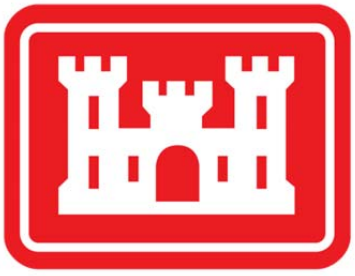
2015 SITE MANAGEMENT PLAN

Defense Depot Memphis, Tennessee
U.S. EPA I.D. Number TN4210020570

Prepared for:

Department of the Army



USACE Contract No. W90FYQ-09-D-0005
Task Order No. DS01

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Prepared for:

U.S. Army Corps of Engineers, Tulsa District
Contract No. W90FYQ-09-D-0005
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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
cDCE	cis-1,2-dichloroethene
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
CY	cubic yard
DDMT	Defense Depot Memphis, Tennessee
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
DO	dissolved oxygen
DoD	Department of Defense
e^2M	engineering-environmental Management, Inc.
EBT	enhanced bioremediation treatment
EE/CA	engineering evaluation and cost analysis
EISR	Early Implementation of Selected Remedy
ESD	Explanation of Significant Differences
ET&D	excavation, transportation and disposal
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
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

LIST OF ACRONYMS AND ABBREVIATIONS

(CONTINUED)

IRACR	Interim Remedial Action Completion Report
IW	injection well
LTM	long-term monitoring
LUC	land use control
LUCIP	land use control implementation plan
MACTEC	MACTEC Engineering and Consulting, Inc.
MAQ	Memphis aquifer
MCL	maximum contaminant level
MI	Main Installation
MLGW	Memphis Light Gas & Water
MNA	monitored natural attenuation
MSCHD	Memphis Shelby County Health Department
MW	monitoring well
NPL	National Priorities List
ODB	Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure Division
O&M	operations and maintenance
OPS	Operating Properly and Successfully
ORP	oxygen reduction potential
OU	Operable Unit
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PCP	pentachlorophenol
PID	photoionization detector
PMW	performance monitoring well
POL	petroleum/oil/lubricants
ppm	parts per million
PRB	permeable reactive barrier
RA	remedial action
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

RD	Remedial Design
RFA	RCRA Facility Assessment
RG	remediation goal
RI	remedial investigation
RL	reporting limit
ROD	Record of Decision
RW	recovery well
SMP	Site Management Plan
SRI	Supplemental Remedial Investigation
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
TOC	total organic carbon
TSVE	thermal soil vapor extraction
TTA	target treatment area
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VI	vapor intrusion
VMP	vapor monitoring point
VOC	volatile organic compound
ZVI	zero valent iron
µg/L	micrograms per liter

1.0 INTRODUCTION

HDR has prepared this 2015 Site Management Plan (SMP) for Defense Depot Memphis, Tennessee (DDMT) under Contract W90FYQ-09-D-0005, Task Order DS01 to the United States Army Corps of Engineers (USACE), Tulsa District. The environmental restoration program at DDMT is directed by the Department of the Army, Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure (BRAC) Division (ODB).

This SMP has been prepared in accordance with *Department of Defense (DoD) Manual Number 4715.20, Defense Environmental Restoration Program [DERP] Guidance* (DoD, 2012) and fulfills a requirement of the *Federal Facilities Agreement at the Defense Distribution Depot Memphis* (FFA) (USEPA, 1995), which was signed by United States Defense Logistics Agency (DLA), United States Environmental Protection Agency (USEPA) and Tennessee Department of Environment and Conservation (TDEC) in 1995. DDMT's USEPA Identification Number is TN4210020570.

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. The 2015 SMP is updated with information available as of 1 October 2014.

Responses to comments on the 2015 SMP, Revision 0 from TDEC and USEPA and approval letters are provided in Appendix A.

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 DoD facilities to be closed under BRAC. Storage and distribution activities continued until DDMT closed in September 1997.

DDMT covers approximately 632 acres and includes the Main Installation (MI) and Dunn Field. The MI contains approximately 567 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 65 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 with USEPA identification number TN4210020570. 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, USEPA prepared a final Hazard Ranking System (HRS) Scoring Package for the facility. On 14 October 1992, 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 Comprehensive Environmental Response, Compensation, and Liability Act (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. 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.

2.3 SITE DESIGNATIONS

Site designations were developed for overlapping environmental programs and for facility reuse. 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 representing 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 and 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 and location. 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 site locations 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 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 selected remedies in the decision documents for DDMT have been implemented. The *Preliminary Close Out Report* (USEPA, 2010a) 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 (OPS) determinations for the remedies implemented on Federal property. The remedial action objectives (RAOs) for groundwater have not been met; remedial action and long-term monitoring are continuing.

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

The MI contains approximately 567 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 soil contamination requiring response consisted primarily of metals, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), and a pesticide, dieldrin. Groundwater 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 *Main Installation Remedial Investigation Report, Volumes I through IV* (CH2M HILL, 2000a), the *Final Main Installation Groundwater Feasibility Study Report* (CH2M HILL, 2000b), and the *Final Main Installation Soils Feasibility Study Report* (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) received final approval in September 2001. The MI ROD specified the RAOs that the selected remedy was expected to meet in order 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 RAOs are:

Surface Soil

- 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.
- to prevent direct contact/ingestion of surface soils contaminated with lead in excess of risk-based criteria for protection of residential children.

Groundwater

- 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.
- to prevent horizontal and vertical offsite migration of groundwater contaminants in excess of MCLs.

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 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 to accommodate the economic redevelopment of the site, 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 selected remedy included EBT in the most contaminated areas and assumed that "untreated parts of the groundwater plume would degrade under natural attenuation". Groundwater concentrations of 100 micrograms per liter (µg/L) for PCE and TCE were used to delineate the initial treatment areas and this criterion was also used for the additional EBT treatment areas.

3.1.3.1 EBT

EBT was implemented in accordance with the *Main Installation Final Remedial Design, Revision 1* (MI RD) (CH2M HILL, 2004a) and the *Main Installation Remedial Action Work Plan* (MI RAWP) (MACTEC Engineering and Consulting, Inc. [MACTEC], 2005a). Two treatment areas, in the southwest and southeast areas of the MI, were defined by 100 µg/L isoconcentration contours for CVOCs. The EBT system was constructed from May to August 2006 with installation of 49 4-inch injection wells (IWs) and 30 2-inch performance monitoring wells (PMWs), construction of the lactate-storage and transfer facility and two trailer-mounted injection systems, and baseline groundwater sampling and analysis.

Sodium lactate was injected biweekly during Year One (September 2006 through August 2007) and monthly during Year Two (September 2007 through February 2009). Changes to injection procedures were made based on field observations and measurements. Performance monitoring was conducted 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, Revision 1* (MI IRACR) (HDR|engineering environmental Management, Inc. [e^2M], 2010), including an OPS determination, was submitted to USEPA and TDEC in 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. The OPS determination and the MI IRACR were approved by USEPA in March 2010. Additional monitoring wells installed in the IAQ and the upper portion of the MAQ supported the groundwater model results.

3.1.3.2 Additional EBT

EBT components were planned to be removed following a period of monitoring after the last injection in February 2009. However, system removal and well abandonment was delayed because of rebound in CVOC concentrations observed in long-term monitoring (LTM) samples. New baseline groundwater samples were collected from IWs and PMWs in December 2011. The sample results confirmed rebound in concentrations of parent compounds in the target treatment areas (TTAs), and additional EBT was recommended utilizing some of the existing IWs and PMWs. Following consultation with USEPA and TDEC, 20 IWs and 11 PMWs not needed for additional EBT were abandoned in June 2012.

EBT was implemented for two years at five treatment areas where individual CVOC concentrations of parent compounds (PCE, TCE and CT) exceeded 100 µg/L: TTA-1N, TTA-1S, TTA-2, the West-Central plume and the Building 835 plume. The *Main Installation Remedial Action Work Plan Addendum, Revision 0* (MI RAWP Addendum) (HDR, 2012b), describing procedures for the additional round of EBT, was approved by USEPA and TDEC in January 2013.

Quarterly injections of sodium lactate solution into the fluvial aquifer were made from November 2012 through August 2014. Injections were made in 45 IWs with 4-inch wells and in 15 2-inch former monitoring wells selected to expand the treatment areas. An additional 13 2-inch wells were used as PMWs. The EBT wells are listed on Table 3 and the well locations are shown on Figure 8.

Performance monitoring was performed three months after the initial injection and quarterly thereafter, preceding the injection event. The results were used to evaluate success of the prior injection event in expanding anaerobic conditions within the fluvial aquifer in the EBT zones and in decreasing CVOC concentrations through reductive dechlorination; the results were also used to determine the volume and concentration of the sodium lactate solution for the current injection event. EBT performance monitoring included field measurements of water quality and groundwater sampling at the IWs and PMWs. Water quality parameters were dissolved oxygen (DO), oxygen reduction potential (ORP), pH, temperature, and conductivity. Groundwater samples were analyzed for VOCs, total organic carbon (TOC), metabolic fatty acids and dissolved gases. Performance monitoring was conducted at all IWs and PMWs beginning in February 2013; the final scheduled EBT monitoring event was in November 2014.

The initial year of additional EBT was described in *Main Installation Year Three Enhanced Bioremediation Treatment Report* (HDR, 2014a). The report described updated baseline monitoring in December 2011; abandonment of selected IWs and PMWs in June 2012; quarterly lactate injections in November 2012 and in February, May and August 2013; and quarterly performance monitoring in February, May, August and November 2013. The report was approved by TDEC on 6 August but was not reviewed by USEPA.

The report stated it was not likely contaminant concentrations would be reduced to MCLs throughout the MI by the current target of December 2015. The following issues were identified:

- Parent CVOCs (PCE, TCE and CT) in the IWs may be reduced to MCLs during Year Four EBT, but it is not clear that cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC) concentrations will be reduced to MCLs or that MCLs will be met in all PMWs.
- Contaminant rebound after the initial EBT indicated residual contamination remains in the aquifer or vadose zone and a period of monitoring will be necessary after active groundwater treatment is completed.
- In 2013, 29 LTM wells in the fluvial aquifer exceeded MCLs and were not affected by current EBT injections, and potential upgradient impacts to groundwater need to be defined in some areas.
- Several IAQ wells exceeded MCLs for PCE and TCE; these concentrations are expected to be reduced over time by remedial action in the fluvial aquifer.

The most recent EBT activities are described in the quarterly report, *Enhanced Bioremediation Treatment Summary Report, August 2014*, which was submitted to USEPA and TDEC on 4 November 2014. The

number of wells exceeding MCLs for individual CVOCs are listed below for sample events since the updated baseline in December 2011.

		Wells Exceeding MCLs					
Event	Total No. of Wells	PCE 5 µg/L	TCE 5 µg/L	cDCE 70 µg/L	VC 2 µg/L	CT 5 µg/L	CF 80 µg/L
Dec 2011	55	51	31	7	1	8	0
Feb 2013	45	34	19	12	0	4	0
May 2013	38	21	13	16	2	3	0
Aug 2013	34	25	16	14	1	3	0
Nov 2013	30	18	9	13	3	1	0
Feb 2013	21	13	8	9	0	2	0
May 2014	28	13	7	9	0	6	7
Aug 2014	21	9	6	7	0	2	5

The increased MCL exceedances for CT and CF observed in May 2014 were due to treatment of several wells in TTA-2 for biofouling using Clorox®. Progress in meeting RAOs will be reviewed in the Year Four annual report to be prepared following the November 2014 performance monitoring.

3.1.3.3 Long Term Monitoring

MI LTM is conducted to evaluate progress, through EBT in targeted treatment areas and natural attenuation processes elsewhere in the fluvial aquifer, in reducing contaminant concentrations to MCLs or lower. LTM is also conducted to monitor horizontal and vertical contaminant migration offsite at concentrations in excess of MCLs. LTM has been performed since 2004 in accordance with the LTM Plan in Appendix B of the MI RD (CH2M HILL, 2004a). Recommendations for LTM optimization, including new well locations, well abandonment, and changes to well classification, sample frequency, analytical parameters and sampling procedures are made in the 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.

The latest annual report, *Annual Long-Term Monitoring Report-2013, Revision 1* (HDR, 2014b), was approved by USEPA and TDEC in July 2014. MI LTM activities during 2013 consisted of abandoning one piezometer in March; installation of two MWs and repair of 19 MWs in July; and monitoring designated LTM wells during sampling events in April and October. In 2013, MI LTM included 99 wells classified as Background (6), Boundary (7), Performance (57) and Sentinel (24); five wells installed in 2012 and 2013 had not been classified. The number of LTM wells was reduced from 2012 to 2013; 20 LTM performance wells were transferred for use as EBT IWs or PMWs, and 5 former PMWs were added as LTM performance wells. The newly installed wells were sampled semiannually and the remaining wells had the following sample frequency: biennial (15 wells), annual (26 wells) and semiannual (53 wells). Samples were collected from 56 wells in a semiannual event in April and from 83 wells in an annual sample in October 2013.

Analytical results for October 2013 showed 55 of the 83 wells sampled with concentrations of PCE, TCE and/or CT above the MCL; eight wells had concentrations above 50 µg/L for these CVOCs. The MCLs were exceeded in one Boundary well, nine Sentinel wells and 45 Performance wells.

None of the designated CVOC plumes in the fluvial aquifer extend off-site, although some plumes may be impacted by off-site contaminants migrating on to the MI. Boundary well MW-219, located immediately upgradient of TTA-1 North, contained PCE above 50 µg/L in October 2013; TCE and cDCE were also detected at low levels. Given its upgradient location, CVOC concentrations at MW-219 indicate potential plume migration on to the MI.

CVOCs in the fluvial aquifer have apparently migrated vertically into the IAQ through the window in the northwestern area of the MI. As noted in previous reports, the CVOC plume in the IAQ extends to the northwest property boundary; the October 2013 concentrations in IAQ well MW-256 were 37.7 µg/L for PCE and 14 µg/L for TCE. Nearby MAQ wells, MW-254 and MW-255, did not contain PCE above the reporting limit (RL), but TCE was detected at 2.7 µg/L in MW-254.

Of the 62 performance wells, 57 are associated with designated plumes and five are outside the designated plumes (MW-25A, MW-52, MW-215A/B and PZ-03). Review of groundwater contours and analytical results during preparation of the 2013 annual report resulted in changes to the performance wells associated with designated plumes. In addition, a new plume, South-Central, was designated. The designated plumes are shown on Figure 9 with PCE and TCE isopleths from the October 2013 sample event; the plumes are listed below with the primary CVOCs and associated LTM wells.

Plume	**CVOC**	**LTM Wells**
TTA-1 North	PCE	DR1-2, DR1-7, DR1-8, MW-100B, PMW21-03, PMW21-05
TTA-1 South	PCE, TCE	DR1-1/1A, DR1-3, DR1-4, MW-101, PMW101-03A/B, PMW101-06A/B
TTA-2	PCE, CT, CF	DR2-1, DR2-3, DR2-4, DR2-6, MW-26, MW-64, MW-88, MW-92, MW-96, MW-217, MW-218, MW-259, PMW92-02
West-Central	PCE	MW-39/39A, MW-94A, MW-98, MW-200, MW-204A/B, MW-205A/B, MW-206A/B, MW-208A/B, MW-210B
Building 835	TCE	MW-142, MW-143, MW-198, MW199B, MW-209B, MW-257
North-Central	TCE	MW-103, MW-104, MW-214A/B, MW-258, MW-260
South-Central	TCE	MW-97, MW-216, MW-261

Of the 45 performance wells exceeding MCLs in October 2013, 34 wells are located in areas where EBT is currently being performed. However, 18 of the 34 wells are not being affected by EBT based on upgradient or side-gradient locations and absence of reductive dechlorination. In addition, 11 performance wells exceeding MCLs are located in other plumes or isolated locations.

The 2013 LTM report had a general recommendation to review additional monitoring well locations in order to address the following data gaps: upgradient control for areas with CVOC concentrations above MCLs (TTA-1N, TTA-2, Building 835 and North-Central plumes); downgradient extent of CVOCs in the IAQ (downgradient of MW-256); and limited hydrogeological and analytical data in the south central MI (area bounded by MW-94A, MW-215A/B, MW-259 and the southern property boundary).

The recommendations implemented for 2014 MI LTM were:

- Wells installed in 2012 (MW-257, MW-258 and MW-259) and in 2013 (MW-260 and MW-261) were classified as performance wells.
- Sample frequencies were established or revised.
    - MW-252, MW-253 and MW-254 were decreased from semiannual to annual sampling based on recent CVOC concentrations ranging from non-detect to near the RL.
    - MW-257 was recommended to be sampled annually.
    - MW-258 and MW-259 were recommended to be sampled semiannually.

TDEC and USEPA submitted comments on the 2013 LTM report in May 2014; the comments and responses were discussed during a project review meeting in Memphis on 29 May. Comments related to the MI were generally in regard to vertical contaminant migration into the IAQ, potential for small secondary source areas, recommendations for additional monitoring wells, review of previous natural attenuation and groundwater modeling studies. USEPA stated an MI ROD Amendment or Explanation of

Significant Differences may be needed to address the following issues: the need for response action in the IAQ; to clarify selection of MNA as an MI remedy component for fluvial groundwater; to address potential on-site impacts from a possible southwest off-site location (near MW-219); and possibly to select response actions in addition to, or other than, EBT in the fluvial aquifer at the MI.

Responses to comments requiring changes to the report were accepted and the 2013 LTM report was approved; the comments and responses are provided in Appendix A of that report. Additional activities to address the comments are discussed in Section 4.5.

For 2014, there are 99 MI LTM wells classified as Background (6), Boundary (7), Performance (62), and Sentinel (24). The sample frequency for two wells installed in 2013 (MW-260 and MW-261) will be determined after four semiannual sample events. The remaining 97 wells had the following sample frequency: biennial (15), annual (30) and semiannual (52). The 2014 MI LTM wells are listed on Table 4 and shown on Figure 10.

The primary CVOC results for the semiannual sample event in April 2014 are summarized on Table 5; the CVOCs most often detected above MCLs and the maximum concentrations reported were PCE at 179 µg/L and TCE at 73.9 µg/L. Concentrations and isopleths for PCE, TCE, cDCE and CT for the April 2014 semiannual LTM event, and including results from the August 2014 EBT performance monitoring, are shown on Figures 11, 12, 13 and 14. PCE and TCE concentrations for the April 2014 LTM event in IAQ and MAQ sentinel wells within the window are shown on the cross-section in Figure 15.

3.1.3.4 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 (LUCIP) was included as Appendix C of the MI RD. 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 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 65 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 CVOCs 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 *Final 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 interim remedial action (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, the final RWs were shutdown in January 2009. Approximately 918 pounds of total VOCs, including 369 pounds of TCE, 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 the *Dunn Field Groundwater Interim Remedial Action 2009 Operations and Closure Report* (HDR, 2010).

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., 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 a former pistol range in the Northeast Open Area; the action was completed in March 2003 and documented in *Removal Action at Former Pistol Range, Site 60* (Jacobs Federal Programs, 2003). Approximately 930 CY of lead contaminated surface soil were 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, Revision 3* (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 ICs: 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 fundamental change in the ROD Amendment 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 indicated 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 RAOs and the RGs for the contaminants of concern, shown on Table 6, 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 16.

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 Remedial Design, Revision 1* (CH2M HILL, 2004c), *Dunn Field Disposal Sites Remedial Action Work Plan, Revision 1* (MACTEC, 2004), and *Dunn Field Disposal Sites Remedial Action Work Plan Addendum 1, Revision 1* (MACTEC, 2006a). The disposal sites are listed on Table 2 as Site No.'s 3, 10, 13, 64 and 90; Site No. 64 was also identified as Installation Assessment Site 31 and Site No. 90 was also listed as Site 4.1. The remedial actions are described in *Dunn Field Disposal Sites Remedial Action Completion Report, Revision 1* (MACTEC, 2006b), which was approved by USEPA in August 2006.

The Disposal Sites RA was performed during two separate mobilizations. During the first mobilization from March 2005 to May 2005, excavations at Sites 13, 64, 90, 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.

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 that the portion of the plume slated for MNA in the ROD was not unduly extensive or high in concentration. ZVI injections were made 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, Revision 1*

(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 (TA-1F) and buried drums with residual 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 Remedial Design* (Dunn Field RD) (CH2M HILL, 2007); the *Dunn Field Source Areas Fluvial Soil Vapor Extraction Remedial Action Work Plan, Revision 1* (FSVE RAWP) (e²M, 2007a); and the *Dunn Field Source Areas Loess/Groundwater Remedial Action Work Plan, Revision 1* (Loess/Groundwater RAWP) (e^2M, 2007b).

The remedial actions are described in the *Dunn Field Source Areas Interim Remedial Action Completion Report, Revision 1* (HDR|e^2M, 2009a); the IRACR was approved by USEPA and TDEC in November 2009. The memorandum, *Dunn Field Operating Properly and Successfully Demonstration, Source Areas Remedial Action* (e^2M, 2009b), was approved by USEPA in October 2009.

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. Ten additional SVE wells were installed in borings for confirmation soil samples in November 2010. The FSVE system layout is shown on Figure 17.

FSVE system operations began in July 2007 and approximately 4,049 pounds of VOCs were removed through July 2012. The VOC concentration in the extracted vapor decreased asymptotically to less than 1 part per million (ppm). The FSVE system was shutdown in July 2012 based on confirmation soil sample results demonstrating that RAOs had been met. The final year of operations and monitoring was described in *Dunn Field Source Areas Fluvial Soil Vapor Extraction System Annual Operations Report, Year Five, Revision 0* (HDR, 2012c), which was approved by USEPA and TDEC in December 2012.

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.

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 continuing sources 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 2007and April 2014 on Figure 18.

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, Revision 2* (Off Depot RAWP) (e^2M, 2009c). Remedial action construction and implementation are described in *Off Depot Groundwater Interim Remedial Action Completion Report, Revision 1* (HDR, 2011a), which was approved by USEPA in August 2011.

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. The AS/SVE system was designed to operate with up to one-third of the 90 AS points operating at any time. The AS points are individually programmed for daily operation in 2 hour blocks and are set to operate in three groups. System operations have been adjusted periodically to reduce potential for plume diversion around the treatment area. The AS/SVE system layout is shown on Figure 19.

AS/SVE operations began 21 December 2009 and approximately 83 pounds of VOCs were removed through December 2013. The latest annual report, *Off Depot Air Sparge-Soil Vapor Extraction System Annual Operations Report, Year Four, Revision 1* (HDR, 2014c), was submitted to USEPA and TDEC in August 2014 following approval of revisions by USEPA and TDEC in July 2014.

Overall performance of the AS/SVE system is evaluated based on results of LTM analyses. The goal for groundwater remediation at Dunn Field is to reduce CVOC concentrations below 50 µg/L for each CVOC constituent, with MNA expected to achieve the RGs for groundwater over time. CVOC concentrations in most wells near the AS/SVE system, including all downgradient wells, were reduced below 50 µg/L for individual CVOCs as of December 2010.

The AS/SVE system is to continue operations until the upgradient concentrations from the Dunn Field plume do not exceed 50 µg/L for individual CVOCs for 12 months; the estimated period for operations was five years, ending in December 2014. Since April 2012, only TCE in one LTM well, MW-159, which is located immediately upgradient of the system has exceeded that standard; TCE was reported at 216 µg/L for MW-159 in April 2014. The Year Four report recommended the AS/SVE system be operated in alternating months to restore the northerly groundwater flow observed prior to system operation. That should allow groundwater to flow from MW-159 into the treatment zone and if necessary extend the operating period without additional cost.

The AS/SVE system shut down on 17 February 2014 due to equipment damage from a power surge during a thunderstorm. System repairs and testing have been completed and operations resumed on 6 March 2015. The change in system operations will be implemented for the remainder of 2015.

3.2.3.5 Long Term Monitoring

Dunn Field LTM is conducted to evaluate progress in meeting RAOs to prevent further offsite migration of VOCs in groundwater in excess of protective target levels and restore 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. 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. Recommendations for LTM optimization are made in the annual LTM reports.

Dunn Field LTM wells are classified 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.

The latest annual report, *Annual Long-Term Monitoring Report-2013, Revision 1* (HDR, 2014b), was approved by USEPA and TDEC in July 2014. Dunn Field LTM activities during 2013 consisted of abandoning 28 wells in March; repair of 12 MWs in July; and monitoring designated LTM wells during sampling events in April and October. In 2013, Dunn Field LTM included 86 wells classified as Background (8), Background-NE (5), Sentinel (9), Performance (50) and Performance-FSVE (14). The Background-NE wells are located on or bordering the northeast section of Dunn Field and have CVOC concentrations from an off-site source(s) upgradient of Dunn. The Performance-FSVE wells were selected for rebound monitoring after shutdown of the FSVE system in July 2012. The wells had the following sample frequency: semiannual (42), annual (29) or biennial (15). Samples were collected from 86 wells in a biennial event in April and from 43 wells in a semiannual sample in October 2013; an additional well was sampled in October to evaluate potential impacts from observed damage at the well head.

Review of the 2013 analytical results showed CVOC concentrations decreasing at most locations in the Off Depot plume and contaminant migration onto the northeast corner of Dunn Field. Results for each LTM well category are summarized below:

- Analytical results for April 2013 showed 18 Performance wells with concentrations above the MCL or TC for one or more CVOCs; individual CVOC concentrations were above 50 µg/L in only one Performance well and above 10 µg/L in only seven Performance wells.

- MW-159 was the only LTM well in the Source Areas on Dunn Field or the Off Depot area to exceed the active treatment objective (50 µg/L); the TCE concentration was 181 µg/L in April and 129 µg/L in October 2013.
- All five Background-NE wells exceeded the MCL for PCE and TCE; DCE exceeded the MCL in four of the wells. The highest concentrations were in MW-130 northeast of Dunn Field.
- Rebound in CVOC concentrations was not observed in the 14 Performance-FSVE wells. One Performance-FSVE well (MW-03) in the northwest corner of Dunn Field contained PCE at 5.32 µg/L; the sample also contained TCE and DCE and the increase is attributed to the off-site plume.
- CVOCs (DCE and/or CF) were detected above the RL in two of nine Sentinel wells. Concentrations were below the MCL and TC, and consistent with past results.
- One CVOC (CF) was detected above the RL but below 1 µg/L in three of eight Background wells.

The recommendations implemented for 2014 Dunn Field LTM were:

- Sample frequencies were revised.
  - MW-28 had only been sampled in 1993 and 1996 with no CVOCs detected. Semiannual samples were collected in 2012 and 2013 to confirm past results. Since the last four samples did not exceed MCLs, MW-28 was decreased to biennial sampling.
  - MW-15, MW-57, MW-157 and MW-242 were decreased from semiannual to annual sampling.
  - MW-44 was increased from annual to semiannual sampling.

As noted in Section 3.1.3.3, TDEC and USEPA submitted comments on the 2013 LTM report in May 2014; the comments and responses were discussed during a project review meeting in Memphis on 29 May. Comments related to Dunn Field were generally in regard to the schedules for abandoning the FSVE and AS/SVE treatment systems in 2015 and for achieving RAOs in 2019, and to the impact on the schedule for achieving RAOs due to contaminant migration onto Dunn Field from an off-site source(s) and suspected commingling of the plumes. The comments regarding Dunn Field did not require changes to the report other than inclusion of the comments and responses in Appendix A of that report.

For 2014, there are 86 Dunn Field LTM wells classified as Background (8), Background-NE (5), Performance (50), Performance-FSVE (14) or Sentinel (9) wells. The wells have the following sample

frequency: biennial (16), annual (32) and semiannual (38). The 2014 Dunn Field LTM wells are listed on Table 7 and the well locations are shown on Figure 20.

The primary CVOC results for the annual sample event in April 2014 are summarized on Table 8; the CVOCs most often detected above the target concentrations in the Dunn Field ROD and the maximum concentrations were: TCE, 216 µg/L; PCE, 60.6 µg/L; TeCA, 20.3 µg/L and DCE 22.6 µg/L. Concentrations and isopleths for TeCA, TCE and PCE for the April 2014 LTM event are shown on Figures 21, 22 and 23.

3.2.3.6 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 and reports have been distributed in accordance with the LUCIP. No deficiencies have been identified.

3.3 PROPERTY TRANSFER

Six Findings of Suitability to Transfer (FOSTs) have been completed including all property within DDMT. The area covered by each FOST is shown on Figure 24. Following approval of FOST 6, USEPA issued the *Superfund Property Reuse Evaluation Checklist for Reporting the Site Wide Ready for Anticipated Use Measure* (USEPA, 2010b) documenting that all cleanup goals affecting current and reasonably anticipated future land uses have been achieved, so there are no unacceptable risks; and all institutional or other controls required in the RODs have been put in place.

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 9. ODB plans to transfer the remaining 24.5 acres on FOST 5 through a competitive public sale.

The transfer has been delayed due to economic conditions, impediments to site development from remediation equipment and monitoring wells on-site, or the presence of groundwater contamination from an off-site source migrating on to the property.

4.0 ACTIVITIES REQUIRED FOR SITE COMPLETION

FSVE operations on Dunn Field were shut down in July 2012 and the area is being monitored for rebound. The additional EBT at the MI will be completed in November 2014. AS/SVE in the off depot area will continue once system repairs are completed. LTM will continue at the MI and Dunn Field until groundwater RAOs are achieved.

4.1 REMEDIAL ACTION OPERATIONS

4.1.1 Fluvial SVE Operations

The FSVE system was shut down in July 2012 based on confirmation soil samples meeting the RAO and system influent asymptotically decreasing below 1 ppm. The conveyance lines were closed and the wells were opened for passive venting. The air intakes and exhausts for the blowers were sealed; power at the equipment compound was switched off, but the MLGW connection remains in place for use during maintenance.

BaroBall™ caps were installed on 11 SVE wells for increased efficiency during passive venting, as recommended by the USEPA project manager. The caps have a control valve which utilizes the natural fluctuation of atmospheric pressure to allow soil gas to flow out of the well while restricting air flow from the surface into the well.

Rebound of CVOC concentrations in groundwater is evaluated through LTM sample results at the 14 Performance-FSVE wells on Dunn Field. The system layout and well locations used to monitor rebound are shown on Figure 17.

Vadose zone modeling was performed in 2011 to estimate the necessary groundwater monitoring period following shutdown. The modeling indicated rebound due to residual CVOC mass in the fluvial sand within 90 days after SVE shutdown, while rebound due to residual CVOC mass in the loess would be observed within approximately 3 years after shutdown. The model parameters and results were described in Appendix F of *Dunn Field Source Areas Fluvial Soil Vapor Extraction System Annual Operations Report, Year Four, Revision 0* (HDR, 2011b). The only indication of rebound to date was increased CVOCs (CF, TCE and cDCE) in MW-87 along the central section of Dunn Field's western boundary; all the results were below MCLs, but CF exceeded the TC. If rebound in the Performance-FSVE wells does not approach 50 µg/L for individual CVOCs in 2015, the FSVE system will be recommended for abandonment/removal and the LTM wells on Dunn Field will be reviewed for abandonment in accordance with the Off Depot LTM plan.

4.1.2 AS/SVE Operations

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. 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. The AS/SVE system layout is shown on Figure 19.

AS/SVE operations include:

- System inspections with repair or replacement of components, as required.
- Readings at AS compressor, SVE wells and system effluent for flow rate, vacuum, temperature, and operating hours.
- Photoionization detector (PID) measurements at SVE wells and system effluent.
- PID and vacuum measurements at VMPs.
- Laboratory samples from system effluent analyzed for VOCs.
- Quarterly reports to describe operations and maintenance (O&M) activities, system status, performance and monitoring results.
- Annual operations report to summarize system operations and monitoring results with data validation and to provide recommendations for optimization of operations.

Inspections include a visual review of the equipment compound (exterior and interior) and major system components. The operator records system flow rates and other operating parameters on field records provided in the O&M manual. Flow rates and operating parameters are read from one of the system computer display screens or directly from gauges and meters located within the equipment room. Original field sheets are maintained onsite in the project file. General maintenance of AS/SVE system components is required to allow for longevity of system components and is performed based on field observations and manufacturer requirements.

Vapor samples for laboratory analysis are limited to the system effluent and are collected quarterly for VOC analysis. PID readings at SVE wells and system effluent and the effluent sampling results are used to assess VOC capture effectiveness, and the effluent sampling results are used to verify compliance with MSCHD air regulations. VMPs are monitored to assess the vacuum radius of influence and vapor

extraction effectiveness; monitoring includes vacuum measurements and PID measurements for semi-quantitative VOC data.

Overall effectiveness of the AS/SVE system is evaluated through groundwater samples during LTM. In accordance with the Off Depot RD (CH2M HILL, 2008), 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 on the nonparametric Mann-Kendall test. In April 2014, LTM Performance wells in the Source Areas on Dunn Field remained below MCLs, except at MW-220 which is impacted by contaminant migration on to Dunn Field; only well MW-159 in the Off Depot area exceeded the treatment goal and only for TCE (216 µg/L).

The Year 4 AS/SVE Report (HDR, 2014c) included a recommendation to operate the AS/SVE system in alternate months to increase movement of plume into treatment area, which was accepted by USEPA and TDEC. The AS/SVE system shutdown in February 2014 due to equipment damage from a power surge before the recommendation could be implemented. AS/SVE system operations resumed in March 2015 and will operate in alternating months for the remainder of 2015.

The operational change will allow system operations to continue to late 2015 and will result in doubling the time period for the operational activities described above. A schedule of operations will be developed after the system has been re-started. If the operational change does not achieve the goal for active remediation, additional steps such as additional AS points will be evaluated.

4.1.3 EBT

EBT was initially performed from September 2006 through March 2009 as described in the MI IRACR (HDR|e^{2}M, 2010). A second round of EBT was performed in accordance with the MI RAWP Addendum (HDR, 2012b) from November 2012 to November 2014 in five areas where individual CVOC concentrations of parent compounds (PCE, TCE and CT) exceeded 100 µg/L: TTA-1N, TTA-1S, TTA-2, the West-Central plume and the Building 835 plume. EBT was implemented through quarterly injections of a sodium lactate solution into the fluvial aquifer using 30 4-inch IWs and 15 2-inch wells selected to expand the treatment areas. In addition, 13 2-inch wells are being used as PMWs. The EBT wells are listed on Table 3 and the locations are shown on Figure 8.

Each injection event included the following activities:

- Clear access to injection and performance monitoring well locations.
- Measure water quality and collect groundwater samples at all injection and performance monitoring wells prior to injections.
- Prepare sodium lactate injection fluid in the trailer-mounted, 500-gallon storage tank.
- Inject sodium lactate solution at designated wells.
- Rinse injection trailer components with potable Alconox/water solution to prevent biological growth between injection events.

Performance monitoring, including field measurements and sampling for laboratory analyses, was used to evaluate success through expanding anaerobic conditions within the fluvial aquifer in the EBT zones and decreases in CVOC concentrations through reductive dechlorination.

Monitoring results through August 2014 show significant reductions in CVOC concentrations at the IWs and less response at the PMWs in most areas. The number of EBT wells with concentrations above MCLs in December 2011 and August 2014 are shown below.

Concentrations Above MCLs		December 2011	August 2014
PCE (5 µg/L)	IW	40	1
	PMW	11	8
TCE (5 µg/L)	IW	23	0
	PMW	9	6
CT (5 µg/L)	IW	5	0
	PMW	3	2
CF (80 µg/L)	IW	0	5
	PMW	0	0
VC (2 µg/L)	IW	1	0
	PMW	0	0

While there has been progress since re-starting EBT in November 2012, significant work remains in order to meet the RAOs. In August 2014, 21 of 58 EBT wells (10 IWs and 11 PMWs) exceeded MCLs for one or more primary CVOCs, mainly PCE, TCE and cDCE.

The ROD estimated that 10 years would be required for the selected remedy to meet RAOs, with final compliance monitoring scheduled for 2016 in the last SMP. That schedule is not achievable based on additional information on extent of groundwater contamination since completion of the ROD and the progress to date through EBT. Further groundwater remedial action on the MI will be delayed until the

Year Four EBT report is completed and a supplemental remedial investigation and focused feasibility study (SRI/FFS) has been conducted as described in Section 4.5.

4.2 LONG TERM MONITORING

LTM 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 monitoring will be performed in accordance with the RODs. Once compliance with RAOs is demonstrated, groundwater monitoring will cease and wells will be abandoned.

Semiannual LTM events are conducted with water level measurements and well condition assessments at all wells and groundwater sampling at designated wells. Samples are collected using permeable diffusion bags at most wells and with bladder pumps or bailers where necessary due to limited saturated thickness, slow recharge or narrow diameter casing. All samples are analyzed for VOCs by method 8260B.

4.2.1 MI LTM

MI LTM is performed in accordance with the MI LTM Plan (CH2M HILL, 2004a) with recommendations for changes made in annual LTM reports. The current status of MI LTM was described in Section 3.1.3.3.

There are currently 99 MI LTM wells classified as Background (6), Boundary (7), Performance (62), and Sentinel (24). Two wells (MW-260 and MW-261) were installed in 2013 and will be assigned a sample frequency following four semiannual sample events. The remaining 97 wells have the following sample frequency: biennial (15), annual (30) and semiannual (52).The MI LTM wells are listed on Table 4 and the well locations are shown on Figure 10.

In April 2014, 54 MI LTM wells were sampled and 48 wells exceeded the MCL for PCE, TCE, cDCE, CT and/or CF. LTM wells exceeding MCLs include performance wells in the fluvial aquifer outside EBT treatment areas and sentinel wells screened in the IAQ.

An SRI/FS will be performed to develop a remedial strategy to achieve RAOs throughout the MI. Additional monitoring wells will be installed for the SRI as discussed in Section 4.5. The wells will be sampled following installation and added to LTM. The new wells will be sampled during the three following semiannual sample events prior to classification and establishing a sample frequency. Other recommended changes for existing wells in 2015 MI LTM will be included in the 2014 annual report.

4.2.2 Dunn Field LTM

Dunn Field LTM is conducted in accordance with the Off Depot LTM Plan (CH2M HILL, 2008) with recommendations for changes made in annual LTM reports. The current status of Dunn Field LTM was described in Section 3.2.3.5.

There are currently 86 Dunn Field LTM wells classified as Background (8), Background-NE (5), Performance (50), Performance-FSVE (14) or Sentinel (9) wells. The wells have the following sample frequency: biennial (16), annual (32) and semiannual (38). The Dunn Field LTM wells are listed on Table 7 and the well locations are shown on Figure 20.

In April 2014, 70 Dunn Field LTM wells were sampled; 14 Performance wells and 5 Background-NE wells had concentrations of TeCA, TCE, PCE, DCE and VC above the MCL or TC. Four of the Performance wells were impacted by the off-site plume. Recommended changes for 2015 Dunn Field LTM will be included in the 2014 annual report.

4.3 LAND USE CONTROLS

The LUCs applicable to the MI and Dunn Field are described in the LUCIPs in the MI RD (CH2M HILL, 2004a) and Off Depot Groundwater RD (CH2M HILL, 2008). 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.

4.4 FIVE YEAR REVIEWS

The continued effectiveness of the selected remedies at the MI and Dunn Field are evaluated in CERCLA Five-Year reviews because hazardous substances remain at the site above levels that allow for unrestricted use and unlimited exposure. Because the final remedies for both the MI and Dunn Field include LUCs 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, Revision 1* (e^2M, 2007c), was approved in January 2008.

The third five-year review was conducted in 2012 in accordance with *Comprehensive Five-Year Review Guidance* (USEPA, 2001). The *Third Five-Year Review, Revision 1* (HDR, 2012d) was approved by

USEPA on 23 January 2013. Two issues were identified, both related to the MI: rebound in CVOC concentrations and the time required to achieve groundwater RAOs. The issues do not affect current protectiveness because there is no current exposure to COCs in groundwater and do not affect future protectiveness because the remedy was shown to be effective in the IRACR. Follow-up actions were recommended: restart EBT on the MI and re-evaluate the time required to achieve RAOs after the first year of EBT. The issues, recommended actions, schedule and status are shown on Table 10.

The remedies at Dunn Field (OU 1) and the MI (OUs 2, 3 and 4) were found to be protective of human health and the environment, and because the RAs at all OUs for DDMT are protective, the site is protective of human health and the environment. The next five-year review for DDMT is required to be completed by 23 January 2018.

During the May 2014 project review meeting, the team discussed USEPA's comment on the *2014 Site Management Plan, Revision 1* (2014 SMP) (HDR, 2014d) regarding the potential for vapor intrusion (VI) issues at DDMT. The discussion included a summary of the VI investigation conducted as part of the Off Depot groundwater remedial action, USEPA guidance being finalized and TDEC VI guidance expected to be issued in 2014; USEPA also stated that VI should be addressed prior to the next five-year review. USEPA agreed to review the VI investigation conducted at DDMT to evaluate the need for further VI investigation and to review other five-year reviews to see how VI has been successfully presented. The need for further study of VI issues at DDMT will be discussed with USEPA and TDEC in order to adequately address the issues prior to the next five-year review to be conducted in 2017.

4.5 SUPPLEMENTAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

An SRI/FS will be performed to develop a remedial strategy to achieve RAOs throughout the MI in order to address the issue in the third five-year review regarding time required to achieve groundwater RAOs on the MI and the areas requiring consideration as identified in the 2014 SMP (HDR, 2014d). The final 2014 SMP stated that re-evaluation of the schedule would include consideration of: 1) CVOC concentrations in the fluvial aquifer that requires active treatment versus natural attenuation, 2) the need for remedial action in the IAQ, 3) the continued use of EBT versus other remedial actions and 4) the potential impact from off-site locations.

The Year Three EBT report (HDR, 2014a) stated that significant progress in reducing CVOC concentrations in the treatment areas had been made but it was unlikely that contaminant concentrations would be reduced below MCLs by the target date of December 2015.

The 2013 LTM report (HDR, 2014b) also addressed the schedule for meeting RAOs on the MI. The conclusions and recommendations summarized the basis for the estimated ROD schedule to meet RAOs including past natural attenuation studies and groundwater modeling and the conceptual site model. The report included a general recommendation for additional wells to improve delineation of contaminant plumes and to clarify site hydrogeology.

As noted in Section 3.1.3.3, TDEC and USEPA comments on the 2013 LTM report related to the MI were generally in regard to vertical contaminant migration into the IAQ, potential for small secondary source areas, recommendations for additional monitoring wells, review of previous natural attenuation and groundwater modeling studies, and potential need for an MI ROD Amendment or Explanation of Significant Differences (ESD). Comment responses were discussed during the May 2014 project review meeting.

The scope of additional investigation in support of an MI ROD Amendment/ESD was discussed and the following areas, consistent with those listed in the 2014 SMP, were identified:

- Review previous natural attenuation study and groundwater modeling.
- Re-evaluate potential for VOC transport in the MAQ from the MI to the MLGW Allen Well Field.
- Evaluate need for response action in IAQ, including review of the conceptual site model that contaminant sources are limited to the fluvial aquifer and remedial actions in the fluvial aquifer would lower contaminant concentrations in the IAQ.
- Clarify selection of MNA as a MI remedy component for the fluvial aquifer.
- On-site impacts from possible off-site sources.
- Response actions in addition to, or other than, EBT in the fluvial aquifer potentially including bioaugmentation with EBT and SVE or AS/SVE as an alternative to EBT.

The following tasks have been authorized by ODB to develop a remedial strategy to achieve RAOs throughout the MI:

- Review site documents to identify data requirements for site hydrogeology and contaminant extent and for evaluation of remedial alternatives.
- Update the hydrogeological model of the site with data collected since implementation of remedial action.

- Review the previous groundwater model which was limited in scope to provide an initial assessment of contaminant migration and potential impacts to the MAQ. Determine revisions to the model program and to site parameters that would be required to provide a more detailed model; and identify additional data needs.
- Identify questions regarding groundwater flow and contaminant migration and whether more detailed modeling is warranted.
- Prepare work plans and conduct two phases of additional field investigation
  - Phase 1 shall include installation of monitoring wells to provide hydrogeology and contaminant extent data as discussed with USEPA and TDEC in the May 2014 project review meeting (Figure 25).
  - Phase 2 shall include installation of additional wells and field data collection to evaluate remedial alternatives.
- Prepare an SRI report to describe the field investigation, present validated analytical results, and further characterize the nature and extent and fate and transport of groundwater contamination at the MI. A detailed risk assessment is not planned; the current RAO requiring restoration of groundwater to concentrations at or less than MCLs is not expected to change.
- The focused feasibility study (FFS) shall include development and screening of remedial action alternatives, including EBT as the currently selected remedy. Develop a limited number of alternatives for detailed analysis to establish the basis for an alternative remedy selection, if warranted.
- Document changes to the selected remedy and schedule through an ESD, or a Revised Proposed Plan (RPP) and ROD Amendment, following completion of the SRI/FFS.

The SRI will not address the USEPA comment regarding identification and mitigation of small soil source areas that may be contributing to rebound and lack of contaminant reduction. As noted in the comment response, previous investigations did not identify areas of impacted soil that warranted remedial action [see *Main Installation Source Area Evaluation* (e^2M, 2008) and *Main Installation Source Area Investigation, Rev. 0* (HDR|e^2M, 2009b)]. In addition, the SRI will not address USEPA comments related to Dunn Field (see Section 3.2.3.5) regarding the impact from contaminant migration onto Dunn Field from an off-site source(s) and suspected commingling of the plumes; as noted in the comment responses, Army continues to evaluate whether it has any obligation with respect to the off-site plume.

4.6 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 and TDEC. 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 completion of remedial action is that groundwater concentrations for CVOCs, which are the contaminants of concern, are below MCLs.

An SRI/FFS will be conducted to update the remedial strategy for the MI, and an ESD or ROD Amendment will be prepared as necessary to document changes to the selected remedy. In order to update the project schedule, a ROD Amendment is assumed to be necessary. The project schedule has been revised to include these tasks, but the schedule and duration for additional RA cannot be determined at this time; an estimate of three years following a ROD Amendment is included.

The schedule for RA on Dunn Field has been revised to incorporate the equipment damage and shutdown of the AS/SVE system in February 2014 and the need for the active remediation goal to be met for one year prior to shut down. The schedule does not incorporate investigation or remedial action for the off-site contamination migrating on Dunn Field.

The estimated timeline for site completion includes the following:

- Main Installation
  - Final EBT sampling in November 2014.
  - SRI to be completed in November 2016.
  - FFS to be completed in January 2017.
  - ROD Amendment to be final in February 2018.
  - Additional remedial action June 2018 through June 2021.
  - MI LTM through 2021, with final quarterly compliance monitoring in 2022.
  - MI Remedial Action Completion Report to be completed in October 2023.
- Dunn Field
  - Off Depot AS/SVE operates through December 2016.
  - Off Depot LTM through 2018, with final quarterly compliance monitoring in 2019.

  - Dunn Field Remedial Action Completion Report to be completed in October 2020.

- Final Closeout Report to be completed in April 2024

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:

FY15

- MI RA – Complete Additional EBT Year 4; perform SRI Phase 1.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- Dunn Field/Off Depot RA – Complete AS/SVE equipment repairs and start extended Year 5 (see note below) operations and monitoring.
- Off Depot LTM – Perform groundwater monitoring in accordance with LTM plan.
- Site Management and Community Relations – Conduct annual LUC inspections; prepare SMP Update and annual community newsletter.

FY16

- MI RA – Perform SRI Phase 2 and complete SRI; begin FFS.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- Dunn Field/Off Depot RA – Complete extended Year 5 (see note below) and begin Year 6 AS/SVE operations and monitoring; remove/abandon FSVE system.
- Off Depot LTM – Perform groundwater monitoring in accordance with LTM plan.
- Site Management and Community Relations – Conduct annual LUC inspections; prepare SMP Update and annual community newsletter.

FY17

- MI RA – Complete FFS; prepare RPP and conduct public comment period/meeting; begin ROD Amendment.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- Dunn Field/Off Depot RA – Complete Year 6 AS/SVE operations and monitoring; remove/abandon AS/SVE system.

- Off Depot LTM – Perform groundwater monitoring in accordance with LTM plan.
- Site Management and Community Relations – Conduct annual LUC inspections; prepare SMP Update and annual community newsletter; conduct 4th Five-Year Review.

Note: Year 5 AS/SVE operations were scheduled to be completed on 31 December 2014 but will be extended to late 2015 due to the equipment damage and system shutdown in February 2014.

The master schedule for MI, Dunn Field and site-wide activities through planned site completion in 2024 is shown on Figure 26. Table 11 lists primary and secondary documents, in accordance with the FFA (USEPA, 1995), for the DDMT environmental restoration program through FY17.

5.2 REQUIREMENTS BY FISCAL YEAR

The financial requirements by fiscal year for the environmental program at DDMT are summarized in Table 12, which lists estimated annual costs by site category: Dunn Field LUC Sites, Dunn Field RA Sites, and MI RA Sites. 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 ODB.

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TABLES

TABLE 1
FUNCTIONAL UNIT AND AREA DESCRIPTIONS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Main Installation

Functional Unit	Name	Size[1] (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[1] (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:
1) Acreage is approximate
FU: Functional Unit
MI: Main Installation

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 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.
2	36.1	Ammonia Hydroxide (7 pounds) and Acetic Acid (1 gallon) Burial (1955)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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. Excavation of this site began in March 2005 and was completed in 2006. USEPA approved the RACR in August 2006. This is also one of 21 sites associated with Dunn Field land use controls for administrative purposes.
4	36.3	POL Burial Site (thirteen 55-gallon drums of oil, grease, and paint)	No further action is required for this site. This is one of five sites associated with Dunn Field groundwater remediation for administrative purposes. Soil vapor extraction system in fluvial deposits operated from July 2007 to July 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 through 2014. USEPA approved the Off Depot IRACR in August 2011.
5	36.4	Methyl Bromide Burial Site A (3 cubic feet) (1955)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
6	36.2	40,037 units ointment (eye) Burial Site (1955)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
7	36.5	Nitric Acid Burial Site (1,700 quart bottles) (1954)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
8	36.6	Methyl Bromide Burial Site B (3,768 1-gallon cans) (1954)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
9	36.17	Ashes and Metal Burial Site (burning pit refuse) (1955)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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. Excavation of this site began in March 2005 and was completed in 2006. USEPA approved the RACR in August 2006. This is also one of 21 sites associated with Dunn Field land use controls for administrative purposes.
11	36.7	Trichloroacetic Acid Burial (1,433 1-ounce bottles) (1965)	No further action is required for this site. This is one of five sites associated with Dunn Field groundwater remediation for administrative purposes. Soil vapor extraction system in fluvial deposits operated from July 2007 to July 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 through 2014. USEPA approved the Off Depot IRACR in August 2011.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
12	36.8	Sulfuric and Hydrochloric Acid Burial (1965)	No further action is required for this site. This is one of five sites associated with Dunn Field groundwater remediation for administrative purposes. Soil vapor extraction system in fluvial deposits operated from July 2007 to July 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 through 2014. USEPA approved the Off Depot IRACR in August 2011.
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. Excavation of this site was completed in March 2005. USEPA approved the RACR in August 2006. This is also one of 21 sites associated with Dunn Field land use controls for administrative purposes.
14	36.22	Municipal Waste Burial Site B (near MW-12) (food, paper products)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
15	36.23	Sodium Burial Sites (1968)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
16	36.1	Unknown Acid Burial Site (1969)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
17	36.11	Mixed Chemical Burial Site C (1969)	No further action is required for this site. This is one of five sites associated with Dunn Field groundwater remediation for administrative purposes. Soil vapor extraction system in fluvial deposits operated from July 2007 to July 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 through 2014. USEPA approved the Off Depot IRACR in August 2011.
18	36.15	Plane Crash Residue (Dunn Field)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
23	36.29	Construction Debris and Food Burial Site (Dunn Field)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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.
50	36.27	Dunn Field Northeastern Quadrant Drainage Ditch	No further action is required at this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
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 this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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 at this site.
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. Excavation of this site was completed in March 2005. USEPA approved the RACR in August 2006. This is also one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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. Excavation and off-site disposal of this site was completed in March 2005. USEPA approved the RACR in August 2006. This is also one of five sites associated with Dunn Field groundwater remediation for administrative purposes. Soil vapor extraction system in fluvial deposits operated from July 2007 to July 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 through 2014. USEPA approved the Off Depot IRACR in August 2011.
91	36.23	Sodium Phosphate Burial (1968)	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
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. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.
93	36.1	Acid Burial Site	No further action is required for this site. This is one of 21 sites associated with Dunn Field land use controls for administrative purposes.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
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.
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 site is associated with MI groundwater remediation for administrative purposes; enhanced bioremediation was selected as the CERCLA groundwater remedy. The EBT system operated from May 2006 until February 2009. USEPA approved the MI OPS determination in March 2010. EBT was restarted in November 2012 and is expected to continue until August 2014.
30	24.3/35.3	Paint Spray Booths (2 of 3 total; Buildings 770 and 1086)	No further action is required for this site.
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.
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.
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.
34	24.3	Building 770 Underground Oil Storage Tanks	The underground storage tanks were removed in 1989. No further action is required for this site.
40	24.3	Safety Kleen Units - 5 of 9 total (all located in Building 770)	No further action is required for this site.
41	24.3	Satellite Drum Accumulation Areas - 1 of 4 total (vicinity Building 770)	No further action is required for this site.
71	Multiple	Herbicide (All railroad tracks) (used to clear tracks)	No further action is required for this site.
82	23.7/23.8	Flammables (Buildings 783 and 793)	No further action is required for this site.
84	27.2	Flammables, Solvents, Waste Oil, etc. (Building 972)	No further action is required for this site.
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. No further action is required for this site.
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. No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
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. No further action is required for this site.
Operable Unit 3: Southeastern Watershed And Golf Course, MI			
25	3.8	Golf Course Pond	No further action is required for this site.
26	3.6	Lake Danielson	No further action is required for this site.
30	4.4	Paint Spray Booths (1 of 3 total - Building 260)	No further action is required for this site.
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 sites.
41	4 and 19	Satellite Drum Accumulation Areas - 2 of 4 total areas (Buildings 260 and 469)	No further action is required for this site.
48	5.2	Former PCB Transformer Storage Area	Site remediation by removal of surface soil was completed in 1998. No further action is required for this site.
49	17.3	Medical Waste Storage Area	No further action is required for this site.
51	3.7	Lake Danielson Outlet Ditch	No further action is required for this site.
52	3.9	Golf Course Pond Outlet Ditch	No further action is required for this site.
58	4.9	Pesticides, Herbicides (Pad 267)	No further action is required for this site.
59	4.1	Pesticides, Cleaners (Building 273)	No further action is required for this site.
65	7.2	XXCC-3 (Building 249)	No further action is required for this site.
66	4.11	POL (Building 253)	No further action is required for this site.
67	4.7	MOGAS (Building 257	No further action is required for this site.
68	4.8	POL (Building 263) (20 by 40 feet)	No further action is required for this site.
69	3.11	2,4-D, M2A1, and M4 Flamethrower Liquid Fuels (surface application)	No further action is required for this site.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	No further action is required for this site.
75	21.5	Unknown Wastes near Building 689	No further action is required for this site.
76	21.5	Unknown Wastes near Building 690	No further action is required for this site.
77	22.2	Unknown Wastes near Buildings 689 and 690	No further action is required for this site.
78	21.3	Alcohol, Acetone, Toluene, Naphtha; Hydrofluoric Acid Spill	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 4: North-Central Area, MI			
28	32.3	Recoupment Area (Building 865)	No further action is required for this site.
35	15.2	DRMO Building S308 - Hazardous Waste Storage	site was decontaminated and certified clean November 2001 in accordance with the RCRA Closure Plan (Permit TNHW-053). No further action is required for this site.
36	15.5	DRMO Hazardous Waste Concrete Storage Pad	No further action is required for this site.
37	15.5	DRMO Hazardous Waste Gravel Storage Pad	No further action is required for this site.
38	15.5	DRMO Damaged/Empty Hazardous Materials Drum Storage Area	No further action is required for this site.
39	15.5	DRMO Damaged/Empty Lubricant Container Area	No further action is required for this site.
41	13.4	Satellite Drum Accumulation Area (1 of 4 total - Building 210)	No further action is required for this site.
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 site.
43	33.9	Former Underground pentachlorophenol Tank Area	The tank was brought above ground in 1986 and drained into drums. The soil around the site 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 site.
44	33.6	Former Wastewater Treatment Unit Area	No further action is required for this site.
45	33.9	Former Contaminated Soil Staging Area	No further action is required for this site.
46	33.9	Former pentachlorophenol Pallet Drying Area	No further action is required for this site.
47	33.9	Former Contaminated Soil Drum Storage Area (removed 1988)	No further action is required for this site.
53	30.2	X-25 Flammable Solvents Storage Area (near Building 925)	No further action is required for this site.
54	15.6	MI - DRMO East Stormwater Runoff Canal	No further action is required for this site.
55	15.6	MI - DRMO North Stormwater Runoff Canal	No further action is required for this site.
56	29.3	MI - West Stormwater Drainage Canal	No further action is required for this site.
57	12.1	Building 629 Spill Area	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
70	Multiple	POL, Various Chemical Leaks (railroad tracks 1, 2, 3, 4, 5, and 6)	No further action is required for this site.
71	Multiple	Herbicide (all railroad tracks) (used to clear tracks)	No further action is required for this site.
72	15.5/15.6	Waste Oil (DRMO yard) (surface application for dust control)	No further action is required for this site.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	No further action is required for this site.
74	15.3	Flammables, Toxics (West End - Building 319)	No further action is required for this site.
79	15.6	Fuels, Miscellaneous Liquids, Wood, and Paper (Vicinity S702)	No further action is required for this site.
80	33.13	Fuel and Cleaners Dispensing (Building 720)	No further action is required for this site.
81	33.7	Fuel Oil AST (Building 765 – removed in 1994)	No further action is required for this site.
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. No further action is required for this site.

Notes:
AST: Aboveground Storage Tank
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
DDT: 4,4′-Dichlorodiphenyltrichloroethane
DRMO: Defense and Reutilization Marketing Office
EBT: enhanced bioremediation treatment
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
RACR: Remedial Action Completion Report
RCRA: Resource Conservation and Recovery Act
USEPA: United States Environmental Protection Agency

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

TABLE 3
MAIN INSTALLATION EBT WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Area	Type	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
IW21-01A	TTA-1N	IW	276504.77	800599.88	294.34	294.99	98.7	10	108.7
IW21-01B	TTA-1N	IW	276500.95	800605.89	294.61	294.85	89.9	10	99.9
IW21-02A	TTA-1N	IW	276464.81	800594.24	294.62	295.25	100.2	10	110.2
IW21-02B	TTA-1N	IW	276462.20	800598.51	294.65	295.12	91.7	10	101.7
IW21-03A	TTA-1N	IW	276551.96	800698.20	292.81	293.23	99.7	10	109.7
IW21-03B	TTA-1N	IW	276549.21	800705.08	292.50	293.12	89.8	10	99.8
IW21-04A	TTA-1N	IW	276518.82	800711.10	292.69	293.20	99.9	10	109.9
IW21-04B	TTA-1N	IW	276515.66	800715.39	292.79	293.30	89.7	10	99.7
MW-21	TTA-1N	IW	276473.36	800602.47	295.00	295.30	92.1	15	107.1
PMW21-01	TTA-1N	IW	276533.14	800600.14	294.76	295.00	88.4	20	108.4
PMW21-02	TTA-1N	PMW	276574.64	800701.00	292.98	293.19	91.3	20	111.3
PMW21-04	TTA-1N	PMW	276601.83	800771.56	291.87	292.20	89.0	20	109.0
IW101-02A	TTA-1S	IW	276198.80	801107.92	291.12	291.60	124.0	15	139.0
IW101-02B	TTA-1S	IW	276200.62	801111.95	291.14	291.72	110.1	15	125.1
IW101-02C	TTA-1S	IW	276203.32	801116.22	291.53	291.74	93.7	15	108.7
IW101-03A	TTA-1S	IW	276164.62	801104.58	291.94	292.36	125.2	15	140.2
IW101-03B	TTA-1S	IW	276161.58	801106.45	291.91	292.51	109.4	15	124.4
IW101-03C	TTA-1S	IW	276158.05	801108.62	292.04	292.54	93.6	15	108.6
IW101-04A	TTA-1S	IW	276249.13	801142.39	291.72	292.18	123.4	15	138.4
IW101-04B	TTA-1S	IW	276252.94	801142.79	291.59	292.08	107.0	15	122.0
IW101-04C	TTA-1S	IW	276257.10	801143.03	291.47	292.05	92.3	15	107.3
IW101-05A	TTA-1S	IW	276214.93	801126.64	291.52	292.12	121.4	15	136.4
IW101-05B	TTA-1S	IW	276218.44	801125.04	291.41	292.06	107.8	15	122.8
IW101-05C	TTA-1S	IW	276221.88	801122.88	291.27	291.89	92.2	15	107.2
IW101-07A	TTA-1S	IW	276125.77	801099.90	292.83	293.13	123.0	15	138.0
IW101-07B	TTA-1S	IW	276123.62	801102.61	292.81	293.15	106.6	15	121.6
IW101-07C	TTA-1S	IW	276121.28	801105.60	292.78	293.08	93.3	15	108.3
DR1-5	TTA-1S	IW	276080.00	800828.43	294.46	294.86	124.7	20	144.7
DR1-5A	TTA-1S	IW	276087.00	800835.01	294.51	294.87	90.0	20	110.0
DR1-6	TTA-1S	IW	276043.88	801103.40	293.17	293.50	114.4	20	134.4
DR1-6A	TTA-1S	IW	276035.02	801103.61	293.28	293.58	90.9	20	110.9
PMW101-02A	TTA-1S	IW	276281.93	801144.78	292.00	292.29	117.7	20	137.7
PMW101-02B	TTA-1S	IW	276286.33	801145.41	291.98	292.24	97.8	20	117.8
PMW101-04A	TTA-1S	PMW	276299.41	801182.12	291.07	291.43	117.9	20	137.9
PMW101-04B	TTA-1S	PMW	276296.40	801186.86	291.47	291.75	98.6	20	118.6
PMW101-07A	TTA-1S	PMW	276143.43	801171.78	292.20	292.52	117.9	20	137.9
PMW101-07B	TTA-1S	PMW	276141.84	801176.74	292.36	292.70	98.0	20	118.0
IW85-05	TTA-2	IW	276815.58	806162.75	304.73	305.30	92.4	10	102.4
IW85-06	TTA-2	IW	276779.47	806183.37	304.81	305.45	95.5	10	105.5
IW92-01	TTA-2	IW	276769.42	806506.97	304.51	304.88	80.4	10	90.4
IW92-02	TTA-2	IW	276719.57	806513.90	304.05	304.87	79.5	10	89.5
IW92-03	TTA-2	IW	276669.17	806511.19	304.20	304.72	83.5	10	93.5
IW92-07	TTA-2	IW	276725.81	806366.98	303.78	304.31	87.8	10	97.8
IW92-08	TTA-2	IW	276784.63	806289.19	304.55	304.93	85.3	10	95.3
DR2-2	TTA-2	IW	276770.85	806658.86	304.30	304.67	78.4	15	93.4
DR2-5	TTA-2	IW	276830.98	806180.40	305.41	305.72	84.5	15	99.5
PMW92-03	TTA-2	IW	276678.91	806438.66	303.91	304.17	92.5	10	102.5
MW-113	TTA-2	PMW	276685.34	806279.10	304.81	304.92	96.0	10	106.0
PMW85-01	TTA-2	PMW	276802.18	806146.13	305.08	305.39	93.2	10	103.2

TABLE 3
MAIN INSTALLATION EBT WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Area	Type	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
PMW85-05	TTA-2	PMW	276752.08	806222.46	305.12	305.32	93.2	10	103.2
MW-85	TTA-2	PMW	276704.14	806064.51	304.13	304.50	95.9	15	110.9
MW-62	B-835	IW	278289.65	801857.92	293.71	293.90	86.1	10	96.1
MW-213	B-835	IW	278427.08	801669.11	294.22	294.20	77.3	15	92.3
MW-212	B-835	PMW	278028.36	802225.40	295.34	295.68	85.3	15	100.3
MW-203A	W-C	IW	276841.76	801740.43	290.70	290.80	142.9	15	162.9
MW-203B	W-C	IW	276821.40	801741.59	290.87	291.10	93.0	15	113.0
MW-197A	W-C	PMW	276975.42	802042.30	291.26	291.54	161.7	15	176.7
MW-197B	W-C	PMW	276973.14	802036.92	291.03	291.43	93.8	15	108.8

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

TABLE 4
MAIN INSTALLATION LTM WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-16	Fluvial	Background	Biennial	278837.83	807099.66	299.86	300.19	57.6	15	72.6
MW-19	Fluvial	Background	Biennial	278945.87	800782.26	290.57	290.86	83.1	10	93.1
MW-22	Fluvial	Boundary	Biennial	275912.38	800702.16	298.04	298.49	95.4	10	105.4
MW-23	Fluvial	Boundary	Biennial	275791.02	801817.13	298.99	299.24	101.2	10	111.2
MW-24	Fluvial	Boundary	Biennial	275616.05	803538.81	299.51	299.81	97.3	15	112.3
MW-25A	Fluvial	Performance	Annual	275975.11	805521.27	269.88	270.13	73.0	10	83.0
MW-26	Fluvial	Performance	Semiannual	276508.16	805962.09	303.69	303.89	97.6	10	107.6
MW-34	Intermediate	Sentinel	Biennial	279411.21	801917.96	299.97	300.80	136.6	20	156.6
MW-38	Intermediate	Sentinel	Biennial	279141.38	802450.43	307.45	308.45	139.9	15	154.9
MW-39	Fluvial	Performance	Semiannual	277280.67	802598.11	296.28	296.58	95.5	20	115.5
MW-39A	Fluvial	Performance	Semiannual	277278.11	802607.66	298.61	298.70	148.1	20	168.1
MW-50	Fluvial	Boundary	Biennial	276455.81	807065.28	298.82	299.32	115.0	10	125.0
MW-52	Fluvial	Performance	Annual	275371.97	805897.36	279.26	279.71	94.0	10	104.0
MW-53	Fluvial	Background	Biennial	279176.66	805136.05	306.38	305.58	72.5	10	82.5
MW-55	Fluvial	Background	Biennial	279301.05	801204.62	292.08	292.48	64.0	10	74.0
MW-63A	Fluvial/Intermediate	Sentinel	Annual	278200.31	803572.83	305.96	306.33	140.0	10	150.0
MW-63B	Fluvial/Intermediate	Sentinel	Annual	278201.32	803557.77	305.78	306.22	115.0	10	125.0
MW-64	Fluvial	Performance	Semiannual	276951.52	805005.97	304.21	304.46	102.0	10	112.0
MW-66A	Fluvial	Background	Biennial	276626.02	799792.63	284.22	284.34	74.6	20	94.6
MW-88	Fluvial	Performance	Semiannual	276879.05	806512.88	305.15	305.47	82.0	15	97.0
MW-89	Intermediate	Sentinel	Annual	278286.97	802555.25	303.98	304.38	147.0	30	177.0
MW-90	Intermediate	Sentinel	Semiannual	278283.60	802539.51	304.19	304.64	115.0	30	145.0
MW-92	Fluvial	Performance	Semiannual	276614.20	806489.66	304.41	304.78	93.0	15	108.0
MW-93	Fluvial	Boundary	Biennial	275542.22	804440.10	294.08	294.31	92.0	15	107.0
MW-94A	Fluvial	Performance	Semiannual	276805.80	803085.80	303.00	303.23	109.6	10	119.6
MW-96	Fluvial	Performance	Annual	276310.14	806320.24	289.02	289.67	75.5	20	95.5
MW-97	Fluvial	Performance	Semiannual	276074.23	802139.23	297.44	297.70	97.5	20	117.5
MW-98	Fluvial	Performance	Semiannual	276891.37	802572.77	294.43	294.93	137.0	10	147.0
MW-99	Fluvial	Background	Biennial	277443.37	801114.53	285.33	285.69	91.5	20	111.5
MW-100B	Fluvial	Performance	Semiannual	276600.61	800854.26	290.92	291.47	107.4	20	127.4
MW-101	Fluvial	Performance	Semiannual	276204.09	801110.27	291.74	291.98	89.0	15	104.0
MW-102B	Fluvial	Boundary	Biennial	275760.59	800707.72	311.40	312.07	120.5	20	140.5
MW-103	Fluvial	Performance	Annual	278690.88	805159.83	301.37	301.89	70.0	20	90.0
MW-104	Fluvial	Performance	Annual	278676.47	805417.03	291.98	292.18	70.5	20	90.5
MW-107	Fluvial/Intermediate	Sentinel	Semiannual	278419.07	803009.93	304.92	305.18	128.0	15	143.0
MW-108	Fluvial/Intermediate	Sentinel	Semiannual	277658.02	802985.53	303.07	303.25	160.0	10	170.0
MW-140	Intermediate	Sentinel	Annual	279061.29	801715.68	298.12	298.16	224.6	20	244.6

TABLE 4
MAIN INSTALLATION LTM WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-141	Intermediate	Sentinel	Semiannual	278019.19	802571.25	303.71	303.70	148.7	20	168.7
MW-142	Fluvial	Performance	Annual	278056.03	801629.12	291.18	291.49	85.0	20	105.0
MW-143	Fluvial	Performance	Semiannual	278301.35	801201.48	290.66	290.90	78.6	20	98.6
MW-198	Fluvial	Performance	Annual	277775.91	802142.37	291.78	292.20	90.3	15	105.3
MW-199A	Intermediate	Sentinel	Annual	277756.40	802573.52	301.53	301.84	146.1	15	161.1
MW-199B	Fluvial	Performance	Semiannual	277751.74	802575.66	301.73	302.07	104.6	15	119.6
MW-200	Fluvial	Performance	Semiannual	277006.10	802859.39	300.18	300.51	102.9	15	117.9
MW-202A	Intermediate	Sentinel	Annual	278685.74	802111.27	299.23	299.69	176.2	15	191.2
MW-202B	Intermediate	Sentinel	Semiannual	278692.79	802112.04	299.51	299.74	118.8	15	133.8
MW-204A	Fluvial	Performance	Semiannual	276724.66	802168.25	292.21	292.49	133.3	15	148.3
MW-204B	Fluvial	Performance	Semiannual	276707.81	802167.07	292.71	293.00	94.9	15	109.9
MW-205A	Fluvial	Performance	Semiannual	277157.18	802277.24	292.30	292.40	141.3	15	156.3
MW-205B	Fluvial	Performance	Semiannual	277173.05	802277.84	292.16	292.30	97.3	15	112.3
MW-206A	Fluvial	Performance	Semiannual	277219.28	802792.28	299.92	300.35	127.3	15	142.4
MW-206B	Fluvial	Performance	Semiannual	277200.85	802794.78	299.90	300.12	96.7	15	111.7
MW-207A	Fluvial	Sentinel	Semiannual	277652.76	803192.01	304.05	304.45	149.9	15	164.9
MW-207B	Fluvial	Sentinel	Semiannual	277665.02	803193.27	304.06	304.42	108.5	15	123.5
MW-208A	Fluvial	Performance	Semiannual	277382.22	802799.08	302.21	302.40	184.2	15	199.2
MW-208B	Fluvial	Performance	Semiannual	277396.90	802814.96	301.79	302.08	106.7	15	121.7
MW-209A	Intermediate	Sentinel	Annual	277574.28	802507.10	298.05	298.36	189.0	15	204.0
MW-209B	Fluvial	Performance	Semiannual	277581.50	802520.13	298.49	298.72	102.3	15	117.3
MW-210A	Intermediate	Sentinel	Semiannual	277238.57	801958.11	289.61	289.70	177.0	15	192.0
MW-210B	Fluvial	Performance	Semiannual	277228.18	801951.94	289.29	289.53	97.0	15	112.0
MW-211	Intermediate	Sentinel	Annual	278000.59	802973.69	303.74	304.09	166.3	15	181.3
MW-214A	Fluvial	Performance	Semiannual	277877.62	803906.94	303.61	303.96	119.1	15	134.1
MW-214B	Fluvial	Performance	Semiannual	277875.84	803922.20	303.70	303.96	101.6	15	116.6
MW-215A	Fluvial	Performance	Annual	277298.37	804164.31	304.50	304.86	128.8	15	143.8
MW-215B	Fluvial	Performance	Annual	277298.27	804177.33	304.56	304.98	105.4	15	120.4
MW-216	Fluvial	Performance	Annual	276024.68	801995.93	297.34	297.63	99.9	15	115.0
MW-217	Fluvial	Performance	Semiannual	276670.60	805213.69	304.18	304.51	101.8	15	116.8
MW-218	Fluvial	Performance	Semiannual	276936.70	805628.44	305.60	306.00	98.9	15	114.0
MW-219	Fluvial	Boundary	Semiannual	276429.49	800460.96	295.13	295.00	98.0	15	113.0
MW-229	Intermediate	Sentinel	Biennial	279294.17	802836.96	311.78	312.09	188.4	20	208.4
MW-252	Intermediate	Sentinel	Semiannual	278789.21	801364.70	294.16	294.40	126.1	20	146.1
MW-253	Intermediate	Sentinel	Semiannual	278287.43	801191.42	290.47	290.80	118.3	20	138.3
MW-254	Memphis	Sentinel	Semiannual	279334.36	800857.53	292.84	293.28	285.8	20	305.8
MW-255	Memphis	Sentinel	Semiannual	279304.76	801226.84	291.84	292.38	284.7	20	304.7

TABLE 4
MAIN INSTALLATION LTM WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-256	Intermediate	Sentinel	Semiannual	279301.82	801243.80	292.68	293.40	127.1	20	147.1
MW-257	Fluvial	TBD	TBD	278549.06	801340.58	292.22	292.67	85.5	15	100.5
MW-258	Fluvial	TBD	TBD	278125.81	804426.82	304.37	304.83	79.3	20	99.3
MW-259	Fluvial	TBD	TBD	276279.04	804450.97	290.77	291.44	98.6	20	118.6
MW-260	Fluvial	TBD	TBD	278398.46	804376.22	304.16	304.45	68.0	20	88.3
MW-261	Fluvial	TBD	TBD	276390.64	802591.62	293.52	293.79	90.0	20	110.3
DR1-1	Fluvial	Performance	Annual	276300.34	800855.57	293.14	293.42	121.7	20	141.7
DR1-1A	Fluvial	Performance	Annual	276307.34	800863.06	293.00	293.37	89.2	20	109.2
DR1-2	Fluvial	Performance	Annual	276536.64	801152.66	290.00	291.39	97.7	20	117.7
DR1-3	Fluvial	Performance	Semiannual	276527.27	801415.91	290.93	291.11	109.7	20	129.7
DR1-4	Fluvial	Performance	Annual	276231.20	801399.53	292.78	293.00	106.3	20	126.3
DR1-7	Fluvial	Performance	Annual	276791.26	801441.36	289.15	289.46	108.3	20	128.3
DR1-8	Fluvial	Performance	Annual	276752.48	800875.32	290.09	290.47	92.7	20	112.7
DR2-1	Fluvial	Performance	Semiannual	276772.10	806497.62	304.90	305.08	73.9	20	93.9
DR2-3	Fluvial	Performance	Semiannual	276539.12	806203.16	303.44	303.66	93.0	20	113.0
DR2-4	Fluvial	Performance	Annual	276455.62	806633.07	303.55	303.96	88.1	20	108.1
DR2-6	Fluvial	Performance	Semiannual	276643.99	805860.91	304.70	304.92	94.6	20	114.6
PMW21-03	Fluvial	Performance	Semiannual	276573.43	800742.52	292.11	292.72	90.3	20	110.3
PMW21-05	Fluvial	Performance	Semiannual	276628.32	801129.72	288.53	288.92	94.3	20	114.3
PMW92-02	Fluvial	Performance	Semiannual	276667.02	806476.47	304.17	304.35	94.8	10	104.8
PMW101-03A	Fluvial	Performance	Semiannual	276348.46	801198.37	291.61	291.99	119.2	20	139.2
PMW101-03B	Fluvial	Performance	Semiannual	276353.09	801194.14	291.55	291.82	99.3	20	119.3
PMW101-06A	Fluvial	Performance	Semiannual	276191.88	801187.45	292.13	292.72	120.0	20	140.0
PMW101-06B	Fluvial	Performance	Semiannual	276194.93	801183.96	292.17	292.40	99.3	20	119.3
PZ-03	Fluvial	Performance	Annual	276379.33	802941.05	298.51	298.98	108.9	10	118.9

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

TABLE 5
MAIN INSTALLATION PRIMARY CVOC RESULTS, APRIL 2104
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

VOC Analyte	MCL (µg/L)	Number of Locations with Analyte Above RL	Maximum Concentrations (µg/L)	Location of Maximum Concentration	Number of Locations with Analyte Above MCL
Carbon tetrachloride	5	9	46.9	MW-217	5
Chloroform	80	21	11.5	DR2-1	0
cis-1,2-Dichloroethene	70	26	133	PMW92-02	1
Tetrachloroethene	5	45	179	DR2-1	37
trans-1,2-Dichloroethene	100	0	0.489	MW-100B	0
Trichloroethene	5	47	73.9	MW-258	30
Vinyl chloride	2	7	185	MW-100B	5

Notes:
µg/L: micrograms per liter
--: Not Listed
RL: reporting limit
MCL: Maximum Contaminant Level

TABLE 6
REMEDIATION GOALS FROM DUNN FIELD RECORD OF DECISION
2015 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:
HI: hazard index
MCL: maximum contaminant level
mg/kg: milligrams per kilogram
ppbv: parts per billion per volume
µg/L: micrograms per liter
—: Not available for groundwater cleanup goals because of low number of detections or detected values consistently less than MCLs.

TABLE 7
DUNN FIELD LTM WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-03	Fluvial	Performance-FSVE	Semiannual	281596.25	802100.69	292.35	290.40	65.5	10	75.5
MW-04	Fluvial	Background	Biennial	281278.87	802369.19	301.61	300.00	60.0	20	80.0
MW-06	Fluvial	Performance-FSVE	Semiannual	280604.17	802069.13	289.11	288.10	51.0	20	71.0
MW-07	Fluvial	Background-NE	Annual	281839.88	802481.70	295.10	293.10	67.0	10	77.0
MW-08	Fluvial	Background-NE	Annual	282001.04	802727.91	292.59	292.74	56.5	10	66.5
MW-13	Fluvial	Background	Biennial	281033.56	802369.21	300.01	300.10	66.0	15	81.0
MW-15	Fluvial	Performance	Semiannual	280348.88	801985.36	295.12	295.23	63.4	15	78.4
MW-28	Fluvial	Background	Semiannual	281568.58	803154.48	294.79	294.89	54.3	15	69.3
MW-31	Fluvial	Performance	Semiannual	281651.53	801783.90	290.37	287.50	64.1	15	79.1
MW-33	Fluvial	Performance	Biennial	280398.10	801561.30	280.71	277.70	44.6	15	59.6
MW-44	Fluvial	Performance	Annual	281073.71	800601.09	269.07	269.40	64.0	10	74.0
MW-54	Fluvial	Performance	Semiannual	281159.21	801183.83	295.39	295.57	84.5	10	94.5
MW-57	Fluvial	Performance	Semiannual	280184.05	802006.19	290.77	291.10	60.0	10	70.0
MW-58	Fluvial	Performance	Biennial	279845.07	802066.44	290.51	290.70	57.0	10	67.0
MW-67	Memphis	Sentinel	Biennial	280473.05	800933.94	278.21	275.53	260.0	15	275.0
MW-68	Fluvial	Performance	Annual	281500.76	802040.04	291.69	291.60	72.5	10	82.5
MW-69	Fluvial	Performance	Annual	281202.55	802011.49	307.02	304.90	82.1	10	92.1
MW-70	Fluvial	Performance	Annual	281029.60	801988.49	304.99	302.80	80.8	10	90.8
MW-71	Fluvial	Performance	Annual	280584.68	801804.71	294.40	291.90	65.5	10	75.5
MW-76	Fluvial	Performance	Annual	281311.98	801642.76	302.71	303.30	73.0	20	93.0
MW-77	Fluvial	Performance	Semiannual	281142.96	801815.29	304.42	304.70	68.0	20	88.0
MW-78	Fluvial	Performance	Biennial	282051.71	802065.28	275.00	275.40	44.5	20	64.5
MW-79	Fluvial	Performance	Semiannual	281794.22	800899.03	285.03	285.40	82.5	20	102.5
MW-80	Fluvial	Background	Biennial	281417.56	800199.07	273.81	274.00	53.0	20	73.0
MW-87	Fluvial	Performance-FSVE	Semiannual	280696.36	802038.55	294.93	292.80	63.0	15	78.0
MW-91	Fluvial	Performance	Annual	280474.97	802014.43	291.99	289.30	55.0	15	70.0
MW-126	Fluvial	Background	Biennial	282390.01	800491.67	252.22	252.49	16.0	10	26.0
MW-129	Fluvial	Background-NE	Annual	282271.08	803128.53	293.01	293.33	65.0	15	80.0
MW-130	Fluvial	Background-NE	Annual	282116.80	803241.45	293.17	293.77	59.5	20	79.5
MW-134	Fluvial	Performance-FSVE	Semiannual	281012.74	802102.58	300.81	301.05	75.0	15	90.0
MW-144	Fluvial	Performance	Semiannual	281138.63	801528.84	291.60	291.89	56.8	20	76.8
MW-145	Fluvial	Performance	Annual	280967.63	800823.18	284.72	284.86	80.1	20	100.1
MW-147	Fluvial	Performance	Annual	281501.94	801674.17	289.76	289.93	60.3	20	80.3
MW-148	Fluvial	Performance	Annual	281377.94	801461.63	294.71	294.87	70.0	20	90.0
MW-149	Fluvial	Performance	Semiannual	281130.04	800982.76	287.18	287.44	81.4	20	101.4
MW-150	Fluvial	Performance	Semiannual	281239.57	801283.62	296.86	297.00	71.2	20	91.2
MW-151	Fluvial	Performance	Semiannual	281290.42	800874.85	284.27	284.42	77.0	20	97.0
MW-152	Fluvial	Performance	Annual	281515.56	800892.84	289.59	289.82	91.0	20	111.0
MW-153	Fluvial	Performance	Biennial	282119.38	800952.34	279.17	279.26	76.1	20	96.1

TABLE 7
DUNN FIELD LTM WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-154	Fluvial	Background	Biennial	280501.53	800919.48	273.81	274.07	53.3	10	63.3
MW-155	Fluvial	Performance	Annual	281325.32	801168.98	291.54	291.83	76.9	20	96.9
MW-157	Fluvial	Performance	Semiannual	281050.86	801348.37	286.47	286.55	56.7	20	76.7
MW-158	Fluvial	Performance	Annual	281434.42	801005.34	294.07	294.38	91.0	15	106.0
MW-158A	Fluvial	Performance	Annual	281443.51	801005.67	293.95	294.22	77.9	15	92.9
MW-159	Fluvial	Performance	Semiannual	281304.17	801006.69	286.36	286.68	80.5	20	100.5
MW-160	Fluvial	Performance	Annual	281366.70	801304.05	293.84	294.13	64.3	20	84.3
MW-163	Fluvial	Performance	Semiannual	281152.59	801487.27	290.63	290.81	56.2	20	76.2
MW-164	Fluvial	Performance	Semiannual	280997.55	801497.47	287.48	287.71	55.6	20	75.6
MW-165	Fluvial	Performance	Semiannual	281384.63	800855.49	287.06	287.35	88.6	15	103.6
MW-165A	Fluvial	Performance	Semiannual	281383.55	800865.69	287.26	287.53	71.3	15	86.3
MW-166	Fluvial	Performance	Semiannual	281225.00	800927.99	282.72	283.29	84.6	15	100.0
MW-166A	Fluvial	Performance	Semiannual	281213.39	800927.27	282.90	283.36	68.1	15	83.4
MW-167	Fluvial	Background	Biennial	281394.03	800618.54	284.82	285.21	70.5	15	85.5
MW-169	Transition	Sentinel	Biennial	282491.23	800956.58	261.90	262.17	68.1	20	88.1
MW-170	Fluvial	Sentinel	Biennial	282443.17	801260.46	273.75	273.98	59.8	20	79.8
MW-171	Fluvial	Sentinel	Biennial	282315.35	801057.83	270.69	271.02	53.3	15	68.3
MW-174	Fluvial	Performance-FSVE	Semiannual	280352.00	802092.07	296.56	296.83	67.0	10	77.0
MW-176	Fluvial	Performance	Annual	280823.77	802032.08	299.68	299.92	76.0	10	86.0
MW-180	Fluvial	Performance	Annual	281476.43	802131.85	296.14	296.39	72.0	10	82.0
MW-182	Fluvial	Sentinel	Annual	280524.22	800623.13	275.40	272.98	62.0	10	72.0
MW-184	Fluvial	Performance	Semiannual	280903.16	801442.29	283.12	283.34	58.0	10	68.0
MW-187	Fluvial	Background	Biennial	280563.18	802348.09	302.74	303.21	76.0	10	86.0
MW-190	Fluvial	Performance	Semiannual	281138.88	801595.73	297.32	297.58	78.0	10	88.0
MW-220	Fluvial	Performance-FSVE	Semiannual	281617.49	802166.87	293.29	290.31	64.9	15	79.9
MW-221	Fluvial	Performance-FSVE	Semiannual	281399.71	802100.05	301.52	298.37	73.1	15	88.1
MW-222	Fluvial	Performance-FSVE	Semiannual	280986.04	802145.54	303.82	301.06	74.2	15	89.2
MW-223	Fluvial	Performance-FSVE	Semiannual	280913.53	802104.29	303.00	300.41	73.9	15	88.9
MW-224	Fluvial	Performance-FSVE	Semiannual	281017.74	802181.62	304.13	301.18	73.7	15	88.7
MW-225	Fluvial	Performance-FSVE	Semiannual	280947.12	802070.50	304.52	301.30	75.0	15	90.0
MW-226	Fluvial	Performance-FSVE	Semiannual	280931.94	802147.21	303.19	300.56	74.2	15	89.2
MW-227	Fluvial	Performance-FSVE	Semiannual	280257.91	802081.00	299.70	296.64	63.6	15	78.6
MW-228	Fluvial	Performance-FSVE	Semiannual	280251.88	802157.40	301.65	298.59	64.1	15	79.1
MW-230	Fluvial	Background-NE	Annual	281842.79	802800.06	286.57	286.66	59.2	15	74.2
MW-235	Fluvial	Sentinel	Annual	280727.57	800447.83	264.00	264.21	50.6	10	60.8
MW-237	Intermediate	Sentinel	Annual	281356.02	800963.99	289.18	289.53	166.5	10	176.7
MW-241	Fluvial	Performance	Annual	281389.82	801396.64	292.97	293.16	73.4	15	88.4
MW-242	Fluvial	Performance	Semiannual	281297.31	801228.65	295.40	295.94	73.2	16	88.7
MW-243	Fluvial	Performance	Semiannual	281370.62	801116.45	292.26	292.53	80.7	20	100.7

TABLE 7
DUNN FIELD LTM WELLS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-244	Fluvial	Performance	Semiannual	281333.49	801101.07	288.72	289.45	76.3	20	96.3
MW-245	Fluvial	Performance	Semiannual	281379.46	801035.00	290.48	290.62	85.1	20	105.1
MW-246	Fluvial	Performance	Semiannual	281387.26	800951.62	288.17	288.49	85.2	20	105.2
MW-247	Fluvial	Performance	Semiannual	281319.40	800900.12	286.17	286.63	80.5	20	100.5
MW-248	Fluvial	Performance	Annual	281253.66	800720.22	275.45	275.93	67.5	20	87.5
MW-249	Fluvial	Performance	Semiannual	281029.63	800789.83	285.53	285.89	78.0	20	98.0
MW-250	Intermediate	Sentinel	Annual	281045.53	800900.38	289.66	290.19	168.7	15	183.7
MW-251	Intermediate	Sentinel	Annual	281211.70	801021.75	285.83	286.16	160.2	15	175.2

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

TABLE 8
DUNN FIELD PRIMARY CVOC RESULTS, APRIL 2014
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

VOC Analyte	MCL (µg/L)	TC (µg/L)	Number of Locations with Analyte Above RL	Maximum Concentrations (µg/L)	Location of Maximum Concentration	Number of Locations with Analyte Above MCL	Number of Locations with Analyte Above TC
1,1,2,2-Tetrachloroethane	--	2.2	17	20.3	MW-159	--	7
1,1,2-Trichloroethane	5	1.9	1	5.12	MW-159	1	0
1,1-Dichloroethene	7	7	12	22.6	MW-130	4	4
1,2-Dichloroethane	5	--	0	0.329	MW-130	0	--
Carbon tetrachloride	5	3	2	1.62	MW-249	0	0
Chloroform	80	12	25	19.3	MW-87	0	1
cis-1,2-Dichloroethene	70	35	2	33.4	MW-159	0	0
Tetrachloroethene	5	2.5	9	60.6	MW-130	3	9
trans-1,2-Dichloroethene	100	50	1	4.36	MW-159	0	0
Trichloroethene	5	5	32	216	MW-159	16	16
Vinyl chloride	2	--	1	11.9	MW-159	1	--

Notes:
µg/L: micrograms per liter
--: Not Listed
RL: reporting limit
MCL: Maximum Contaminant Level
TC: Target Concentration

TABLE 9
PROPERTY TRANSFER STATUS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

FOST No.	Area	Date FOST signed	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	PBC	Deed (Memphis Police Department)	6-Feb-02
			13.36	EDC	Deed (DRC)	6-May-02
3	MI	1-Jul-04	302.48	EDC	Deed (DRC)	14-Apr-06
			46.74	PBC	Letter of Assignment (DOI/NPS)	29-Sep-05
4	DF	4-Mar-05	1.57	PBC	Deed (Memphis)	2-Sep-05
			39.35	CPS	Deed (Dunn Field Business Park, LLC)	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 10
STATUS OF FOLLOW-UP ACTIONS FROM THIRD FIVE-YEAR REVIEW
2015 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		
Rebound in groundwater concentrations of CVOCs on the MI in TAs and concentrations above MCLs in IAQ wells	Restart EBT	ODB	USEPA/TDEC	11/15/2012	N	N	11/6/2012	Injections restarted in November 2012.
Time required to achieve RAOs on the MI	Re-evaluate in annual report following one year of additional EBT	ODB	USEPA/TDEC	3/11/2014	N	N	4/4/2014	Year Three EBT Report submitted to USEPA/TDEC concluded "it is not likely that contaminant concentrations will be reduced to MCLs throughout the MI by December 2015". A supplemental remedial investigation and focused feasibility study is being performed to develop a remedial strategy to achieve RAOs throughout the MI.

Notes:
CVOCs: chlorinated volatile organic compounds
EBT: enhanced bioremediation treatment
IAQ: intermediate aquifer
MCLs: maximum contaminant levels
MI : Main Installation
ODB: Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure Division
RAOs: Remedial Action Objectives
TAs: treatment areas
TDEC: Tennesse Department of Environment and Conservation
USEPA: United States Environemtnal Protection Agency

TABLE 11
PRIMARY AND SECONDARY DOCUMENTS, FY15 THROUGH FY17
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Activity	2015 SMP Date	Date Type
Fiscal Year 2015		
2015 Site Management Plan, Rev. 0	**30 November 2014**	**Deadline**
MI Supplemental RI Phase 1 Work Plan, Rev 0	**28 December 2014**	**Deadline**
2014 LTM Report, Rev 0	8 January 2015	Target
2015 Site Management Plan, Rev. 1	**29 January 2015**	**Deadline**
MI Year 4 EBT Report, Rev. 0	9 March 2015	Target
MI Supplemental RI Phase 1 Work Plan, Rev 1	**12 March 2015**	**Deadline**
2014 LTM Report, Rev 1	8 April 2015	Target
MI Year 4 EBT Report, Rev. 1	7 June 2015	Target
2015 Annual LUCIP Inspection Reports	31 July 2015	Target
MI Supplemental RI Phase 1 Summary Report	3 September 2015	Target
Fiscal Year 2016		
MI Supplemental RI Phase 2 Work Plan, Rev 0	12 November 2015	Deadline
2016 Site Management Plan, Rev. 0	30 November 2015	Deadline
2015 LTM Report, Rev 0	7 January 2016	Target
MI Supplemental RI Phase 2 Work Plan, Rev 1	25 January 2016	Deadline
2016 Site Management Plan, Rev. 1	29 January 2016	Deadline
Off Depot AS/SVE Operations Report, Year 5 Rev 0	29 February 2016	Target
2015 LTM Report, Rev 1	6 April 2016	Target
Off Depot AS/SVE Operations Report, Year 5 Rev 1	28 June 2016	Target
2016 Annual LUCIP Inspection Reports	31 July 2016	Target
MI Supplemental RI Report, Rev 0	7 August 2016	Deadline
Focused Feasibility Study Report, Rev 0	16 October 2016	Deadline
Fiscal Year 2017		
MI Supplemental RI Report, Rev 1	3 November 2016	Deadline
2017 Site Management Plan, Rev. 0	30 November 2016	Deadline
2016 LTM Report, Rev 0	5 January 2017	Target
MI Focused Feasibility Study Report, Rev 1	20 January 2017	Deadline
2017 Site Management Plan, Rev. 1	29 January 2017	Deadline
Off Depot AS/SVE Operations Report, Year 6 Rev 0	16 March 2017	Target
MI Revised Proposed Plan, Rev 0	2 April 2017	Deadline

TABLE 11
PRIMARY AND SECONDARY DOCUMENTS, FY15 THROUGH FY17
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

2016 LTM Report, Rev 1	5 April 2017	Target
MI Revised Proposed Plan, Rev 1	16 June 2017	Deadline
Fourth Five-Year Review, Rev 0	18 June 2017	Deadline
Off Depot AS/SVE Operations Report, Year 6 Rev 1	14 July 2017	Target
2017 Annual LUCIP Inspection Reports	31 July 2017	Target

Notes:

1) Deadlines are dates for primary documents in FY, FY+1 and FY+2. Primary documents are subject to regulatory agency review, comment, and approval. Current FY deadlines are noted in **bold** type. FY+1 and FY+2 deadlines for primary documents will roll forward in subsequent years unless alternate dates are negotiated in the annual SMP updates.

2) Targets are dates for submission of secondary documents. Secondary documents may be reviewed and commented upon, but are not subject to approval except in the context of the next Primary document in the CERCLA process.

TABLE 12
FISCAL YEAR REQUIREMENTS
2015 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Description	2015	2016	2017	2018	2019	2020	2021	2022	Out Years	Total
Dunn Field Land Use Control Sites										
	$84,000	$84,000	$126,000	$84,000	$84,000	$84,000	$84,000	$126,000	$0	$756,000
Dunn Field Remedial ActionSites										
	$165,000	$340,000	$170,000	$170,000	$170,000	$255,000	$250,000	$80,000	$0	$1,600,000
Main Installation Remedial ActionSites										
	$1,059,000	$636,000	$231,000	$2,322,000	$143,000	$206,000	$143,000	$143,000	$1,296,000	$6,179,000
Total	$1,308,000	$1,060,000	$527,000	$2,576,000	$397,000	$545,000	$477,000	$349,000	$1,296,000	$8,535,000

FIGURES

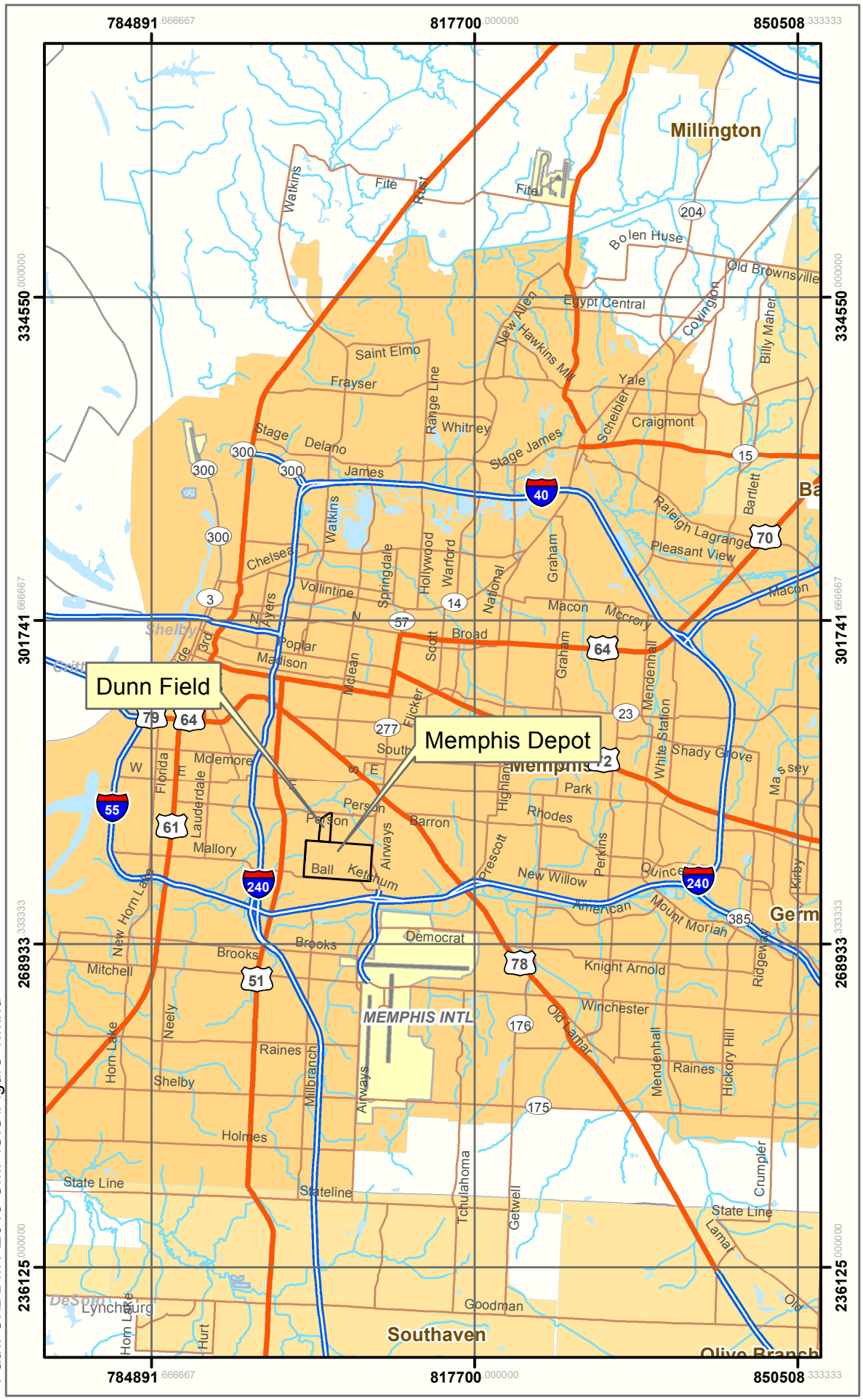

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Figure 1

SITE LOCATION MAP

2015 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

Date: November 2014
Edition: Rev 0

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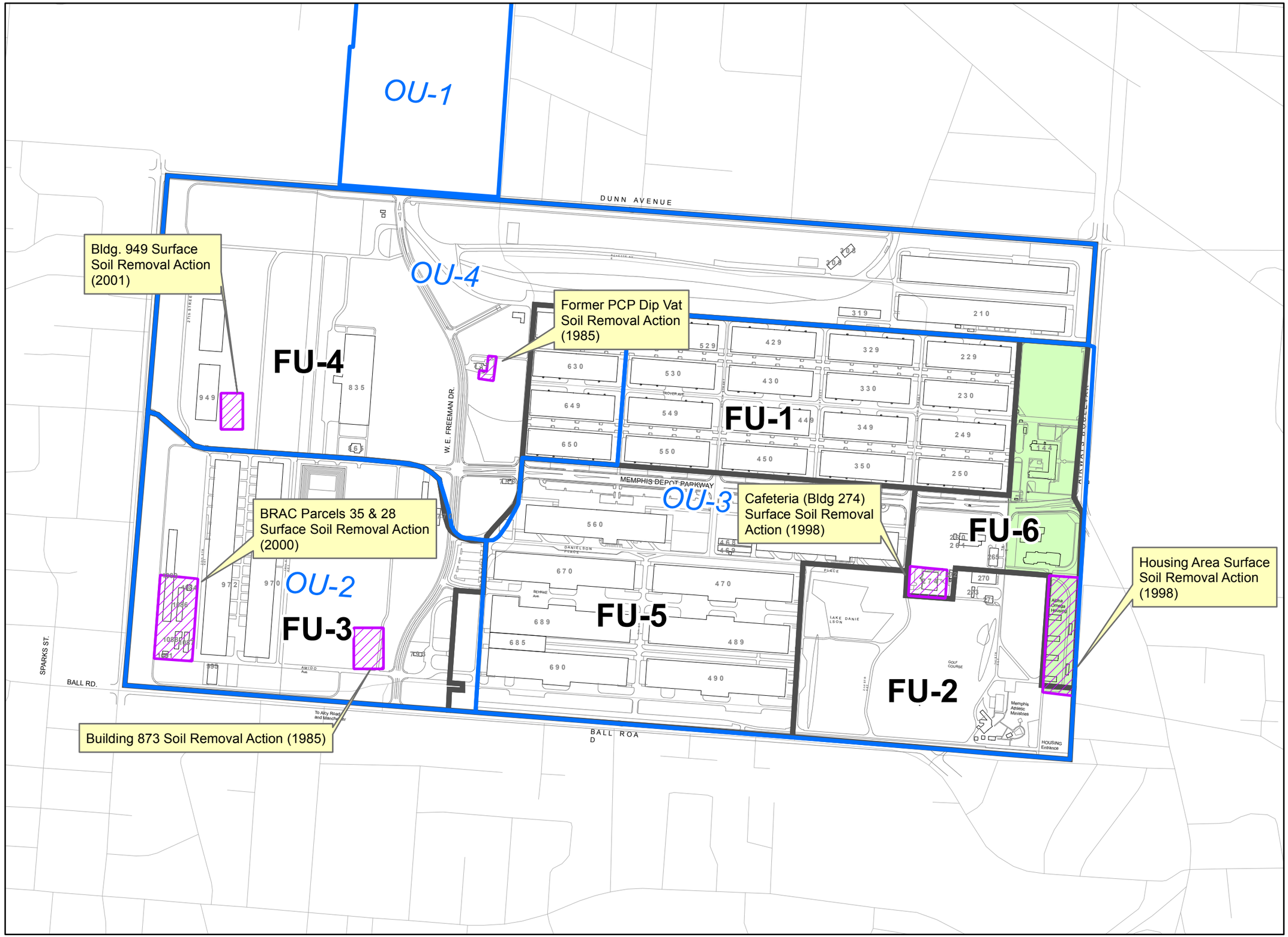

Figure 2

UNIT BOUNDARIES AND RESPONSE ACTIONS

2015 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

Date: December 2014
Edition: Rev 0

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Figure 3

DUNN FIELD AREA DESIGNATIONS, REMOVAL ACTIONS AND INTERIM REMEDIAL ACTION

2015 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

0 150 300 600
Feet

Date: December 2014
Edition: Rev 0

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Figure 4

OU-1 SITE LOCATIONS

2015 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

Date: December 2014
Edition: Rev 0

Figure 5

OU-2 SITE LOCATIONS

2015 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

Date: December 2014
Edition: Rev 0

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Figure 6

OU-3 SITE LOCATIONS

2015 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

Date: December 2014
Edition: Rev 0

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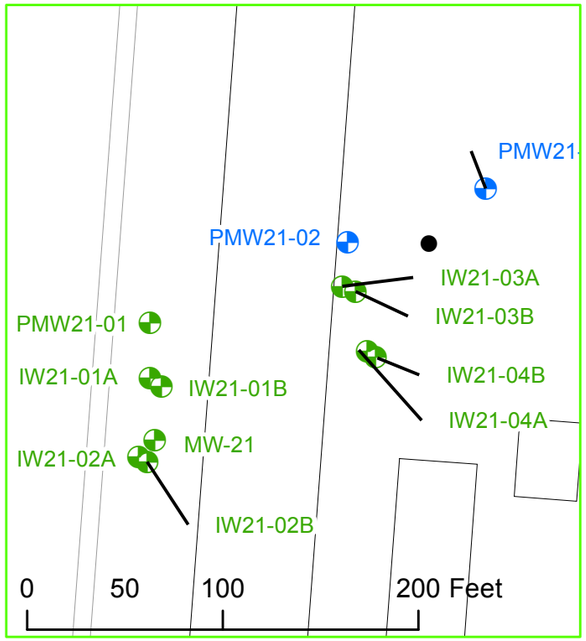
Figure 7

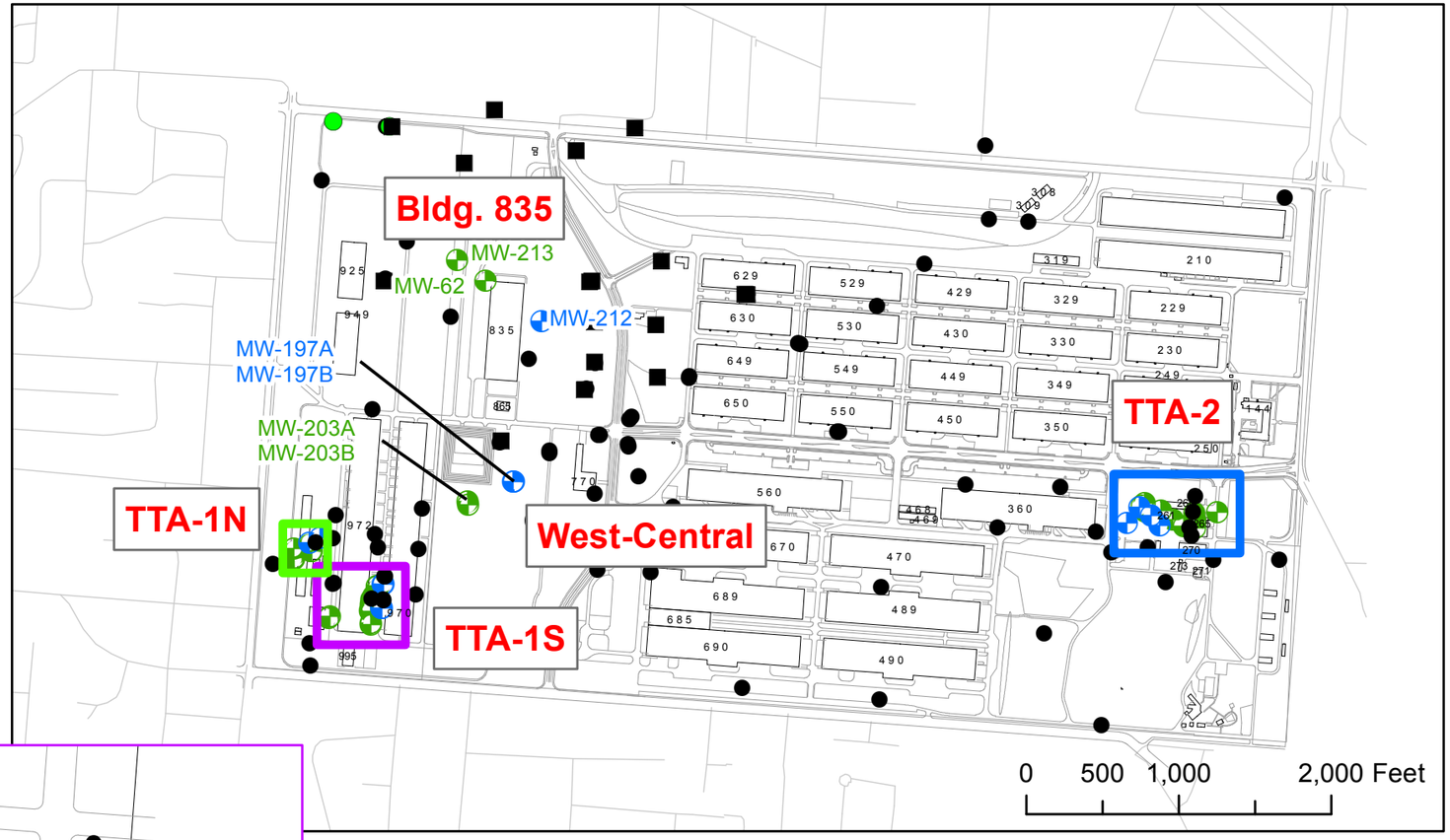
OU-4 SITE LOCATIONS

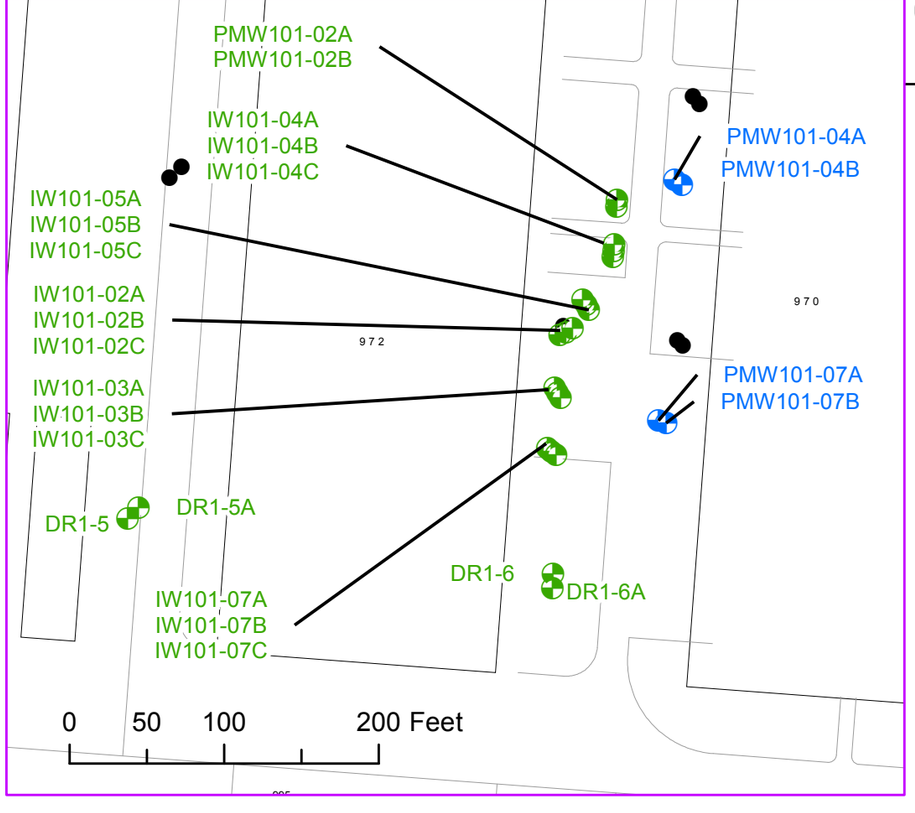
2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Date: December 2014
Edition: Rev 0







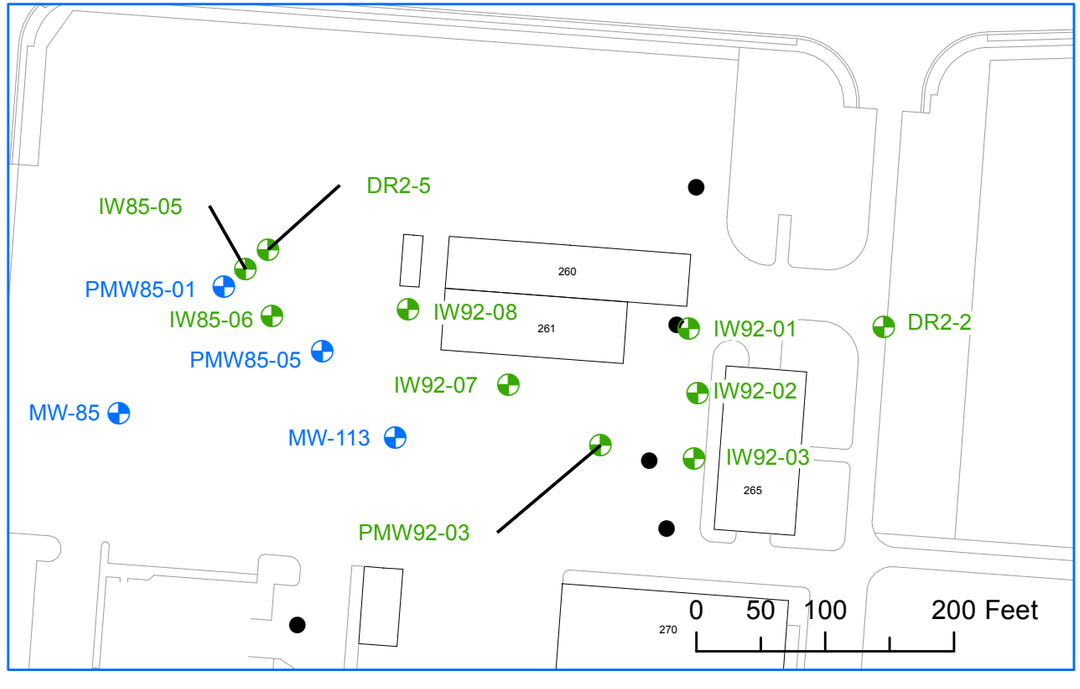


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Figure 8

MAIN INSTALLATION EBT WELL LOCATION MAP

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Transition Zone or Intermediate Aquifer
- Monitoring Well Screened in the Memphis Aquifer
- EBT Injection Well
- EBT Performance Monitoring Well

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Date: December 2014
Edition: Rev 0

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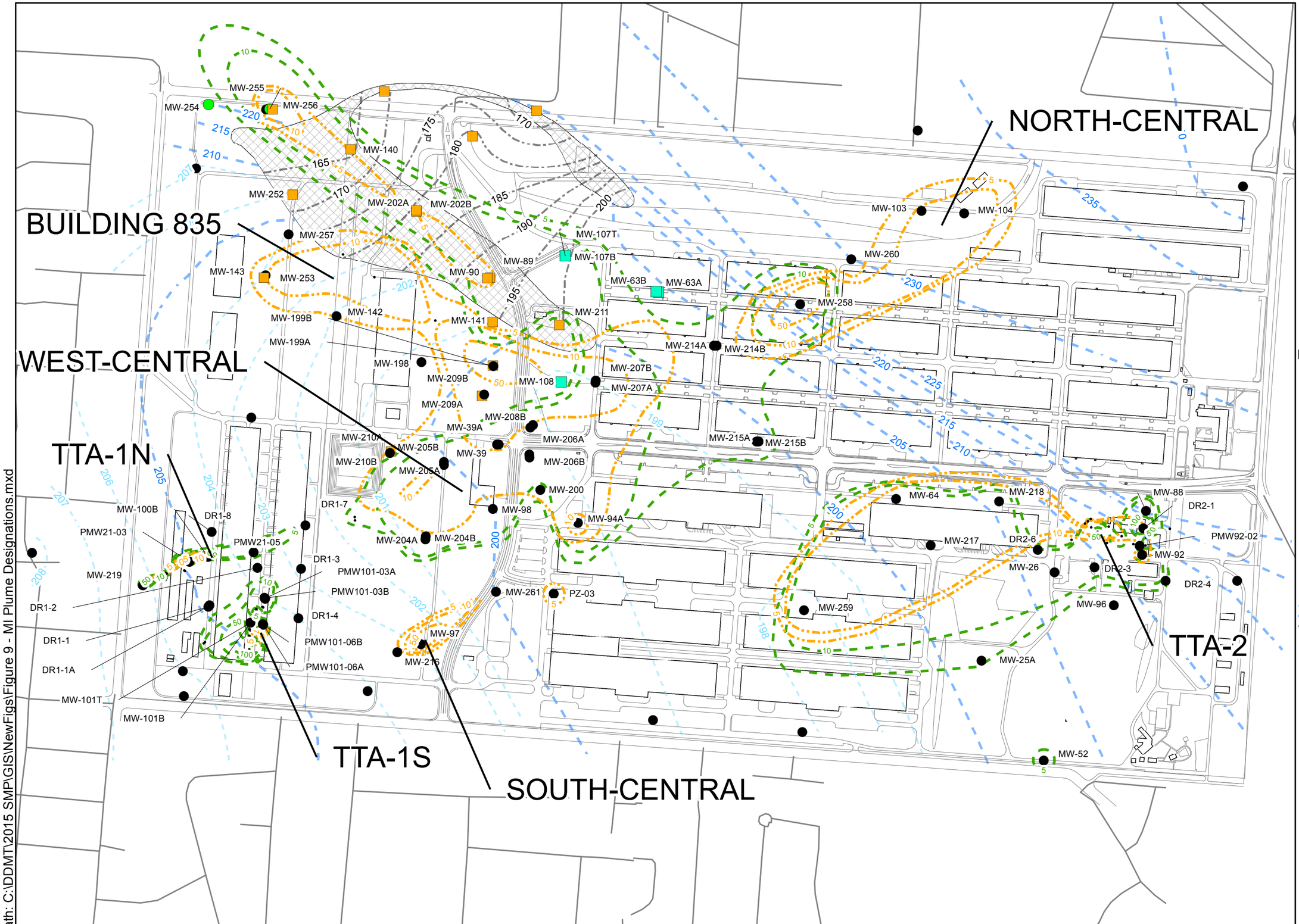

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Figure 9

MAIN INSTALLATION PLUME DESIGNATIONS

2015 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

PCE

TCE

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

0 200 400 800
Feet

Date: December 2014
Edition: Rev 0

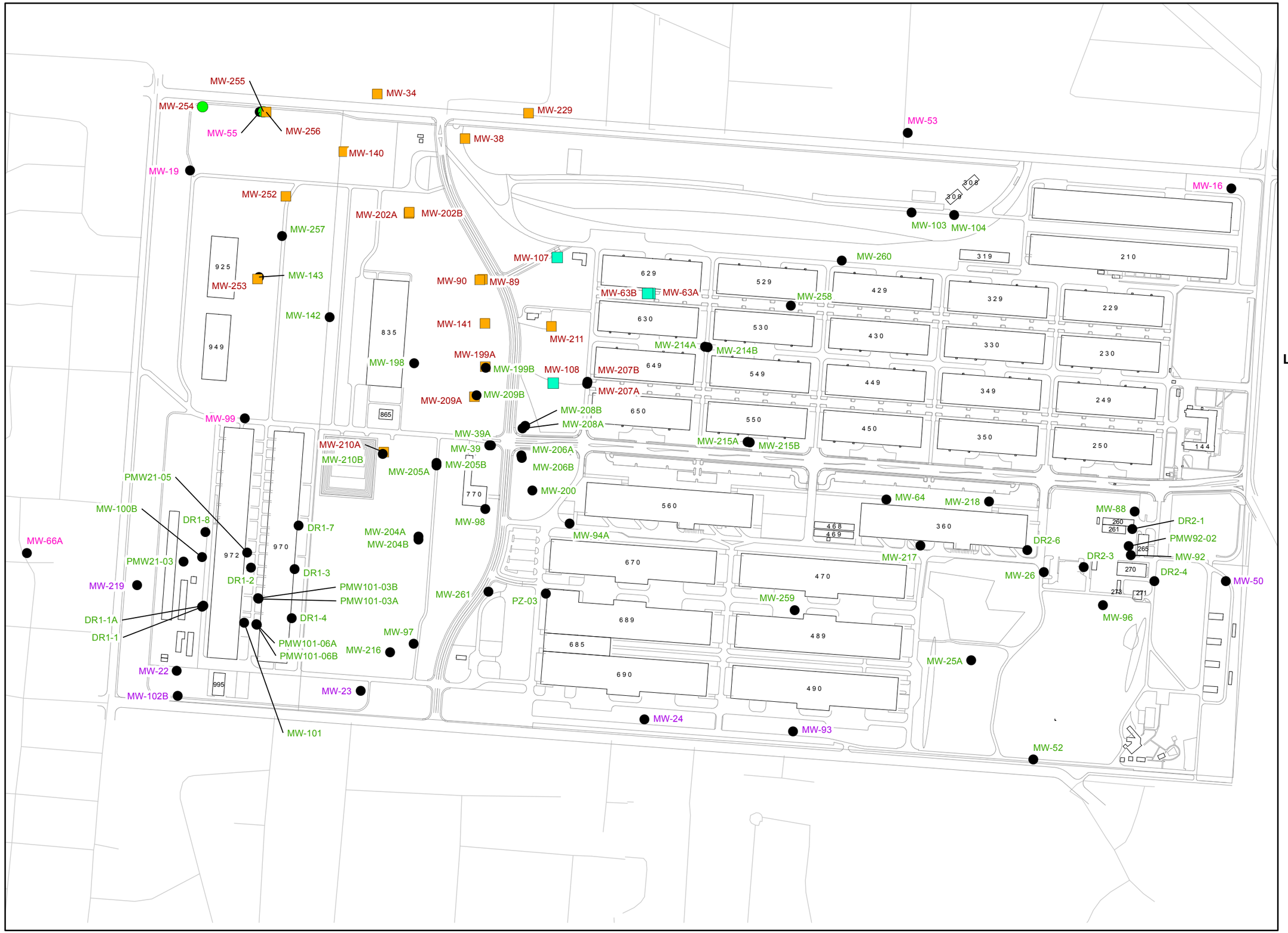

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Figure 10

MAIN INSTALLATION LTM WELL LOCATION MAP

2015 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

Well Classification

- MW-16 Background
- MW-34 Sentinel
- MW-88 Performance
- MW-219 Boundary

0 250 500 1,000
Feet

Date: December 2014
Edition: Rev 0

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Figure 11

MAIN INSTALLATION PCE CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPIS, TENNESSEE

Legend

PCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300
- Not Sampled

PCE Isopleth
ug/L

- 5
- 10
- 50
- 100

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
Clay Elevation Exceeds Groundwater Elevation

0 250 500 1,000
Feet

Note:
1. Analytical results from the EBT monitoring event (8/4-12/14) and the April 2014 LTM event (4/22-26/14).
2. Groundwater contours are from the April 2014 LTM event.

Date: December 2014
Edition: Rev 0

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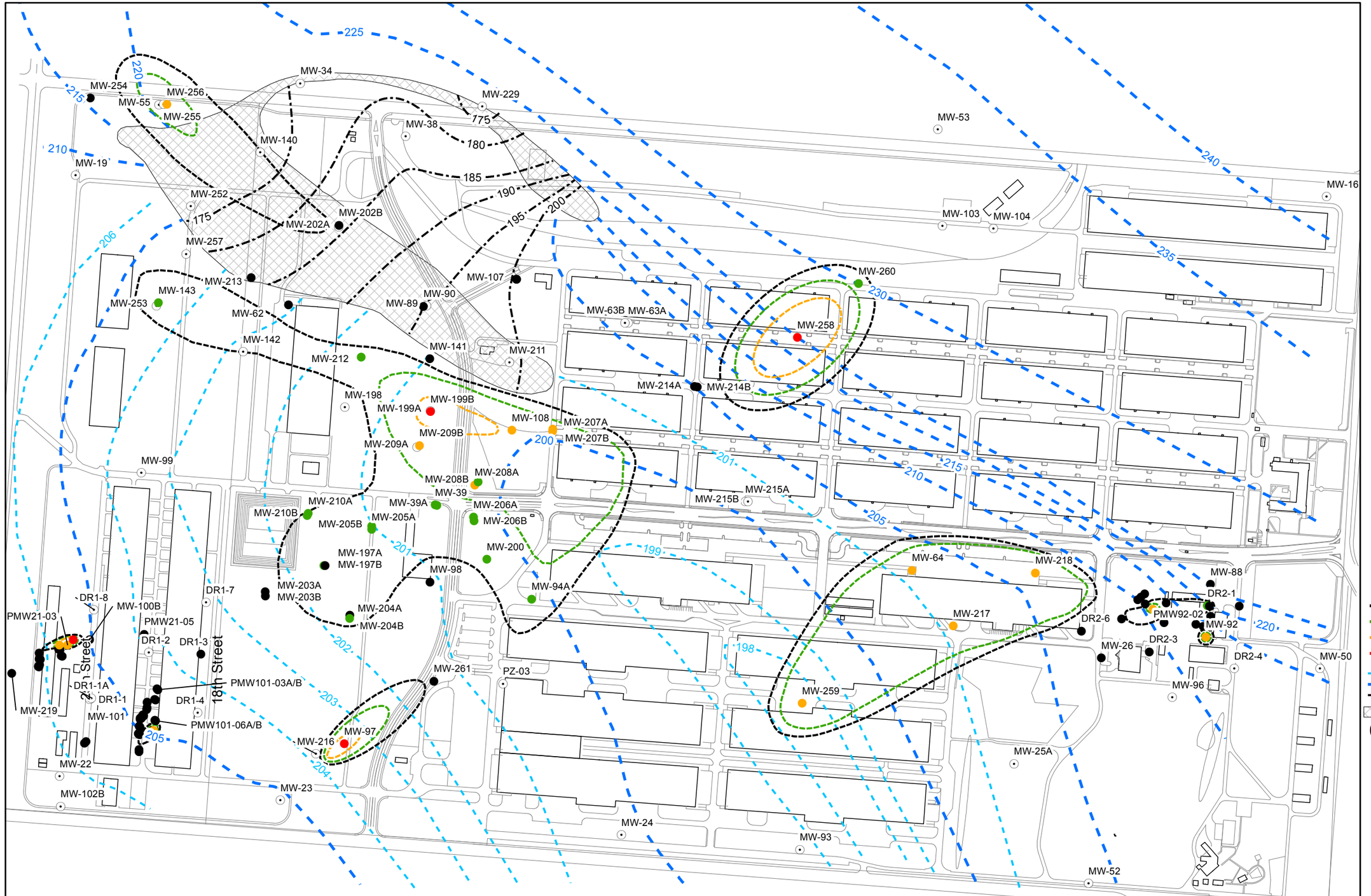

Note:
1. Analytical results from the EBT monitoring event (8/4-12/14) and the April 2014 LTM event (4/22-26/14).
2. Groundwater contours are from the April 2014 LTM event.

N
W E
S

Figure 12

MAIN INSTALLATION TCE CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300
- Not Sampled

TCE Isopleth
ug/L

- 5
- 10
- 50
- 100

- 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
- Clay Elevation Exceeds Groundwater Elevation

0 250 500 1,000
Feet

Date: December 2014
Edition: Rev 0

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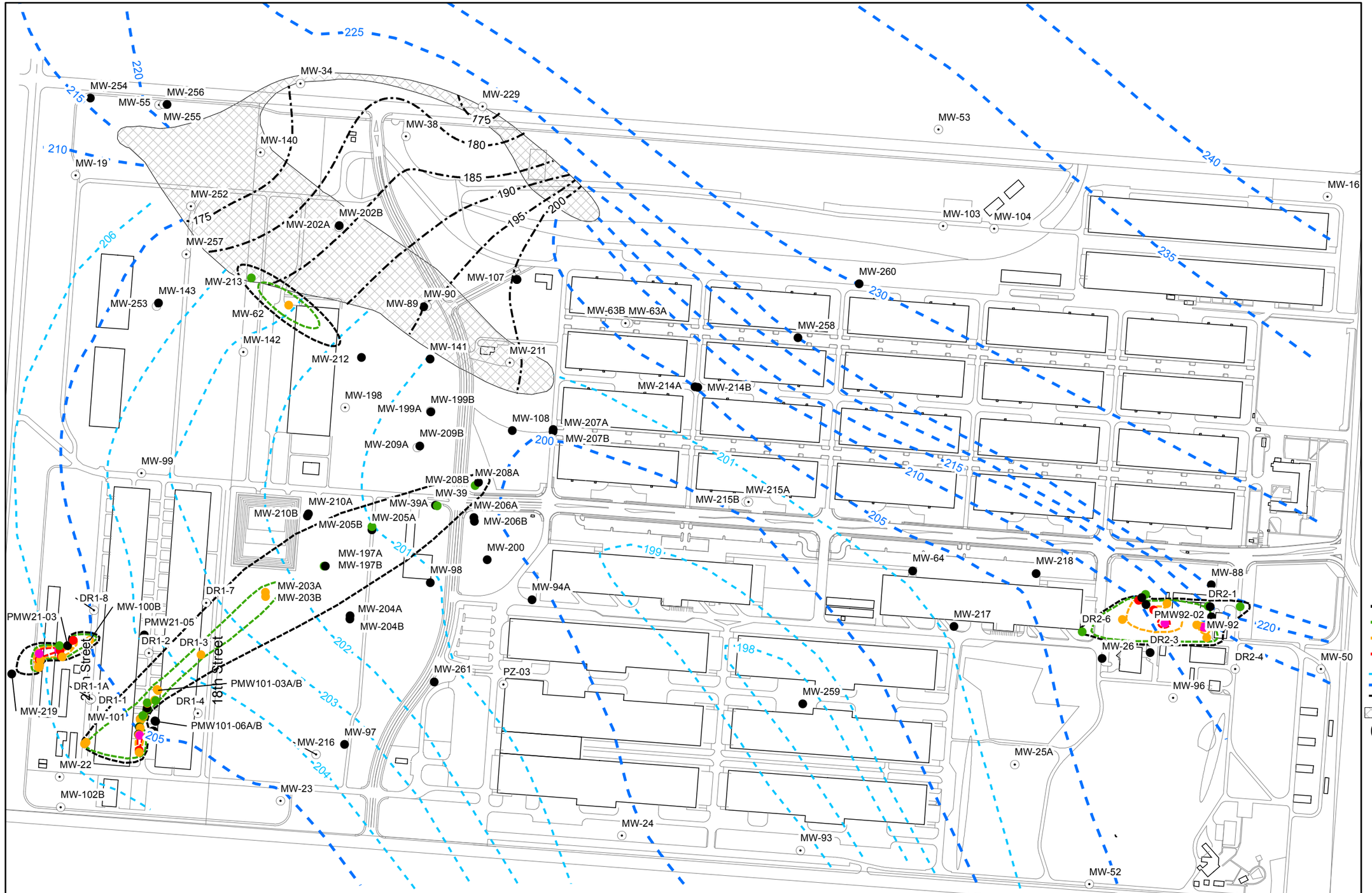

Note:
1. Analytical results from the EBT monitoring event (8/4-12/14) and the April 2014 LTM event (4/22-26/14).
2. Groundwater contours are from the April 2014 LTM event.

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Figure 13

MAIN INSTALLATION cDCE CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

cDCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300
- Not Sampled

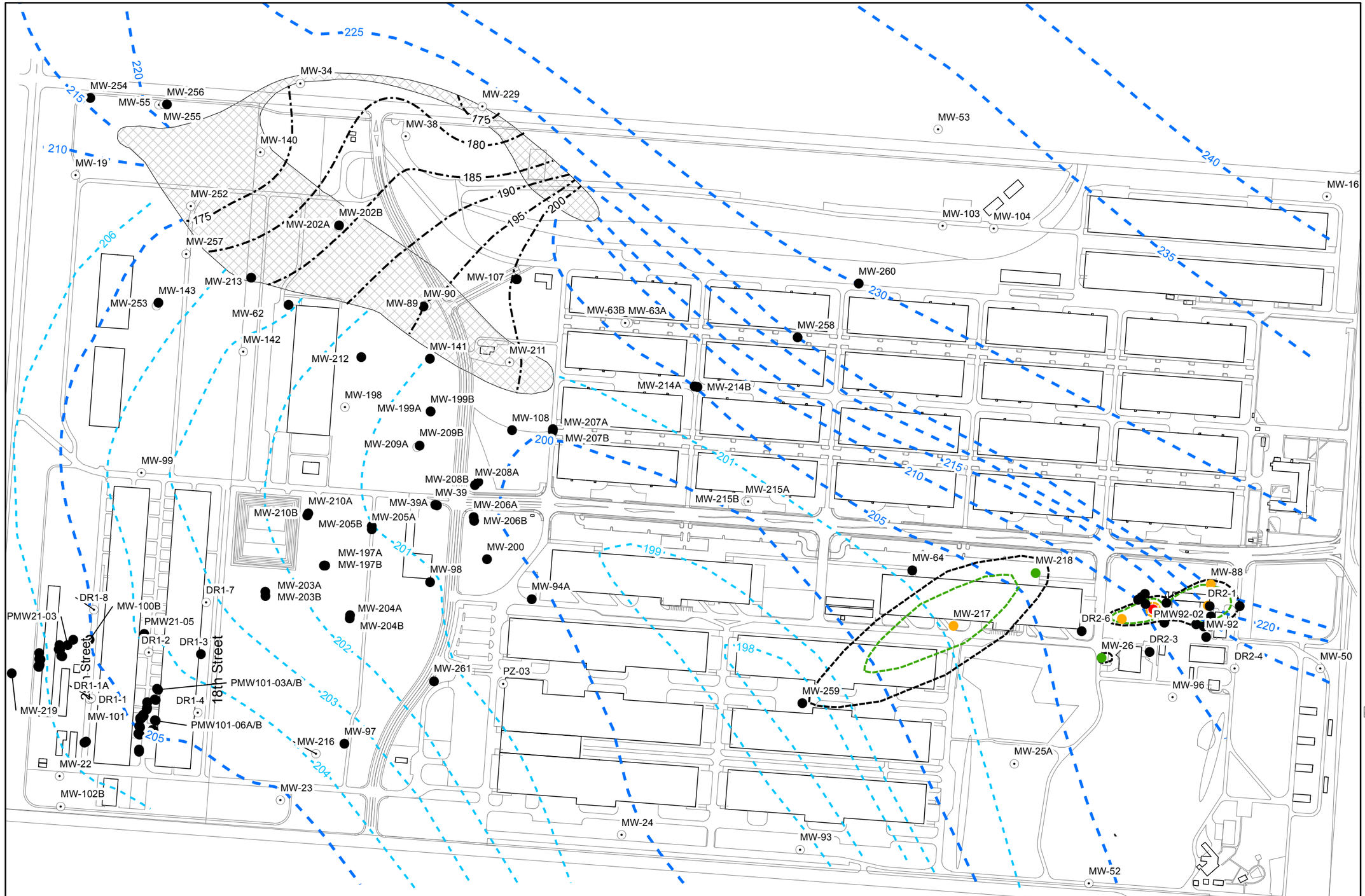
cDCE Isopleth
ug/L

- 5
- 10
- 50
- 100

- 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
- Clay Elevation Exceeds Groundwater Elevation

0 250 500 1,000
Feet

Date: December 2014
Edition: Rev 0



Note:
1. Analytical results from the EBT monitoring event (8/4-12/14) and the April 2014 LTM event (4/22-26/14).
2. Groundwater contours are from the April 2014 LTM event.

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Figure 14

MAIN INSTALLATION CT CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

CTRanges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 200
- Not Sampled

CT Isopleth
ug/L

- 5
- 10
- 50
- 100

- 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
- Clay Elevation Exceeds Groundwater Elevation

0 250 500 1,000
Feet

Date: December 2014
Edition: Rev 0

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 Clay to Clayey Silt

Sandy Clay to Clayey Sand

Clay

Grey Clay

Sand

Grey Clay

Silty Sandy Clay

MW-254 MW-255 MW-256 MW-252 MW-140 MW-55 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-24 MW-81

ABANDONED

B.T.

PCE 0.901
TCE 2.8

PCE 43.5
TCE 13.4

PCE 27.1
TCE 4.19

PCE 19.9
TCE 4.46

PCE <1
TCE 67.9

MW-209A
195.45

PCE 0.298
TCE 29.3

PCE 34.7
TCE 3.86

PCE 9.7
TCE 6.9

PCE 26.4
TCE 7.03

PCE 20.2
TCE 6.38

PCE 13.7
TCE 6.65

PCE 30.2
TCE 8.95

PCE 19.9
TCE 8.56

20
0
200

Note:
PCE and TCE concentrations in ug/L from samples collected April 2014.

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Figure 15

CROSS-SECTION A WITH PCE AND TCE RESULTS, APRIL 2014

2015 SITE MANAGMENT 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
- Fluvial Aquifer Groundwater Elevation 10/4/2010
- Intermediate Aquifer Groundwater Elevation 10/4/2010
- Memphis Aquifer Groundwater Elevation 10/4/2010
- Well Screen Interval

Date: December 2014
Revision: 0

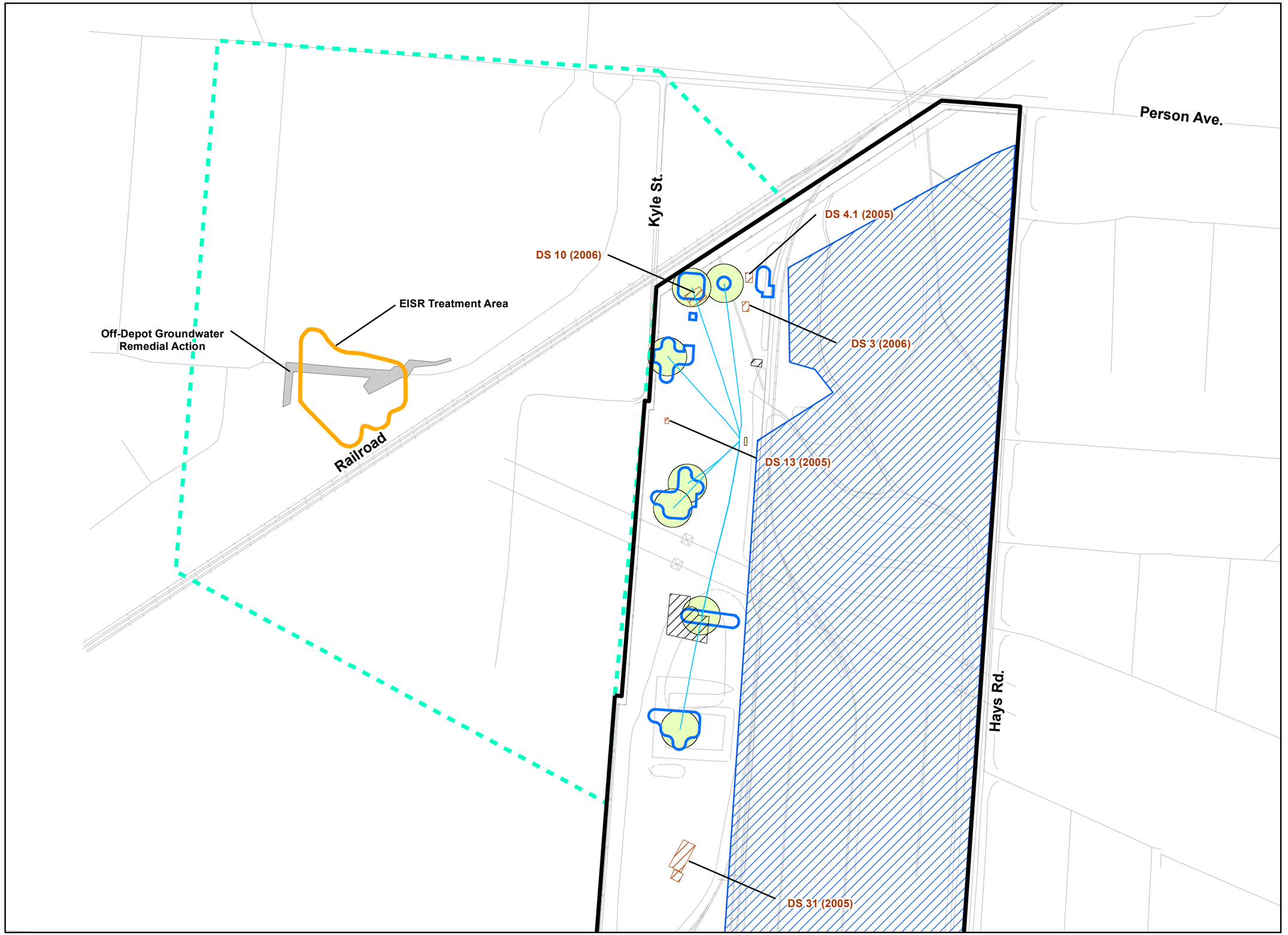

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Figure 16

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

2015 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

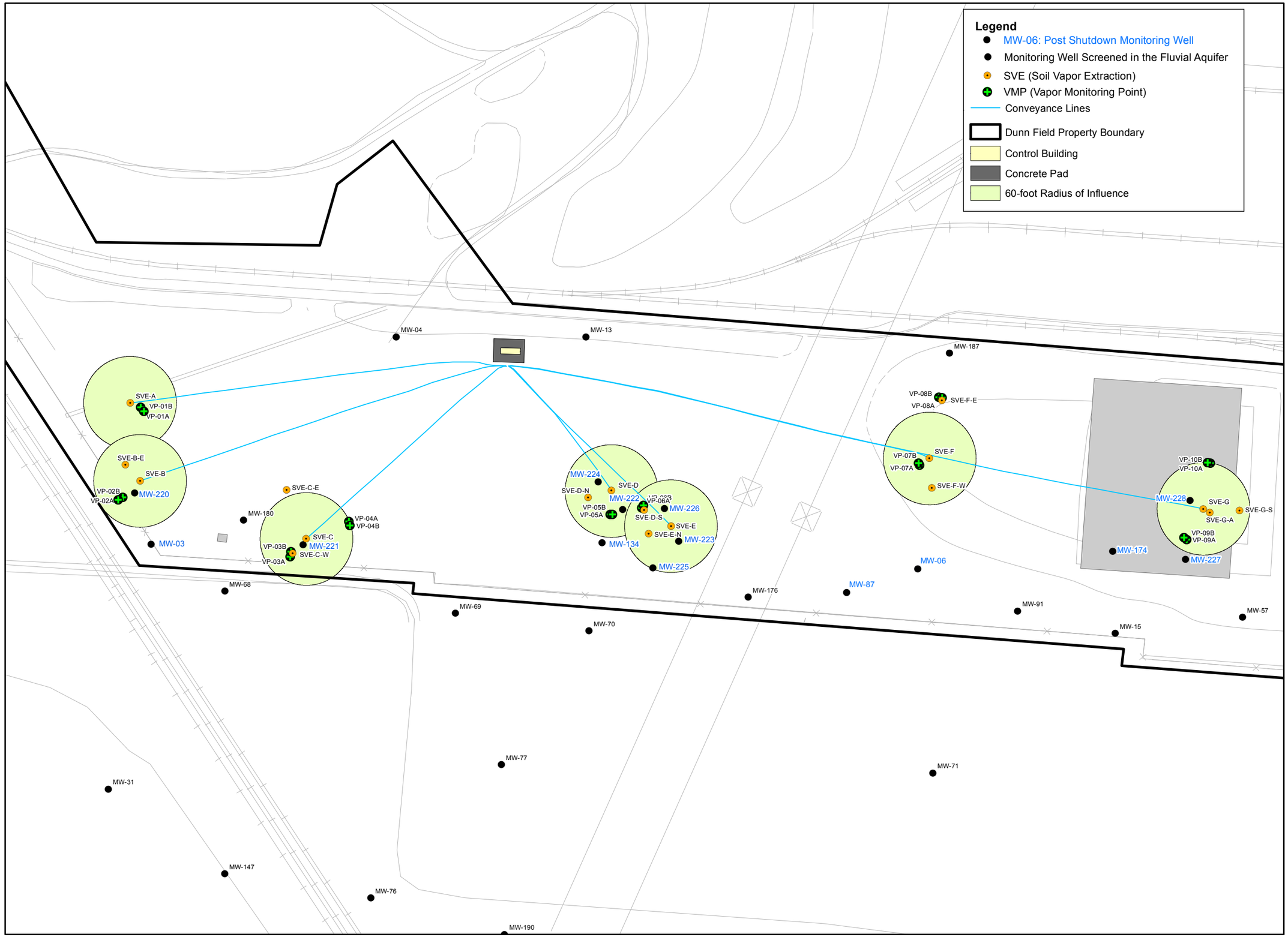
Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Aerial Photo Date: 2006

0 100 200 400
Feet

Date: December 2014
Edition: Rev 0

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 16.mxd



Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 17.mxd

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Figure 17

FLUVIAL SVE SYSTEM

2015 SITE MANAGEMENT PLAN

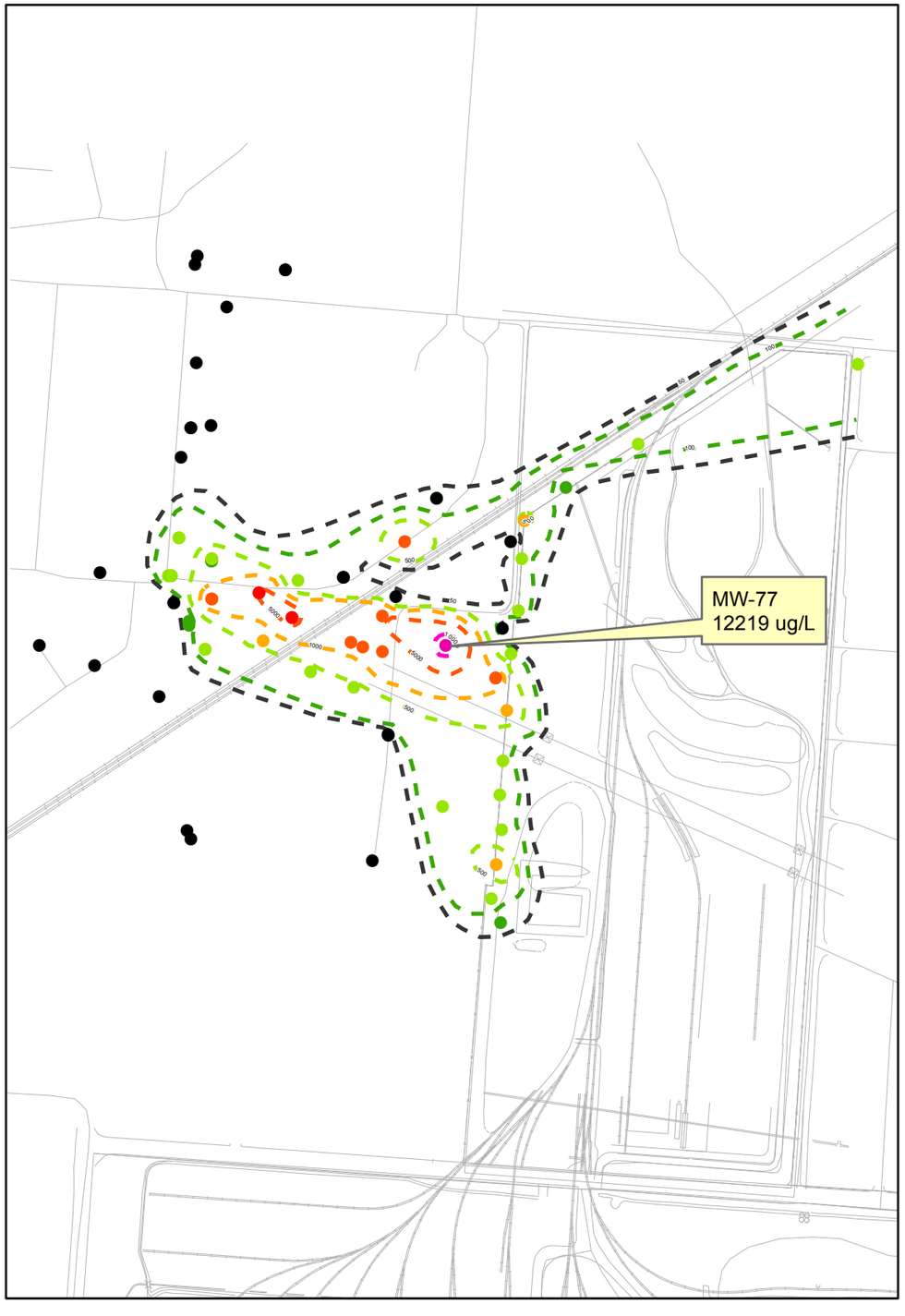
DEFENSE DEPOT
MEMPHIS, TENNESSEE

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

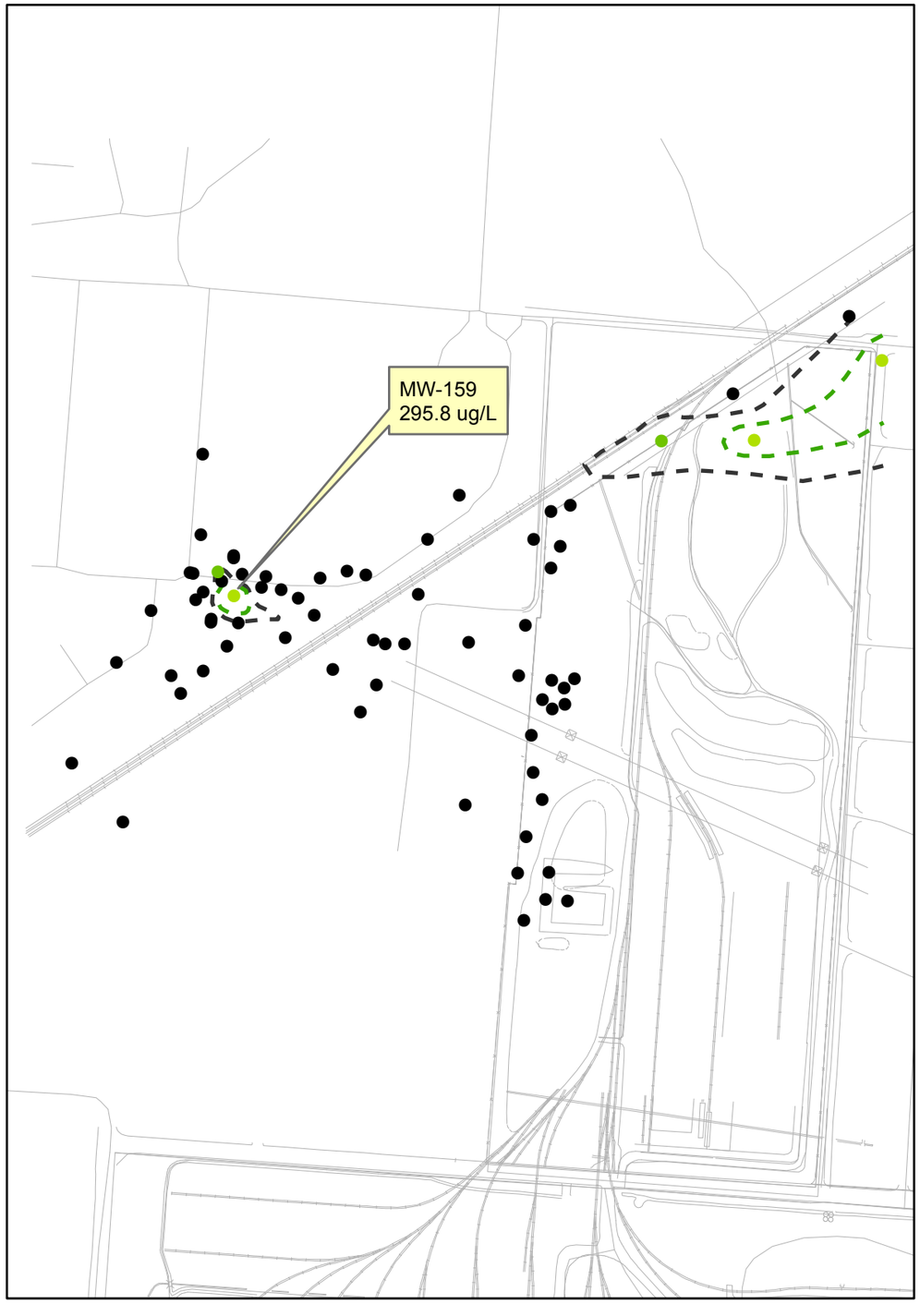
0 50 100 150 200 Feet

Date: December 2014
Edition: Rev 0

HDR



APRIL 2007



APRIL 2014

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Figure 18

DUNN FIELD TOTAL CVOC CONCENTRATIONS, 2007 - 2014

2015 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

Date: December 2014
Edition: Rev 0

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 18.mxd

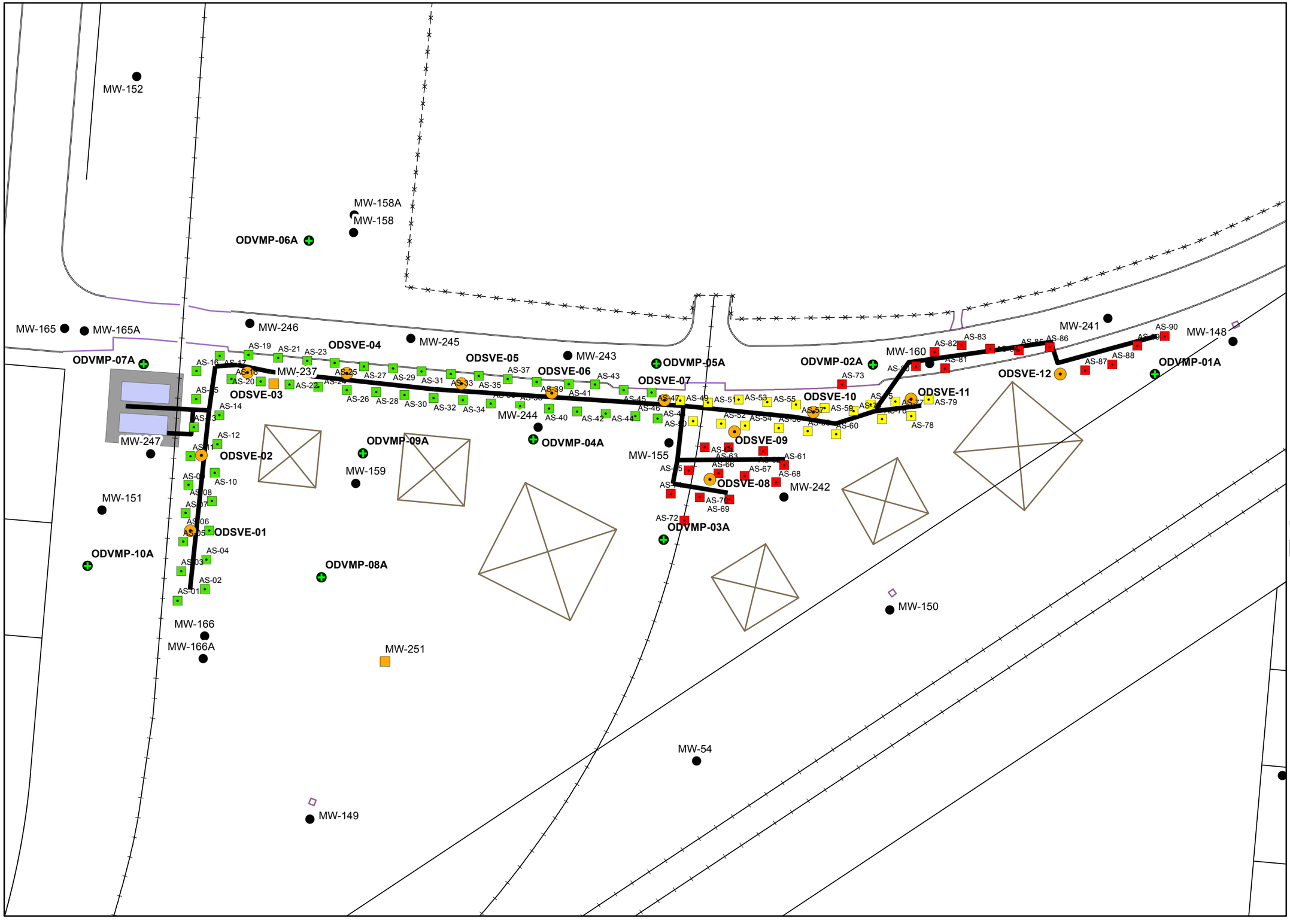

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Figure 19

AS-SVE SYSTEM

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

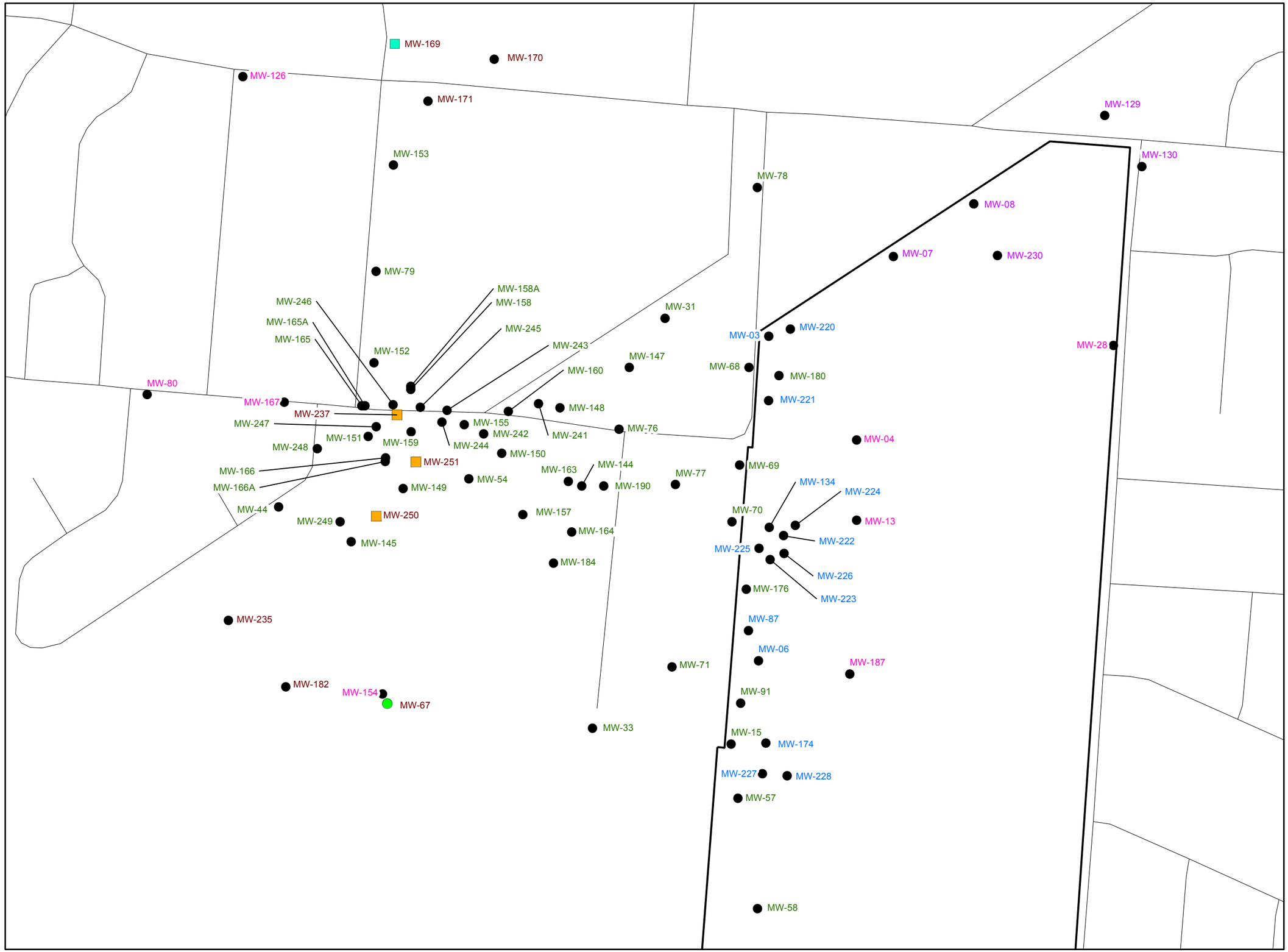
Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- AS Location (full time)
- AS Location (1/2 time)
- AS Location (closed)
- VMP Location
- SVE Location
- Conveyance Lines
- SVE Compound

0 25 50 75 100
Feet

Date: December 2014
Edition: Rev 0

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 19.mxd



Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 20 Dunn Field LTM Well Location Map.mxd

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Figure 20

DUNN FIELD
LTM WELL LOCATION MAP

2015 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

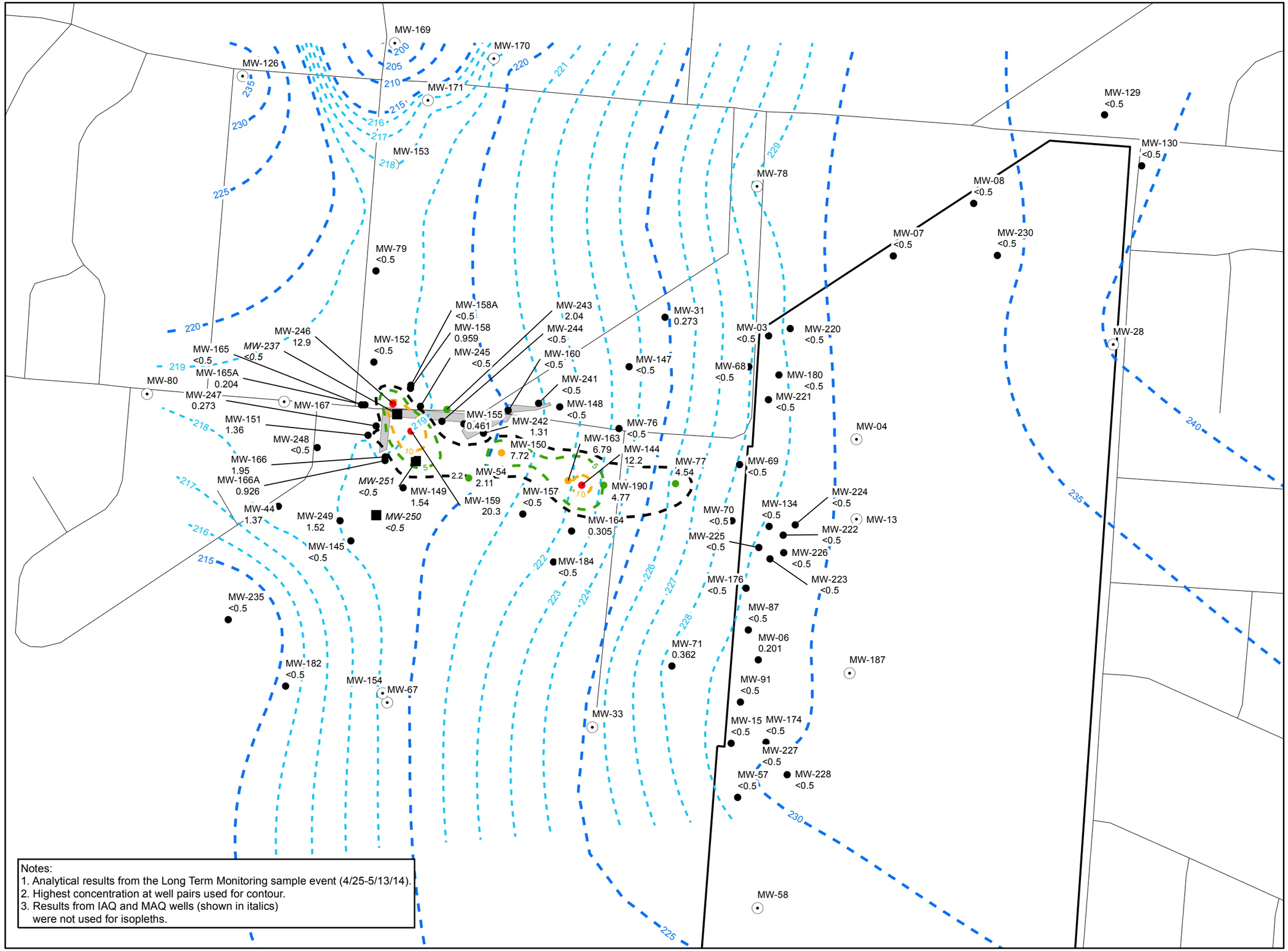
Off Depot Well Classification

- MW-04 Background
- MW-07 Background-NE
- MW-250 Sentinel
- MW-15 Performance
- MW-03 Performance-FSVE

Dunn Field Boundary

0 150 300 450
Feet

Date: December 2014
Edition: Rev 0



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/25-5/13/14).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

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Figure 21

DUNN FIELD TeCA CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TeCA Ranges (ug/L)

- 0-2
- 2-5
- 5-10
- 10-50
- Not Sampled

TeCA Isopleth (ug/L)

- 2.2
- 5
- 10

Air Sparge Well Area

Original Dunn Field Property Boundary

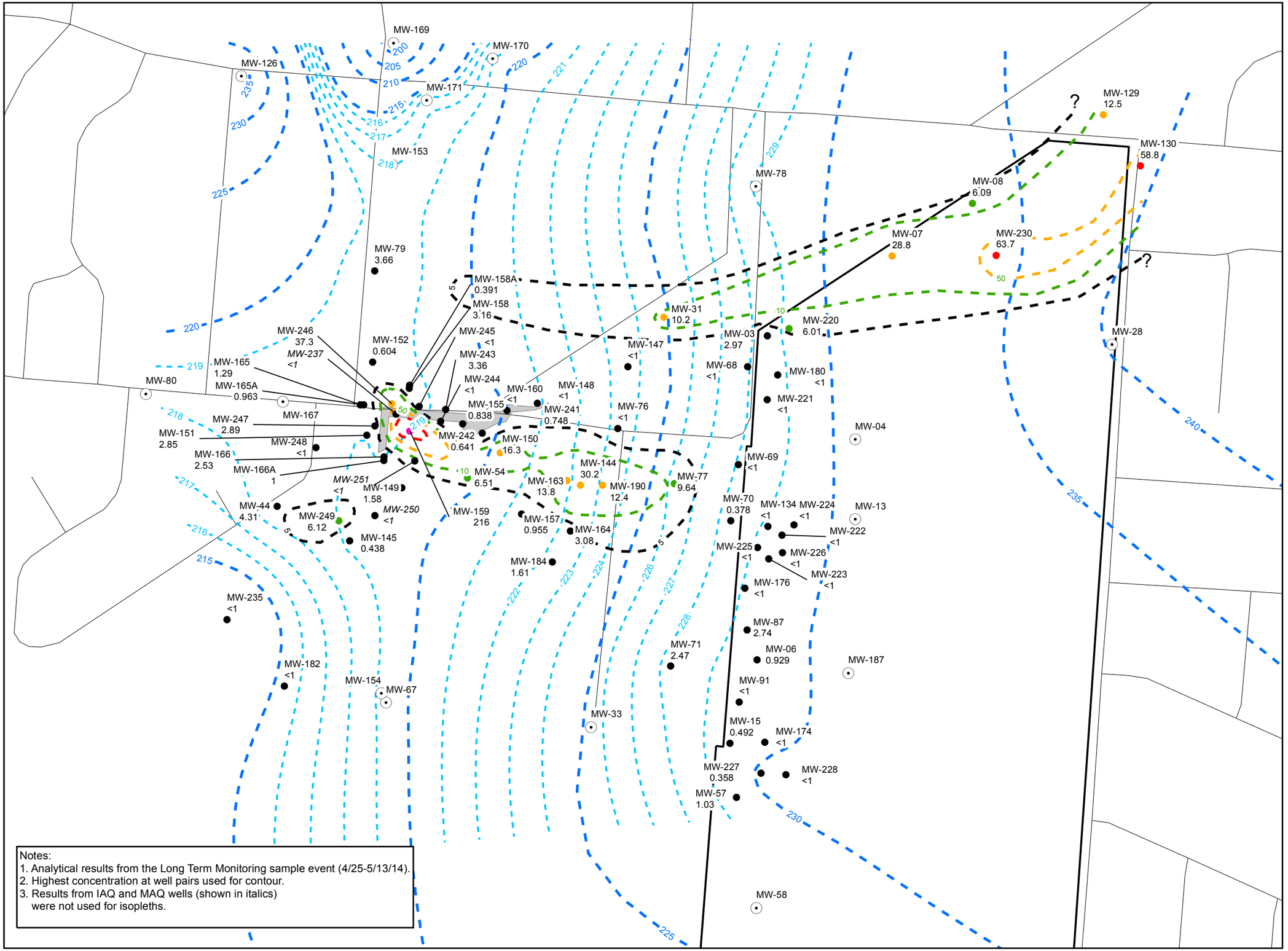
Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300
Feet

Date: December 2014
Edition: Rev 0

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 21 TeCA Apr2014.mxd



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/25-5/13/14).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 22 DF TCE APR14.mxd

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Figure 22

DUNN FIELD
TCE
CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges (ug/L)
- 0-5
- 5-10
- 10-50
- 50-100
- 100-300
- Not Sampled

TCE Isopleth (ug/L)
- 5
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

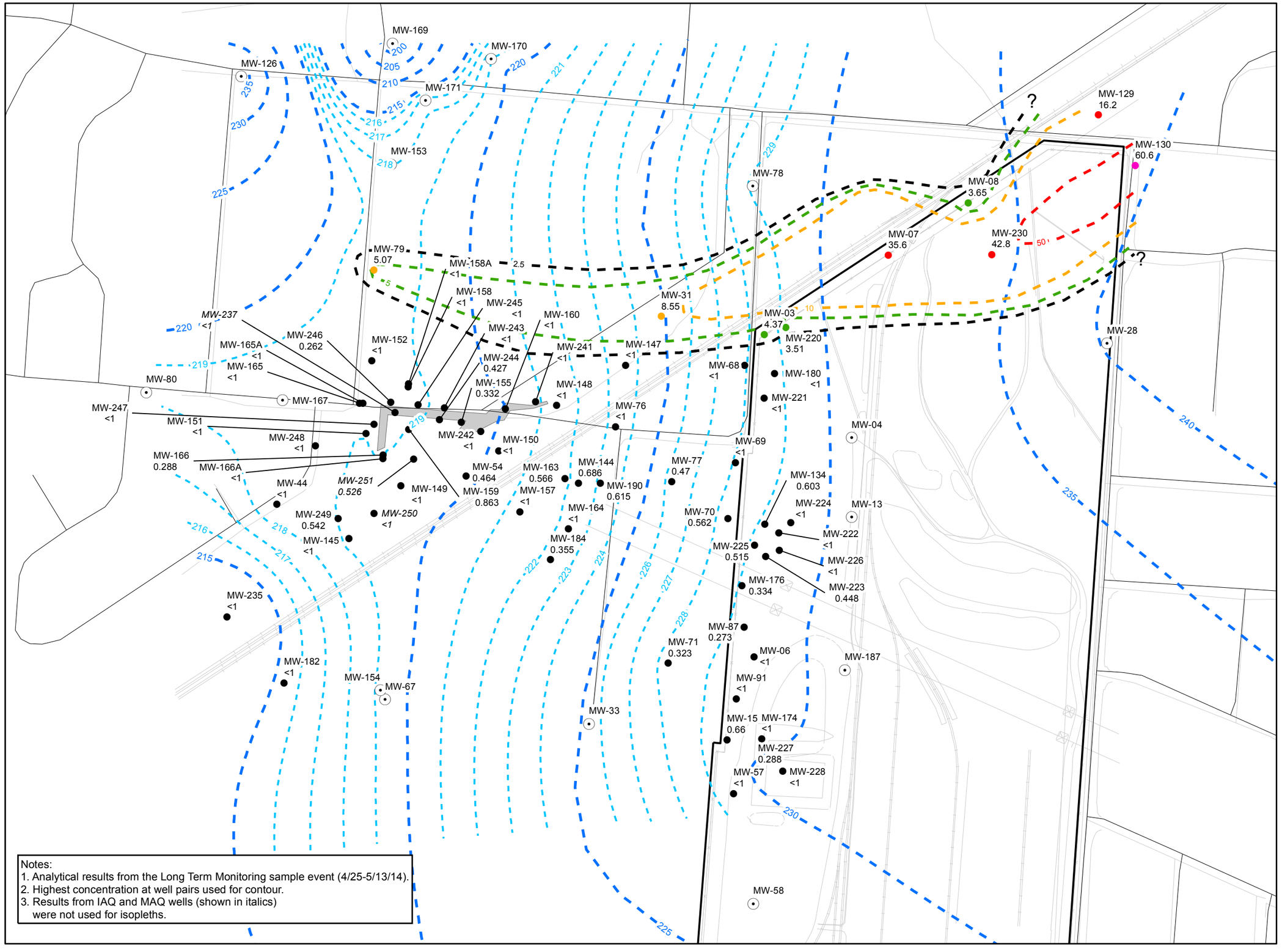
Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300
Feet

Date: December 2014
Edition: Rev 0

HDR



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/25-5/13/14).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 23 DF PCE Apr2014.mxd

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Figure 23

DUNN FIELD PCE CONCENTRATIONS

2015 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

PCE Ranges (ug/L)
- 0 - 2.5
- 2.5 - 5
- 5 - 10
- 10 - 50
- 50 - 250
- Not Sampled

PCE Isopleth (ug/L)
- 2.5
- 5
- 10
- 50

Air Sparge Well Area

Original Dunn Field Property Boundary

Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300
Feet

Date: December 2014
Edition: Rev 0

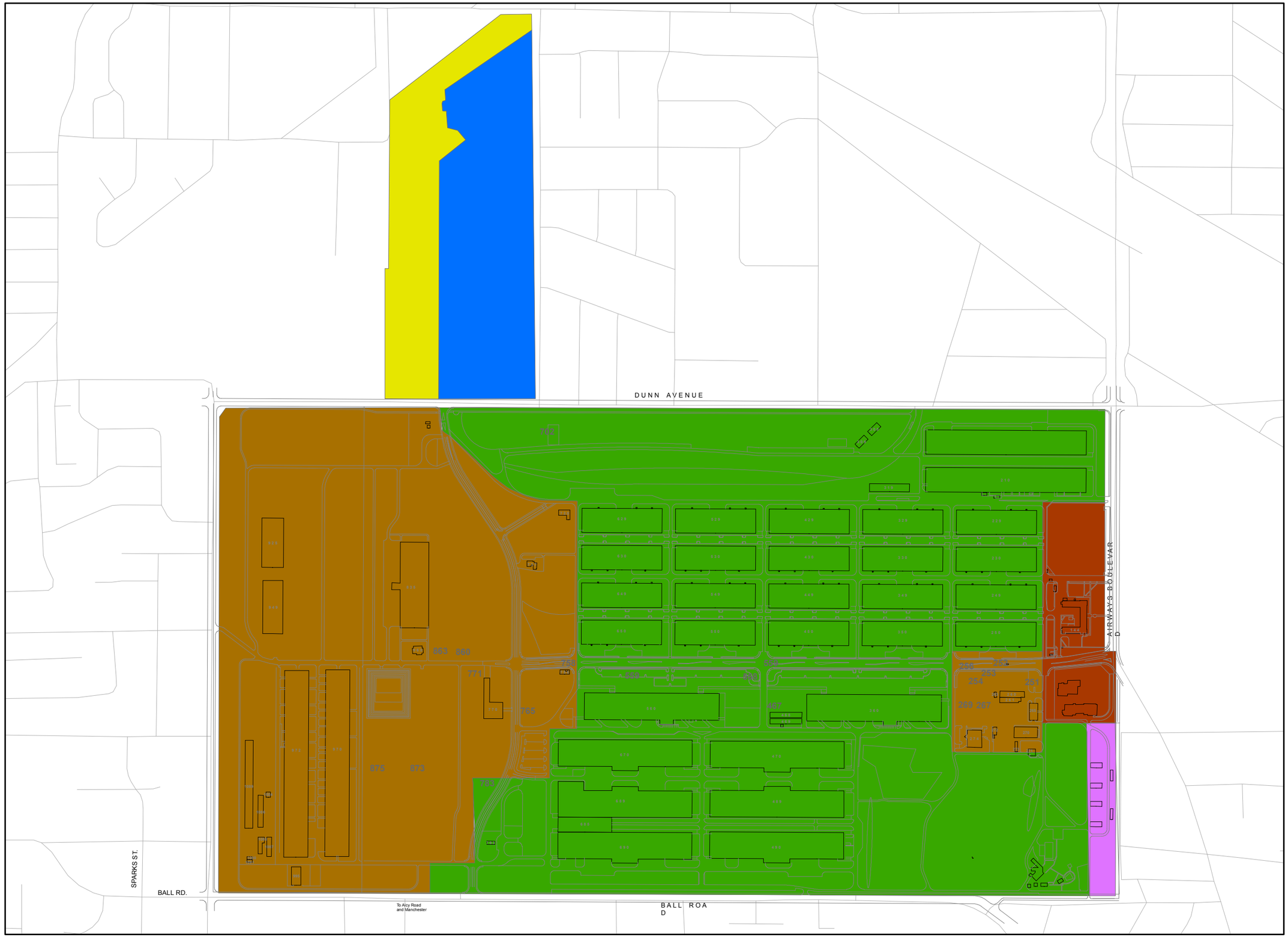

Figure 24

FINDING OF SUITABILITY TO TRANSFER MAP

2015 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

Date: December 2014
Edition: Rev 0

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 24.mxd

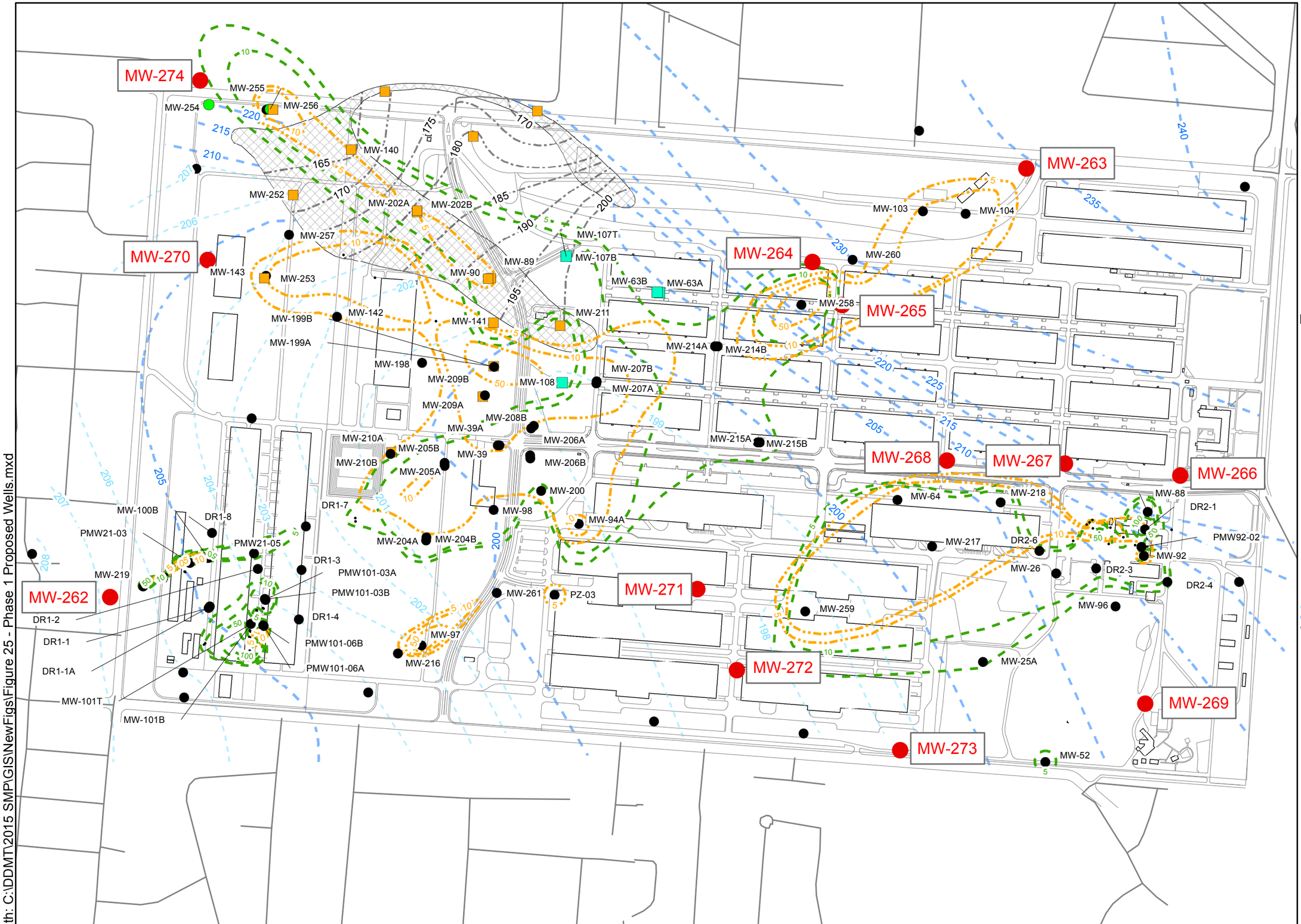

Figure 25

SRI PHASE 1 PROPOSED WELL LOCATIONS

2015 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
- Proposed New Well Location
- PCE
- TCE
- 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

0 200 400 800
Feet

Date: December 2014
Edition: Rev 0

Path: C:\DDMT\2015 SMP\GIS\NewFigs\Figure 25 - Phase 1 Proposed Wells.mxd

Figure 26
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
1		**MAIN INSTALLATION**	**6346 d**	**Mon 9/11/06**		**Thu 1/25/24**
2		**Main Installation Remedial Action (RA)**	**5586 d**	**Mon 9/11/06**		**Sun 12/26/21**
3		MI RA-O Initial Enhanced Bioremediation Treatment (Y1 and Y2)	900 d	Mon 9/11/06		Thu 2/26/09
4		**MI RA-O Additional Enhanced Bioremediation Treatment**	**994 d**	**Mon 9/17/12**		**Sun 6/7/15**
5	**P**	**MI RAWP Addendum**	**136 d**	**Mon 9/17/12**		**Wed 1/30/13**
6		Prepare and Submit Rev. 0 MI RAWP Addendum	49 d	Mon 9/17/12		Sun 11/4/12
7		Agency Review & Submit Comments on Rev. 1 MI RAWP Addendum	59 d	Mon 11/5/12	6	Wed 1/2/13
8		Prepare & Submit Rev. 1 MI RAWP Addendum	28 d	Thu 1/3/13	7	Wed 1/30/13
9		Additional EBT Y3 Quarterly Injections	290 d	Mon 11/5/12	6	Wed 8/21/13
10		Additional EBT Y3 Quarterly Sampling	282 d	Mon 2/4/13	9SS+91 d	Tue 11/12/13
11	**S**	**Additional EBT Y3 Annual Report**	**209 d**	**Wed 11/13/13**		**Mon 6/9/14**
12		Prepare and Submit Rev. 0 Additional EBT Y3 Report	119 d	Wed 11/13/13	10	Tue 3/11/14
13		Agency Review & Submit Comments on Rev. 1 Additional EBT Y3 Report	62 d	Wed 3/12/14	12	Mon 5/12/14
14		Prepare & Submit Rev. 1 Additional EBT Y3 Report	28 d	Tue 5/13/14	13	Mon 6/9/14
15		Additional EBT Y4 Quarterly Injections	281 d	Wed 11/13/13	10	Wed 8/20/14
16		Additional EBT Y4 Quarterly Sampling	281 d	Mon 2/3/14	15SS+82 d	Mon 11/10/14
17	**S**	**Additional EBT Y4 Annual Report**	**209 d**	**Tue 11/11/14**		**Sun 6/7/15**
18		Prepare and Submit Rev. 0 Additional EBT Y4 Report	119 d	Tue 11/11/14	16	Mon 3/9/15
19		Agency Review & Submit Comments on Rev. 1 Additional EBT Y4 Report	62 d	Tue 3/10/15	18	Sun 5/10/15
20		Prepare & Submit Rev. 1 Additional EBT Y4 Report	28 d	Mon 5/11/15	19	Sun 6/7/15
21		**Supplemental Remedial Investigation (SRI)**	**739 d**	**Mon 10/27/14**		**Thu 11/3/16**
22		Document & Model Review	84 d	Mon 12/15/14	24FS-14 d	Sun 3/8/15
23	**P**	**SRI Phase 1 Work Plan**	**137 d**	**Mon 10/27/14**		**Thu 3/12/15**
24		Prepare and Submit Rev. 0 SRI Phase 1 Work Plan	63 d	Mon 10/27/14		Sun 12/28/14
25		Agency Review and Submit Comments on Rev. 0 SRI Phase 1 Work Plan	60 d	Mon 12/29/14	24	Thu 2/26/15
26		Prepare and Submit Rev. 1 SRI Phase 1 Work Plan	14 d	Fri 2/27/15	25	Thu 3/12/15
27		SRI Phase 1 Field Activities	56 d	Fri 4/3/15	26FS+21 d	Thu 5/28/15
28	**S**	**SRI Review/Phase 1 Summary Report**	**98 d**	**Fri 5/29/15**		**Thu 9/3/15**
29		Prepare and Submit Rev. 0 SRI Review/Phase 1 Summary Report	98 d	Fri 5/29/15	27	Thu 9/3/15
30	**P**	**SRI Phase 2 Work Plan**	**130 d**	**Fri 9/18/15**		**Mon 1/25/16**
31		Prepare and Submit Rev. 0 SRI Phase 2 Work Plan	56 d	Fri 9/18/15	29FS+14 d	Thu 11/12/15
32		Agency Review and Submit Comments on Rev. 0 SRI Phase 2 Work Plan	60 d	Fri 11/13/15	31	Mon 1/11/16
33		Prepare and Submit Rev. 2 SRI Phase 2 Work Plan	14 d	Tue 1/12/16	32	Mon 1/25/16
34		SRI Phase 2 Field Activities	60 d	Tue 2/16/16	33FS+21 d	Fri 4/15/16
35	**P**	**SRI Report**	**200 d**	**Mon 4/18/16**		**Thu 11/3/16**
36		Prepare and Submit Rev. 0 SRI Report	112 d	Mon 4/18/16	34FS+2 d	Sun 8/7/16
37		Agency Review and Submit Comments on Rev. 0 SRI Report	60 d	Mon 8/8/16	36	Thu 10/6/16
38		Prepare and Submit Rev. 1 SRI Report	28 d	Fri 10/7/16	37	Thu 11/3/16
39		**Focused Feasibility Study (FFS)**	**547 d**	**Fri 7/24/15**		**Fri 1/20/17**
40		Document Review/Develop Alternatives	35 d	Fri 7/24/15	29FS-42 d	Thu 8/27/15
41		Screen Alternatives/Selected Preferred Alternatives	35 d	Mon 6/13/16	36FS-56 d	Sun 7/17/16
42	**P**	**FFS Report**	**187 d**	**Mon 7/18/16**		**Fri 1/20/17**
43		Prepare and Submit Rev. 0 FFS Report	91 d	Mon 7/18/16	41	Sun 10/16/16
44		Agency Review and Submit Comments on Rev. 0 FFS Report	61 d	Mon 10/17/16	43	Fri 12/16/16

Figure 26
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
45		Prepare and Submit Rev. 1 FFS Report	35 d	Sat 12/17/16	44	Fri 1/20/17
46		**Record of Decision (ROD) Amendment**	**1799 d**	**Mon 1/23/17**		**Sun 12/26/21**
47	**P**	**Revised Proposed Plan (RPP)**	**145 d**	**Mon 1/23/17**		**Fri 6/16/17**
48		Prepare and Submit Rev. 0 RPP	70 d	Mon 1/23/17	45FS+2 d	Sun 4/2/17
49		Agency Review and Submit Comments on Rev. 0 RPP	61 d	Mon 4/3/17	48	Fri 6/2/17
50		Prepare and Submit Rev. 1 RPP	14 d	Sat 6/3/17	49	Fri 6/16/17
51		**Public Comment Period**	**53 d**	**Sun 6/25/17**		**Wed 8/16/17**
52		Notice of RPP Comment Period and Public Meeting	7 d	Sun 6/25/17	50FS+8 d	Sat 7/1/17
53		RPP Public Comment Period	31 d	Mon 7/17/17	52FS+15 d	Wed 8/16/17
54		Public Meeting	7 d	Thu 7/27/17	53SS+10 d	Wed 8/2/17
55	**P**	**ROD Amendment**	**252 d**	**Mon 6/19/17**		**Sun 2/25/18**
56		Prepare and Submit Rev. 0 ROD Amendment	119 d	Mon 6/19/17	50FS+2 d	Sun 10/15/17
57		Agency Review and Submit Comments on Rev. 0 ROD Amendment	61 d	Mon 10/16/17	56	Fri 12/15/17
58		Prepare and Submit Rev. 1 ROD Amendment	30 d	Sat 12/16/17	57	Sun 1/14/18
59		Process MI ROD Amendment through ODB, TDEC, EPA	30 d	Mon 1/15/18	58	Tue 2/13/18
60		Final MI ROD Amendment	0 d	Tue 2/13/18	59	Tue 2/13/18
61		Notice of MI ROD Amendment	7 d	Mon 2/19/18	60FS+5 d	Sun 2/25/18
62		**New MI Remedial Action**	**1668 d**	**Sat 6/3/17**		**Sun 12/26/21**
63	**P**	**New MI Remedial Design**	**193 d**	**Sat 6/3/17**		**Tue 12/12/17**
64		Prepare and Submit Rev. 0 New MI RD	105 d	Sat 6/3/17	49	Fri 9/15/17
65		Agency Review and Submit Comments on Rev. 0 New MI RD	60 d	Sat 9/16/17	64	Tue 11/14/17
66		Prepare and Submit Rev. 1 New MI RD	28 d	Wed 11/15/17	65	Tue 12/12/17
67	**P**	**New MI Remedial Action Work Plan**	**158 d**	**Wed 12/13/17**		**Sat 5/19/18**
68		Prepare and Submit Rev. 0 New MI RAWP	70 d	Wed 12/13/17	66	Tue 2/20/18
69		Agency Review and Submit Comments on Rev. 0 New MI RAWP	60 d	Wed 2/21/18	68	Sat 4/21/18
70		Prepare and Submit Rev. 1 New MI RAWP	28 d	Sun 4/22/18	69	Sat 5/19/18
71		**New MI Remedial Action Years 1-3**	1097 d	Sun 6/17/18	70FS+28 d	Thu 6/17/21
72	**S**	**New MI RA Annual Report Year 1**	**193 d**	**Mon 6/17/19**		**Thu 12/26/19**
73		Prepare & Submit Rev. 0 Y1 MI RA Report	105 d	Mon 6/17/19	71SS+365 d	Sun 9/29/19
74		Agency Review & Submit Comments on Rev. 0 Y1 MI RA Report	60 d	Mon 9/30/19	73	Thu 11/28/19
75		Prepare & Submit Rev. 1 Y1 MI RA Report	28 d	Fri 11/29/19	74	Thu 12/26/19
76	**S**	**New MI RA Annual Report Year 2**	**193 d**	**Wed 6/17/20**		**Sat 12/26/20**
77		Prepare & Submit Rev. 0 Y3 MI RA Report	105 d	Wed 6/17/20	73SS+366 d	Tue 9/29/20
78		Agency Review & Submit Comments on Rev. 0 Y2 MI RA Report	60 d	Wed 9/30/20	77	Sat 11/28/20
79		Prepare & Submit Rev. 1 Y2 MI RA Report	28 d	Sun 11/29/20	78	Sat 12/26/20
80	**S**	**New MI RA Annual Report Year 3**	**193 d**	**Thu 6/17/21**		**Sun 12/26/21**
81		Prepare & Submit Rev. 0 Y3 MI RA Report	105 d	Thu 6/17/21	77SS+365 d	Wed 9/29/21
82		Agency Review & Submit Comments on Rev. 0 Y3 MI RA Report	60 d	Thu 9/30/21	81	Sun 11/28/21
83		Prepare & Submit Rev. 1 Y3 MI RA Report	28 d	Mon 11/29/21	82	Sun 12/26/21
84		**MI Annual LUCIP Inspections**	**762 d**	**Wed 7/1/15**		**Mon 7/31/17**
85	S	MI Annual LUCIP Inspection and Report - 2015	31 d	Wed 7/1/15		Fri 7/31/15
86	S	MI Annual LUCIP Inspection and Report - 2016	31 d	Fri 7/1/16		Sun 7/31/16
87	S	MI Annual LUCIP Inspection and Report - 2017	31 d	Sat 7/1/17		Mon 7/31/17
88		**MI RA-O Long Term Monitoring**	2922 d	Wed 1/1/14		Fri 12/31/21

Figure 26
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
89		**Main Installation Compliance Monitoring**	365 d	Sat 1/1/22	88	Sat 12/31/22
90	**P**	**Main Installation RA Completion Report**	**300 d**	**Sun 1/1/23**		**Fri 10/27/23**
91		Prepare & Submit Rev. 0 MI RACR	60 d	Sun 1/1/23	89	Wed 3/1/23
92		Agency Review & Submit Comments on Rev. 0 MI RACR	60 d	Thu 3/2/23	91	Sun 4/30/23
93		Respond to Agency Comments on Rev. 0 MI RACR	60 d	Mon 5/1/23	92	Thu 6/29/23
94		Prepare & Submit Rev. 1 MI RACR	120 d	Mon 5/1/23	92	Mon 8/28/23
95		Agency Review of Rev. 1 MI RACR w/ Concurrence	60 d	Tue 8/29/23	94	Fri 10/27/23
96		**Main Installation Well Abandonment**	90 d	Sat 10/28/23	95	Thu 1/25/24
97						
98						
99		**DUNN FIELD**	**4932 d**	**Wed 7/25/07**		**Sat 1/23/21**
100		**Dunn Field Fluvial SVE Remedial Action**	**3263 d**	**Wed 7/25/07**		**Wed 6/29/16**
101		Fluvial SVE Operations Years 1 to 5	1827 d	Wed 7/25/07		Tue 7/24/12
102		Fluvial SVE Rebound Monitoring	1196 d	Wed 7/25/12	101	Mon 11/2/15
103		**Abandon Fluvial SVE System**	84 d	Thu 4/7/16	139	Wed 6/29/16
104		**Dunn Field Off Depot GW Remedial Action**	**2856 d**	**Fri 12/18/09**		**Thu 10/12/17**
105		**Dunn Field Off Depot RA-O AS/SVE Operations Years 1 to 6**	2570 d	Fri 12/18/09		Fri 12/30/16
106	**S**	**Year 5 Extended AS/SVE Report**	**177 d**	**Mon 1/4/16**		**Tue 6/28/16**
107		Prepare & Submit Rev. 0 Y5 Extended AS/SVE Report	57 d	Mon 1/4/16		Mon 2/29/16
108		Agency Review & Submit Comments on Rev. 0 Y5 Extended AS/SVE Report	60 d	Tue 3/1/16	107	Fri 4/29/16
109		Prepare & Submit Rev. 1 Y5 Extended AS/SVE Report	60 d	Sat 4/30/16	108	Tue 6/28/16
110	**S**	**Year 6 AS/SVE Report**	**179 d**	**Tue 1/17/17**		**Fri 7/14/17**
111		Prepare & Submit Rev. 0 Y6 AS/SVE Report	59 d	Tue 1/17/17		Thu 3/16/17
112		Agency Review & Submit Comments on Rev. 0 Y6 AS/SVE Report	60 d	Fri 3/17/17	111	Mon 5/15/17
113		Prepare & Submit Rev. 1 Y6 AS/SVE Report	60 d	Tue 5/16/17	112	Fri 7/14/17
114		**Abandon AS/SVE System**	90 d	Sat 7/15/17	113	Thu 10/12/17
115		**Dunn Field Annual LUCIP Inspections**	**762 d**	**Tue 7/1/14**		**Sun 7/31/16**
116	S	Dunn Field Annual LUCIP Inspection and Report - 2014	31 d	Tue 7/1/14		Thu 7/31/14
117	S	Dunn Field Annual LUCIP Inspection and Report - 2015	31 d	Wed 7/1/15		Fri 7/31/15
118	S	Dunn Field Annual LUCIP Inspection and Report - 2016	31 d	Fri 7/1/16		Sun 7/31/16
119		**Dunn Field RA-O Long Term Monitoring**	1825 d	Wed 1/1/14		Sun 12/30/18
120		**Dunn Field Compliance Monitoring**	365 d	Mon 12/31/18	119	Mon 12/30/19
121	**P**	**Dunn Field RA Completion Report**	**300 d**	**Tue 12/31/19**		**Sun 10/25/20**
122		Prepare & Submit Rev. 0 Dunn Field RACR	60 d	Tue 12/31/19	120	Fri 2/28/20
123		Agency Review & Submit Comments on Rev. 0 Dunn Field RACR	60 d	Sat 2/29/20	122	Tue 4/28/20
124		Respond to Agency Comments on Rev. 0 Dunn Field RACR	60 d	Wed 4/29/20	123	Sat 6/27/20
125		Prepare & Submit Rev. 1 Dunn Field RACR	120 d	Wed 4/29/20	123	Wed 8/26/20
126		Agency Review of Rev. 1 Dunn Field RACR w/ Concurrence	60 d	Thu 8/27/20	125	Sun 10/25/20
127		**Dunn Field Well Abandonment**	90 d	Mon 10/26/20	126	Sat 1/23/21
128						
129						
130		**Memphis Depot NPL Site-Wide Activities**	**3510 d**	**Mon 9/15/14**		**Wed 4/24/24**
131		**Site-Wide (MI and Dunn Field) LTM Reports**	**878 d**	**Mon 11/10/14**		**Wed 4/5/17**
132	**S**	**2014 LTM Report**	**150 d**	**Mon 11/10/14**		**Wed 4/8/15**

Figure 26
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
133		Prepare & Submit Rev. 0 2014 LTM Report	60 d	Mon 11/10/14		Thu 1/8/15
134		Agency Review & Submit Comments on Rev. 0 2014 LTM Report	60 d	Fri 1/9/15	133	Mon 3/9/15
135		Prepare & Submit Rev. 1 2014 LTM Report	30 d	Tue 3/10/15	134	Wed 4/8/15
136	S	**2015 LTM Report**	**150 d**	**Mon 11/9/15**		**Wed 4/6/16**
137		Prepare & Submit Rev. 0 2015 LTM Report	60 d	Mon 11/9/15		Thu 1/7/16
138		Agency Review & Submit Comments on Rev. 0 2015 LTM Report	60 d	Fri 1/8/16	137	Mon 3/7/16
139		Prepare & Submit Rev. 1 2015 LTM Report	30 d	Tue 3/8/16	138	Wed 4/6/16
140	S	**2016 LTM Report**	**150 d**	**Mon 11/7/16**		**Wed 4/5/17**
141		Prepare & Submit Rev. 0 2016 LTM Report	60 d	Mon 11/7/16		Thu 1/5/17
142		Agency Review & Submit Comments on Rev. 0 2016 LTM Report	60 d	Fri 1/6/17	141	Mon 3/6/17
143		Prepare & Submit Rev. 1 2016 LTM Report	30 d	Tue 3/7/17	142	Wed 4/5/17
144		**Site Management Plan (SMP) Updates**	**868 d**	**Mon 9/15/14**		**Sun 1/29/17**
145	P	**2015 Site Management Plan**	**137 d**	**Mon 9/15/14**		**Thu 1/29/15**
146		Prepare & Submit Rev 0 2015 SMP	77 d	Mon 9/15/14		Sun 11/30/14
147		Agency Review & Submit Comments on Rev 0 2015 SMP	30 d	Mon 12/1/14	146	Tue 12/30/14
148		Prepare & Submit Rev 1 2015 SMP	30 d	Wed 12/31/14	147	Thu 1/29/15
149	P	**2016 Site Management Plan**	**138 d**	**Mon 9/14/15**		**Fri 1/29/16**
150		Prepare & Submit Rev 0 2016 SMP	78 d	Mon 9/14/15		Mon 11/30/15
151		Agency Review & Submit Comments on Rev 0 2016 SMP	30 d	Tue 12/1/15	150	Wed 12/30/15
152		Prepare & Submit Rev 1 2016 SMP	30 d	Thu 12/31/15	151	Fri 1/29/16
153	P	**2017 Site Management Plan**	**140 d**	**Mon 9/12/16**		**Sun 1/29/17**
154		Prepare & Submit Rev 0 2017 SMP	80 d	Mon 9/12/16		Wed 11/30/16
155		Agency Review & Submit Comments on Rev 0 2017 SMP	30 d	Thu 12/1/16	154	Fri 12/30/16
156		Prepare & Submit Rev 1 2017 SMP	30 d	Sat 12/31/16	155	Sun 1/29/17
157	P	**CERCLA Fourth 5-Year Review**	**341 d**	**Mon 2/27/17**		**Fri 2/2/18**
158		Notice of Five-Year Review	14 d	Mon 2/27/17		Sun 3/12/17
159		Document Review, Interviews, Inspection, Technical Assessment	70 d	Mon 3/13/17	158	Sun 5/21/17
160		Prepare & Submit Rev. 0 4th 5-Year Review	84 d	Mon 3/27/17	159SS+14 d	Sun 6/18/17
161		Agency Review & Submit Comments on Rev. 0 4th 5-Year Review	61 d	Mon 6/19/17	160	Fri 8/18/17
162		Respond to Agency Comments on Rev. 0 4th 5-Year Review	28 d	Sat 8/19/17	161	Fri 9/15/17
163		Prepare & Submit Rev. 1 4th 5-Year Review	63 d	Sat 8/19/17	161	Fri 10/20/17
164		Agency Review of Rev. 1 4th 5-Year Review	60 d	Sat 10/21/17	163	Tue 12/19/17
165		Prepare & Submit Final 4th 5-Year Review	21 d	Wed 12/20/17	164	Tue 1/9/18
166		Final 4th 5-Year Review Signed	10 d	Wed 1/10/18	165	Fri 1/19/18
167		Notification of 4th 5-Year Review Completion	7 d	Sat 1/27/18	166FS+7 d	Fri 2/2/18
168	P	**Final Closeout Report (FCOR)**	**180 d**	**Sat 10/28/23**		**Wed 4/24/24**
169		Prepare & Submit Rev. 0 FCOR	60 d	Sat 10/28/23	126,95	Tue 12/26/23
170		Agency Review & Submit Comments on Rev. 0 FCOR	60 d	Wed 12/27/23	169	Sat 2/24/24
171		Respond to Agency Comments on Rev. 0 FCOR	15 d	Sun 2/25/24	170	Sun 3/10/24
172		Prepare & Submit Rev. 1 FCOR	30 d	Sun 2/25/24	170	Mon 3/25/24
173		Agency Review of Rev. 1 FCOR w/ Concurrence	30 d	Tue 3/26/24	172	Wed 4/24/24
174		Final FCOR	0 d	Wed 4/24/24	173	Wed 4/24/24
175		**Site Completion**	0 d	Wed 4/24/24	174	Wed 4/24/24

APPENDIX A

RESPONSES TO USEPA AND TDEC COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

March 11, 2015

FED-EX
RETURN RECEIPT REQUESTED

Ms. Carolyn Jones
Assistant Chief of Staff for Installation Management
Base Realignment and Closure Division (ACSIM-ODB)
2530 Crystal Drive (Taylor Building), Room 5000
Arlington, VA 22202-3940

Dear Ms. Jones:

The U.S. Environmental Protection Agency (EPA) has received and reviewed the Department of Army, Defense Depot of Memphis, Tennessee 2015 Site Management Plan (SMP) and comment responses.

EPA finds the above referenced document to be adequate and looks forward to the planned meeting on Monday, March 16, 2015 to discuss site concerns along with SMP in greater detail. If you have any questions, please contact me at (404) 229 -9500.

Sincerely,

Diedre Lloyd
Remedial Project Manager
Federal Facilities Branch
Superfund Division

cc: Ms. Carolyn Jones, (Signed Original), United Parcel Service, Return Receipt
Mr. Jamie A. Woods, PG, Tennessee, Department of Environment and Conservation, Memphis Environmental Field Office, 8383 Wolf Lake Drive, Bartlett, TN 38133-4119
Ms. Joan Hutton, CALIBRE, 3898 Mountain View Road, Kennesaw, GA 30152
Mr. Thomas Holmes, HDR Environmental, P.O. Box 728, Highlands, NC 28741

Responses to:
U.S. Environmental Protection Agency (EPA) Region 4 Comments on:
2015 Site Management Plan, Defense Depot Memphis, Tennessee (TN4210020570)
November 2014 (Revision 0)

EPA Comments:

1) **Site transition – September 22, 2014:** The DDMT site was transitioned from the previous site manager, Julie Corkran to the present site manager, Diedre Lloyd on September 22, 2014. Site and program continuity are of great importance and will be maintained throughout EPA's restructuring. All efforts will be made to minimize any inconvenience and/or delays. The *Main Installation Year Three Enhanced Bioremediation Treatment Report* (HDR, 2014a) and *The Main Installation Remedial Investigation Phase 1 Work Plan, Revision 0 Report* will be reviewed and comments provided by EPA. There have been unavoidable delays due to site transition, superfund divisional reorganization and restructuring due to funding issues and employee retirements.

   Response: The Army understands that delays can occur during a transition and looks forward to receiving comments on the primary and secondary documents submitted to EPA. The Army requests that notification of delays in review of primary documents be submitted in accordance with the *Federal Facilities Agreement Between USEPA Region IV, TDEC, and Defense Logistics Agency at Defense Distribution Depot Memphis, Tennessee* (FFA).
   Given that the *Main Installation Year Three Enhanced Bioremediation Treatment Report* (EBT Y3 Report) is a secondary document submitted in April 2014, the report will not be revised to address comments. The EBT Y4 Report is to be submitted in March 2015 and comments on the EBT Y3 Report will be considered during its preparation, if received in time. Implementation of the *Supplemental Remedial Investigation Phase 1 Work Plan* (SRI WP) is scheduled to begin in April 2015; notification of delay in submittal of comments (due March 2, 2015) would be helpful to limit delay in field work.
   The comment is not considered to require revision of the SMP.

2) **Page 3-5, second paragraph** – The Main Installation Year Three Enhanced Bioremediation Treatment Report (HDR, 2014a) stated it was not likely contaminant concentrations

   Response: The comment appears to be incomplete.

3) **Page 4-3, second paragraph** – this paragraph discusses the potential for shutdown of the AS/SVE system when individual CVOC concentrations are at or below 50 ppb for 12 months. However, given the current site concerns with respect to rebound concentrations and the potential investigation into vapor intrusion concerns on the MI, it is premature to discuss any type of system shutdown for DDMT since, as the report mentions on page 4-4, there is significant work that remains in order to meet RAOs.

   Response: The comment combines separate issues which are relevant to the Dunn Field-Off Depot area or to the MI, but not to both. Discussion of the shutdown criteria for the AS/SVE system is presented to make project goals clear in order that progress or problems can be identified. Site concerns related to rebound and potential for vapor intrusion on the MI do not appear relevant to the AS/SVE operations. The reference to "significant work remains in order to meet the RAOs" is also in regard to activities on the MI.
   The comment is not considered to require revision of the SMP.

4) EPA requests a face to face meeting or teleconference to discuss plans/schedules, reporting and sampling frequencies – either meeting type is acceptable to EPA and can be scheduled at a mutually acceptable time for all parties with the understanding that the meeting take place before any scheduled field or reporting activities are initiated.

   Response: The Army will be pleased to discuss a schedule for a meeting(s) to move forward restoration activities at DDMT. Please contact the BRAC Environmental Coordinator, Joan Hutton, to discuss meetings or other issues needing attention.
   The comment is not considered to require revision of the SMP.

5) Please include a timeline for the remedial/monitoring strategies outlined to achieve RAOs from the present throughout anticipated site closure in 2024. EPA understands that as the timeline approaches anticipated site closure the timeline will include estimates based on best data available at the time.

   Response: As stated on page 5-2, "The master schedule for MI, Dunn Field and site-wide activities through planned site completion in 2024 is shown on Figure 26. Please let us know if EPA believes additional information is required.
   The comment, as currently understood, is not considered to require revision of the SMP.

6) **Page 4-6:** please include a table that identifies each site where an annual LUC inspection will be conducted along with an anticipated date of inspection for each site of group of sites. EPA would like to be informed when these inspections take place and EPA would like to accompany the site personnel conducting the inspections.

   Response: The land use controls and inspection requirements, described in the land use control implementation plans referenced in Section 4.3, do not reference individual sites but the MI and Dunn Field as a whole. The period for completion of the annual inspection of each area is listed on the Master Schedule, Figure 26. The Army will notify EPA prior to the annual inspections, and an EPA representative may accompany the inspector if this does not delay the inspection.

7) **Table 11, page 1 of 2:** The Annual LUCIP Inspection Reports in each of the Fiscal Years listed should also be considered Primary (deadline) documents instead of Target (secondary) documents as outlined in Table 11.

   Response: The Army does not agree that the Annual LUCIP reports meet the criteria for primary documents as described in Section XV.B.1. of the FFA: "Primary documents include those reports, plans and studies that are major, discrete portions of the response action process." Section XV.C.1. of the FFA states: "Secondary documents include those reports, plans and studies that are discrete portions of the Primary Documents and are typically input or feeder documents." The relevant primary documents are the remedial action completion reports (listed as Final Remediation Reports in the FFA under XV.B.1.k.) for the MI and Dunn Field, which are listed in the Master Schedule; the Annual LUCIP reports are analogous to Secondary Documents listed in the FFA under XV.B.1 g. Progress Reports or i. Post-Construction Reports.

8) **Table 11, page 1 of 2:** The MI Supplemental RI Phase 1 Summary Report should be considered a Primary (Deadline) document instead of a Target (secondary) document as outlined in the aforementioned table.

Response: The Army does not agree that the Supplemental RI Phase 1 Summary Report meets the criteria for primary documents, as described in response to comment 7. The summary report will be used to describe the Phase 1 field data, analytical results and document review findings for use in planning the Phase 2 investigation and for use in the focused feasibility study. The Phase 1 report is a feeder document to the full SRI report, which is listed as a Primary document. EPA and TDEC will have the opportunity to comment on the Phase 1 report, as well as the SRI Phase 2 Work Plan, which is also listed as a Primary document.

9) **Page 4-7, 3rd paragraph:** The concern and potential for vapor intrusion has been raised by EPA at the DDMT site and should be addressed before the next scheduled 5 year review, as previously discussed. EPA will review all previous site information inclusive of 5 year reviews and would like to schedule a conference call with all parties at a mutually agreed upon time, with the understanding that this conference will occur in enough time to make plans to adequately address any VI issues before the next 5 year review.

Response: The Army agrees that further discussion is warranted and will add the item to the agenda for the project meeting requested in Comment 4. In addition, Army is waiting on updated VI guidance from both EPA and TDEC, which we understand is forthcoming.
The last sentence of the subject paragraph will be deleted and replaced with: The need for further study of VI issues at DDMT will be discussed with USEPA and TDEC in order to adequately address the issues prior to the next five-year review to be conducted in 2017.

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
MEMPHIS ENVIRONMENTAL FIELD OFFICE
8383 WOLF LAKE DRIVE
BARTLETT, TN 38133-4119
PHONE (901) 371-3000 STATEWIDE 1-888-891-8332 FAX (901) 371-3170

March 12, 2015

Carolyn Jones
Program Manager
Office of the Chief of Staff for Installation Management
Attn: BRAC Division (DAIM-ODB)
2530 Crystal Drive (Taylor Bldg.), Room 5000
Arlington, VA 22202-3940

Subject: **2015 Site Management Plan - Response to Comments**
Defense Depot Memphis, Tennessee
TDoR ID # 79-736
EPA ID # TN 4210020570

Dear Ms. Jones,

TDEC-DoR has reviewed the **2015 Site Management Plan - Response to Comments**, as compiled and submitted by T. Holmes (HDRInc), and approves of these responses for document revision. If there are questions or concerns, please contact me at (901) 371-3041 or at jamie.woods@tn.gov .

Regards,

Jamie A. Woods, P.G.
Project Manager
Division of Remediation
Memphis Environmental Field Office

cc: Thomas C. Holmes (HDRInc)
Diedre Lloyd (EPA-PM)
Joan Hutton (CALIBRE)
TDoR NCO: file 79-736
TDoR MEFO: file 79-736

Responses to:
Tennessee Department of Environment and Conservation (TDEC) Comments on:
2015 Site Management Plan, Defense Depot Memphis, Tennessee (TN4210020570)
November 2014 (Revision 0)

TDEC Comments:

1) **Section 3.1.2, Record of Decision (Main Installation); page 3-2:** We need to consider amending the MI ROD to include an RAO for soils, subsurface soils and/or groundwater impacted with VOCs on the Main Installation, in order to account for the vapor intrusion risk, as included in the RAOs for the Dunn Field ROD.

   Response: The Army agrees that further discussion regarding potential for vapor intrusion and the need for further study at DDMT is warranted, as noted in the response to EPA Comment 9. The Army considers an additional RAO to be unnecessary at present, based on past investigations:
   a) VOC concentrations in subsurface soils on the MI are much lower than at Dunn Field prior to remediation. The 2008 membrane interface probe (MIP) investigation determined the areas of elevated CVOCs were of limited vertical extent and only 5 of 70 confirmation soil samples exceeded the Dunn Field remediation goals (RGs) even though sample locations were biased toward locations with higher potential for VOCs. Three of the five locations were only slightly above the RGs.
   b) VI monitoring for the Off Depot remedial action in 2009 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 VOC concentrations in the plume at the VI sample location were much higher than on the MI, with trichloroethene up to 1,000 micrograms per liter (µg/L) and total chlorinated VOCs up to 2,605 µg/L.
   The comment is not considered to require revision of the SMP beyond that recommended in the response to EPA Comment 9.

2) **Section 3.2.3.4, Off Depot Groundwater Remedial Action; page 3-16, last paragraph in Section 3.2.3.4:** Regarding the shutdown and restart of the AS/SVE system, please update this section to reflect the new anticipated start date, if applicable.

   Response: The 2nd sentence in the paragraph will be replaced with the following: "Installation of new/repaired equipment was completed in January and the system is expected to be restarted in February 2015 after further testing.