vertically offsite at concentrations in excess of MCLs. MI LTM is performed in accordance with the LTM plan in the MI RD. Recommendations for changes to LTM wells and sample frequency are made in annual LTM reports.

MI LTM wells are classified in four categories:

- Background – wells screened in the fluvial aquifer located along or outside the MI boundary; wells upgradient of or at a distance from groundwater plumes on the MI and Dunn Field; and wells with no, or low, previous detections of site constituents.

- Boundary – wells screened in the fluvial aquifer located along or outside the MI boundary to monitor constituent migration from off-site sources.
- Sentinel – wells screened within either the fluvial or intermediate aquifer adjacent to or within the window to the IAQ.
- Performance – wells screened in the fluvial aquifer and within the limits of known groundwater plumes.

Five sentinel wells, three in the IAQ and two in the MAQ, were installed in 2010. The hydrogeologic data supported the conceptual model of a connection between the fluvial and deeper aquifers; a lithologic cross-section incorporating the new wells is shown on Figure 19.

Long-term ground water monitoring will continue to track progress of the remedy toward achieving RAOs for ground water. Currently, there are 109 wells used for MI LTM: 7 background wells, 7 boundary wells, 71 performance wells and 24 sentinel wells. The sample frequency for the new sentinel wells will be recommended in the 2011 annual LTM report. The remaining wells have the following sample frequency: biennial (12 wells), annual (32 wells) and semiannual (60 wells). The MI LTM wells are listed on Table 6 and the well locations are shown on Figure 20.

MI LTM samples are collected from monitoring wells using low-flow sampling with bladder pumps. Water quality parameters used to confirm stabilization prior to sampling were also used to evaluate the extent of bioremediation on the MI. Use of PDBs for groundwater sampling will be considered in the 2011 annual LTM report.

There are 71 LTM performance wells screened in the fluvial aquifer and within the limits of designated groundwater plumes: TTA-1 North (MW-21 Area), TTA-1 South (MW-101 Area), TTA-2, West Central, Building 835 and North Central. The designated plumes, primary CVOCs and associated CWNs are listed below.

Plume	CVOC	LTM Wells
TTA-1 North	PCE	DR1-2, DR1-7, DR1-8, MW-21, MW-100B, PMW21-03 and PMW21-05
TTA-1 South	PCE, TCE	DR1-1, DR1-1A, DR1-3, DR1-4, DR1-5, DR1-5A, DR1-6, DR1-6A, MW-101, PMW101-04A/B
TTA-2	PCE, CT, CF	DR2-1, DR2-2, DR2-3, DR2-4, DR2-5, DR2-6, MW-26, MW-64, MW-85, MW-88, MW-92, MW-96, MW-113, MW-217, MW-218, PMW92-03 and PMW92-06
West-Central	PCE	MW-39/39A, MW-94A, MW-98, MW-197A/B, MW-200, MW-203A/B, MW-204A/B, MW-205A/B, MW-206A/B, MW-208A/B, MW-210B, MW-214A/B, MW-215A/B, PZ-03
Bldg 835	TCE	MW-62, MW-142, MW-198, MW199B, MW-209B, MW-212, MW-213 (dry)
North-Central	TCE	MW-103, MW-104

There are four isolated LTM performance wells outside the designated plumes (MW-25A, MW-52, MW-97 and MW-216).

4.3 LAND USE CONTROLS

The LUCs applicable to the MI and Dunn Field are described in the LUCIPs in the MI RD and Off Depot Groundwater RD. LUCs will remain in place until concentrations of contaminants of concern have been reduced to levels that allow for unlimited exposure and unrestricted use. An annual inspection is conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved.

The continued effectiveness of the remedy, including all LUCs implemented at the site, will be evaluated in the CERCLA 5-Year review. The report will include the information contained in the site inspection forms and an evaluation of the need to modify the LUCs.

4.4 FIVE YEAR REVIEWS

Hazardous substances will remain at the site above levels that allow for unrestricted use and unlimited exposure after completion of the RA. Under CERCLA section 121, and as provided in the current guidance on 5-year reviews: OSWER Directive 9355.7-03B-P *Comprehensive Five-Year Review Guidance*, June 2001, DA must conduct a statutory five-year review. Because the final remedies for both the MI and Dunn Field include land use controls in perpetuity, the period in which five-year reviews will be needed is indefinite.

The initial statutory review, *Memphis Depot, Dunn Field, Five Year Review* (CH2M HILL, 2003b), was triggered by initiation of the IRA groundwater recovery system at Dunn Field on DDMT in 1998. The second review was conducted in 2007 and the report, *Second Five-Year Review, Defense Depot Memphis, Tennessee* (e^2M, 2007c), was approved in January 2008.

The second five year review stated the remedy was expected to be protective of human health and the environment upon completion of remedial actions. At that time, the selected remedy in the Dunn Field ROD had not been fully implemented and an amendment to the ROD was being prepared. Attainment of RGs in subsurface soils at Dunn Field was expected by 2012. Groundwater cleanup goals were to be achieved through active treatment and natural attenuation, with RGs expected to be met by 2016 on the MI and by 2018 on Dunn Field. Exposure pathways were considered to be controlled. Long-term protectiveness of the remedial action was to be confirmed by soil sampling after remedial actions are completed on Dunn Field and by groundwater sampling performed during LTM and compliance monitoring at the MI and Dunn Field.

The second five year review identified the following issues regarding implementation of the selected remedy at Dunn Field and groundwater contamination at the Main Installation and at Dunn Field.

- Changes to Dunn Field selected remedy
- Additional groundwater plume delineation at MI
- Hydraulic connectivity of Fluvial and Intermediate aquifers
- Source of offsite plume NE of Dunn Field

The issues did not affect current protectiveness because there was no current exposure to COCs in subsurface soil or groundwater; however future protectiveness was affected because of the potential for vertical migration of COCs from the fluvial aquifer. Follow-up actions were recommended to increase protectiveness through improvements to the remedial actions or providing additional information on areas possibly needing remedial action. All actions have been completed as noted on Table 7.

The third five-year review will be performed in 2012 for approval in January 2013. The review will be performed in accordance with *Comprehensive Five-Year Review Guidance* (USEPA, 2001). The Community Involvement Plan (HDR, 2011b) includes the following activities for notification and public input. The community will be notified of the five-year review and input will be solicited through a letter to local officials and former RAB members, and a notice published in a local general circulation newspaper. Upon completion of the review, a second notice will be published stating that the review has

been completed; the notice will include a location where the report can be viewed and a contact for more information.

4.5 SITE COMPLETION

Selected remedies for DDMT have been implemented in accordance with the MI and Dunn Field RODs, and the IRACRs have been approved by USEPA. The Preliminary Closeout Report has also been approved by USEPA, and the NPL site status is Construction Complete.

Soil cleanup standards have been met where applicable. The remaining requirement for site closure is that groundwater concentrations for the contaminants of concern (CVOCs) are below MCLs. Maximum CVOC concentrations in groundwater have decreased due to RAs but remain above MCLs. The maximum concentrations in March-April 2011 were TCE at 232 µg/L and TeCA at 79 µg/L for Dunn Field and tetrachloroethene at 193 µg/L, TCE at 166 µg/L and CT at 175 µg/L for the MI.

The timeline for site closure includes the following:

- Main Installation
    - MI LTM through 2015, with final quarterly compliance monitoring in 2016
    - MI Remedial Action Completion Report in 2017
- Dunn Field
    - FSVE operates through July 2012
    - Off Depot Air Sparge with SVE operates through December 2014
    - Off Depot LTM through 2019, with final quarterly compliance monitoring in 2020.
    - Dunn Field Remedial Action Completion Report in 2021
- Final Closeout Report in 2021

The Dunn Field RAs are progressing well with continued reduction in groundwater concentrations and are currently expected to meet cleanup levels by or before 2021. Groundwater concentrations on the MI are generally stable, but are not decreasing and have rebounded in some areas since EBT was discontinued. Additional RA on the MI will be evaluated in the 2011 annual LTM report.

5.0 SCHEDULE AND FISCAL YEAR REQUIREMENTS

5.1 RESPONSE SCHEDULES

The environmental restoration activities currently planned for the next three fiscal years are summarized below:

FY12

- Fluvial SVE – Complete Year 5 system operations and monitoring through July 2012; mothball system for potential re-use until removal and well abandonment is approved.
- Off Depot AS/SVE – Year 3 System Operations and Monitoring through December 2012.
- Off Depot LTM – Perform required groundwater monitoring in accordance with LTM plan; additional focus on groundwater rebound at Dunn Field following shutdown of Fluvial SVE.
- Main Installation LTM – Perform required groundwater monitoring in accordance with LTM plan.
- Five-Year Review – Perform third five-year review with final report approval in January 2013.
- Site Management and Community Relations – Conduct annual LUC inspections in July and activities required by community relations plan; prepare Site Management Plan Update

FY13

- Off Depot AS/SVE – Year 4 System Operations and Monitoring through December 2013.
- Off Depot LTM – Perform required groundwater monitoring in accordance with LTM plan; additional focus on groundwater rebound at Dunn Field.
- Main Installation LTM – Perform required groundwater monitoring in accordance with LTM plan.
- Site Management and Community Relations – Conduct annual LUC inspections in July and activities required by community relations plan; prepare Site Management Plan Update

FY14

- Off Depot AS/SVE – Complete Year 5 System Operations and Monitoring through December 2014; mothball system for potential re-use until removal and well abandonment is approved.

- Off Depot LTM – Perform required groundwater monitoring in accordance with LTM plan; additional focus on groundwater rebound at Dunn Field.
- Main Installation LTM – Perform required groundwater monitoring in accordance with LTM plan.
- Site Management and Community Relations – Conduct annual LUC inspections in July and activities required by community relations plan; prepare Site Management Plan Update

The master schedule for MI, Dunn Field and site-1wide activities through through site completion in 2021 is shown on Figure 21. Table 8 provides major milestones for the DDMT environmental restoration program through FY14 for use as a quick reference for upcoming document reviews.

5.2 REQUIREMENTS BY FISCAL YEAR

The financial requirements by fiscal year for the environmental program at DDMT are summarized in Table 9. These requirements will be further refined to reflect periodic updates to the cost-to-complete database that tracks funding requirements by site and is maintained by DA for DDMT.

6.0 REFERENCES

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TABLES

TABLE 1
FUNCTIONAL UNIT AND AREA DESCRIPTIONS
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Main Installation

Functional Unit	Name	Size (Acres)	Common Past Land Use	Description
1	Twenty Typical Warehouses	89	Transportation to and storage in closed warehouses	Located in the northeastern area of the MI, consisting of about 20 large warehouses, with interspersed roadways and railroad tracks.
2	Southeast Golf Course/ Recreational Area	53	Golf, other recreation	Located in the southeastern corner of the MI1, consisting of golf course (Parcel 3). This FU also includes a baseball field and a small playground in the southeastern corner. This FU includes two constructed ponds and two concrete-lined drainage ditches from the ponds leading to the off-site area.
3	Southwest Open Area	92	Transportation to and storage in open-sided warehouses, painting and sandblasting, open storage	Located in the southwestern corner of the MI, consisting of varied type of parcels and sites.
4	Northern and Open Areas	193	Open storage, and transportation to and storage in closed warehouses	Located in the north-central to northwest area of the MI, covering a large area.
5	Newer Warehouses	109	Transportation to and storage in closed warehouses	Located in the south-central area of the MI and includes 10 large warehouse buildings.
6	Administrative and Residential Areas	33	Offices, equipment storage and maintenance, on-base housing	Located along the property boundary of the Depot along the Airways Boulevard. This FU includes the old Residential Unit Area, parking lots, and other asphalt-paved areas.

Dunn Field

Area	Size (Acres)	Description
Northeast Open Area	20	Land in the northeast quadrant of Dunn Field, mostly grass covered with some lightly wooded areas.
Disposal Area	14	Open land in the northwest quadrant of Dunn Field, where the majority of disposal sites are located.
Stockpile Area	30	Open land in the southern half of Dunn Field. Area of former bauxite and fluorspar stockpiles (removed in 1999) and burial areas in the eastern and southwestern portions of Dunn Field.

Notes:
FU: Functional Unit
MI: Main Installation

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 1: Dunn Field			
1	36.16	Mustard and Lewisite Training Sets (9 sets) Burial Site (1955)	A CERCLA Removal Action took place for this area in 2000-2001. No further remedial action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls.
2	36.1	Ammonia Hydroxide (7 pounds) and Acetic Acid (1 gallon) Burial (1955)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls.
3	36.2	Mixed Chemical Burial Site (orthotoluidine dihydrochloride) (1955)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. This unit is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Excavation of this site began in March 2005 and was completed in 2006. USEPA approved the RACR in August 2006.
4	36.3	POL Burial Site (thirteen 55-gallon drums of oil, grease, and paint)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Releases from this unit are addressed by the selected groundwater remedy. Soil vapor extraction system in fluvial deposits began operating in July 2007 and is scheduled to operate until 2012. Thermal-enhanced soil vapor extraction system in loess deposits operated from May until December 2008. USEPA approved the Source Areas OPS determination in October 2009 and the Source Areas IRACR in November 2009. The off-depot groundwater air sparging/soil vapor extraction system began operating in December 2009 and is scheduled to operate until 2014.
5	36.4	Methyl Bromide Burial Site A (3 cubic feet) (1955)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
6	36.2	40,037 units ointment (eye) Burial Site (1955)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
7	36.5	Nitric Acid Burial Site (1,700 quart bottles) (1954)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
8	36.6	Methyl Bromide Burial Site B (3,768 1-gallon cans) (1954)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
9	36.17	Ashes and Metal Burial Site (burning pit refuse) (1955)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
10	36.21	Solid Waste Burial Site (near MW-10) (metal, glass, trash, etc.)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. This unit is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Excavation of this site began in March 2005 and was completed in 2006. USEPA approved the RACR in August 2006.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
11	36.7	Trichloroacetic Acid Burial (1,433 1-ounce bottles) (1965)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. Releases from this unit are addressed by the selected groundwater remedy. Soil vapor extraction system in fluvial deposits began operating in July 2007 and is scheduled to operate until 2012. Thermal-enhanced soil vapor extraction system in loess deposits operated from May until December 2008. USEPA approved the Source Areas OPS determination in October 2009 and the Source Areas IRACR in November 2009. The off-depot groundwater air sparging/soil vapor extraction system began operating in December 2009 and is scheduled to operate until 2014.
12	36.8	Sulfuric and Hydrochloric Acid Burial (1965)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Releases from this unit are addressed by the selected groundwater remedy. Soil vapor extraction system in fluvial deposits began operating in July 2007 and is scheduled to operate until 2012. Thermal-enhanced soil vapor extraction system in loess deposits operated from May until December 2008. USEPA approved the Source Areas OPS determination in October 2009 and the Source Areas IRACR in November 2009. The off-depot groundwater air sparging/soil vapor extraction system began operating in December 2009 and is scheduled to operate until 2014.
13	36.9	Mixed Chemical Burial (Acid, 900 pounds; unnamed solids, 8,100 pounds)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. This unit is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Excavation of this site was completed in March 2005. USEPA approved the RACR in August 2006.
14	36.22	Municipal Waste Burial Site B (near MW-12) (food, paper products)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
15	36.23	Sodium Burial Sites (1968)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
16	36.1	Unknown Acid Burial Site (1969)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
17	36.11	Mixed Chemical Burial Site C (1969)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Releases from this unit are addressed by the selected groundwater remedy. Soil vapor extraction system in fluvial deposits began operating in July 2007 and is scheduled to operate until 2012. Thermal-enhanced soil vapor extraction system in loess deposits operated from May until December 2008. USEPA approved the Source Areas OPS determination in October 2009 and the Source Areas IRACR in November 2009. The off-depot groundwater air sparging/soil vapor extraction system began operating in December 2009 and is scheduled to operate until 2014.
18	36.15	Plane Crash Residue (Dunn Field)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
19	36.24	Former Tear Gas Canister Burn Site (Dunn Field)	No further action is required at this site.
20	36.25	Probable Asphalt Burial Site (Dunn Field)	No further action is required at this site.
21	36.26	XXCC-3 Burial Site (Dunn Field)	No further action is required at this site.
22	36.15	Hardware Burial Site (nuts and bolts) (Dunn Field)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls.
23	36.29	Construction Debris and Food Burial Site (Dunn Field)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
24	36.29	Former Burial/Burn Site and Neutralization Pit	Beginning in August 2000 all 29 bomb casings were recovered from the burial site and 900 cubic yards of soil contaminated with mustard degradation by-products were excavated and disposed offsite. Beginning in November 2000, 33 cubic yards of soil contaminated with mustard and degradation by-products were excavated from the neutralization pit and disposed offsite. In March 2001, the CERCLA Removal Action was complete. No further action is required for this site; however it is located in a section of the Dunn Field stockpile area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
50	36.27	Dunn Field Northeastern Quadrant Drainage Ditch	No further action is required for this site; however, a portion of this area is located in a section of Dunn Field area where the selected CERCLA remedy includes land use controls.
60	36.14	Pistol Range Impact Area/Bullet Stop	A CERCLA Removal Action for lead in surface soil was conducted in 2003. No further action is required at this site.
61	36.28	Buried Drain Pipe (Northwestern Quadrant of Dunn Field)	No further action is required for the site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls.
62	36.12/36.13	Bauxite Storage (Northeastern Quadrant of Dunn Field)	No further action is required at this site.
63	36.29/36.30	Fluorspar Storage (10 mounds in Southeastern Quadrant of Dunn Field, 1 mound in Southwestern Quadrant of Dunn Field) All mounds removed by 1999	No further action is required for the portions of this site in Subparcel 36.30; however, Subparcel 36.29 is located in an area of Dunn Field where the selected CERCLA remedy includes land use controls. A portion of this unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
64	36.29	Bauxite Storage (Southwestern Quadrant of Dunn Field Removed in 1972), CC-2 Burial Site, IA Site 31 (smoke pot burn/disposal area)	The selected CERCLA remedy for IA Site 31 includes excavation of contaminated soils/waste materials and off-site disposal. For the remaining portions of the site no further action is required. All of Site 64 is located in an area of Dunn Field where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Excavation of this site was completed in March 2005. USEPA approved the RACR in August 2006.
85	36.14	Old Pistol Range Building 1184/Temporary Pesticide Storage	A CERCLA Removal Action for lead in surface soil was conducted in 2003. No further action is required at this site.
86	36.18/36.19	Food Supplies (Dunn Field)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
90	36.3	POL Burial Site (thirty-two 55-gallon drums of oil, grease, and thinner) (1955)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. This unit is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy. Releases from this unit are addressed by the selected groundwater remedy. Excavation and off-site disposal of this site was completed in March 2005. USEPA approved the RACR in August 2006. Soil vapor extraction system in fluvial deposits began operating in July 2007 and is scheduled to operate until 2012. Thermal-enhanced soil vapor extraction system in loess deposits operated from May until December 2008. USEPA approved the Source Areas OPS determination in October 2009 and the Source Areas IRACR in November 2009. The off-depot groundwater air sparging/soil vapor extraction system began operating in December 2009 and is scheduled to operate until 2014.
91	36.23	Sodium Phosphate Burial (1968)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
92	36.23	14 Burial Pits: Na_2PO_4, sodium, acid, medical supplies, and chlorinated lime (1969)	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
93	36.1	Acid Burial Site	No further action is required for this site; however, it is located in the Dunn Field disposal area where the selected CERCLA remedy includes land use controls. This unit overlies the subsurface soil remediation area where soil vapor extraction was selected as part of the CERCLA remedy.
Operable Unit 2: Southwestern Quadrant, MI			
27	24.1	Former Recoupment Area (Building 873)	Contaminated soil removed in 1985 as part of pre-Remedial Investigation activities. No further action is required for this site; however, it is located in FU 2 on the MI for which the selected CERCLA remedy includes land use controls.
29	35.2	Former Underground Waste Oil Storage Tank	The tank was located and removed during a CERCLA Removal Action in 2000; the contaminated soils were disposed as special waste and the tank contents were disposed as RCRA hazardous waste. This unit is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This unit overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy. The enhanced bioremediation treatment system operated from May 2006 until February 2009. USEPA approved the MI OPS determination in March 2010.
30	24.3/35.3	Paint Spray Booths (2 of 3 total; Buildings 770 and 1086)	No further action is required for this unit; however, it is located in FUs 3 & 6 on MI for which the selected CERCLA remedy includes land use controls.
31	35.4	Former Paint Spray Booth (Building 1087)	Building 1087 was decontaminated by vacuuming to remove free dust and pressure washing. The surface soil outside the building was excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site; however, it is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This unit overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
32	35.5	Sandblasting Waste Accumulation Area	Building 1088 was decontaminated by vacuuming to remove free dust and pressure washing. The surface soil outside the building was excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site; however, it is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This unit overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bio-remediation was selected as the CERCLA remedy.
33	35.4	Sandblasting Waste Drum Storage Area (metal shed south of Building 1088)	The surface soil in this area was excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site; however, it is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This unit overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
34	24.3	Building 770 Underground Oil Storage Tanks	The underground storage tanks were removed in 1989. This unit is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls.
40	24.3	Safety Kleen Units - 5 of 9 total (all located in Building 770)	No further action is required for these units; however, they were located in FUs 3, 5 and 6 on the MI for which the selected CERCLA remedy includes land use controls.
41	24.3	Satellite Drum Accumulation Areas - 1 of 4 total (vicinity Building 770)	The units were located in FUs 1, 3, 5 and 6 on the MI for which the selected CERCLA remedy includes land use controls.
71	Multiple	Herbicide (All railroad tracks) (used to clear tracks)	This area is located throughout the MI for which the selected CERCLA remedy includes land use controls.
82	23.7/23.8	Flammables (Buildings 783 and 793)	This area is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls.
84	27.2	Flammables, Solvents, Waste Oil, etc. (Building 972)	This area is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls.
87	35.2	DDT, banned pesticides (Building 1084)	Building 1084 was demolished and the debris was disposed off-site at a solid waste landfill. A concrete sump beneath the building was excavated; the contaminated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. This area is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This area overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
88	35.2	POL (Building 1085)	The concrete slab and hydraulic lift were removed during a CERCLA Removal Action in 2000; the contaminated soils were disposed offsite as special waste and the lift and cylinders were cleaned and disposed as scrap metal. The concrete debris was disposed offsite as construction debris. This area is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This area overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
89	28.2	Acids (Building 1089)	Building 1089 was decontaminated by vacuuming to remove free dust and pressure washing. The surface soil in areas outside the southern end of the building were excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. This area is located in FU 3 on the MI for which the selected CERCLA remedy includes land use controls. This area overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 3: Southeastern Watershed And Golf Course, MI			
25	3.8	Golf Course Pond	This unit is in FU 2 on the MI for which the selected CERCLA remedy includes land use controls.
26	3.6	Lake Danielson	This unit is located in FU 2 on the MI for which the selected CERCLA remedy includes land use controls.
30	4.4	Paint Spray Booths (1 of 3 total - Building 260)	No further action is required for this unit; however, it is located in FUs 3 & 6 on MI for which the selected CERCLA remedy includes land use controls.
40	4, 19, and 21	Safety Kleen Units - 4 of 9 total units (Buildings 253, 469, 490, and 689)	No further action is required for these units; however, they were located in FUs 3, 5 and 6 on the MI for which the selected CERCLA remedy includes land use controls.
41	4 and 19	Satellite Drum Accumulation Areas - 2 of 4 total areas (Buildings 260 and 469)	The units were located in FUs 1, 3, 5 and 6 on the MI for which the selected CERCLA remedy includes land use controls.
48	5.2	Former PCB Transformer Storage Area	Site remediation by removal of surface soil was completed in 1998. This unit is located in FU 6 on the MI for which the selected CERCLA remedy includes land use controls. This unit overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
49	17.3	Medical Waste Storage Area	No further action is required for this unit; however, it is located in FU 5 on the MI for which the selected CERCLA remedy includes land use controls.
51	3.7	Lake Danielson Outlet Ditch	No further action is required for this area; however, it is located in FU 2 on the MI for which the selected CERCLA remedy includes land use controls.
52	3.9	Golf Course Pond Outlet Ditch	No further action is required for this area; however, it is located in FU 2 on the MI for which the selected CERCLA remedy includes land use controls.
58	4.9	Pesticides, Herbicides (Pad 267)	This area is located in FU 6 on the MI for which the selected CERCLA remedy includes land use controls. This area overlies a groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
59	4.1	Pesticides, Cleaners (Building 273)	This unit is located in FU 2 on the MI for which the selected CERCLA remedy includes land use controls. This site overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
65	7.2	XXCC-3 (Building 249)	No further action is required for this unit; however, it is located in FU 1 on the MI for which the selected CERCLA remedy includes land use controls.
66	4.11	POL (Building 253)	This unit is located in FU 6 on the MI for which the selected CERCLA remedy includes land use controls. The unit overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
67	4.7	MOGAS (Building 257	This area is located in FU 6 on the MI for which the selected CERCLA remedy includes land use controls. This area overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
68	4.8	POL (Building 263) (20 by 40 feet)	This area is located in FU 6 on the MI for which the selected CERCLA remedy includes land use controls. This area overlies the groundwater treatment area of FU 7, Groundwater at the MI, where enhanced bioremediation was selected as the CERCLA remedy.
69	3.11	2,4-D, M2A1, and M4 Flamethrower Liquid Fuels (surface application)	This area is located in FU 2 on the MI for which the selected CERCLA remedy includes land use controls.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	This area is located throughout the MI for which the selected CERCLA remedy includes land use controls
75	21.5	Unknown Wastes near Building 689	This area is located in FU 5 on the MI for which the selected CERCLA remedy includes land use controls.
76	21.5	Unknown Wastes near Building 690	This area is located in FU 5 on the MI for which the selected CERCLA remedy includes land use controls.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
77	22.2	Unknown Wastes near Buildings 689 and 690	This area is located in FU 5 on the MI for which the selected CERCLA remedy includes land use controls.
78	21.3	Alcohol, Acetone, Toluene, Naphtha; Hydrofluoric Acid Spill	This area is located in FU 5 on the MI for which the selected CERCLA remedy includes land use controls.
Operable Unit 4: North-Central Area, MI			
28	32.3	Recoupment Area (Building 865)	No further action is required for this site; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
35	15.2	DRMO Building S308 - Hazardous Waste Storage	Unit was decontaminated and certified clean November 2001 in accordance with the RCRA Closure Plan (Permit TNHW-053). No further action is required for this unit; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
36	15.5	DRMO Hazardous Waste Concrete Storage Pad	This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
37	15.5	DRMO Hazardous Waste Gravel Storage Pad	This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
38	15.5	DRMO Damaged/Empty Hazardous Materials Drum Storage Area	This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
39	15.5	DRMO Damaged/Empty Lubricant Container Area	This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
41	13.4	Satellite Drum Accumulation Area (1 of 4 total - Building 210)	The units were located in FUs 1, 3, 5 and 6 on the MI for which the selected CERCLA remedy includes land use controls.
42	33.9	Former pentachlorophenol Dip Vat Area	In 1986, the dip vat was removed and the soil was excavated to a depth of 10 feet. Soil with PCP concentrations greater than 200 ppb remained beneath the excavated area. The excavation was backfilled with clean soil and with gravel or concrete placed on top of the fill. No further remedial action is required for this unit. This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
43	33.9	Former Underground pentachlorophenol Tank Area	The tank was brought above ground in 1986 and drained into drums. The soil around the unit was excavated to a depth of 10 to 15 feet, 20 feet wide and 22 feet long. The pumps and lines were also removed. The excavation was backfilled with clean soil and with gravel or concrete placed on top of the clean fill. No further remedial action is required for this unit. This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
44	33.6	Former Wastewater Treatment Unit Area	No further action is required for this site; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
45	33.9	Former Contaminated Soil Staging Area	No further action is required for this site; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
46	33.9	Former pentachlorophenol Pallet Drying Area	This unit is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
47	33.9	Former Contaminated Soil Drum Storage Area (removed 1988)	No further action is required for this unit; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
53	30.2	X-25 Flammable Solvents Storage Area (near Building 925)	No further action is required for this area; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
54	15.6	MI - DRMO East Stormwater Runoff Canal	No further action is required for this area; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
55	15.6	MI - DRMO North Stormwater Runoff Canal	No further action is required for this area; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
56	29.3	MI - West Stormwater Drainage Canal	No further action is required for this area; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
57	12.1	Building 629 Spill Area	This area is located in FU 1 on the MI for which the selected CERCLA remedy includes land use controls.
70	Multiple	POL, Various Chemical Leaks (railroad tracks 1, 2, 3, 4, 5, and 6)	This area is located throughout the MI for which the selected CERCLA remedy includes land use controls.
71	Multiple	Herbicide (all railroad tracks) (used to clear tracks)	This area is located throughout the MI for which the selected CERCLA remedy includes land use controls.
72	15.5/15.6	Waste Oil (DRMO yard) (surface application for dust control)	This area is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	This area is located throughout the MI for which the selected CERCLA remedy includes land use controls.
74	15.3	Flammables, Toxics (West End - Building 319)	No further action is required for this area; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
79	15.6	Fuels, Miscellaneous Liquids, Wood, and Paper (Vicinity S702)	No further action is required for this area; however, it is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
80	33.13	Fuel and Cleaners Dispensing (Building 720)	This area is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
81	33.7	Fuel Oil AST (Building 765 – removed in 1994)	This area is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.
83	30.5	Disposal of Dried Paint Residues - South of Building 949	Lead contaminated soil was removed from an area of approximately 7,200 square feet. The CERCLA Removal Action was completed in 2001. This area is located in FU 4 on the MI for which the selected CERCLA remedy includes land use controls.

Notes:
AOC: Area of Concern
AST: Aboveground Storage Tank
CWM: Chemical Warfare material
CWMP: Chemical Warfare Management Plan
DDT: 4,4′-Dichlorodiphenyltrichloroethane
DRMO: Defense and Reutilization Marketing Office
FU: Functional Unit
IRACR: Interim Remedial Action Completion Report
MI: Main Installation
MOGAS: Motor gasoline
Na: Sodium
OPS: Operating Properly and Successfully
PCB: Polychlorinated biphenyl
PO_4: Phosphate
POL: Petroleum, oil, and lubricants

a. Source: DLA correspondence dated September 24, 2004, RE: Corrective Action Permit Application and Attachment 1 Summary of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Defense Depot Memphis, Tennessee

TABLE 3
REMEDIATION GOALS FROM DUNN FIELD RECORD OF DECISION
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

	Remedial Goal Objectives				
	Site-Specific Soil Screening Levels to be Protective		Protective Soil Vapor Concentration		Groundwater Target Concentrations at 10-4 Target Risk Levels and Target HI=1.0 (µg/L)
Parameter	Loess Specific Values (mg/kg)	Fluvial Deposit Specific Values (mg/kg)	Loess Specific Values (ppbv)	Fluvial Deposit Specific Values (ppbv)	
Carbon Tetrachloride	0.2150	0.1086	28.14	14.22	3.0
Chloroform	0.9170	0.4860	61.57	32.63	12.0
Dichloroethane, 1,2-	0.0329	0.0189	1.12	0.64	—
Dichloroethene, 1,1-	0.1500	0.0764	57.00	29.03	7/340
Dichloroethene, cis-1,2-	0.7550	0.4040	73.86	39.52	35.0
Dichloroethene, trans-1,2-	1.5200	0.7910	256.53	133.50	50.0
Methylene Chloride	0.0305	0.0169	5.14	2.85	—
Tetrachloroethane, 1,1,2,2-	0.0112	0.0066	0.03	0.55	2.2
Tetrachloroethene	0.1806	0.0920	15.18	0.99	2.5
Trichloroethane, 1,1,2	0.0627	0.0355	0.84	2.03	1.9
Trichloroethene	0.1820	0.0932	10.56	2.06	5.0
Vinyl Chloride	0.0294	0.0150	28.94	14.77	—

Notes:
mg/kg: milligrams per kilogram
µg/L: micrograms per liter
ppbv: parts per billion per volume
MCL: maximum contaminant level
HI: hazard index
—: Not available for groundwater cleanup goals because of low number of detections or detected values consistently less than MCLs.

TABLE 4
PROPERTY TRANSFER STATUS
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

FOST No.	Area	Date FOST signed (anticipated date)	Acres	Type of Conveyance	Type of Transfer (Transferee)	Date of Transfer/Deed
1	MI	23-Feb-01	6.52	PBC	Deed (Alpha Omega Veterans)	18-Sep-01
2	MI	27-Sep-01	4.67 13.36	PBC EDC	Deed (Memphis Police Department) Deed (DRC)	6-Feb-02 6-May-02
3	MI	1-Jul-04	302.48 46.74	EDC PBC	Deed (DRC) Letter of Assignment (DOI/NPS)	14-Apr-06 29-Sep-05
4	DF	4-Mar-05	1.57 39.35	PBC CPS	Deed (Memphis) Deed (Dunn Field Business Park, LLC)	2-Sep-05 24-Oct-07
5	DF	12-Jul-10	24.5	CPS		
6	MI	2-Aug-10	193.0	EDC	Deed (DRC)	30-Mar-11

Notes:
CPS: Competitive Public Sale
DF: Dunn Field
DOI/NPS: Department of Interior/National Parks Service
DRC: Depot Redevelopment Corporation
EDC: Economic Development Conveyance
MI: Main Installation
PBC: Public Benefit Conveyance

TABLE 5
OFF DEPOT LTM WELLS
2012 SITE MANAGEMENT PLAN
Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Stick Up (ft)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-03	Fluvial	Performance	Annual	281596.25	802100.69	290.40	2.0	65.5	10	75.5
MW-04	Fluvial	Background	Biennial	281278.87	802369.19	300.00	1.6	60.0	20	80.0
MW-05	Fluvial	Performance	Annual	281254.49	802084.68	301.30	3.3	60.0	20	80.0
MW-06	Fluvial	Performance	Annual	280604.17	802069.13	288.10	1.0	51.0	20	71.0
MW-07	Fluvial	Performance	WL	281839.88	802481.70	293.10	2.0	67.0	10	77.0
MW-08	Fluvial	Background	WL	282001.04	802727.91	292.74	-0.2	56.5	10	66.5
MW-10	Fluvial	Performance	WL	281662.55	802201.26	289.20	-0.4	58.6	10	68.6
MW-13	Fluvial	Background	Biennial	281033.56	802369.21	300.10	-0.1	66.0	15	81.0
MW-14	Fluvial	Background	Biennial	280003.37	802288.95	302.44	-0.2	65.0	15	80.0
MW-15	Fluvial	Performance	Annual	280348.88	801985.36	295.23	-0.1	63.4	15	78.4
MW-28	Fluvial	Background	WL	281568.58	803154.48	294.89	-0.1	54.3	15	69.3
MW-31	Fluvial	Performance	Annual	281651.53	801783.90	287.50	2.9	64.1	15	79.1
MW-32	Fluvial	Performance	Annual	280834.37	801615.51	285.60	-0.2	52.7	15	67.7
MW-33	Fluvial	Performance	Biennial	280398.10	801561.30	277.70	3.0	44.6	15	59.6
MW-37	Intermediate	Sentinel	Biennial	280831.22	801616.58	285.50	-0.6	165.7	15	180.7
MW-42	Fluvial	Background	WL	281883.92	800182.40	275.10	-0.3	49.0	10	59.0
MW-43	Intermediate	Sentinel	WL	280284.33	800111.73	284.99	0.0	161.5	10	171.5
MW-44	Fluvial	Performance	Annual	281073.71	800601.09	269.40	-0.3	64.0	10	74.0
MW-45	Fluvial	Background	WL	280728.08	804125.99	293.30	-0.1	58.0	10	68.0
MW-51	Fluvial	Background	Biennial	282345.86	802828.62	275.50	-0.3	55.0	10	65.0
MW-54	Fluvial	Performance	Semiannual	281160.10	801183.32	295.60	-0.25	84.5	10	94.5
MW-57	Fluvial	Performance	Annual	280184.05	802006.19	291.10	-0.3	60.0	10	70.0
MW-58	Fluvial	Performance	Biennial	279845.07	802066.44	290.70	-0.2	57.0	10	67.0
MW-65	Fluvial	Background	Biennial	283529.72	803887.68	264.00	-0.8	40.8	10	50.8
MW-67	Memphis	Sentinel	WL	280473.05	800933.94	275.53	2.7	260.0	15	275.0
MW-68	Fluvial	Performance	WL	281500.76	802040.04	291.60	0.1	72.5	10	82.5
MW-69	Fluvial	Performance	Annual	281202.55	802011.49	304.90	2.1	82.1	10	92.1
MW-70	Fluvial	Performance	Semiannual	281029.60	801988.49	302.80	2.19	80.8	10	90.8
MW-71	Fluvial	Performance	Annual	280584.68	801804.71	291.90	2.5	65.5	10	75.5
MW-74	Fluvial	Performance	Annual	280991.20	802044.29	304.00	-0.3	70.0	20	90.0
MW-75	Fluvial	Performance	Annual	281080.10	802051.10	304.30	-0.7	71.0	20	91.0
MW-76	Fluvial	Performance	Semiannual	281311.98	801642.76	303.30	-0.59	73.0	20	93.0
MW-77	Fluvial	Performance	Semiannual	281142.96	801815.29	304.70	-0.28	68.0	20	88.0
MW-78	Fluvial	Performance	Biennial	282051.71	802065.28	275.40	-0.4	44.5	20	64.5
MW-79	Fluvial	Performance	Semiannual	281794.22	800899.03	285.40	-0.37	82.5	20	102.5
MW-80	Fluvial	Background	WL	281417.56	800199.07	274.00	-0.2	53.0	20	73.0
MW-87	Fluvial	Performance	Annual	280696.36	802038.55	292.80	2.1	63.0	15	78.0
MW-91	Fluvial	Performance	Annual	280474.97	802014.43	289.30	2.7	55.0	15	70.0
MW-126	Fluvial	Background	WL	282390.01	800491.67	252.49	-0.3	16.0	10	26.0
MW-127	Fluvial	Background	WL	280738.40	799810.30	268.86	-0.2	60.0	10	70.0
MW-128	Fluvial	Background	Biennial	282712.19	803376.38	284.77	-0.6	54.8	20	74.8
MW-129	Fluvial	Background	WL	282271.08	803128.53	293.33	-0.3	65.0	15	80.0

TABLE 5
OFF DEPOT LTM WELLS
2012 SITE MANAGEMENT PLAN
Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Stick Up (ft)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-130	Fluvial	Background	WL	282116.23	803242.02	293.69	-0.5	59.5	20	79.5
MW-132	Fluvial	Performance	Annual	281006.28	802129.10	301.05	-0.3	73.5	15	88.5
MW-134	Fluvial	Performance	Annual	281012.74	802102.58	301.05	-0.2	75.0	15	90.0
MW-144	Fluvial	Performance	Annual	281138.63	801528.84	291.89	-0.3	56.8	20	76.8
MW-145	Fluvial	Performance	Annual	280967.63	800823.18	284.86	-0.1	80.1	20	100.1
MW-147	Fluvial	Performance	Annual	281501.06	801674.04	289.97	-0.2	60.2	20	80.2
MW-148	Fluvial	Performance	Semiannual	281377.94	801461.63	294.87	-0.157	70.0	20	90.0
MW-149	Fluvial	Performance	Semiannual	281130.04	800982.76	287.44	-0.267	81.4	20	101.4
MW-150	Fluvial	Performance	Semiannual	281238.66	801283.61	297.15	-0.332	71.2	20	91.2
MW-151	Fluvial	Performance	Semiannual	281290.42	800874.85	284.42	-0.15	77.0	20	97.0
MW-152	Fluvial	Performance	Semiannual	281515.56	800892.84	289.82	-0.23	91.0	20	111.0
MW-153	Fluvial	Performance	Biennial	282119.38	800952.34	279.26	-0.1	76.1	20	96.1
MW-154	Fluvial	Background	WL	280501.53	800919.48	274.07	-0.3	53.3	10	63.3
MW-155	Fluvial	Performance	Semiannual	281325.31	801168.93	291.84	-0.19	77.0	20	97.0
MW-157	Fluvial	Performance	Semiannual	281050.91	801348.32	286.83	-0.05	57.0	20	77.0
MW-158	Fluvial	Performance	Semiannual	281434.42	801005.34	294.38	-0.31	91.0	15	106.0
MW-158A	Fluvial	Performance	Semiannual	281443.51	801005.67	294.22	-0.27	77.9	15	92.9
MW-159	Fluvial	Performance	Semiannual	281304.29	801006.52	286.58	-0.25	80.4	20	100.4
MW-160	Fluvial	Performance	Semiannual	281366.52	801304.26	294.11	-0.11	65.9	20	85.9
MW-161	Fluvial	Performance	Semiannual	281120.29	801596.82	296.67	-0.27	61.8	20	81.8
MW-162	Fluvial	Performance	Semiannual	281244.22	801596.06	299.89	-0.19	66.3	20	86.3
MW-163	Fluvial	Performance	Semiannual	281152.59	801487.27	290.81	-0.18	56.2	20	76.2
MW-164	Fluvial	Performance	Semiannual	280997.55	801497.47	287.71	-0.23	55.6	20	75.6
MW-165	Fluvial	Performance	Semiannual	281384.63	800855.49	287.35	-0.29	88.6	15	103.6
MW-165A	Fluvial	Performance	Semiannual	281383.55	800865.69	287.53	-0.27	71.3	15	86.3
MW-166	Fluvial	Performance	Semiannual	281224.99	800928.09	280.96	2.48	83.9	15	98.9
MW-166A	Fluvial	Performance	Semiannual	281213.35	800927.36	280.92	2.53	68.3	15	83.3
MW-167	Fluvial	Background	WL	281394.03	800618.54	285.21	-0.4	70.5	15	85.5
MW-169	Transition	Sentinel	Biennial	282491.23	800956.58	262.17	-0.3	68.1	20	88.1
MW-170	Fluvial	Sentinel	Biennial	282443.17	801260.46	273.98	-0.2	59.8	20	79.8
MW-171	Fluvial	Sentinel	Biennial	282315.35	801057.83	271.02	-0.3	53.3	15	68.3
MW-172	Fluvial	Background	Biennial	280213.31	802221.98	300.94	-0.7	68.0	10	78.0
MW-174	Fluvial	Performance	Annual	280352.00	802092.07	296.83	-0.3	67.0	10	77.0
MW-176	Fluvial	Performance	Annual	280823.77	802032.08	299.92	-0.2	76.0	10	86.0
MW-178	Fluvial	Background	Biennial	280982.81	802227.34	300.57	-0.3	76.0	10	86.0
MW-179	Fluvial	Performance	Annual	281075.70	802158.65	301.32	-0.2	77.0	10	87.0
MW-180	Fluvial	Performance	Annual	281476.43	802131.85	296.39	-0.3	72.0	10	82.0
MW-182	Fluvial	Sentinel	Biennial	280524.22	800623.13	272.98	2.4	62.0	10	72.0
MW-184	Fluvial	Performance	Annual	280903.16	801442.29	283.34	-0.2	58.0	10	68.0
MW-185	Fluvial	Sentinel	Biennial	282673.47	800985.92	256.98	-0.3	85.0	10	95.0
MW-186	Fluvial	Sentinel	Biennial	282691.30	800988.07	256.69	-0.4	148.0	10	158.0
MW-187	Fluvial	Background	Biennial	280563.18	802348.09	303.21	-0.5	76.0	10	86.0

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Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Stick Up (ft)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-190	Fluvial	Performance	Annual	281138.88	801595.73	297.58	-0.3	78.0	10	88.0
MW-220	Fluvial	Performance	Annual	281617.49	802166.87	290.31	3.0	64.9	15	79.9
MW-221	Fluvial	Performance	Annual	281399.71	802100.05	298.37	3.2	73.1	15	88.1
MW-222	Fluvial	Performance	Annual	280986.04	802145.54	301.06	2.8	74.2	15	89.2
MW-223	Fluvial	Performance	Annual	280913.53	802104.29	300.41	2.6	73.9	15	88.9
MW-224	Fluvial	Performance	Annual	281017.74	802181.62	301.18	3.0	73.7	15	88.7
MW-225	Fluvial	Performance	Annual	280947.12	802070.50	301.30	3.2	75.0	15	90.0
MW-226	Fluvial	Performance	Annual	280931.94	802147.21	300.56	2.6	74.2	15	89.2
MW-227	Fluvial	Performance	Annual	280257.91	802081.00	296.64	3.1	63.6	15	78.6
MW-228	Fluvial	Performance	Annual	280251.88	802157.40	298.59	3.1	64.1	15	79.1
MW-230	Fluvial	Background	WL	281842.54	802800.22	286.92	-0.4	59.3	15	74.3
MW-231	Intermediate	Sentinel	Biennial	280944.20	801628.65	289.43	-0.3	167.8	26	193.3
MW-232	Intermediate	Performance	Semiannual	281294.53	801006.27	285.63	-0.45	150.1	21	170.6
MW-234	Intermediate	Sentinel	Biennial	281005.44	801630.89	291.71	-0.2	166.6	10	176.8
MW-235	Fluvial	Sentinel	Biennial	280727.57	800447.83	264.21	-0.2	50.6	10	60.8
MW-237	Intermediate	Sentinel	Biennial	281356.02	800963.99	289.53	-0.4	166.5	10	176.7
MW-239	Intermediate	Sentinel	Biennial	281334.02	801009.58	288.77	-0.3	165.5	10	175.7
MW-240	Intermediate	Sentinel	Biennial	282897.03	800869.30	259.51	-0.2	86.6	10	96.8
MW-241	Fluvial	Performance	Semiannual	281389.92	801396.74	293.00	-0.18	73.3	15	88.3
MW-242	Fluvial	Performance	Semiannual	281297.31	801228.65	295.94	-0.54	73.2	16	88.7
MW-243	Fluvial	Performance	Semiannual	281370.62	801116.45	292.53	-0.27	80.7	20	100.7
MW-244	Fluvial	Performance	Semiannual	281333.49	801101.07	289.45	-0.73	76.3	20	96.3
MW-245	Fluvial	Performance	Semiannual	281379.56	801035.07	290.55	-0.42	84.7	20	104.7
MW-246	Fluvial	Performance	Semiannual	281387.26	800951.62	288.49	-0.32	85.2	20	105.2
MW-247	Fluvial	Performance	Semiannual	281319.67	800900.12	286.16	-0.46	80.0	20	100.0
MW-248	Fluvial	Performance	Semiannual	281253.66	800720.22	275.93	-0.48	67.5	20	87.5
MW-249	Fluvial	Performance	Semiannual	281029.63	800789.83	285.89	-0.36	78.0	20	98.0
MW-250	Intermediate	Performance	Semiannual	281045.53	800900.38	290.19	-0.53	168.7	15	183.7
MW-251	Intermediate	Performance	Semiannual	281211.70	801021.75	286.16	-0.33	160.2	15	175.2

Notes:
ft: feet
btoc: below top of casing
msl: mean seal level

TABLE 6
MAIN INSTALLATION LTM WELLS
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Stick Up (ft)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-16	Fluvial	Background	Biennial	278837.83	807099.66	300.19	-0.3	57.6	15	72.6
MW-19	Fluvial	Background	Biennial	278945.87	800782.26	290.86	-0.3	83.1	10	93.1
MW-21	Fluvial	Performance	Semiannual	276473.39	800602.39	295.21	-0.2	92.1	15	107.1
MW-22	Fluvial	Boundary	Biennial	275912.38	800702.16	298.49	-0.5	95.4	10	105.4
MW-23	Fluvial	Boundary	Biennial	275791.02	801817.13	299.24	-0.3	101.2	10	111.2
MW-24	Fluvial	Boundary	Biennial	275616.05	803538.81	299.81	-0.3	97.3	15	112.3
MW-25A	Fluvial	Performance	Annual	275975.11	805521.27	270.13	-0.3	73.0	10	83.0
MW-26	Fluvial	Performance	Semiannual	276508.16	805962.09	303.89	-0.2	97.6	10	107.6
MW-34	Intermediate	Sentinel	Annual	279411.21	801917.96	300.80	-0.8	136.6	20	156.6
MW-38	Intermediate	Sentinel	Annual	279141.38	802450.43	308.45	-1.0	139.9	15	154.9
MW-39	Fluvial	Performance	Semiannual	277280.67	802598.11	296.58	-0.3	95.5	20	115.5
MW-39A	Fluvial	Performance	Semiannual	277278.20	802607.72	298.49	0.0	147.9	20	167.9
MW-50	Fluvial	Boundary	Biennial	276455.81	807065.28	299.32	-0.5	115.0	10	125.0
MW-52	Fluvial	Performance	Annual	275371.97	805897.36	279.71	-0.5	94.0	10	104.0
MW-53	Fluvial	Background	Biennial	279176.66	805136.05	305.58	0.8	72.5	10	82.5
MW-55	Fluvial	Background	Biennial	279301.05	801204.62	292.48	-0.4	64.0	10	74.0
MW-62	Fluvial	Performance	Semiannual	278289.89	801858.16	294.10	-0.5	86.0	10	96.0
MW-63A	Fluvial/Intermediate	Sentinel	Annual	278200.31	803572.83	306.33	-0.4	140.0	10	150.0
MW-63B	Fluvial/Intermediate	Sentinel	Annual	278201.32	803557.77	306.22	-0.4	115.0	10	125.0
MW-64	Fluvial	Performance	Semiannual	276951.52	805005.97	304.46	-0.2	102.0	10	112.0
MW-66A	Fluvial	Background	Biennial	276626.02	799792.63	284.34	-0.1	74.6	20	94.6
MW-85	Fluvial	Performance	Semiannual	276704.14	806064.51	304.50	-0.4	95.9	15	110.9
MW-88	Fluvial	Performance	Semiannual	276879.05	806512.88	305.47	-0.3	82.0	15	97.0
MW-89	Intermediate	Sentinel	Annual	278286.97	802555.25	304.38	-0.4	147.0	30	177.0
MW-90	Intermediate	Sentinel	Semiannual	278283.60	802539.51	304.64	-0.5	115.0	30	145.0
MW-92	Fluvial	Performance	Semiannual	276614.20	806489.66	304.78	-0.4	93.0	15	108.0
MW-93	Fluvial	Boundary	Biennial	275542.22	804440.10	294.31	-0.2	92.0	15	107.0
MW-94A	Fluvial	Performance	Semiannual	276805.80	803085.80	303.23	-0.2	109.6	10	119.6
MW-96	Fluvial	Performance	Annual	276310.14	806320.24	289.67	-0.7	75.5	20	95.5
MW-97	Fluvial	Performance	Semiannual	276074.23	802139.23	297.70	-0.3	97.5	20	117.5
MW-98	Fluvial	Performance	Semiannual	276891.37	802572.77	294.93	-0.5	137.0	10	147.0
MW-99	Fluvial	Background	Biennial	277443.37	801114.53	285.69	-0.4	91.5	20	111.5
MW-100B	Fluvial	Performance	Semiannual	276600.65	800854.43	291.60	-0.5	107.5	20	127.5
MW-101	Fluvial	Performance	Semiannual	276204.27	801110.38	291.99	-0.3	89.0	15	104.0
MW-102B	Fluvial	Boundary	Biennial	275760.59	800707.72	312.07	-0.7	120.5	20	140.5
MW-103	Fluvial	Performance	Annual	278690.88	805159.83	301.89	-0.5	70.0	20	90.0
MW-104	Fluvial	Performance	Annual	278676.47	805417.03	292.18	-0.2	70.5	20	90.5
MW-107	Fluvial/Intermediate	Sentinel	Annual	278419.07	803009.93	305.18	-0.3	128.0	15	143.0

TABLE 6
MAIN INSTALLATION LTM WELLS
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Stick Up (ft)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-108	Fluvial/Intermediate	Sentinel	Semiannual	277658.02	802985.53	303.25	-0.2	160.0	10	170.0
MW-113	Fluvial	Performance	Semiannual	276685.34	806279.10	304.92	-0.1	96.0	10	106.0
MW-140	Intermediate	Sentinel	Annual	279061.29	801715.68	298.16	0.0	224.6	20	244.6
MW-141	Intermediate	Sentinel	Semiannual	278019.19	802571.25	303.70	0.0	148.7	20	168.7
MW-142	Fluvial	Performance	Annual	278056.03	801629.12	291.49	-0.3	85.0	20	105.0
MW-143	Fluvial	Background	Semiannual	278301.27	801201.33	290.74	-0.2	78.5	20	98.5
MW-197A	Fluvial	Performance	Semiannual	276975.42	802042.30	291.54	-0.3	162.0	15	177.0
MW-197B	Fluvial	Performance	Semiannual	276973.14	802036.92	291.43	-0.4	94.2	15	109.2
MW-198	Fluvial	Performance	Annual	277775.67	802141.93	291.80	-0.3	90.0	15	105.0
MW-199A	Intermediate	Sentinel	Annual	277756.40	802573.52	301.84	-0.3	146.1	15	161.1
MW-199B	Fluvial	Performance	Semiannual	277751.74	802575.66	302.07	-0.3	104.6	15	119.6
MW-200	Fluvial	Performance	Semiannual	277006.10	802859.39	300.51	-0.3	102.9	15	117.9
MW-202A	Intermediate	Sentinel	Annual	278685.74	802111.27	299.69	-0.5	176.2	15	191.2
MW-202B	Intermediate	Sentinel	Semiannual	278692.79	802112.04	299.74	-0.2	118.8	15	133.8
MW-203A	Fluvial	Performance	Semiannual	276841.61	801740.37	290.78	-0.2	142.9	15	158.0
MW-203B	Fluvial	Performance	Semiannual	276821.58	801741.76	290.75	-0.2	92.8	15	107.8
MW-204A	Fluvial	Performance	Semiannual	276724.66	802168.25	292.49	-0.3	133.3	15	148.3
MW-204B	Fluvial	Performance	Semiannual	276707.82	802167.00	292.67	-0.4	94.5	15	109.5
MW-205A	Fluvial	Performance	Semiannual	277157.28	802277.37	292.32	-0.4	141.0	15	156.0
MW-205B	Fluvial	Performance	Semiannual	277173.13	802277.76	292.04	-0.2	97.0	15	112.0
MW-206A	Fluvial	Performance	Semiannual	277219.28	802792.28	300.35	-0.4	127.3	15	142.4
MW-206B	Fluvial	Performance	Semiannual	277200.85	802794.78	300.12	-0.2	96.7	15	111.7
MW-207A	Fluvial	Sentinel	Semiannual	277652.65	803191.86	303.99	-0.2	149.7	15	164.7
MW-207B	Fluvial	Sentinel	Semiannual	277665.39	803193.06	304.03	-0.2	108.3	15	123.3
MW-208A	Fluvial	Performance	Semiannual	277382.04	802799.25	301.91	-0.4	183.4	15	198.5
MW-208B	Fluvial	Performance	Semiannual	277396.90	802814.96	302.08	-0.3	106.7	15	121.7
MW-209A	Intermediate	Sentinel	Annual	277574.28	802507.10	298.36	-0.3	189.0	15	204.0
MW-209B	Fluvial	Performance	Semiannual	277581.50	802520.13	298.72	-0.2	102.3	15	117.3
MW-210A	Intermediate	Sentinel	Semiannual	277238.49	801958.05	289.78	-0.1	177.1	15	192.0
MW-210B	Fluvial	Performance	Semiannual	277228.18	801951.94	289.53	-0.2	97.0	15	112.0
MW-211	Intermediate	Sentinel	Annual	278000.59	802973.69	304.09	-0.4	166.3	15	181.3
MW-212	Fluvial	Performance	Semiannual	278028.36	802225.44	295.68	-0.3	85.7	15	100.7
MW-213	Fluvial	Performance	Semiannual	278426.83	801668.99	294.12	-0.3	76.9	15	91.9
MW-214A	Fluvial	Performance	Annual	277877.62	803906.94	303.96	-0.4	119.1	15	134.1
MW-214B	Fluvial	Performance	Annual	277875.84	803922.20	303.96	-0.3	101.6	15	116.6
MW-215A	Fluvial	Performance	Annual	277298.37	804164.31	304.86	-0.4	128.8	15	143.8
MW-215B	Fluvial	Performance	Annual	277298.27	804177.33	304.98	-0.4	105.4	15	120.4
MW-216	Fluvial	Performance	Annual	276024.68	801995.93	297.63	-0.3	99.9	15	115.0

TABLE 6
MAIN INSTALLATION LTM WELLS
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Stick Up (ft)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-217	Fluvial	Performance	Semiannual	276670.60	805213.69	304.51	-0.3	101.8	15	116.8
MW-218	Fluvial	Performance	Semiannual	276936.70	805628.44	306.00	-0.4	98.9	15	114.0
MW-219	Fluvial	Boundary	Semiannual	276429.60	800460.96	295.07	-0.2	97.7	15	112.8
MW-229	Intermediate	Sentinel	Annual	279293.98	802836.28	311.99	-0.2	188.4	20	208.4
MW-252	Intermediate	Sentinel	TBD	278789.21	801364.70	294.40	-0.2	126.1	20	146.1
MW-253	Intermediate	Sentinel	TBD	278287.43	801191.42	290.80	-0.3	118.3	20	138.3
MW-254	Memphis	Sentinel	TBD	279334.36	800857.53	293.28	-0.4	285.8	20	305.8
MW-255	Memphis	Sentinel	TBD	279304.76	801226.84	292.38	-0.5	284.7	20	304.7
MW-256	Intermediate	Sentinel	TBD	279301.82	801243.80	293.40	-0.7	127.1	20	147.1
PMW101-04A	Fluvial	Performance	Semiannual	276299.41	801182.12	291.43	-0.4	117.9	20	137.9
PMW101-04B	Fluvial	Performance	Semiannual	276296.40	801186.86	291.75	-0.3	98.6	20	118.6
PMW21-03	Fluvial	Performance	Semiannual	276573.43	800742.52	292.72	-0.6	90.3	20	110.3
PMW21-05	Fluvial	Performance	Semiannual	276628.32	801129.72	288.92	-0.4	94.3	20	114.3
PMW92-03	Fluvial	Performance	Semiannual	276678.91	806438.66	304.17	-0.3	92.5	10	102.5
PMW92-06	Fluvial	Performance	Semiannual	276766.94	806270.66	304.97	-0.3	91.6	10	101.6
PZ-03	Fluvial	Performance	Annual	276379.33	802941.05	298.98	-0.5	108.9	10	118.9
DR1-1	Fluvial	Performance	Annual	276300.45	800855.38	293.26	-0.2	121.7	20	141.7
DR1-1A	Fluvial	Performance	Annual	276307.37	800863.15	293.29	-0.2	89.3	20	109.3
DR1-2	Fluvial	Performance	Annual	276536.56	801152.64	290.28	-0.2	97.8	20	117.8
DR1-3	Fluvial	Performance	Semiannual	276527.27	801415.91	291.11	-0.2	109.7	20	129.7
DR1-4	Fluvial	Performance	Annual	276231.20	801399.53	293.00	-0.2	106.3	20	126.3
DR1-5	Fluvial	Performance	Semiannual	276079.76	800828.18	294.88	-0.4	125.2	20	145.2
DR1-5A	Fluvial	Performance	Semiannual	276086.88	800835.32	294.88	-0.3	89.7	20	109.7
DR1-6	Fluvial	Performance	Semiannual	276044.05	801103.49	293.44	-0.5	115.8	20	135.8
DR1-6A	Fluvial	Performance	Semiannual	276035.13	801103.29	293.52	-0.4	90.8	20	110.8
DR1-7	Fluvial	Performance	Annual	276791.26	801441.36	289.46	-0.3	108.3	20	128.3
DR1-8	Fluvial	Performance	Annual	276752.46	800875.44	290.37	-0.4	92.7	20	112.7
DR2-1	Fluvial	Performance	Semiannual	276772.10	806497.62	305.08	-0.2	73.9	20	93.9
DR2-2	Fluvial	Performance	Semiannual	276771.06	806658.74	304.49	-0.1	79.0	20	99.0
DR2-3	Fluvial	Performance	Semiannual	276539.12	806203.16	303.66	-0.2	93.0	20	113.0
DR2-4	Fluvial	Performance	Annual	276455.68	806632.64	303.80	-0.3	88.0	20	108.0
DR2-5	Fluvial	Performance	Semiannual	276830.90	806180.36	305.55	-0.1	85.0	20	105.0
DR2-6	Fluvial	Performance	Semiannual	276643.99	805860.91	304.92	-0.2	94.6	20	114.6

Notes:
ft: feet
btoc: below top of casing
msl: mean seal level

TABLE 7
STATUS OF FOLLOW-UP ACTIONS FROM SECOND FIVE-YEAR REVIEW
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Issues	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)		Completion Date	Document
					Current	Future		
Changes to Dunn Field selected remedy	1) Complete Public Comment period for Proposed Plan	DLA	USEPA/ TDEC	10/29/2008	N	Y	11/25/2008	*Dunn Field Record of Decision Amendment, Rev. 3* (e^2M, 2009a)
	2) Complete ROD Amendment			4/27/2009			3/19/2009	
Additional groundwater plumes delineation at MI	Determine treatment requirements	DLA	USEPA/ TDEC	6/30/2008	N	Y	2/20/2009	*Main Installation Source Area Investigation Report, Rev. 0* (e^2M, 2009a)
Hydraulic connectivity of Fluvial and Intermediate aquifers	1) Intermediate Aquifer Study Report	DLA	USEPA/ TDEC	1/11/2008	N	Y	4/14/2008	*Results of the Memphis Depot – Dunn Field Intermediate Aquifer Investigation* (CH2M HILL, 2008a)
	2) Incorporate results in Final Off Depot Groundwater RD			5/17/2008			9/10/2008	*Memphis Depot Dunn Field Off Depot Groundwater Final Remedial Design, Rev. 1* (CH2M HILL 2008b)
Source of offsite plume NE of Dunn Field	Installation of offsite monitoring wells	TDEC	USEPA	6/30/2008	N	Y	9/26/2007	*Site Investigation Narrative Report (PASI) Cintas Site* (TDEC, 2007)

Notes:
DLA: Defense Logistics Agency
RD: Remdial Desisgn
ROD: Record of Decision
TDEC: Tennesse Department of Environment and Conservation
USEPA: United States Environemtnal Protection Agency

TABLE 8
MAJOR MILESTONES FY12 THROUGH FY14
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Activity	2012 SMP Date	Expected Date (if different)
Fluvial SVE Year 4 Annual Report, Rev 0 Submittal	30 October 2011	--
2012 Site Management Plan, Rev. 0 Submittal	30 November 2011	--
2011 MI LTM Report, Rev 0 Submittal	12 January 2012	--
Fluvial SVE Year 4 Annual Report, Rev 1 Submittal	28 January 2012	--
2012 Site Management Plan, Rev. 1 Submittal	29 January 2012	--
2011 Dunn Field LTM and Year 2 AS/SVE Report, Rev 0 Submittal	29 February 2012	--
2011 MI LTM Report, Rev 1 Submittal	11 April 2012	--
2011 Dunn Field LTM and Year 2 AS/SVE Report, Rev 1 Submittal	28 June 2012	--
3rd Five-Year Review, Rev. 0 Submittal	29 July 2012	--
2012 Annual LUCIP Inspection Reports	31 July 2012	--
Fluvial SVE Year 5 Annual Report, Rev 0 Submittal	1 November 2012	--
2013 Site Management Plan, Rev. 0 Submittal	30 November 2012	--
3rd Five-Year Review, Rev. 1 Submittal	26 December 2012	--
2012 MI LTM Report, Rev 0 Submittal	10 January 2013	--
2013 Site Management Plan, Rev. 1 Submittal	29 January 2013	--
Final 3rd Five-Year Review Submittal	30 January 2013	--
Fluvial SVE Year 5 Annual Report, Rev 1 Submittal	30 January 2013	--
2012 Dunn Field LTM and Year 3 AS/SVE Report, Rev 0 Submittal	1 March 2013	--
2012 MI LTM Report, Rev 1 Submittal	10 April 2013	--
2012 Dunn Field LTM and Year 3 AS/SVE Report, Rev 1 Submittal	29 June 2013	--
2013 Annual LUCIP Inspection Reports	31 July 2013	--
2014 Site Management Plan, Rev. 0 Submittal	29 November 2013	--
2013 MI LTM Report, Rev 0 Submittal	9 January 2014	--
2014 Site Management Plan, Rev. 1 Submittal	28 January 2014	--
2013 Dunn Field LTM and Year 4 AS/SVE Report, Rev 0 Submittal	1 March 2014	--
2013 MI LTM Report, Rev 1 Submittal	9 April 2014	--
2013 Dunn Field LTM and Year 4 AS/SVE Report, Rev 1 Submittal	29 June 2014	--
2014 Annual LUCIP Inspection Reports	31 July 2014	--

TABLE 9
FISCAL YEAR REQUIREMENTS
2012 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site	Description	Phase	FY12	FY13	FY14	FY15	FY16	FY17	FY18+	Total CTC
	Dunn Field Land Use Control Sites									
DDMT-002	NH3 Hydroxide/Acetic Acid Burial	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-003	Mixed Chemical Burial	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-005	OU1 Methyl Bromide Site A	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-006	OU1 Eye Ointment Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-007	OU1 Fuming Nitric Acid Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-008	OU1 Methyl Bromide Site B	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-009	Ashes and Metal Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-010	OU1 Solid Waste Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-013	OU1 Mixed Chemical Site B	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-014	OU1 Municipal Waste Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-015	OU1 Sodium Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-016	OU1 Unknown Acid Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-018	OU1 Plane Crash Residue Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-022	OU1 Hardware Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-023	OU1 Construction Debris/Food Burial	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-061	OU1 Buried Drain Pipe (NW Quadrant)	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-064	OU1 Bauxite Storage	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-086	OU1 Food Supplies Burial Site	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-091	OU1 NA Phos Burial 1968 Site 15.1	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-092	OU1 14 Burial Pits (Site 15.2)	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
DDMT-093	OU1 Acid Date Unknown (Site 16.1)	LTM	$3,000	$1,000	$1,000	$1,000	$1,000	$2,000	$28,000	$37,000
		Subtotal	$63,000	$21,000	$21,000	$21,000	$21,000	$42,000	$588,000	$777,000
	Dunn Field Remedial ActionSites									
DDMT-004	004 OU1 POL Burial Site	RAC	$30,000							$30,000
DDMT-004	004 OU1 POL Burial Site	RAO	$120,000	$54,000	$45,000	$26,000	$26,000	$32,000	$26,000	$329,000
DDMT-004	004 OU1 POL Burial Site	LTM							$236,000	$236,000
DDMT-011	OU1 Trichloracetic Acid Burial Site	RAC	$30,000							$30,000
DDMT-011	OU1 Trichloracetic Acid Burial Site	RAO	$120,000	$54,000	$45,000	$26,000	$26,000	$32,000	$26,000	$329,000
DDMT-011	OU1 Trichloracetic Acid Burial Site	LTM							$236,000	$236,000
DDMT-012	OU1 H2SO4/HCl Acid Burial Site	RAC	$30,000							$30,000
DDMT-012	OU1 H2SO4/HCl Acid Burial Site	RAO	$120,000	$54,000	$45,000	$26,000	$26,000	$32,000	$26,000	$329,000
DDMT-012	OU1 H2SO4/HCl Acid Burial Site	LTM							$236,000	$236,000
DDMT-017	OU1 Mixed Chemical Site C	RAC	$30,000							$30,000
DDMT-017	OU1 Mixed Chemical Site C	RAO	$120,000	$54,000	$45,000	$26,000	$26,000	$32,000	$26,000	$329,000
DDMT-017	OU1 Mixed Chemical Site C	LTM							$236,000	$236,000
DDMT-090	090 OU1 POL Burial Site	RAC	$30,000							$30,000
DDMT-090	090 OU1 POL Burial Site	RAO	$120,000	$54,000	$45,000	$26,000	$26,000	$32,000	$26,000	$329,000
DDMT-090	090 OU1 POL Burial Site	LTM							$236,000	$236,000
		Subtotal	$750,000	$270,000	$225,000	$130,000	$130,000	$160,000	$1,310,000	$2,975,000
	Main Installation Remedial ActionSites									
DDMT-029	OU2 Former UST Waste Oil	RAO	$316,000	$219,000	$203,000					$738,000
DDMT-029	OU2 Former UST Waste Oil	LTM				$444,000	$128,000	$33,000	$545,000	$1,150,000
		Subtotal	$316,000	$219,000	$203,000	$444,000	$128,000	$33,000	$545,000	$1,888,000
		Total	$1,129,000	$510,000	$449,000	$595,000	$279,000	$235,000	$2,443,000	$5,640,000

FIGURES

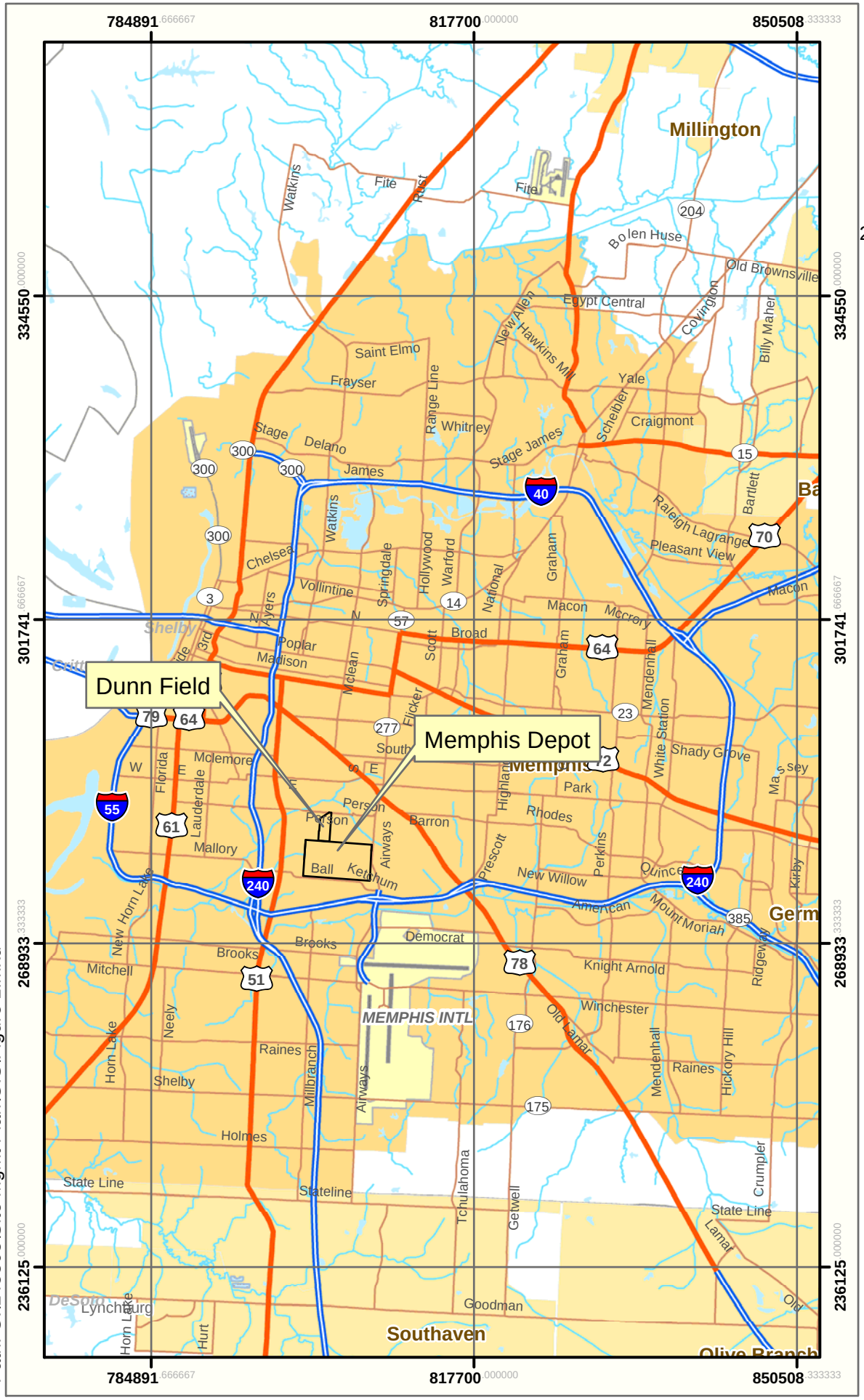

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Figure 1

SITE LOCATION MAP

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 0.6 1.2 1.8 2.4 3 Miles

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Path: G:\145803\Site Mgmt Plan\GIS\Figure 1.mxd

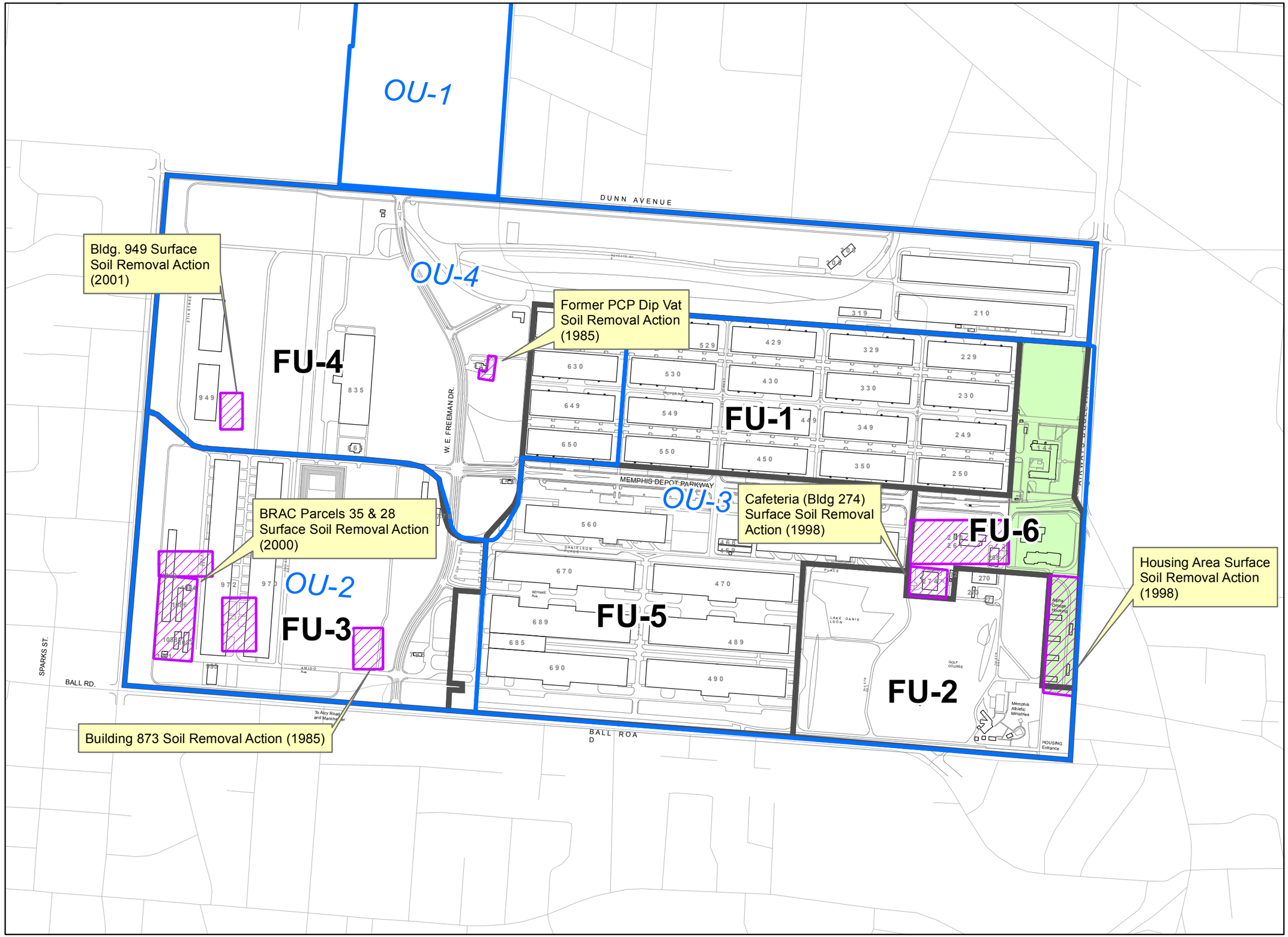

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Figure 2

UNIT BOUNDARIES AND RESPONSE ACTIONS

2012 SITE MANAGEMENT PLAN

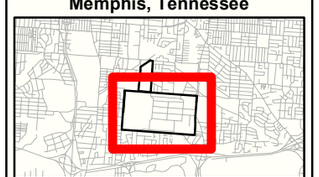
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend
- Operable Units (OU-#)
- Functional Unit Boundary (FU-#)
- Areas Available for Unrestricted Use
- Past Response Actions

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 250 500 1,000
Scale in Feet

Installation Location
Memphis, Tennessee



Date: October 2011
Edition: Rev 0

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Figure 3

DUNN FIELD AREA DESIGNATIONS, REMOVAL ACTIONS AND INTERIM REMEDIAL ACTION

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

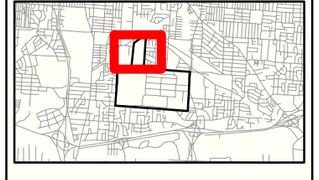
- Original Dunn Field Perimeter
- Unrestricted Use Area from ROD
- Area Designations
- IRA Recovery Well
- IRA Discharge Conveyance Line
- Removal Actions

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Aerial Photo Date: 2006

0 150 300 600
Feet

Installation Location
Memphis, Tennessee



Date: October 2011
Edition: Rev 0

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Figure 4

OU-1 SITE LOCATIONS

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Chemical Warfare Management Plan Site
- Proposed Early Removal Site
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 100 200 400
Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Figure 5

OU-2 SITE LOCATIONS

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

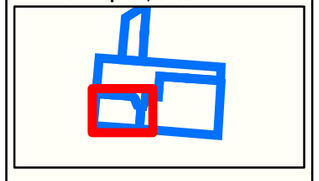
- Early Removal Site
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Trichloroethene Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Datum : WGS 84
Units: Feet

0 125 250 500

Scale in Feet

Installation Location
Memphis, Tennessee



Date: October 2011
Edition: Rev 0

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Figure 6

OU-3 SITE LOCATIONS

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 150 300 600

Scale in Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

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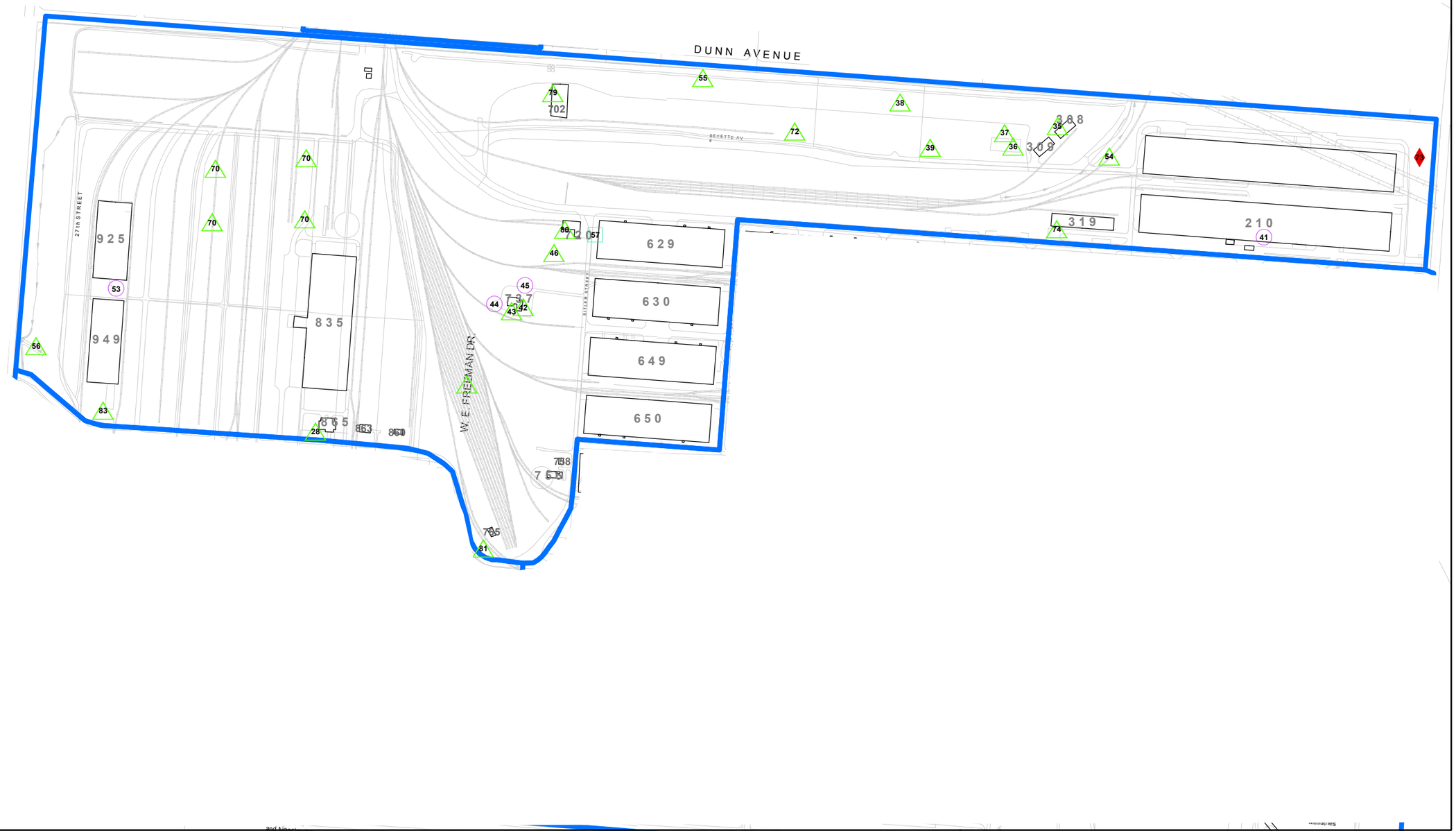

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Figure 7

OU-4 SITE LOCATIONS

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

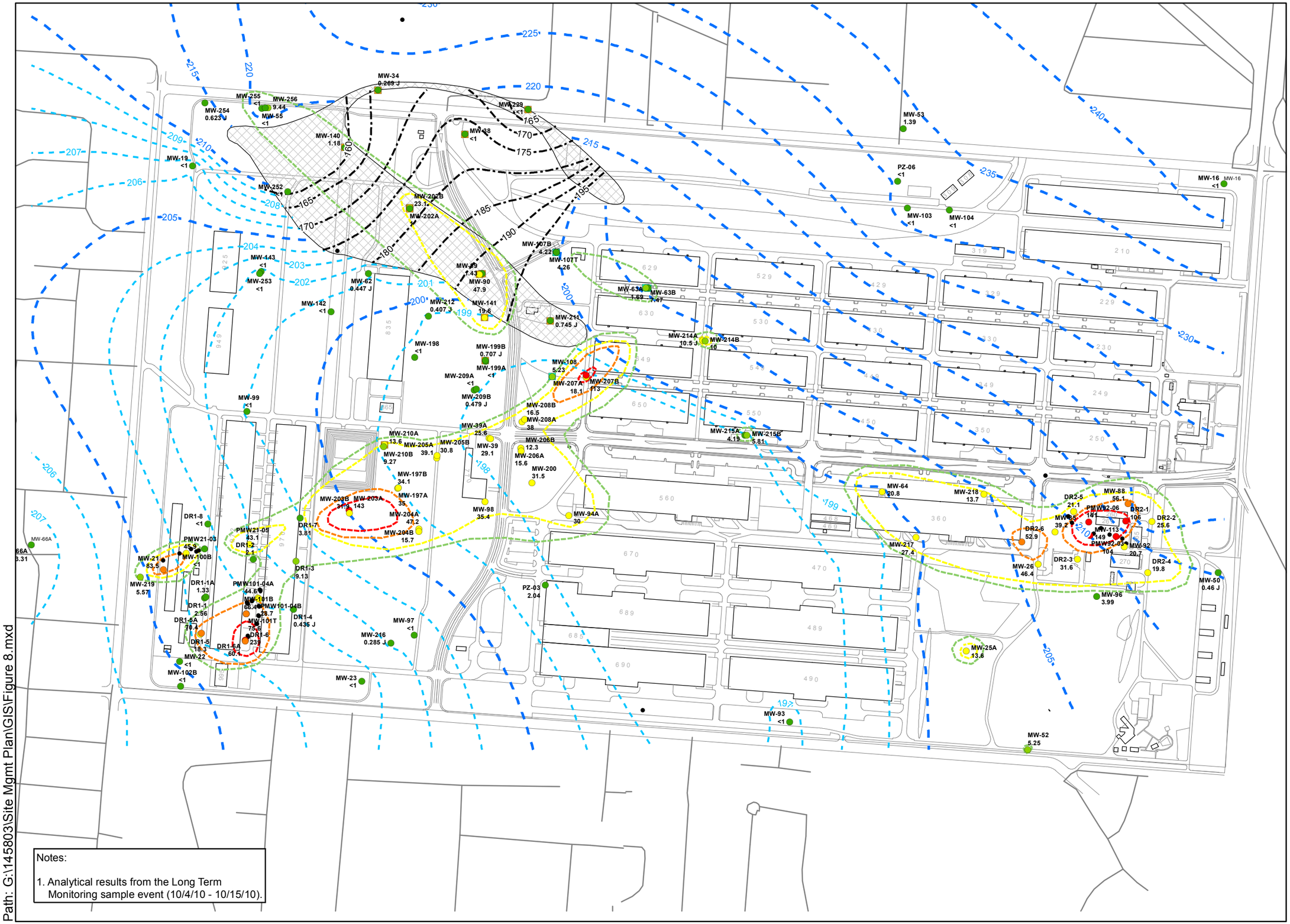
0 250 500 1,000

Scale in Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR



Notes:

1. Analytical results from the Long Term Monitoring sample event (10/4/10 - 10/15/10).

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Figure 8

MAIN INSTALLATION PCE ISOPLETH MAP, OCTOBER 2010

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

PCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300

PCE Isopleth
ug/L

- 5
- 10
- 50
- 100
- Clay Elevation Exceeds Groundwater Elevation
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Intermediate Aquifer 5-ft. contour

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

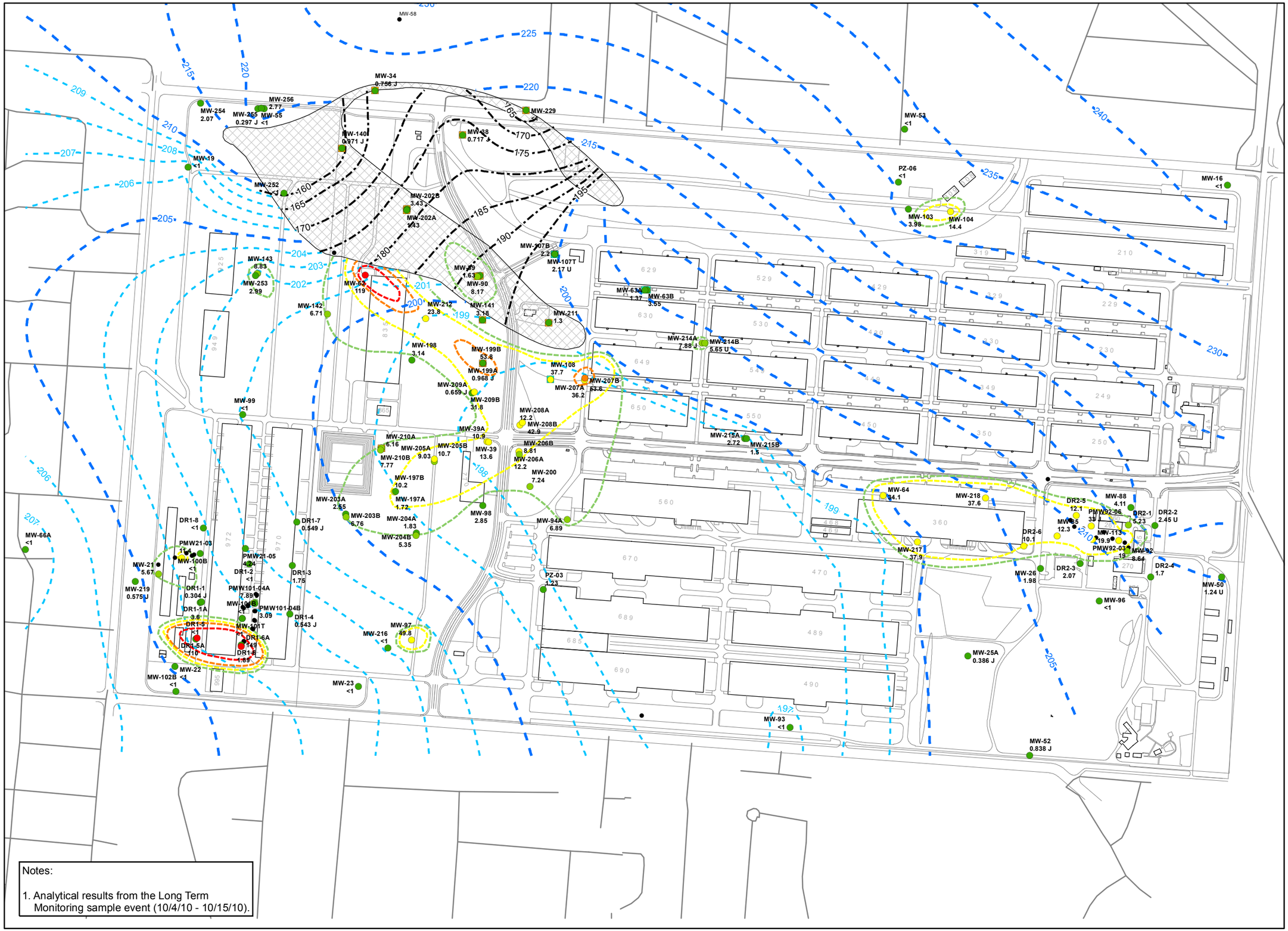
0 200 400 800

Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR



Notes:

1. Analytical results from the Long Term Monitoring sample event (10/4/10 - 10/15/10).

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Figure 9

MAIN INSTALLATION TCE ISOPLETH MAP, OCTOBER 2010

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

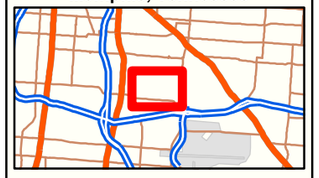
TCE Ranges
ug/L
- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300

TCE Isopleth
ug/L
- 5
- 10
- 50
- 100
- Clay Elevation Exceeds Groundwater Elevation
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Intermediate Aquifer 5-ft. contour

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 200 400 800
Feet

Installation Location
Memphis, Tennessee



Date: October 2011
Edition: Rev 0

HDR

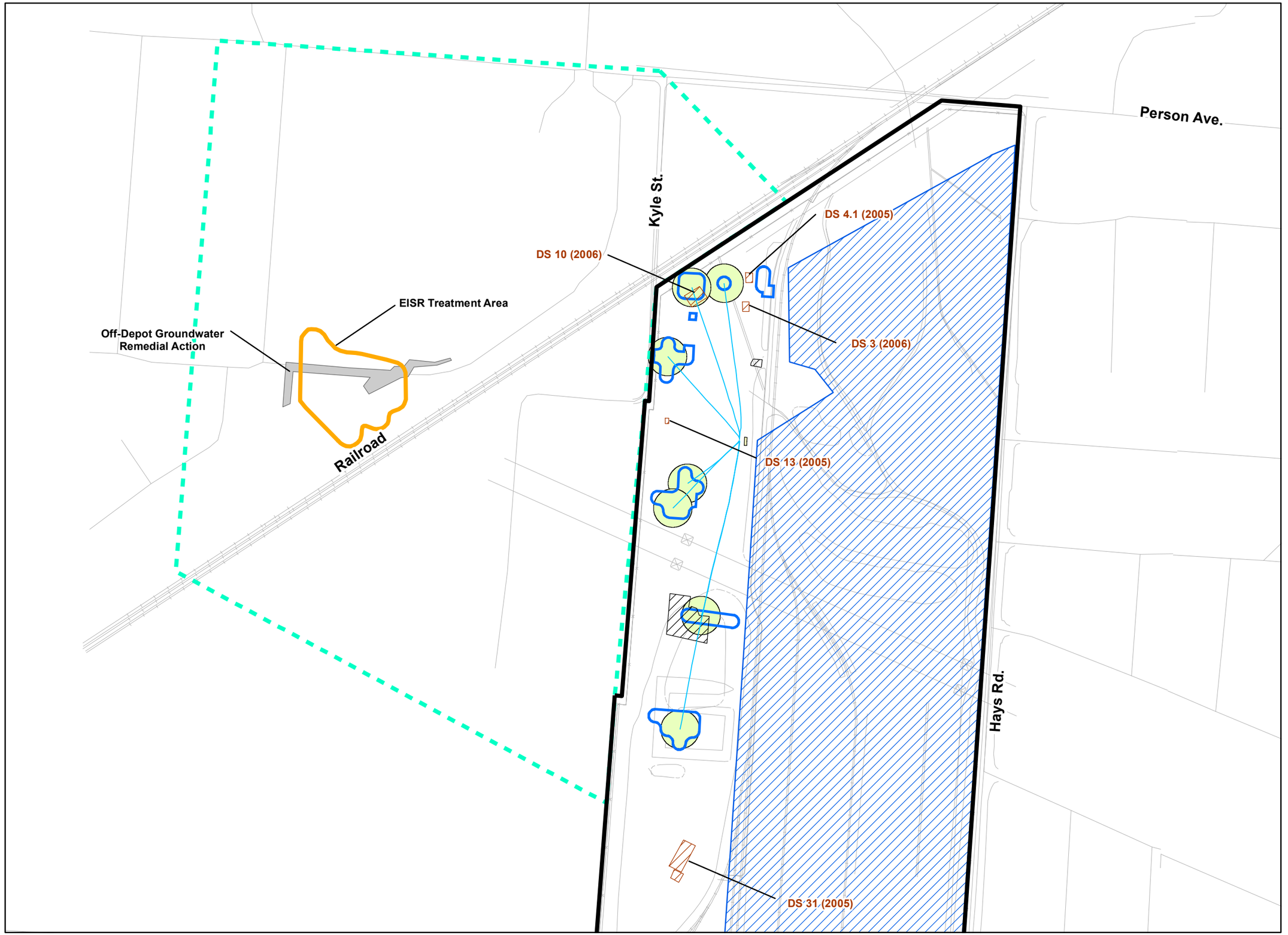


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Figure 10

DUNN FIELD DISPOSAL SITES, SOURCE AREAS AND OFF-DEPOT GROUNDWATER REMEDIAL ACTIONS

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

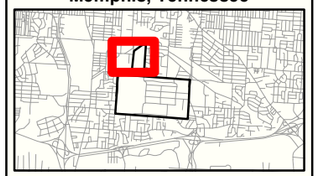
- Original Dunn Field Perimeter
- Unrestricted Use Area from ROD
- Off-Site Treatment Area
- EISR Treatment Area
- Disposal Sites Excavation Area
- Fluvial SVE Well - 60-foot radius of influence
- Fluvial SVE Conveyance Line
- SVE Control Building
- Loess Excavation Areas
- Loess Thermal-Enhanced SVE Treatment Areas
- Air Sparge-SVE Area

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Aerial Photo Date: 2006

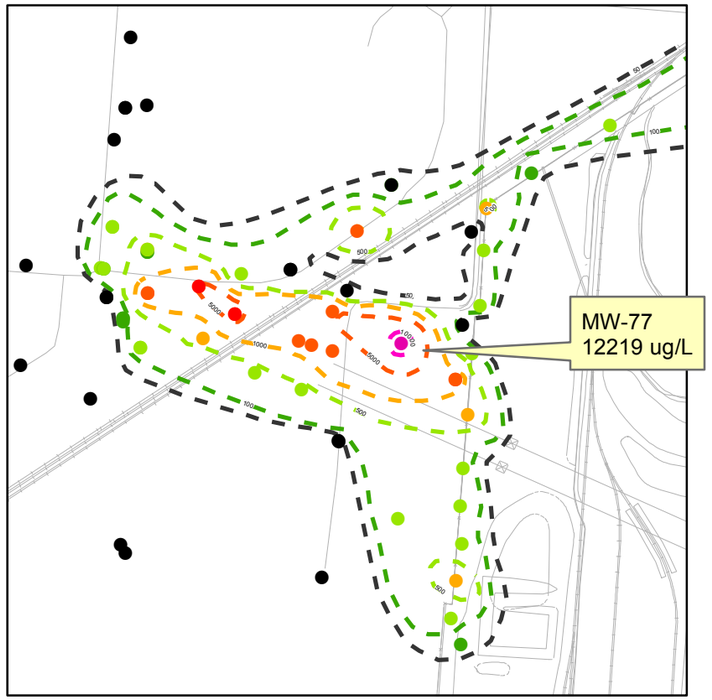
0 100 200 400
Feet

Installation Location
Memphis, Tennessee

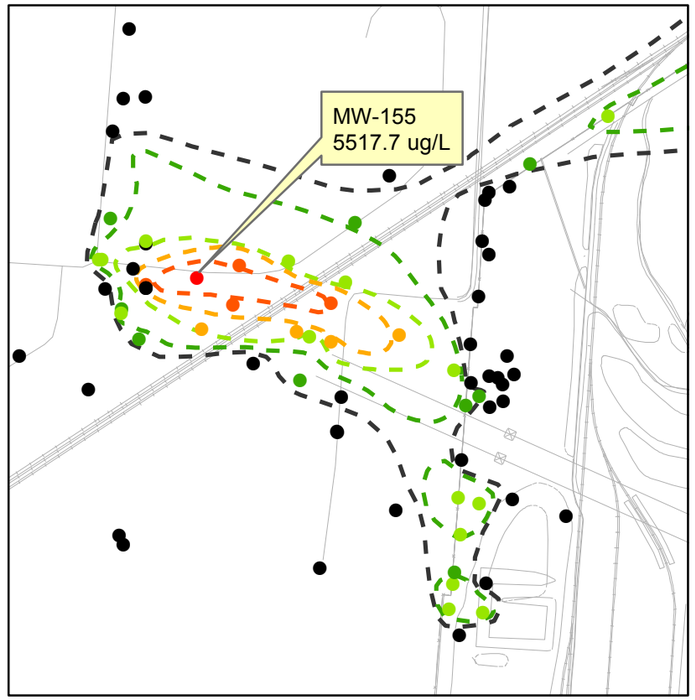


Date: October 2011
Edition: Rev 0

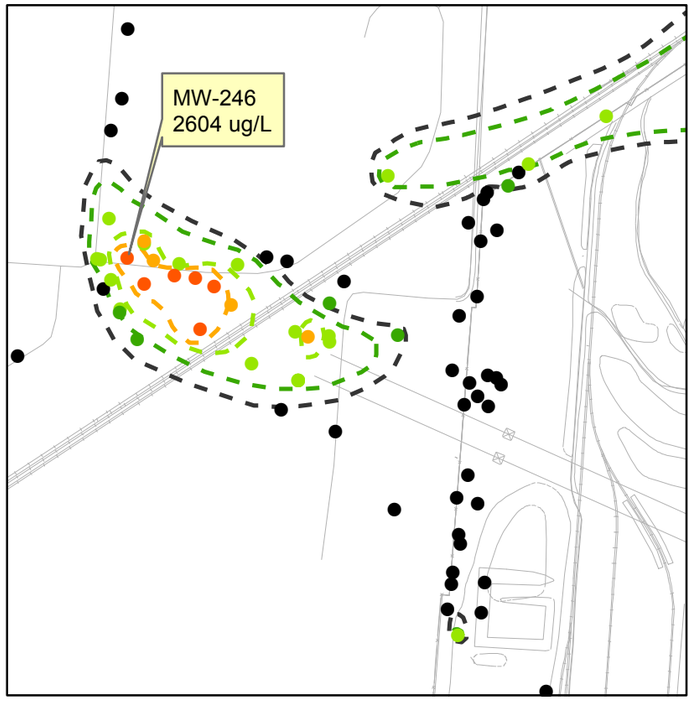
HDR



APRIL 2007



APRIL 2008



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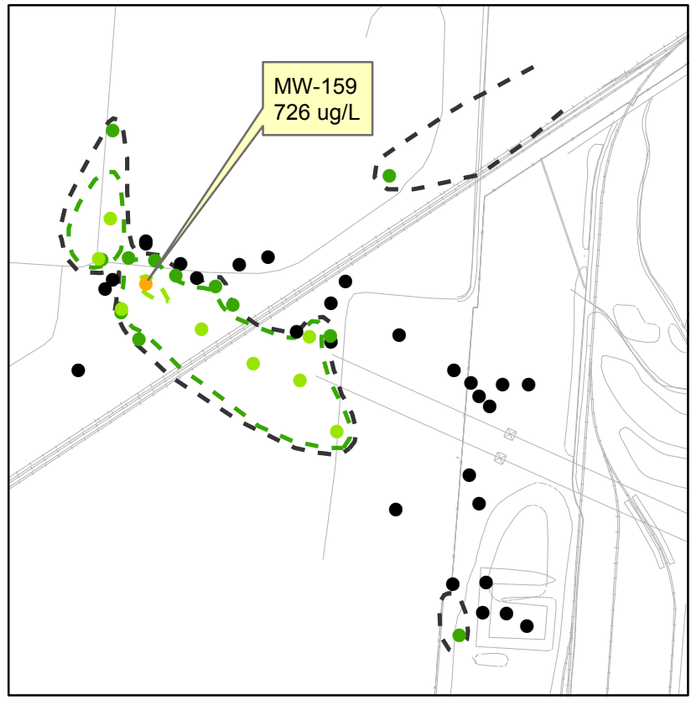

MARCH 2010

Figure 11

DUNN FIELD TOTAL CVOC CONCENTRATIONS, 2007 - 2010

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

Total CVOC Isopleth (ug/L)

- 50
- 100
- 500
- 1000
- 5000
- 10000

Total CVOC Ranges (ug/L)

- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000
- 1000 - 5000
- 5000 - 10000
- 10000 - 50000

0 200 400 600 800

Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

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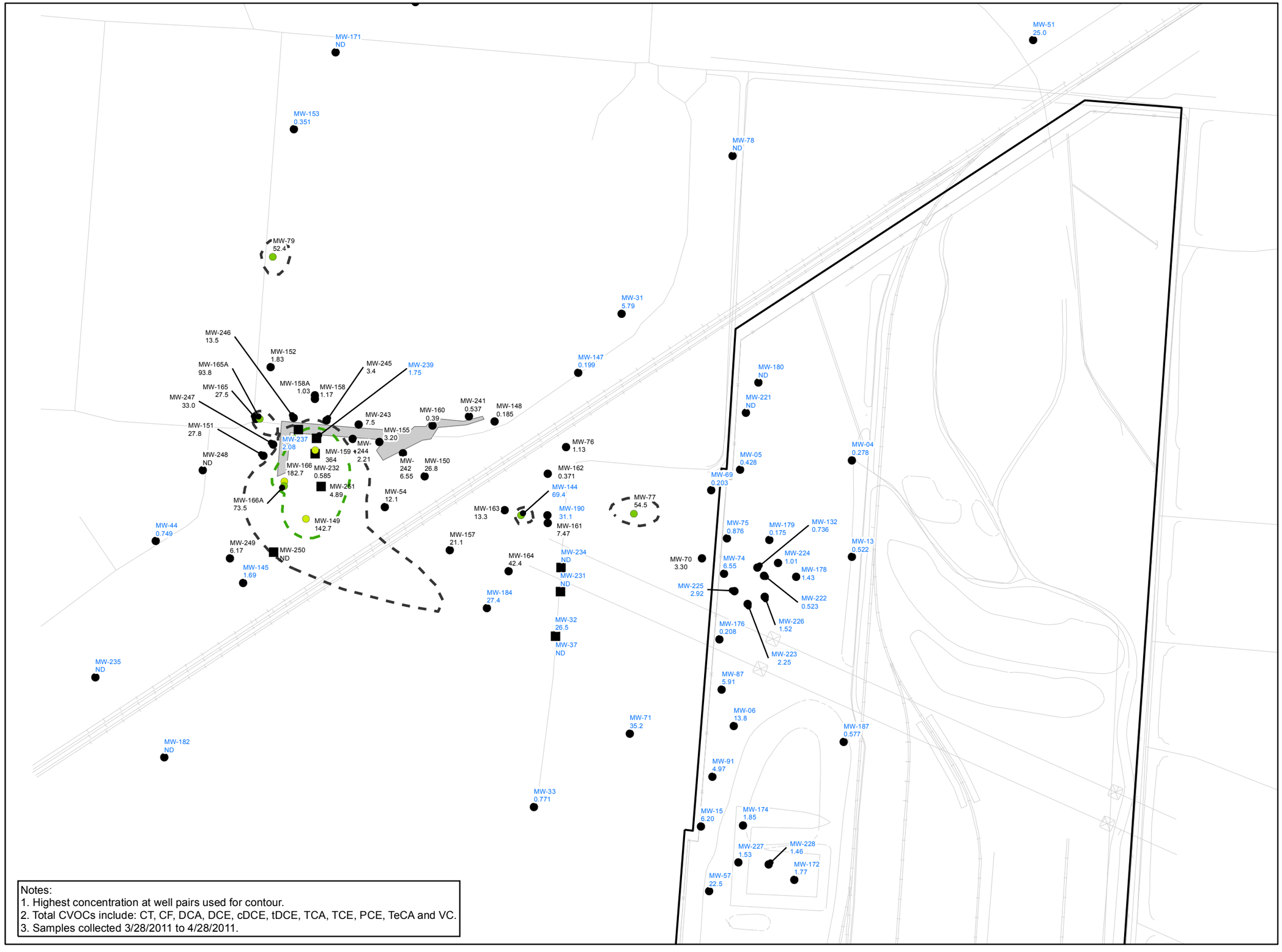

Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, TeCA and VC.
3. Samples collected 3/28/2011 to 4/28/2011.

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Figure 12
DUNN FIELD TOTAL CVOC CONCENTRATIONS, APRIL 2011

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

CVOCs Fluvial Wells
ug/L
- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000

Total CVOC Isopleth (ug/L)
- 50
- 100
- 500

CVOCs Non-Fluvial Wells
ug/L
- 0 - 50
- SVE -Soil Vapor Extraction Point
- Original Dunn Field Property Boundary

MW-05 100 Blue: Off Depot LTM Sample Event

MW-249 100 Black: Off Depot Performance Monitoring Sample Event (Non-Fluvial Wells - Italics)

0 100 200 300

Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 3/28/2011 to 4/28/2011.

Path: G:\145803\Site Mgmt Plan\GIS\Figure 13.mxd

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Figure 13

DUNN FIELD TeCA CONCENTRATIONS, APRIL 2011

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TeCA Ranges

ug/L

- 0-2
- 2-5
- 5-10
- 10-50
- 50-100

TeCA Non-Fluvial Wells

ug/L

- 0 - 5

TeCA Contour

ug/L

- 2.2
- 5
- 10
- 50

Air Sparge Well Area

Original Dunn Field Property Boundary

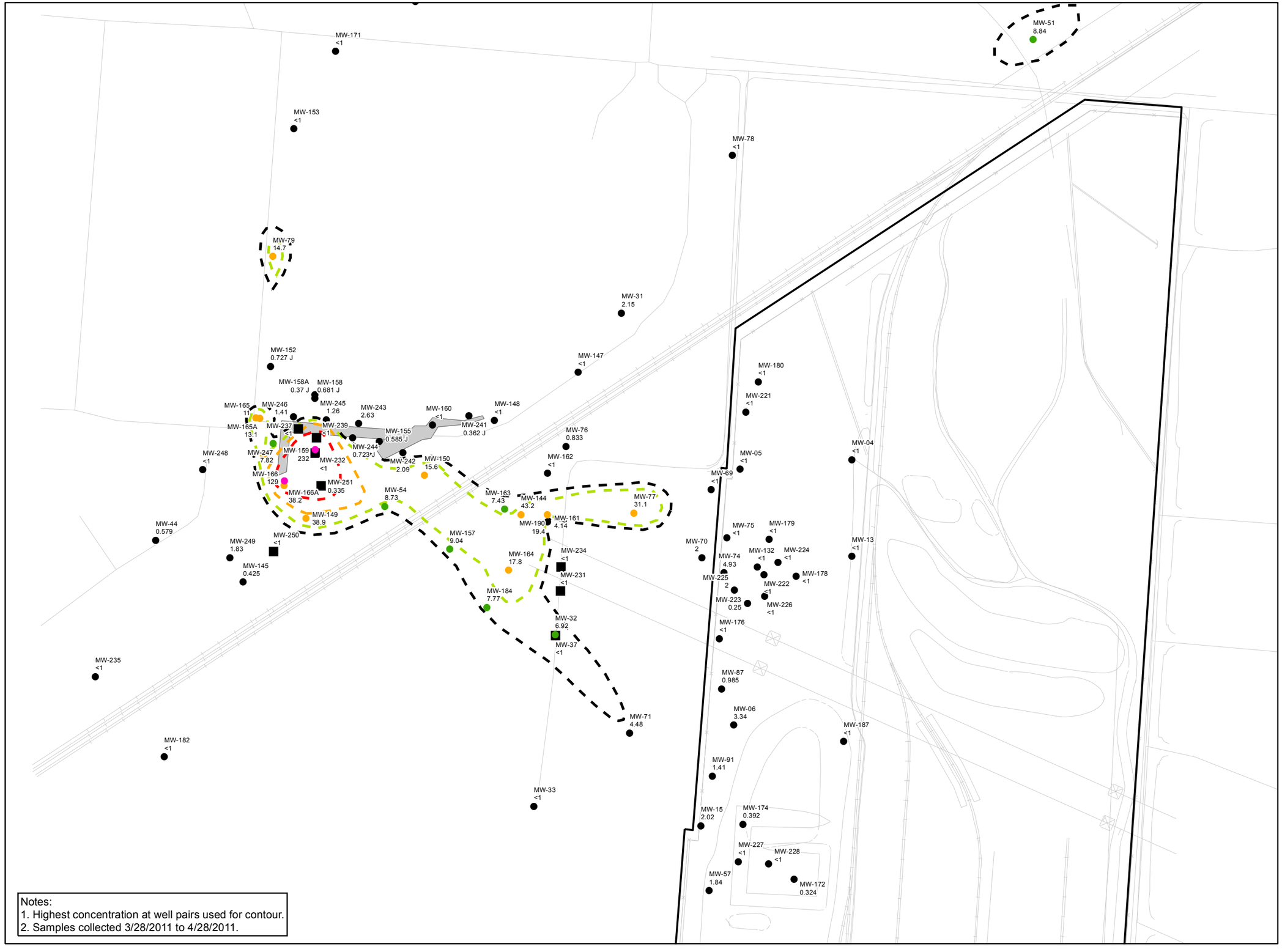
0 100 200 300

Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR



Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 3/28/2011 to 4/28/2011.

Path: G:\145803\Site Mgmt Plan\GIS\Figure 14.mxd

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Figure 14

DUNN FIELD TCE CONCENTRATIONS, APRIL 2011

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges
ug/L
- 0-5
- 5-10
- 10-50
- 50-100
- 100-250

TCE Non-Fluvial Wells
ug/L
- 0 - 5

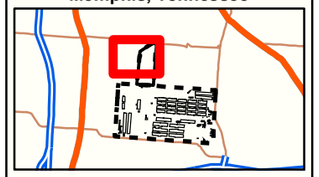
TCE Contour
ug/L
- 5
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

0 100 200 300
Feet

Installation Location
Memphis, Tennessee



Date: October 2011
Edition: Rev 0

HDR

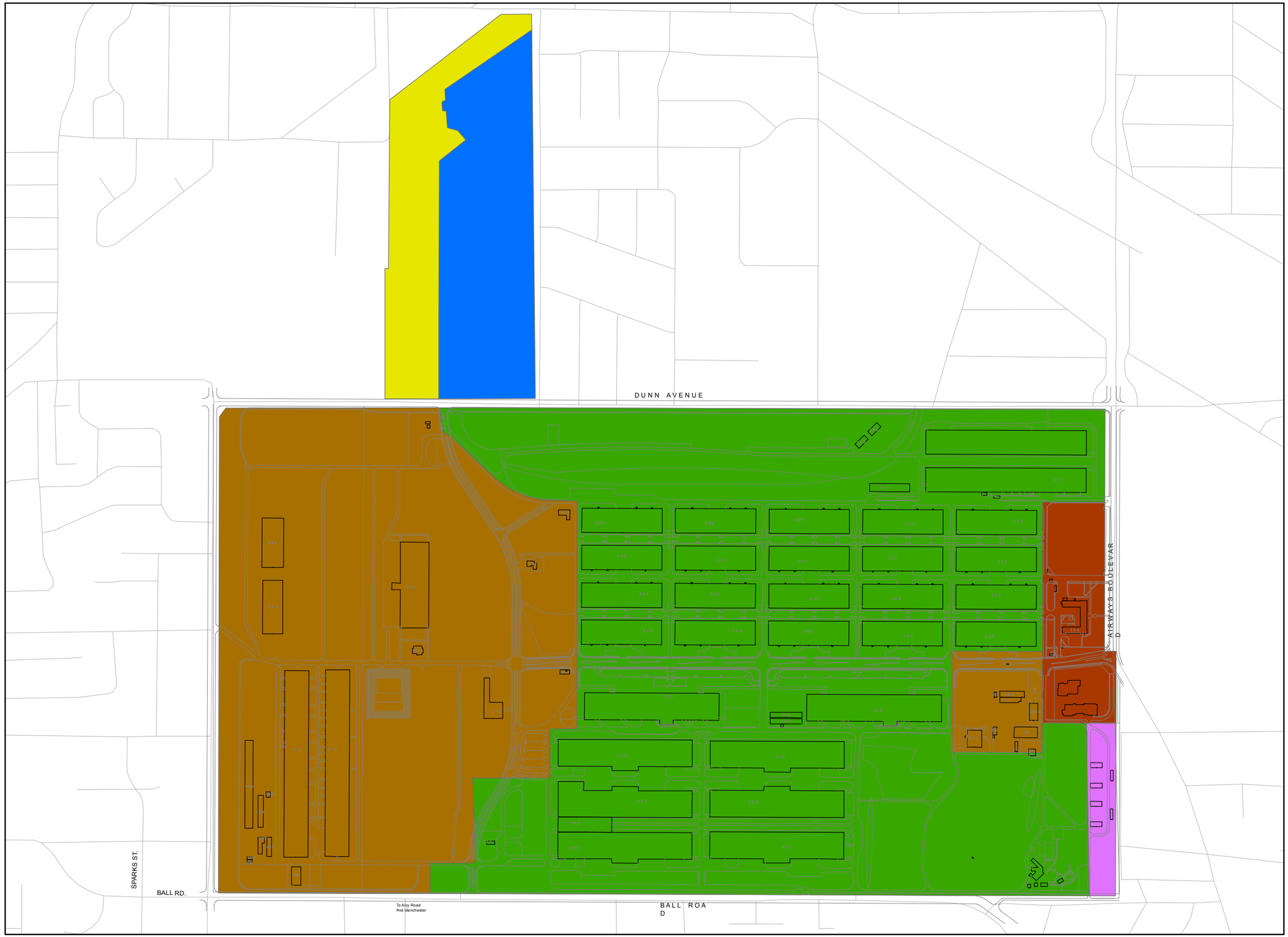


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Figure 15

FINDING OF SUITABILITY TO TRANSFER MAP

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

FOST
Fost Number

- FOST 1 *signed 02/23/01, deeds signed 02/06/02 and 05/06/02.*
- FOST 2 *signed 9/27/01, deed signed 9/18/01*
- FOST 3 *signed 07/01/04, deeds signed 04/04/05, 08/18/06 and 10/12/06.*
- FOST 4 *signed 03/04/05, deed signed 10/17/07.*
- FOST 5 *signed 7/12/10; property not transferred.*
- FOST 6 *signed 8/3/10; deed signed 3/30/11.*

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 250 500 1,000

Scale in Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Path: G:\145803\Site Mgmt Plan\GIS\Figure 15.mxd

Path: G:\145803\Site Mgmt Plan\GIS\Figure 16.mxd

Figure 16

FLUVIAL SVE SYSTEM

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Projection: NAD 1927 StatePlane Tennessee
Datum : WGS 84
Units: Feet

0 50 100 150 200 Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

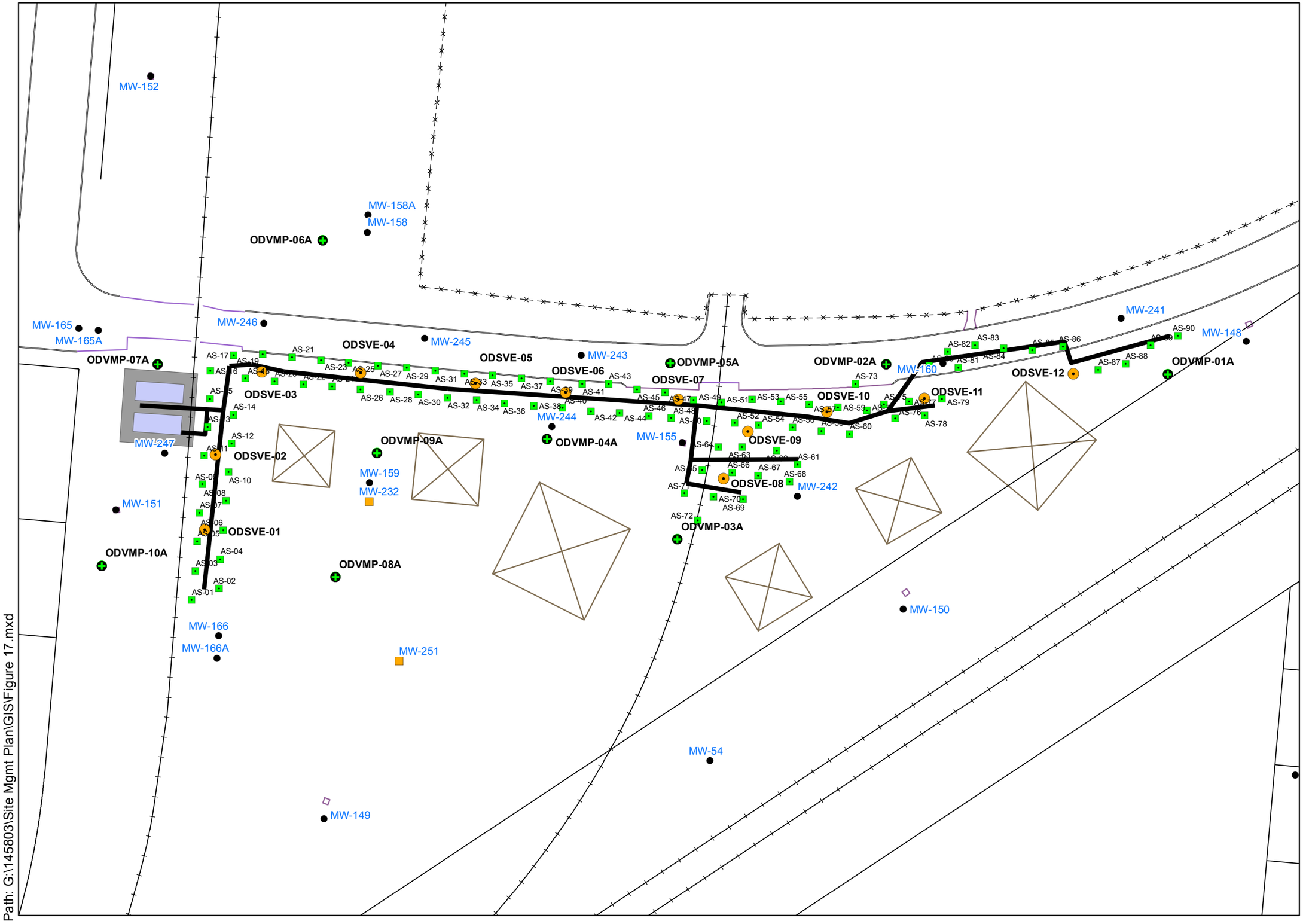

Figure 17

AS-SVE SYSTEM

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- AS Well Location
- VMP Location
- SVE Location
- Conveyance Lines
- SVE Compound

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Path: G:\145803\Site Mgmt Plan\GIS\Figure 17.mxd

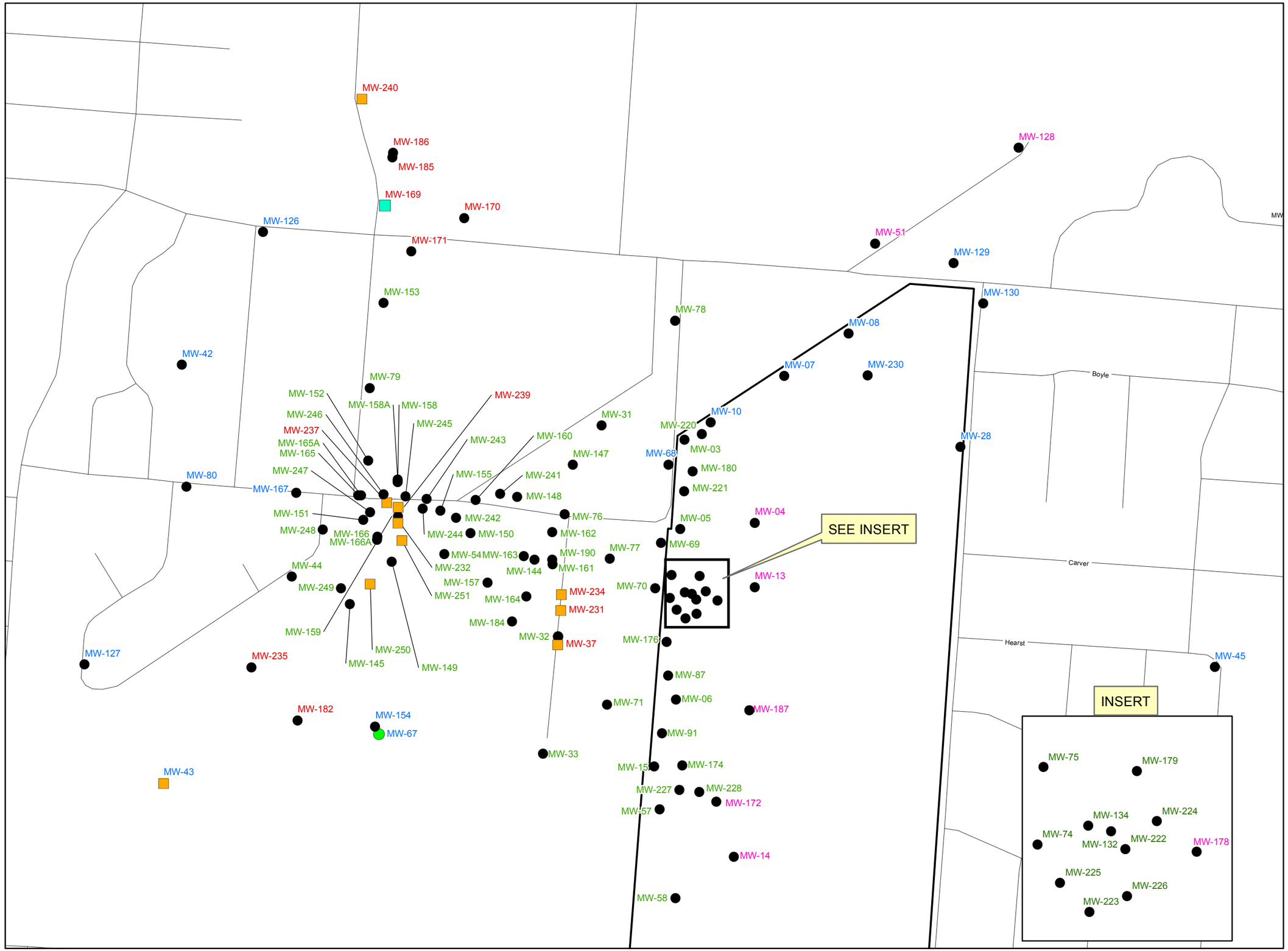

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Figure 18

OFF DEPOT LTM WELL LOCATION MAP

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Transition Zone
- Monitoring Well Screened in the Memphis Aquifer

Off Depot Well Classification

- MW-04 Background
- MW-05 Sentinel
- MW-06 Performance
- MW-03 Water Level Only

Dunn Field Boundary

0 150 300 450 600
Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Path: G:\145803\Site Mgmt Plan\GIS\Figure 18.mxd

A
NORTH

A'
SOUTH

MW-254
MW-55
MW-256
MW-255
MW-252
offset
333-ft. from
centerline
MW-140
offset 88-ft.
from centerline
MW-202A/MW-202B
MW-89/MW-90
MW-141
MW-199A
MW-199B
MW-209A
MW-209B
MW-39
MW-39A
MW-206A
MW-206B
MW-200
MW-94A
MW-94
MW-81/MW-24

300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0

Silty Clay to
Clayey Silt

Sandy Clay to
Clayey Sand

Sand with Gravel

Grey Clay

Clayey Sand

Silty Sand

Clay

Memphis
Sand

Sand

Silty Sandy
Clay

B.T.

MW-55
MW-256
MW-252
MW-202B
MW-90
MW-199B
MW-209A
195.57 MSL
MW-39
MW-209B
MW-206B
MW-200
MW-94A
MW-206A
MW-199A
MW-89
MW-141
MW-39A
MW-202A
MW-140
MW-209A
MW-94
MW-24
MW-81
MW-255
MW-254

20
0
200

N
W
E
S

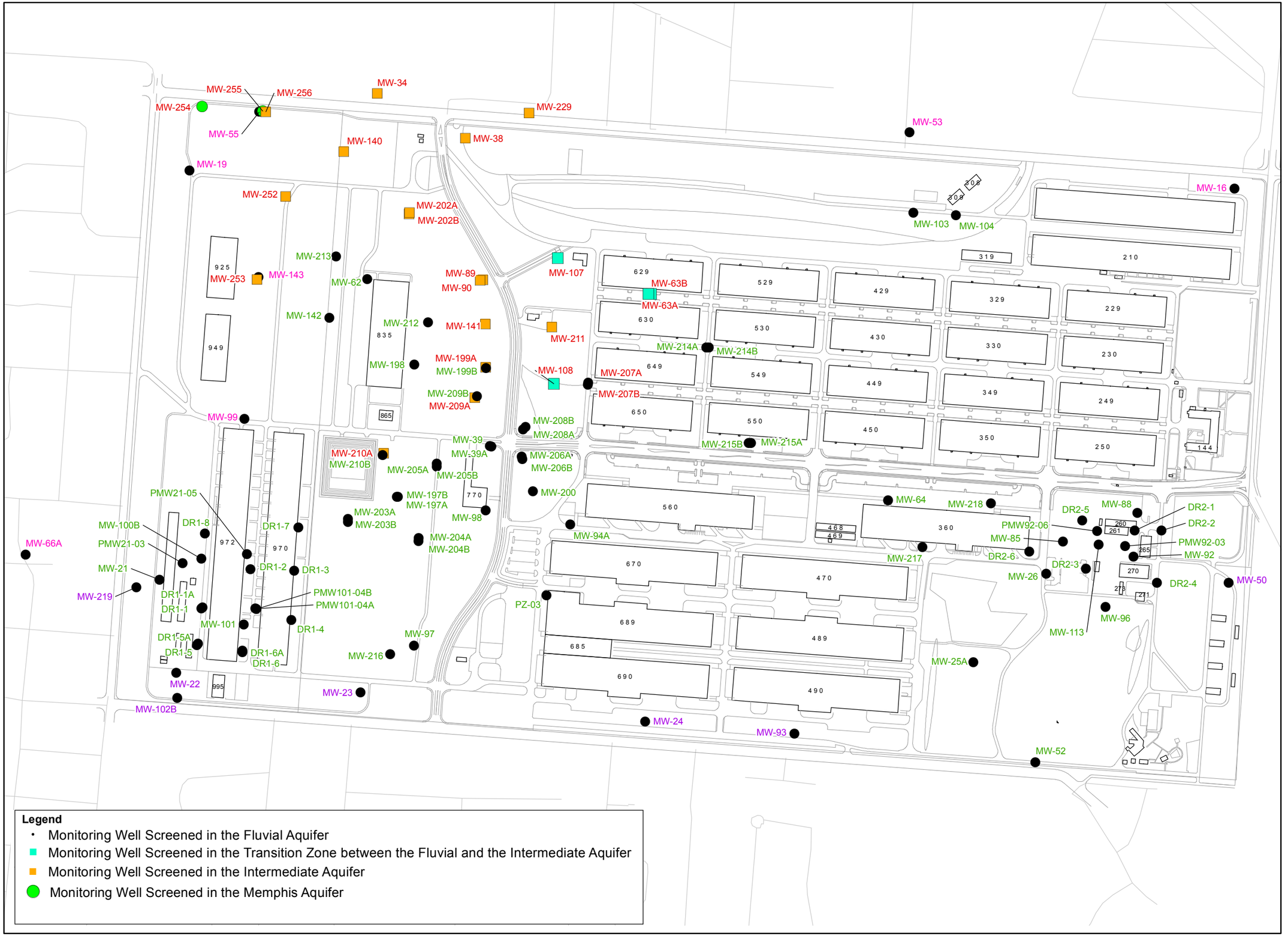
Figure 19

MAIN INSTALLATION
LITHOLOGIC CROSS-SECTION

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

- Silty Clay to Clayey Silt
- Sandy Clay to Clayey Sand
- Fluvial Sand or Sand with Gravel
- Clayey Sand to Silty Clay
- Intermediate Sand
- Clay
- Memphis Sand
- Groundwater Elevation
- Groundwater Elevation 3/23/2010
- Groundwater Elevation 8/13/2010
- Well Screen Interval



Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Transition Zone between the Fluvial and the Intermediate Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Memphis Aquifer

N
W E
S

Figure 20

MAIN INSTALLATION LTM WELL LOCATION MAP

2012 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Off Depot Well Classification

- MW-16 Background
- MW-34 Sentinel
- MW-21 Performance
- MW-219 Boundary

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 250 500 1,000
Feet

Installation Location
Memphis, Tennessee

Date: October 2011
Edition: Rev 0

HDR

Path: G:\145803\Site Mgmt Plan\GIS\Figure 20.mxd

Figure 21
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
1		**MAIN INSTALLATION**	**4065 d**	**Mon 9/11/06**		**Fri 10/27/17**
2		**Main Installation Remedial Action (RA)**	**4065 d**	**Mon 9/11/06**		**Fri 10/27/17**
3		**MI RA-O (Injection) Year 1**	365 d	Mon 9/11/06		Mon 9/10/07
4		**MI RA-O (Injection) Year 2**	365 d	Tue 9/11/07	3	Tue 9/9/08
5		**MI RA-O (Injection) Extended Injections**	170 d	Wed 9/10/08	4	Thu 2/26/09
6		**MI Interim RA Completion Report (with OPS)**	**310 d**	**Mon 5/18/09**		**Tue 3/23/10**
13		**MI RA Complete / Remedy in Place**	**0 d**	**Tue 3/23/10**	**12**	**Tue 3/23/10**
14		**Additional MI Sentinel Wells**	**185 d**	**Sat 2/27/10**		**Mon 8/30/10**
20		**MI RA-O (Long Term Monitoring)**	2500 d	Fri 2/27/09	5	Fri 1/1/16
21		**2011 MI LTM Report**	**150 d**	**Mon 11/14/11**		**Wed 4/11/12**
22	S	Prepare & Submit Rev. 0 2011 MI LTM Report	60 d	Mon 11/14/11		Thu 1/12/12
23		Agency Review & Submit Comments on Rev. 0 2011 MI LTM Report	60 d	Fri 1/13/12	22	Mon 3/12/12
24	S	Prepare & Submit Rev. 1 2011 MI LTM Report	30 d	Tue 3/13/12	23	Wed 4/11/12
25	S	MI Annual LUCIP Inspection and Report - 2012	31 d	Mon 7/2/12		Wed 8/1/12
26		**2012 MI LTM Report**	**150 d**	**Mon 11/12/12**		**Wed 4/10/13**
27	S	Prepare & Submit Rev. 0 2012 MI LTM Report	60 d	Mon 11/12/12		Thu 1/10/13
28		Agency Review & Submit Comments on Rev. 0 2012 MI LTM Report	60 d	Fri 1/11/13	27	Mon 3/11/13
29	S	Prepare & Submit Rev. 1 2012 MI LTM Report	30 d	Tue 3/12/13	28	Wed 4/10/13
30	S	MI Annual LUCIP Inspection and Report - 2013	31 d	Mon 7/1/13		Wed 7/31/13
31		**2013 MI LTM Report**	**150 d**	**Mon 11/11/13**		**Wed 4/9/14**
32	S	Prepare & Submit Rev. 0 2013 MI LTM Report	60 d	Mon 11/11/13		Thu 1/9/14
33		Agency Review & Submit Comments on Rev. 0 2013 MI LTM Report	60 d	Fri 1/10/14	32	Mon 3/10/14
34	S	Prepare & Submit Rev. 1 2013 MI LTM Report	30 d	Tue 3/11/14	33	Wed 4/9/14
35	S	MI Annual LUCIP Inspection and Report - 2014	31 d	Tue 7/1/14		Thu 7/31/14
36		**2014 MI LTM Report**	**150 d**	**Mon 11/10/14**		**Wed 4/8/15**
37	S	Prepare & Submit Rev. 0 2014 MI LTM Report	60 d	Mon 11/10/14		Thu 1/8/15
38		Agency Review & Submit Comments on Rev. 0 2014 MI LTM Report	60 d	Fri 1/9/15	37	Mon 3/9/15
39	S	Prepare & Submit Rev. 1 2014 MI LTM Report	30 d	Tue 3/10/15	38	Wed 4/8/15
40		**2015 MI LTM Report**	**150 d**	**Mon 11/9/15**		**Wed 4/6/16**
41	S	Prepare & Submit Rev. 0 2015 MI LTM Report	60 d	Mon 11/9/15		Thu 1/7/16
42		Agency Review & Submit Comments on Rev. 0 2015 MI LTM Report	60 d	Fri 1/8/16	41	Mon 3/7/16
43	S	Prepare & Submit Rev. 1 2015 MI LTM Report	30 d	Tue 3/8/16	42	Wed 4/6/16
44		**Main Installation Compliance Monitoring**	365 d	Sat 1/2/16	20	Sat 12/31/16
45		**Main Installation RA Completion Report**	**300 d**	**Sun 1/1/17**		**Fri 10/27/17**
46	P	Prepare & Submit Rev. 0 MI RACR	60 d	Sun 1/1/17	44	Wed 3/1/17
47		Agency Review & Submit Comments on Rev. 0 MI RACR	60 d	Thu 3/2/17	46	Sun 4/30/17
48		Respond to Agency Comments on Rev. 0 MI RACR	60 d	Mon 5/1/17	47	Thu 6/29/17
49	P	Prepare & Submit Rev. 1 MI RACR	120 d	Mon 5/1/17	47	Mon 8/28/17
50		Agency Review of Rev. 1 MI RACR w/ Concurrence	60 d	Tue 8/29/17	49	Fri 10/27/17
51		**Main Installation Well Abandonment**	90 d	Fri 6/30/17	48	Wed 9/27/17
52						
53						
54		**DUNN FIELD**	**5290 d**	**Fri 5/4/07**		**Tue 10/26/21**
55		**Dunn Field Source Areas Remedial Action**	**3375 d**	**Fri 5/4/07**		**Fri 7/29/16**
56		**Dunn Field Fluvial SVE Remedial Action**	**3375 d**	**Fri 5/4/07**		**Fri 7/29/16**
57		Notice of Fluvial SVE RA Implementation	1 d	Fri 5/4/07		Fri 5/4/07
58		**Fluvial SVE Year 1 Operation**	373 d	Wed 7/25/07		Thu 7/31/08

Figure 21
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
59		**Fluvial SVE Year 2 Operation**	365 d	Fri 8/1/08	58	Fri 7/31/09
60		**Fluvial SVE Year 3 Operation**	365 d	Sat 8/1/09	59	Sat 7/31/10
61		**Fluvial SVE Year 4 Operation**	365 d	Sun 8/1/10	60	Sun 7/31/11
62		**Fluvial SVE Year 4 Annual Report**	**118 d**	**Mon 10/3/11**		**Sat 1/28/12**
63	S	Prepare & Submit Rev. 0 FSVE Y4 Report	28 d	Mon 10/3/11		Sun 10/30/11
64		Agency Review & Submit Comments on Rev. 0 FSVE Y4 Report	60 d	Mon 10/31/11	63	Thu 12/29/11
65	S	Prepare & Submit Rev. 1 FSVE Y4 Report	30 d	Fri 12/30/11	64	Sat 1/28/12
66		**Fluvial SVE Year 5 Operation**	365 d	Mon 8/1/11	61	Mon 7/30/12
67		**Mothball Fluvial SVE System**	60 d	Tue 7/31/12	66	Fri 9/28/12
68		**Fluvial SVE Year 5 Annual Report**	**150 d**	**Mon 9/3/12**		**Wed 1/30/13**
69	S	Prepare & Submit Rev. 0 FSVE Y5 Report	60 d	Mon 9/3/12	66	Thu 11/1/12
70		Agency Review & Submit Comments on Rev. 0 FSVE Y5 Report	60 d	Fri 11/2/12	69	Mon 12/31/12
71	S	Prepare & Submit Rev. 1 FSVE Y5 Report	30 d	Tue 1/1/13	70	Wed 1/30/13
72		**Post Shutdown Groundwater Monitoring (with Dunn Field LTM)**	1460 d	Tue 7/31/12	66	Fri 7/29/16
73		**Dunn Field Off Depot GW Remedial Action**	**2262 d**	**Mon 4/20/09**		**Mon 6/29/15**
74		**Dunn Field Off Depot AS/SVE Construction**	**242 d**	**Mon 4/20/09**		**Thu 12/17/09**
82		**Dunn Field AS/SVE O&M Year 1**	379 d	Fri 12/18/09	81	Fri 12/31/10
83		**2010 Dunn Field LTM Report**	**82 d**	**Mon 11/29/10**		**Fri 2/18/11**
85		**Dunn Field Off Depot Interim RA Completion Report**	**241 d**	**Sat 1/1/11**		**Mon 8/29/11**
91		**Dunn Field Off Depot RA-O (Operations and LTM) Years 2 - 5**	1461 d	Sat 1/1/11	82	Wed 12/31/14
92		Dunn Field Annual LUCIP Inspection and Report - 2011	31 d	Fri 7/1/11		Sun 7/31/11
93		**2011 Dunn Field LTM & Year 2 AS/SVE Report**	**180 d**	**Sun 1/1/12**		**Thu 6/28/12**
94	S	Prepare & Submit Rev. 0 2011 LTM and Y2 AS/SVE Report	60 d	Sun 1/1/12		Wed 2/29/12
95		Agency Review & Submit Comments on Rev. 0 2012 LTM and Y2 AS/SVE Report	60 d	Thu 3/1/12	94	Sun 4/29/12
96	S	Prepare & Submit Rev. 1 2011 LTM and Y2 AS/SVE Report	60 d	Mon 4/30/12	95	Thu 6/28/12
97		Dunn Field Annual LUCIP Inspection and Report - 2012	31 d	Sun 7/1/12		Tue 7/31/12
98		**2012 Dunn Field LTM & Year 3 AS/SVE Report**	**180 d**	**Tue 1/1/13**		**Sat 6/29/13**
99	S	Prepare & Submit Rev. 0 2012 LTM and Y3 AS/SVE Report	60 d	Tue 1/1/13		Fri 3/1/13
100		Agency Review & Submit Comments on Rev. 0 2012 LTM and Y3 AS/SVE Report	60 d	Sat 3/2/13	99	Tue 4/30/13
101	S	Prepare & Submit Rev. 1 2012 LTM and Y3 AS/SVE Report	60 d	Wed 5/1/13	100	Sat 6/29/13
102		Dunn Field Annual LUCIP Inspection and Report - 2013	31 d	Mon 7/1/13		Wed 7/31/13
103		**2013 Dunn Field LTM & Year 4 AS/SVE Report**	**180 d**	**Wed 1/1/14**		**Sun 6/29/14**
104	S	Prepare & Submit Rev. 0 2013 LTM and Y4 AS/SVE Report	60 d	Wed 1/1/14		Sat 3/1/14
105		Agency Review & Submit Comments on Rev. 0 2013 LTM and Y4 AS/SVE Report	60 d	Sun 3/2/14	104	Wed 4/30/14
106	S	Prepare & Submit Rev. 1 2013 LTM and Y4 AS/SVE Report	60 d	Thu 5/1/14	105	Sun 6/29/14
107		Dunn Field Annual LUCIP Inspection and Report - 2014	31 d	Tue 7/1/14		Thu 7/31/14
108		**2014 Dunn Field LTM & Year 5 AS/SVE Report**	**180 d**	**Thu 1/1/15**		**Mon 6/29/15**
109	S	Prepare & Submit Rev. 0 2014 LTM and Y5 AS/SVE Report	60 d	Thu 1/1/15		Sun 3/1/15
110		Agency Review & Submit Comments on Rev. 0 2014 LTM and Y5 AS/SVE Report	60 d	Mon 3/2/15	109	Thu 4/30/15
111	S	Prepare & Submit Rev. 1 2014 LTM and Y5 AS/SVE Report	60 d	Fri 5/1/15	110	Mon 6/29/15
112		**Abandon Fluvial SVE and AS/SVE Systems**	90 d	Sat 7/30/16	72	Thu 10/27/16
113		**Dunn Field RA-O (LTM) Year 6 - 10**	1826 d	Thu 1/1/15	91	Tue 12/31/19
114		**Dunn Field Compliance Monitoring**	365 d	Wed 1/1/20	113	Wed 12/30/20
115		**Dunn Field Well Abandonment**	90 d	Thu 12/31/20	114	Tue 3/30/21
116		**Dunn Field RA Completion Report**	**300 d**	**Thu 12/31/20**		**Tue 10/26/21**
117	P	Prepare & Submit Rev. 0 Dunn Field RACR	60 d	Thu 12/31/20	114	Sun 2/28/21
118		Agency Review & Submit Comments on Rev. 0 Dunn Field RACR	60 d	Mon 3/1/21	117	Thu 4/29/21

Figure 21
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
119		Respond to Agency Comments on Rev. 0 Dunn Field RACR	60 d	Fri 4/30/21	118	Mon 6/28/21
120	P	Prepare & Submit Rev. 1 Dunn Field RACR	120 d	Fri 4/30/21	118	Fri 8/27/21
121		Agency Review of Rev. 1 Dunn Field RACR w/ Concurrence	60 d	Sat 8/28/21	120	Tue 10/26/21
122						
123						
124		**Memphis Depot NPL Site-Wide Activities**	**3924 d**	**Wed 3/30/11**		**Sat 12/25/21**
125		**Site Management Plan (SMP) Updates**	**1215 d**	**Mon 10/3/11**		**Thu 1/29/15**
126		**2012 Site Management Plan**	**119 d**	**Mon 10/3/11**		**Sun 1/29/12**
127	P	Prepare & Submit Rev 0 2012 SMP	59 d	Mon 10/3/11		Wed 11/30/11
128		Agency Review & Submit Comments on Rev 0 2012 SMP	30 d	Thu 12/1/11	127	Fri 12/30/11
129	P	Prepare & Submit Rev 1 2012 SMP	30 d	Sat 12/31/11	128	Sun 1/29/12
130		**2013 Site Management Plan**	**120 d**	**Mon 10/1/12**		**Mon 1/28/13**
131	P	Prepare & Submit Rev 0 2013 SMP	60 d	Mon 10/1/12		Thu 11/29/12
132		Agency Review & Submit Comments on Rev 0 2013 SMP	30 d	Fri 11/30/12	131	Sat 12/29/12
133	P	Prepare & Submit Rev 1 2013 SMP	30 d	Sun 12/30/12	132	Mon 1/28/13
134		**2014 Site Management Plan**	**114 d**	**Mon 10/7/13**		**Tue 1/28/14**
135	P	Prepare & Submit Rev 0 2014 SMP	54 d	Mon 10/7/13		Fri 11/29/13
136		Agency Review & Submit Comments on Rev 0 2014 SMP	30 d	Sat 11/30/13	135	Sun 12/29/13
137	P	Prepare & Submit Rev 1 2014 SMP	30 d	Mon 12/30/13	136	Tue 1/28/14
138		**2015 Site Management Plan**	**116 d**	**Mon 10/6/14**		**Thu 1/29/15**
139	P	Prepare & Submit Rev 0 2015 SMP	56 d	Mon 10/6/14		Sun 11/30/14
140		Agency Review & Submit Comments on Rev 0 2015 SMP	30 d	Mon 12/1/14	139	Tue 12/30/14
141	P	Prepare & Submit Rev 1 20154 SMP	30 d	Wed 12/31/14	140	Thu 1/29/15
142		**RA Sampling and Analysis Plan Update**	**335 d**	**Wed 3/30/11**		**Mon 2/27/12**
143	S	Prepare & Submit Rev. 0 RA SAP Update	185 d	Wed 3/30/11		Fri 9/30/11
144		Agency Review & Submit Comments on Rev. 0 RA SAP Update	60 d	Sat 10/1/11	143	Tue 11/29/11
145		Respond to Agency Comments on Rev. 0 RA SAP Update	30 d	Wed 11/30/11	144	Thu 12/29/11
146	S	Prepare & Submit Rev. 1 RA SAP Update	60 d	Wed 11/30/11	144	Sat 1/28/12
147		Agency Review of Rev. 1 RA SAP Update w/ Concurrence	30 d	Sun 1/29/12	146	Mon 2/27/12
148		**CERCLA Third 5-Year Review**	**347 d**	**Mon 3/5/12**		**Thu 2/14/13**
149	**P**	**Prepare & Submit Rev. 0 3rd 5-Year Review**	**147 d**	**Mon 3/5/12**		**Sun 7/29/12**
150		Publish Notice of 3rd 5-Year Review and Contact Stakeholders	14 d	Mon 3/5/12		Sun 3/18/12
151		Document Review	14 d	Mon 3/19/12	150	Sun 4/1/12
152		Site Inspections	14 d	Mon 4/2/12	151	Sun 4/15/12
153		Stakeholder Interviews	14 d	Mon 4/2/12	152SS	Sun 4/15/12
154		Assessment of Protectiveness	14 d	Mon 4/16/12	153	Sun 4/29/12
155		Report Preparation	105 d	Mon 4/16/12	153	Sun 7/29/12
156		Agency Review & Submit Comments on Rev. 0 3rd 5-Year Review	60 d	Mon 7/30/12	155	Thu 9/27/12
157		Respond to Agency Comments on Rev. 0 3rd 5-Year Review	30 d	Fri 9/28/12	156	Sat 10/27/12
158	P	Prepare & Submit Rev. 1 3rd 5-Year Review	60 d	Fri 9/28/12	156	Mon 11/26/12
159		Agency Review of Rev. 1 3rd 5-Year Review	30 d	Tue 11/27/12	158	Wed 12/26/12
160	P	Prepare & Submit Final 3rd 5-Year Review	15 d	Thu 12/27/12	159	Thu 1/10/13
161		Final 3rd 5-Year Review Signed	20 d	Fri 1/11/13	160	Wed 1/30/13
162		Notification of 3rd 5-Year Review Completion	15 d	Thu 1/31/13	161	Thu 2/14/13
163		**CERCLA Fourth 5-Year Review**	347 d	Mon 3/6/17		Thu 2/15/18
164		**Final Closeout Report (FCOR)**	**180 d**	**Tue 6/29/21**		**Sat 12/25/21**
165	P	Prepare & Submit Rev. 0 FCOR	60 d	Tue 6/29/21	48,119	Fri 8/27/21

Figure 21
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
166		Agency Review & Submit Comments on Rev. 0 FCOR	60 d	Sat 8/28/21	165	Tue 10/26/21
167		Respond to Agency Comments on Rev. 0 FCOR	15 d	Wed 10/27/21	166	Wed 11/10/21
168	P	Prepare & Submit Rev. 1 FCOR	30 d	Wed 10/27/21	166	Thu 11/25/21
169		Agency Review of Rev. 1 FCOR w/ Concurrence	30 d	Fri 11/26/21	168	Sat 12/25/21
170	P	Final FCOR	0 d	Sat 12/25/21	169	Sat 12/25/21
171		**Site Completion**	0 d	Sat 12/25/21	170	Sat 12/25/21