DUNN FIELD
OFF DEPOT GROUNDWATER
INTERIM REMEDIAL ACTION COMPLETION REPORT

Defense Depot Memphis, Tennessee

Prepared for:

U.S.ARMY

Department of the Army

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AFCEE

AFCEE Contract No. FA8903-08-D-8771
Task Order No. 0069

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Revision 1

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LIST OF ACRONYMS AND ABBREVIATIONS

acfm	actual cubic feet per minute
AFCEE	Air Force Center for Engineering and the Environment
ALS	Alsip Locating Service
AOC	Area of Concern
AS/SVE	air sparging with soil vapor extraction
AWS	air/water separator
BCT	BRAC Cleanup Team
bgs	below ground surface
BRAC	Base Realignment and Closure
BWSC	Barge Waggoner Summer and Cannon
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	chloroform
CQAP	Construction Quality Assurance Plan
CT	carbon tetrachloride
CVOC	chlorinated volatile organic compound
cDCE	cis-1,2-dichloroethene
tDCE	trans-1,2-dichloroethene
DCE	1,1-dichloroethene
DDMT	Defense Depot Memphis, Tennessee
DLA	Defense Logistics Agency
DO	dissolved oxygen
DPT	direct push technology
DQE	data quality evaluation
DQO	data quality objective
e^2M	engineering-environmental Management, Inc
EISR	Early Implementation of Selected Remedy
ET&D	excavation, transportation and disposal
FFA	Federal Facilities Agreement
FSVE	Fluvial Soil Vapor Extraction
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
hp	horsepower

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendment
IAQ	intermediate aquifer
IDW	Investigation Derived Waste
in. H_2O	inches of water
in. Hg	inches of mercury
IRA	Interim Remedial Action
IRACR	Interim Remedial Action Completion Report
lb/hr	pounds per hour
LCS	laboratory calibration standard
LTM	Long-Term Monitoring
LUC	Land Use Controls
LUCIP	Land Use Control Implementation Plan
MAQ	Memphis Aquifer
MCL	Maximum Contaminant Level
MDL	method detection limit
MEK	2-butanone
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
MI	Main Installation
MIBK	4-methyl-2-pentanone
ml	milliliter
ml/min	milliliters per minute
MLGW	Memphis Light Gas & Water
MNA	monitoring natural attenuation
MSCHD	Memphis Shelby County Health Department
MS/MSD	matrix spike/matrix spike duplicate
MW	monitoring well
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
NPT	National Pipe Thread

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

NTU	nephelometric turbidity units
O&M	Operations and Maintenance
OPS	Operating Properly and Successfully
ORP	oxygen reduction potential
OUs	operable units
PCE	tetrachloroethene
PDB	passive diffusion bag
PID	photoionization detector
PLC	programmable logic controller
PMW	performance monitoring well
ppb	parts per billion
ppbv	parts per billion by volume
PPE	personal protective equipment
ppm	parts per million
PRB	permeable reactive barrier
psi	pounds per square inch
psig	pounds per square inch gauge
PVC	polyvinyl chloride
PW	present worth
QC	Quality Control
RA	Remedial Action
RA-C	Remedial Action Construction
RAO	Remedial Action Objectives
RA SAP	Remedial Action Sampling and Analysis Plan
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RG	Remediation Goal
RL	Reporting Limit
ROD	Record of Decision
ROE	Right of Entry
RW	recovery well

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

scfm	standard cubic feet per minute
SVE	Soil Vapor Extraction
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TA	treatment area
TC	target concentration
TCA	1,1,2 trichloroethane
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TeCA	1,1,2,2 tetrachloroethane
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VMP	vapor monitoring point
VOC	volatile organic compound
ZVI	zero valent iron

1.0 INTRODUCTION

HDR has prepared this Interim Remedial Action Completion Report (IRACR) to describe the Off Depot Groundwater Remedial Action (RA) for Dunn Field at Defense Depot Memphis, Tennessee (DDMT). The RA was performed for the Defense Logistics Agency (DLA) through the Air Force Center for Engineering and the Environment (AFCEE). Responsibility for environmental restoration activities at DDMT transferred from DLA to the Department of the Army in December 2010.

The RA included installation and operation of an air sparging with soil vapor extraction (AS/SVE) system in the fluvial aquifer at the distal end of the Off Depot groundwater plume west of Dunn Field. This IRACR has been prepared in accordance with guidance in *Close Out Procedures for National Priorities List (NPL) Sites* (United States Environmental Protection Agency [USEPA], 2000).

1.1 SITE LOCATION AND DESCRIPTION

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

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

1.2 REGULATORY STATUS

On 28 September 1990, USEPA Region 4 and Tennessee Department of Environment and Conservation (TDEC) issued the Depot a Resource Conservation and Recovery Act (RCRA) Part B permit for the storage of hazardous waste (TN 4210020570). 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 completed in 1990 identified 49 SWMUs and 8 AOCs.

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

On 6 March 1995, USEPA, TDEC, and the Depot entered into a Federal Facilities Agreement (FFA) (USEPA, 1995) under CERCLA, Section 120, and RCRA, Sections 3008(h) and 3004(u) and (v). The FFA outlines the process for investigation and cleanup of the Depot sites under CERCLA. The parties agreed that investigation and cleanup of releases from the sites (including formerly identified SWMUs/AOCs) would satisfy any RCRA corrective action obligation under the USEPA HSWA permit and Tennessee Code -Annotated, Section 68-212-101 *et seq.*

In 2005, TDEC denied renewal of the Depot's Hazardous Waste Corrective Action Permit terminating requirements to continue corrective action under the hazardous waste regulations, as all correction action activities were being performed under CERCLA authority.

DDMT is 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. The *Memphis Depot Main Installation Record of Decision* (MI ROD) (CH2M HILL, 2001) includes OUs 2, 3, and 4. The *Memphis Depot Dunn Field ROD* (Dunn Field ROD) (CH2M HILL, 2004a) addresses OU 1, the only known and documented waste burial area. Disposal records and interviews with facility personnel identified specific instances when some waste burials occurred on Dunn Field, with the earliest record of burial in 1946.

1.3 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 3 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, except in the southwestern area of Dunn Field. Off site, to the west and northwest of Dunn Field, there are possible gaps in the clay. Where present, these gaps create connections to the underlying intermediate aquifer (IAQ) from the fluvial deposits. The IAQ is locally developed in deposits of the Jackson Formation/Upper Claiborne Group.

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

1.4 SITE INVESTIGATION ACTIVITIES

Site investigations at Dunn Field were summarized in the *Source Areas Interim Remedial Action Completion Report, Revision 1* (Source Areas IRACR) (HDR, 2009a). Findings applicable to the Off Depot groundwater are summarized below.

The Dunn Field ROD identified three primary contaminant plumes in the fluvial aquifer underlying Dunn Field. Mixing and intermingling of the plumes have occurred due to the groundwater extraction system (now removed) and natural groundwater flow. The nine chlorinated volatile organic compounds (CVOCs) listed below were detected most frequently in past groundwater sampling events:

- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- cis-1,2-Dichloroethene (cDCE)
- trans-1,2-Dichloroethene (tDCE)
- 1,1-Dichloroethene (DCE)
- 1,1,2,2-Tetrachloroethane (TeCA)
- 1,1,2-Trichloroethane (TCA)
- Carbon tetrachloride (CT)
- Chloroform (CF)

The highest groundwater contaminant concentrations were detected in the central plume. TeCA and TCE had the highest concentrations, up to 40,800 micrograms per liter (µg/L) for TeCA and 7,110 µg/L for TCE (MW-73 in October 2003).

1.5 PRIOR REMOVAL AND REMEDIAL ACTIVITIES

Removal and remedial actions at Dunn Field were also summarized in the Source Areas IRACR. The actions were the Interim Groundwater Remedial Action (IRA) completed in 2009; the Chemical Warfare Materiel Removal Action completed in 2001; and the Soil Removal Action at Site 60, Former Pistol Range completed in 2003. Only the IRA is directly applicable to the Off Depot groundwater and is summarized below.

The *Record of Decision for Interim Remedial Action* was signed in April 1996, with the objective of hydraulic containment to prevent further contaminant plume migration and reduce contaminant mass in groundwater. The IRA groundwater recovery system included 11 recovery wells (RWs) screened in the fluvial aquifer and located along the western boundary of Dunn Field. The system began operation in November 1998. The groundwater was discharged to the city sewer system without treatment under Industrial Wastewater Discharge Agreement Permit # S-NN3-092 with the City of Memphis.

Based on reduction of CVOC concentrations in groundwater following implementation of the Dunn Field Source Areas RA, five RWs were shutdown on in June 2008 and the remaining RWs were shutdown in January 2009. Effluent samples from the IRA discharge were collected quarterly to monitor contaminant mass reduction. The IRA system discharged approximately 312,000,000 gallons of groundwater to the sewer system and removed approximately 918 pounds of total volatile organic compounds (VOCs), including 369 pounds of TCE. The IRA system was removed and the RWs abandoned in July 2010. The final year of groundwater monitoring for the IRA and the closure activities were described in *2009 Operations and Closure Report, Dunn Field Groundwater Interim Remedial Action* (HDR, 2010).

2.0 DUNN FIELD BACKGROUND

2.1 RECORD OF DECISION AND AMENDMENT

The Dunn Field ROD was finalized in April 2004. The selected remedy addresses surface soil, material within disposal sites and associated soil, and CVOCs in subsurface soil and groundwater. The RA objectives (RAOs) established in the Dunn Field ROD for groundwater are:

- 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 major 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 long-term monitoring (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 land use controls (LUCs), which consist of the following institutional controls: Deed and/or lease restrictions; Notice of Land Use Restrictions; City of Memphis/Shelby County zoning restrictions and the Memphis and Shelby County Health Department (MSCHD) groundwater well restrictions.

The selected remedies were modified through the *Dunn Field Record of Decision Amendment* (ROD Amendment) (e^2M, 2009) approved in January 2009. The fundamental change, which resulted in preparation of the ROD Amendment, was the use of AS/SVE instead of a PRB for the Off Depot groundwater plume. The ROD Amendment also revised the criteria for extent of the AS/SVE system and clarified the treatment objective. The AS/SVE system was selected to cross the core of the plume near the downgradient end and to reduce the individual CVOC concentrations in groundwater to 50 µg/L or less. Groundwater modeling results indicate that the AS/SVE system in combination with natural attenuation processes would reduce groundwater concentrations to maximum contaminant levels (MCLs) in accordance with the RAOs within a reasonable period of time.

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). The *Dunn Field Disposal Site RA Completion Report* (MACTEC, 2006) was approved by USEPA on 25 August 2006. The *Operating Properly and Successfully Demonstration, Source Areas Remedial Action* (HDR, 2009b) was approved by USEPA in October 2009 and the Source Areas IRACR was approved by USEPA and TDEC in November 2009.

Upon completion of the AS/SVE system for Off Depot groundwater in 2009, construction of the selected remedies was completed. The *Preliminary Close Out Report* (USEPA, 2010) was approved in May 2010 and the DDMT NPL site status was revised to Construction Complete.

2.2 FLUVIAL SVE

The Fluvial SVE (FSVE) system is still in operation on Dunn Field. The system consists of two blowers connected to seven SVE wells with screened intervals at approximately 30 to 70 feet bgs. System operations began in July 2007 and approximately 4,030 pounds of VOCs were removed through July 2010. The VOC concentration in the extracted vapor has decreased asymptotically to less than 1 part per million (ppm). The FSVE system was shutdown October 2010 to January 2011 for a rebound test and confirmation soil sampling to evaluate progress toward RGs. A report describing the rebound test and soil sampling was submitted to USEPA and TDEC on 21 February 2011.

The test results indicated the FSVE system has removed the majority of VOCs in fluvial soils based on minor increase in photo-ionization detector (PID) measurements in SVE wells and vapor monitoring points (VMPs) during shutdown and confirmation soil sample results meeting the RGs. However, vapor samples collected at the end of the shutdown period demonstrated that residual VOCs remain in the fluvial soil. Based on the results, five of the seven FSVE wells were shutdown in April 2011 after quarterly samples were collected with the remaining two wells to be shutdown at the end of Year 4 in July 2011. The SVE wells would be left open to the atmosphere to operate as passive vent wells and ground water monitoring performed to evaluate contaminant migration to groundwater.

Vadose zone modeling was performed to estimate the time required for rebound in groundwater concentrations of CVOCs, assuming residual concentrations are sufficient to cause impacts to groundwater. The results were presented in a quarterly FSVE report submitted to USEPA and TDEC on 17 June 2011. The vadose zone model indicated that impacts to groundwater due to leachate from the fluvial sand would be observed 60 to 90 days after shutdown, but impacts due to leachate from the loess would not be observed for two to four years. Due to the monitoring period required to evaluate potential groundwater impacts and continued removal of CVOCs from the vadose zone, operation of all FSVE wells will be re-started in July 2011 and will continue through July 2012. The FSVE system will be shutdown completely in 2012; groundwater will be monitored for at least four years prior to permanent shutdown and removal.

2.3 EARLY IMPLEMENTATION OF SELECTED REMEDY

An additional RA was implemented in the Off Depot area in 2004. DLA determined that an Early Implementation of Selected Remedy (EISR) using the ZVI injection process should be taken at the leading edge of the high-concentration portion of the central plume in the fluvial aquifer. The EISR was a response to increased levels of CVOCs in wells approximately 1,000 feet west of Dunn Field. The rationale and scope for this action were described in a memorandum, *EISR Component to Address Groundwater Contamination West of Dunn Field* (CH2M HILL, 2004b), which was approved by the BRAC Cleanup Team (BCT) on 21 October 2004. The overall objective of the EISR was to reduce contaminant mass downgradient of the planned PRB location in order to ensure that the portion of the plume slated for MNA in the ROD was not unduly extensive or high in concentration.

ZVI injections were made 18 November 2004 through 8 January 2005 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 is described in the *EISR Interim Remedial Action Completion Report* (MACTEC, 2005a). The injections did not achieve the goal of 90 percent or greater reduction of TCE and TeCA. 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.

2.4 REMEDIAL DESIGN AND REMEDIAL ACTION WORK PLAN

The Off Depot Groundwater RA, the final RA planned for Dunn Field, has the following components:

- 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 as indicated by changes in CVOC concentrations and/or changes in the lateral or vertical extent of the CVOC plume
- Institutional controls to prevent access to contaminated groundwater

As the active portion of the Off Depot remedy, AS/SVE is being implemented to volatilize CVOCs near the leading edge of the groundwater plume west of Dunn Field in order to remove CVOCs from groundwater and prevent further plume migration. The RGs for the contaminants of concern in subsurface soils and groundwater at Dunn Field are listed in Table 1. The goal for Source Areas remediation relative to groundwater is to reduce CVOC concentrations on Dunn Field to below 50 µg/L for each constituent, with the combination of AS/SVE and MNA expected to achieve the RGs for groundwater over time. The goal for Source Areas groundwater has been met at most locations based on groundwater samples collected in October 2008.

The *Memphis Depot Dunn Field Off Depot Groundwater Final Remedial Design, Revision 1* (Off Depot RD) (CH2M HILL, 2008) was approved by USEPA on 6 October 2008 and by TDEC on 8 October 2008. The *Dunn Field Off Depot Groundwater Remedial Action Work Plan, Revision 2* (Off Depot RAWP) (HDR, 2009c) was submitted to USEPA and TDEC 15 April 2009. TDEC approved Revision 0 of the Off Depot Remedial Action Work Plan (RAWP) on 18 October 2008 and USEPA approved Revision 1 on 18 March 2009. In the approval letter, USEPA suggested two revisions regarding reporting requirements and contingency action; those changes were made in the final version.

3.0 CONSTRUCTION ACTIVITIES

AFCEE Contract FA8903-04-D-8722, Task Order 64 for construction and first year operation of the AS/SVE system was awarded to HDR on 26 September 2008. Notice to proceed was received from AFCEE on 24 November 2008.

The Off Depot RA included installation of additional performance monitoring wells (PMWs) and baseline groundwater sampling; vapor intrusion monitoring; installation of AS points, SVE wells and VMPs; off-site construction and installation AS and SVE control buildings with associated equipment; trenching and installation of conveyance piping from each AS point and SVE well to the control buildings; system testing and start-up operations; and system operation and performance monitoring.

The RA implementation was completed in accordance with the Off Depot RD and the Off Depot RAWP. Construction activities were performed by HDR under the direction of the project manager and the Construction Certifying Engineer. The site manager directed on-site activities with support from on-site staff and personnel from other HDR offices. Key subcontractors are identified in the summaries for each RA component.

3.1 SUMMARY DESCRIPTION

The AS/SVE system was designed to intercept the majority of the Off-Depot CVOC plume and to reduce individual CVOC concentrations below 50 µg/L. The location of the AS barrier in the Off Depot RD was based on the October/November 2007 groundwater sampling results. The locations of the individual AS and SVE wells were reviewed using the October 2008 groundwater sampling results; no changes in AS/SVE well locations were necessary. The total CVOC concentrations from October 2008 and the footprint of the AS and SVE wells are shown on Figure 2.

The AS barrier was designed to treat the primary CVOCs in groundwater, TCE and TeCA. The AS barrier includes 90 vertical AS points, with 78 AS points spaced at 15-foot intervals in two offset rows with an L-shaped pattern at the distal end of the plume and 12 additional AS points in the central portion of the AS barrier to address the core of the plume. Each AS point was installed at the base of the fluvial aquifer (90 to 100 feet bgs). Twelve SVE wells were installed on approximately 50-foot centers to capture the vapors from the AS points. Each SVE well has a 30-foot screened interval with the top at at 35 to 45 feet bgs.

The amount of air required for the 90 AS points, 450 standard cubic feet per minute (scfm), was calculated based on a maximum injection rate of 15 scfm and pulsed operation such that 1/3 of the AS points are operating at any one time. The design injection of up to 15 scfm for 1/3 of the day is equivalent to a constant rate of 5 scfm, which was used to predict system effectiveness. Pulsed operation was selected to decrease the required system injection flow capacity, optimize air distribution by limiting the formation of permanent air channels, and minimize the likelihood that groundwater will bypass the AS barrier due to permeability reductions caused by the air injection.

The AS points and SVE wells are connected via buried piping to two equipment buildings; one housing the compressor for the sparge points and the other housing two blowers for the SVE wells. System controls were installed in a control room of the SVE building. Standard operation includes 1/3 of the AS points and all of the SVE wells running concurrently.

Dual, nested VMPs were installed at 10 locations with 5-foot screens to monitor the radius of influence of the SVE wells and the CVOC concentrations in the vadose zone. The system layout, including AS points, SVE wells and VMPs, is shown on Figure 3.

Additional PMWs were installed in the AS/SVE treatment area (TA) and baseline groundwater monitoring was performed before system operations began. Vapor probes were installed for vapor intrusion monitoring at selected residential properties above the Off Depot plume and vapor samples were also collected before system operations began.

3.2 PRE-CONSTRUCTION ACTIVITIES

3.2.1 Pre-Construction Conference

A pre-construction conference was held at DDMT 22 April 2009; HDR and TDEC representatives were present at the site while DLA and USEPA representatives took part by conference call.

The organization chart from the RAWP was used to review roles and responsibilities. The activities and key subcontractors for AS/SVE system construction were:

- Site Grading and Trenching: Jones Brothers
- Drilling and Well Installation: WDC
- SVE System Construction: Onion Equipment/Tetrasolv Filtration
- AS and SVE line installation: Jones Brothers
- Equipment Compound and Electrical: Jones Brothers

- Laboratory Analyses: Microbac Laboratories

BCT members discussed the importance of communication during RA construction and operations, and requested updates and prompt notification when issues or concerns are identified. It was agreed that HDR would provide construction/monitoring updates during BCT meetings; technical memoranda at completion of construction and sampling events (baseline monitoring, system construction and start-up), and quarterly summaries during AS/SVE operations to document system operations and to provide groundwater and vapor monitoring results.

The project schedule from the RAWP was used to discuss the status of site preparation and upcoming RA activities. Status of the site access agreement with MLGW was discussed and plans were made for additional contacts by HDR, TDEC and USEPA to resolve the delay in approval by MLGW. The preconstruction activities were discussed: removal of abandoned railroad tracks and grading; survey of drilling locations; monitoring well construction, abandonment and baseline monitoring; and vapor intrusion monitoring, including residential access agreements and the period for quarterly monitoring. It was agreed that vapor intrusion monitoring would be performed at locations where access was made available and the need for additional locations would be determined based on the initial monitoring results. AS/SVE system construction was discussed: installation of AS points, SVE wells and VMPs; conveyance piping trenches; off-site construction of AS/SVE control buildings; construction of the system equipment pad and utility connections; installation of the control buildings; and system start-up.

The RAWP called for pressure testing the AS and SVE conveyance lines for leakage prior to system start-up; this could not be accomplished because the well screens prevent an effective pressure test. USEPA and TDEC representatives agreed to the deviation from the design, but stated it should be documented. HDR noted that the control buildings would be inspected during construction and prior to shipment.

The final construction inspection was scheduled to be held at the BCT meeting following completion of construction activities. No other issues or concerns were raised. After the conference call, HDR and TDEC personnel viewed the construction area.

Due to the delay in obtaining the access agreement with MLGW, the remedial action construction (RA-C) start date was postponed approximately 30 days; a request for extension was requested by DLA in accordance with the FFA and approved by USEPA. The access agreement with MLGW was finalized on 9 June 2009. Notification of RA mobilization for the Off Depot RA was submitted to USEPA and TDEC on 17 June 2009.

3.2.2 Permitting

Installation and operation of the AS/SVE system did not require a construction/operating permit from MSCHD due to expected VOC emissions below 0.1 pounds per hour (lb/hour). Following discussions with MSCHD, the AS/SVE system was incorporated into existing Operating Permit No. 001030-01P for the FSVE system on Dunn Field. The permitted VOC emission limit of 5.71 lb/hour applies to the combined emissions from the two systems. Field measurements and laboratory analyses of the Off Depot SVE discharge are periodically conducted to ensure compliance with the emission limit. Copies of SVE operations records are kept onsite and are subject to review by MSCHD personnel. Compliance with the permit is documented in annual emissions reports submitted to MSCHD.

Well permits from MSCHD were obtained for monitoring well abandonment (issued 7 April 2009), installation of new PMWs (issued 7 April 2009) and installation of AS points, SVE wells and VMPs (issued 15 April 2009). The City of Memphis Engineering Department approved the street cut permit, the permit for wells within the right-of-way and the traffic control plan on 16 June 2009.

The approved access agreement was delivered to MLGW for signature on 8 June 2009. During this meeting, MLGW personnel voiced concerns about drilling near gas lines in the area and the potential for gas to be captured by the SVE wells or to enter the control buildings through the piping trenches. HDR provided information on the screen depth and bentonite/grout seals for the SVE wells and noted that all conveyance lines were open and aboveground before entering the control building; the information resolved their concerns.

Construction subcontractor, Jones Brothers, obtained required building and electrical permits from the Memphis and Shelby County Department of Construction Code Enforcement.

3.2.3 Site Survey and Utility Clearance

A safety meeting was held with drilling contractor WDC on 16 April 2009 in order to review the RA-C area prior to mobilization. WDC determined that a short-staff drilling rig would be needed in a few areas because of the overhead lines. WDC and HDR agreed to use two standard rigs throughout drilling and well installation, with the short-staff rig mobilized only for the locations closer to the overhead lines. No other special safety concerns were identified. Copies of the health and safety plan (HASP) and Off Depot RAWP were provided to WDC.

Barge Waggoner Summer and Cannon (BWSC), a Registered Professional Land Surveyor licensed in the State of Tennessee, marked the drilling locations during pre-construction surveys. BWSC marked locations for PMWs and VMPs on 6 June 2009 and for AS points and SVE wells on 24 and 26 June, 2009.

HDR met with an MLGW safety specialist on 4 June to discuss drilling near the power lines at the MLGW substation adjacent to the TA. The overhead transmission lines carry 161,000 volts and have a minimum clearance of 15 feet; the lines on telephone poles along Menager Road have a minimum clearance of 10 feet. MLGW agreed to mark the tower line heights at the street curb to aid the driller's clearance review. Contacts were provided for underground utilities and for an MLGW safety specialist to visit the site and ensure proper clearance from the overhead lines.

HDR called the Tennessee One Call underground utility location system on 9 June 2009. WDC and Jones Brothers were notified of the ticket numbers to add their companies to the utility locate system. The utility location tickets were renewed every ten days throughout system construction. The One Call system notified the following utility companies: MLGW, AT&T, XO Communications and 360 Networks. Each utility arrived at the site within the allotted 72 hours and marked their utilities. A private utility locator contractor, Alsip Locating Service (ALS), was also hired by HDR to locate underground utilities on 10 June 2009. Natural gas lines, electrical lines, and telecommunication lines were marked throughout the area.

Several locations were shifted based on the location survey and utility clearance. The drilling location changes are shown on Table 2. The only locations shifted more than 10 feet were two wells moved to avoid impacts to residential property (MW-248 and MW-249) and a third well moved to avoid overhead power lines (MW-250). In addition, a power washer and soil vacuum unit was used to advance borings within 2 feet of a marked utility from ground surface to a depth of 6 feet; several AS points and SVE wells were located near underground gas and electric lines.

3.2.4 Site Preparation and Mobilization

Site subcontractors, Jones Brothers and WDC, mobilized personnel and equipment to DDMT on 15 June 2009 and took part in a construction kick-off meeting with HDR. Discussion included design criteria and specifications in the RAWP, site access, and the HASP requirements. The HASP was reviewed and signed by all personnel coming onto the site. Site preparation and drilling began on 16 June 2009. As noted in Section 3.2.1, Notification of RA mobilization was submitted on 17 June 2009.

An abandoned railway line on an elevated berm in the western portion of the TA was removed to prevent ponding of rainwater and to clear the area for installation of AS points, SVE wells and control buildings.

Brush, vegetation clearing and grading was performed by Jones Brothers on 16 to 19 June 2009. Vegetation, debris and railroad ties (120 cubic yards) were removed and disposed at E-BOX landfill, 10636 Shelton Rd., Collierville, TN. The area was graded to allow drill rig access and to maintain the original drainage to the west into an existing storm sewer line. Silt fencing and hay bails were placed around the inlet to the storm sewer to prevent debris and silt from entering the storm water sewer. The erosion control measures were inspected by certified erosion control staff from HDR on a daily basis.

WDC constructed a decontamination pad on the existing asphalt pad at Dunn Field and had a 20,000 gallon Baker tank delivered for storage of wastewater. Drilling was conducted during 10-day shifts. Well construction materials were staged at the Off Depot construction area during the work shifts; WDC hired a security company to provide a night guard for materials and equipment. Between shifts, equipment and materials were stored at Dunn Field. The HDR Field Office on the MI at Building 265 was used for sub-contractor meetings.

3.3 BASELINE PERFORMANCE MONITORING

AS/SVE is being implemented to volatilize CVOCs near the leading edge of the groundwater plume west of Dunn Field in order to remove CVOCs from groundwater and prevent further plume migration. Performance monitoring results will be used to assess the effectiveness of AS/SVE in meeting these objectives.

Well installation and baseline monitoring was performed to expand the performance monitoring network and establish groundwater conditions in the Off Depot area prior to construction of the AS/SVE system. The new PMWs increased monitoring locations upgradient and downgradient of the AS/SVE system (MW-241 to MW-247) and added monitoring locations south of the plume’s leading edge in the fluvial aquifer (MW-248 and MW-249) and in the IAQ (MW-250 and MW-251). The PMW locations are shown on Figure 4.

The field activities consisted of the installation and development of 11 monitoring wells, the abandonment of 28 monitoring wells, and sampling of designated PMWs (25 existing wells and 11 new wells). Well installation, well abandonment and baseline sampling were performed in accordance with the Off Depot RAWP and the *Remedial Action Sampling and Analysis Plan* (RA SAP) (MACTEC, 2005b).

3.3.1 Well Installation and Development

Nine wells were installed in the fluvial aquifer (MW-241 to MW-249) and two wells in the IAQ (MW-250 and MW-251). The fluvial aquifer wells were planned to screen the aquifer from the underlying clay to the water table. The IAQ wells were to screen the first significant sand layer (>15-foot thickness) within the Jackson Formation/Upper Claiborne Group or a maximum depth of 200 feet bgs.

The wells were installed by WDC Exploration from 6 June to 27 July 2009. HDR field geologists were present during drilling to record field observations and log the soil core. During development, MW-247 was determined to have a blocked casing; the initial well was over-drilled and a replacement well (also MW-247) installed on 27 July 2009.

Borings for the fluvial aquifer monitoring wells were advanced using rotasonic drilling methods with a 6-inch outer core barrel and a 4-inch inner core barrel. Continuous soil cores were collected from ground surface to the termination depth of each boring. The soil borings were drilled at least five feet into the uppermost clay of the Jackson Formation/Upper Claiborne Group. The borings were back-filled with bentonite to approximately one foot below the top of the clay/base of the fluvial aquifer and one foot of sand was added to set the well at the proper depth.

Borings for the IAQ wells were drilled in the same manner as the fluvial aquifer wells, except that a surface casing was seated in the gray clay. When the clay at the base of the fluvial aquifer was reached, an 8.5-inch core barrel was advanced an additional 5 feet and a 7-inch diameter steel surface casing was grouted in place using a tremie pipe. The grout was allowed to set for at least 24 hours prior to drilling into the IAQ. The Off Depot RAWP called for a 10-inch core barrel and a 6-inch Schedule 80 polyvinyl chloride (PVC) casing but this was changed because the inside diameter of the 6-inch casing was smaller than the outside diameter of the 4-inch inner core barrel. The borings were then advanced to boring termination with a 6-inch outer core barrel and a 4-inch inner core barrel.

Soil core from the capillary zone to the bottom of the screened interval was collected, placed in labeled core boxes, and stored at the HDR field office. Soil boring logs are provided in Appendix A.

Monitoring wells were constructed of new, 2-inch inside diameter schedule 40 PVC with internal flush joined threaded joints and a 15 or 20-foot section of factory-slotted 0.010-inch well screen. A filter pack of clean 10/20 gradation filter sand was placed around the screen uniformly from the bottom of the well to at least 5 feet above the top of the well screen. A bentonite seal at least 5 feet thick was placed above the sand and the annular space was filled with a cement-bentonite grout mixture to approximately 6 inches below the ground surface. With the exception of the surface casing, the IAQ wells were constructed in the same manner as the fluvial aquifer wells. All wells had flush-mount completions with an 11-inch ID manhole set within a 2-foot by 2-foot by 0.5-foot thick concrete pad.

Well construction was performed by WDC under the supervision of an HDR geologist. Well installation diagrams are provided in Appendix B and a well installation summary is provided on Table 3.

The wells were developed at least 24 hours after installation. All of the wells were developed using a set of stacked Typhoon submersible pumps; the wells were surged by raising and lowering a surge block attached to a winch on the development rig. Water quality measurements were made to evaluate well development in accordance with the RA SAP criteria: stabilized turbidity less than 10 nephelometric turbidity units (NTUs), pH within 0.1 standard units, and temperature and specific conductance within 10 percent for three consecutive readings. A well development summary, including volume purged and final stabilization parameters, is shown on Table 4. All wells met the development criteria.

3.3.2 Well Abandonment

Well abandonment was performed as planned in the Off Depot RAWP. Twenty-eight monitoring wells were abandoned on 27 to 30 July. Total well depth, location, and date of abandonment are listed on Table 5. The abandoned well locations are shown on Figure 5.

The wells were abandoned in accordance with MSCHD requirements and the permit obtained from MSCHD. Well abandonment was performed by WDC and observed by an HDR field technician. The total depth of each well was measured to confirm that no obstructions were present that might interfere with placement of the tremie pipe and grout. One half gallon of chlorine bleach was poured into each well. Bentonite was added to the well to absorb water in the screened interval and to seal the screen. The wells were then grouted with Portland type II cement with 5 percent bentonite. The grout was placed using the pressure tremie pipe method from the bottom to the top of the well casing and was allowed to set for 48 hours; the well head was capped with concrete. All surface completions (manholes, pads, and bollards) were removed and disposed as solid waste.

The field crew mistakenly abandoned MW-56 instead of MW-58. The wells are located approximately 160 feet apart in the southwest area of Dunn Field, are screened at the same elevation and have had similar analytical results. The mistake was discussed at the BCT meeting on 1 September 2009 and the BCT agreed to the use MW-58 for LTM.

3.3.3 Groundwater Sampling

Groundwater levels were measured in the PMWs and other wells at Dunn Field on 27 July 2009. Measurements were made using Solinist Model 101 water level meters with electronic sensors and tapes graduated in 0.01-foot increments. The water level measurements are shown on Table 6.

Baseline groundwater samples were collected from the 36 PMWs during two events due to the delayed access agreement with MLGW. In order to complete planning for vapor intrusion monitoring, samples were collected from 16 wells on 8 June 2009. The 11 new wells and 9 remaining PMWs were sampled on 27 to 30 July 2009 following well installation and development. Samples were sent to Microbac Laboratories in Marietta, Ohio, for laboratory analysis. The samples were analyzed for VOCs by method 8260B.

Groundwater samples in the Off Depot area have been collected using both passive diffusion bag (PDB) samplers and low-flow sampling procedures. The primary difference is that wells with PDBs do not have water quality parameters measured. Analytical results have been comparable. During baseline sampling, the newly installed wells were sampled using low-flow procedures. The depth of water was checked in the existing wells in order to use PDBs where saturated screen thickness was greater than 5 feet. Based on this review, MW-163 was sampled using low-flow procedures and the other existing wells were sampled using PDBs. PDBs were placed in wells at least 3 weeks prior to sample collection. The sampling procedure for each well is listed with the performance monitoring schedule on Table 7.

3.3.3.1 Low Flow Sampling

Samples were collected from 12 monitoring wells using low-flow purging methods with portable stainless steel bladder pumps, Teflon® bladders and Teflon®-lined polyethylene tubing. Following sampling, the bladder and tubing for each well were placed in separate, sealed plastic bags and stored for future sample events. The pumping rate at each well was set such that the water levels would not decline more than 1.2 inches (0.1 foot). Following stabilization, samples were collected in 40-milliliter (ml) vials preserved with hydrochloric acid.

Water quality parameters were measured at approximately 5 to 10 minute intervals during purging using a flow-through cell with a YSI 556 and a HACH 2100P turbidity meter. The units were calibrated each morning prior to sampling, and if abnormal readings were observed during the day, the instruments were recalibrated in the field. All measurements were recorded on the field sampling forms.

Purging continued at each well for up to two hours in order to meet the stabilization criteria: three successive readings within 0.1 for pH, 10 milliVolts for oxygen reduction potential (ORP), 3 percent for specific conductance, 10 percent for dissolved oxygen (DO) and <20 NTU for turbidity. Temperature was also measured and recorded but was not used as a stabilization parameter. Samples were collected when stabilization criteria were met or the field team leader approved the variance from the criteria. The final stabilization measurements are shown on Table 8. The following samples were collected without meeting the stabilization criteria:

- Samples were collected from six wells (MW-244, MW-246, MW-247, MW-249, MW-250, and MW-251) with elevated turbidity measurements (33.7 NTUs to 133 NTUs) after purging the wells for a minimum of two hours.

3.3.3.2 Passive Diffusion Bag Sampling

Samples were collected from 24 monitoring wells using PDBs. Upon removal from each MW, a sample of water from the PDB was transferred to 40-ml vials preserved with hydrochloric acid. Following sample collection, a single, new PDB was filled with deionized water and placed in the middle of the saturated section of well screen.

3.3.4 Baseline Monitoring Results

Water level measurements are shown on Figure 6 for the fluvial aquifer and on Figure 7 for the IAQ. Groundwater elevation contours for the fluvial aquifer show flow is to the west from Dunn Field with decreasing gradient toward the trough in the underlying clay near MW-246. While there are a relatively small number of water level measurements in the IAQ, the elevation contours indicate flow is to the south.

Soil borings for the new monitoring wells were all drilled into or through the upper clay in the Jackson Formation/Upper Claiborne Group that forms the base of the fluvial aquifer. Cross-sections through the Off Depot area are shown on Figures 8 and 9.

Groundwater samples were collected from 36 PMWs in June and July 2009, with 33 fluvial aquifer wells and 3 IAQ wells (MW-232, MW-250 and MW-251). The complete analytical results are presented in Appendix C. Table 9 lists the analytical results for all constituents detected above the reporting limit (RL) in one or more samples. The primary CVOC results are summarized on Table 10.

Total CVOC concentrations for the baseline sampling of the PMWs in June-July 2009 are shown on Figure 10 and include results from the April 2009 IRA semiannual sample event. The highest total CVOC concentrations were 2,604 µg/L at MW-246 and 2,281 µg/L at MW-155. Concentrations of TCE and/or TeCA exceeded 1,000 µg/L in MW-155, MW-159, MW-242, MW-244 and MW-246. The PMWs encompass the core of the groundwater plume and are considered sufficient for evaluation of the AS/SVE system.

CVOCs were detected above the RL in two of the PMWs screened in the IAQ, but the results did not indicate significant vertical migration of CVOCs from the Off Depot plume in the fluvial aquifer. DCE and CF were reported in MW-251 at concentrations of 3.33 µg/L and 0.313 µg/L, respectively and vinyl chloride (VC) was reported in MW-232 at 1.51 µg/L. No concentrations exceeded the respective MCL.

3.4 VAPOR INTRUSION MONITORING

Soil vapor sampling was performed to assess potential vapor intrusion at residential structures from CVOCs in the Off Depot plume. Soil vapor sampling was performed before and during AS/SVE system operation to evaluate its potential impact on indoor air quality. The Off Depot RAWP identified the following tasks for soil vapor sampling:

- Identification of target areas
- Structure Survey
- Soil Sampling
- Soil Vapor Sampling
- Sub-slab pressure measurements (if warranted)

3.4.1 Identification of Target Areas and Structure Survey

Target areas were identified based on CVOC concentrations above groundwater screening values in USEPA guidance, as listed on Table 11. Analytical results for groundwater samples collected April to June 2009 were reviewed to finalize the target areas. TCE was the CVOC present at the highest concentrations relative to the groundwater screening value in all wells along the perimeter of the Off Depot plume. The TCE 5 µg/L isopleth and a 100 feet outer buffer are shown on Figure 11. Twelve parcels within the outer boundary were selected for review; the properties are listed on Table 12.

A visual survey was performed from the street for each property. The features of interest were presence of a structure, and whether the foundation was constructed on or below grade or with a crawlspace. Observations were recorded separately for each property using the form in the RAWP. The site information was also compared to property descriptions on the Shelby County tax assessor website.

Requests for Right of Entry (ROE) were mailed to the 12 property owners (Table 12). HDR personnel met with owners of the properties selected for vapor probe installation to describe the probe installation and sampling process and to evaluate rig access and utility clearance. Based on site conditions and access, vapor probe locations were selected at four properties. Three vapor probe locations, as called for in the RAWP, were identified on two properties (1764 Meadowhill and 1739 Regan). Only one vapor probe location was selected at each of the other two properties: 0 Rozelle is a vacant county-owned property and the one location was considered representative of the area; and 1733 Regan had limited access and one vapor probe at 1739 Regan was near the common property boundary. In addition, a control location was selected on the MLGW substation property adjacent to both an AS/SVE vapor monitoring point (VMP-4) and a monitoring well with high CVOC concentrations (MW-155). The vapor probe locations are described on Table 13.

3.4.2 Field Activities

The field activities consisted of collection of soil samples for geotechnical analysis at four locations, installation of nine vapor probes with shallow and deep sample screens, and baseline vapor sampling at the vapor probes. Utility clearance at all drilling locations was performed on 3 September 2009 by ALS on private properties and by Tennessee One Call services within public rights of way. Soil borings were advanced by Boart Longyear using a Geoprobe 6620DT direct push technology (DPT) drill rig. HDR staff supervised all field activities. Continuous soil cores were collected in 5-foot runs at each boring; the 2-inch diameter cores were collected in acetate liners within the DPT core barrel.

3.4.2.1 Soil Sampling

Geotechnical analysis of soil samples was performed to determine physical properties in case vapor intrusion modeling was performed. Samples were collected on 9-10 September 2009 from soil borings advanced by DPT at four vapor probe locations (VI-1, VI- 2, VI-3, and VI-6) shown on Figure 12.

At each location, three soil samples were collected over two foot intervals at 5-7, 10-12, and 15-17 feet bgs. The RAWP called for the test sample to be collected from the 6-inch section with the coarsest grain size in order to estimate conservative vapor intrusion conditions. However, 1-foot samples were submitted from VI-1 (5.5-6.5, 10.5-11.5, and 15.5-16.5 ft) and the laboratory requested that the complete 2-foot soil sample be submitted from the remaining borings in order to provide sufficient material for the tests. The soil type was consistently silty clay for the full depth of the four borings.

The samples were collected by cutting the acetate liners at the selected interval and sealing the ends with duct tape. HDR delivered the soil samples to Construction Quality Consultants of Memphis for analysis of soil bulk density (ASTM D2937), soil moisture content (ASTM D2216), grain size (ASTM D1140), and Atterberg Limits (ASTM D4318). The RAWP called for analysis of grain density (API RP40), but the test was omitted because the laboratory reported the API test method had been discontinued. In addition, grain size analyses were performed by ASTM D1140 instead of D422, which was referenced in the RAWP. ASTM D1140 is the appropriate method for fine-grained soils.

Soil sample boring VI-1 was used for installation of the soil vapor probe. The other three soil sample borings were filled with bentonite, hydrated and capped with grout; separate borings, approximately 1 foot away, were drilled for vapor probe installation.

3.4.2.2 Vapor Intrusion Monitoring Point Installation

Soil vapor probes with two sample screens were installed at nine locations (VI-1 to VI-9) on 9-10 September 2009. The locations are shown on Figure 12. The RAWP called for the two vapor sample screens in each probe to be placed in the coarsest soil interval from 4 to 8 feet bgs and 14 to 18 feet bgs. If the soil was homogenous, the sample screens were to be placed at 5 feet and 15 feet bgs.

Soil boring logs for each probe location are provided in Appendix A. The loess was observed to be relatively uniform silty clay at all locations except at VI-3 and VI-5. Gravelly clay was observed at 17 to 18 feet bgs in VI-3; this was not observed in the initial boring for soil samples. Fill sand, apparently from a utility trench, was observed at 5 to 6 feet bgs in VI-5. The sample screens were placed accordingly at these locations. The remaining vapor sample screens were placed at approximately 5 feet and 15 feet, except that the shallow sample screen at VI-1 was installed at 4 feet bgs due to overuse of filter sand.

The vapor sample screens are 6-inch long, 0.5-inch diameter stainless steel wire mesh (pore diameter 0.0006-inches) with a threaded fitting on the bottom for anchoring and a fitting at the top to connect to 0.25-inch diameter Teflon tubing. Once the deeper screen depth was reached, the sample screen and tubing was lowered in the open borehole and glass beads were placed in the annulus to six inches above the probe; filter sand was used above and below the screen. Fine bentonite chips were then gravity poured to create an annular seal as the DPT rod was slowly retracted. A funnel and tubing was used to hydrate the bentonite. This process was repeated for the installation of the shallow vapor probe. Bentonite-cement grout was placed from the filter sand above the shallow sample screen to the ground surface. The ends of the sample tubing were capped and clearly marked to identify the shallow and deep screens. The VI probes were completed with a well cap and 1-foot by 1-foot concrete pad. Installation diagrams are provided in Appendix B and a summary is shown on Table 14.

3.4.2.3 Soil Vapor Sampling

Baseline vapor sampling was performed by HDR on 14-15 September 2009. Samples were collected from the two vapor screens at each location, except VI-5B which had excessive moisture due to the saturated sand screened by the probe. Vapor samples were also collected from VMP-4A (60-65 feet bgs) and VMP-4B (41 to 46 feet bgs) to obtain vapor concentrations in the fluvial sands above the groundwater plume.

At each VI probe location, the probes were purged of three well volumes (filter media and tubing) using the sampling pump prior to sample collection; the VMPs were purged of three tubing volumes. Multiple PID readings were collected using a dedicated Tedlar bag until three consecutive readings were within 10%. Laboratory samples were then collected in a 1-liter Summa canisters with a flow regulator at 200 milliliters per minute (ml/min). Vapor samples were also collected from VI-7A, VMP-4A and VMP-4B in 6-liter Summa canisters to evaluate potential difference in results based on sample volume. The Summa canisters were shipped from the laboratory with negative pressure and the sampling pump was not required for sample collection. Samples were submitted to Accutest Laboratories in Dayton, NJ on 15 September 2009 for analysis of VOCs by USEPA Method TO-15.

3.4.3 Summary of Findings

Results of the geotechnical analyses are presented on Table 15. As described on the boring logs, the soil was uniform throughout the target area and at all sample depths. All samples were at least 90% silt and clay.

Soil vapor samples were collected from the two screened intervals in the nine vapor probes (except VI-5B) and VMP-4. The complete analytical results are presented in Appendix C, including duplicate samples and the 6L Summa canister samples. Analytical results for the 1L and 6L Summa canisters were similar.

Table 16 lists the analytical results for the primary CVOCs at Dunn Field and for other VOCs detected above the RL in one or more samples. The analytical results for the primary CVOCs are summarized below.

Three CVOCs were detected above RLs in samples from the probes installed in the loess. All concentrations were below the vapor screening levels presented in the RAWP.

- TCE was reported in 5 wells with a maximum concentration of 4 micrograms per cubic meter ($\mu g/m^3$) in VI-9B. The vapor screening value (27 $\mu g/m^3$) was not exceeded.
- PCE was reported in 14 samples with a maximum concentration of 16 $\mu g/m^3$ in VI-5A. The vapor screening value (34 $\mu g/m^3$) was not exceeded.

- Methylene chloride was reported in 9 wells with a maximum concentration of 17 µg/m^3 in VI-3B. The vapor screening value (190 µg/m^3) was not exceeded.

Nine CVOCs were detected above RLs in the two VMP samples. Reported concentrations were much higher than in the vapor probe samples; TeCA and TCE were detected at the highest concentrations, as in groundwater samples within the plume.

- TeCA was reported in both samples with a maximum concentration of 1420 µg/m^3 in VMP-4A.
- TCE was reported in both samples with a maximum concentration of 6830 µg/m^3 in VMP-4A.
- TCA was reported in the sample from VMP-4B at a concentration of 22 µg/m^3.
- CT was reported in the sample from VMP-4B at a concentration of 14 µg/m^3.
- CF was reported in the sample from VMP-4B at a concentration of 15 µg/m^3.
- cDCE was reported in both samples with a maximum concentration of 801 µg/m^3 in VMP-4A.
- Methylene chloride was reported in the sample from VMP-4A at a concentration of 57 µg/m^3.
- PCE was reported in both samples with a maximum concentration of 41 µg/m^3 in VMP-4A.
- tDCE was reported in both samples with a maximum concentration of 85.2 µg/m^3 in VMP-4A.

3.4.4 Conclusions and Recommendations

The primary CVOCs detected in the loess vapor samples were below residential vapor screening values. Vapor concentrations in the loess were orders of magnitude lower than in the fluvial sands and the primary contaminants in the fluvial sands (TeCA and TCE) were not detected as frequently or at similar relative concentrations in the loess. In addition, the results for the vapor sample collected in the loess directly above the plume (VI-2) were similar to results from the locations above the edge of the plume. The results indicate 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.

Following initial presentation of the VI results, the following additional information was provided in response to questions from USEPA regarding the use of 1-L and 6-L Summa canisters:

VMP-4A and VMP-4B are 1-inch diameter PVC vapor monitoring probes with 5-foot screens installed in the fluvial sands at depths of 49 and 64 feet bgs; this VMP is located above the core of the Off Depot plume. Past practice for the FSVE has been to collect vapor samples in 6-L canisters for SVE wells and

VMPs. The VI probes have 6-inch long, 0.5 inch diameter screens in the loess at depths of 5 and 15 feet bgs with 0.25-inch diameter Teflon® tubing to the surface.

The appropriate sample volume was discussed with the laboratory prior to sampling to confirm the RLs would be sufficient for the screening levels. The only significant difference was that lower detection limits can be achieved with greater sample volume (6-L); however, the RLs for the 1-L canisters were well below the screening levels. Although VI sample volume was less than half the 1-L container volume at two locations (VI-3B and VI-8B) due to tight soils, the laboratory was able to achieve standard RLs for these samples.

The Off Depot RD specifically calls for 1-L canisters, although it refers to New Jersey Department of Environmental Protection (NJDEP) guidance in several locations. The NJDEP guidance calls for 6-L canisters when collecting ambient air samples (inside the home or just outside the home) but does not mention soil gas samples. Other state guidance documents (NY, CA) do not specify size, just the analytical method (TO-15). TDEC underground storage tank soil gas sampling guidance calls for 1-L canisters.

HDR collected 6-L samples from the VMPs and from one VI probe as "duplicates" for comparison. The samples are not actual duplicates because they are collected sequentially. The results for the three locations with 1-L and 6-L samples are included in Appendix C.

The results for the five analytes with the highest concentration in each pair of samples were compared:

- For VI-7A, the 6-L sample results were 9% to 154% of the 1-L sample results.
- For VMP-4A, the 6-L sample results were 133% to 150% of the 1-L sample results.
- For VMP-4B, the 6-L sample results were 190% to 232% of the 1-L sample results.

The variability was much greater in the VMP-4B samples, but the results were sufficiently similar that the same conclusions regarding vapor intrusion would be made regardless of the sample results used at each location. Later VI samples were collected with 1-L Summa canisters based on the Off Depot RD, guidance documents, tight soils and the baseline results.

3.5 AS/SVE SYSTEM CONSTRUCTION

AS/SVE system construction included the following major components:

- AS points, SVE wells and VMPs;

- Conveyance Piping for AS points and SVE wells; and
- Equipment Compound with Control Buildings and Perimeter Fencing

3.5.1 Well Construction

Ninety AS points, twelve SVE wells and ten VMPs were constructed at the distal end of the Off Depot groundwater plume. The locations are shown on Figure 3.

3.5.1.1 AS Points

Ninety AS points (AS-1 through AS-12) were installed 8 July to 28 August 2009 at the locations shown on Figure 3. AS installation data are provided on Table 17.

AS points were installed in 6-inch diameter soil borings advanced using rotasonic drilling with a target depth of 6 to 12 inches below the top of clay at the base of the fluvial aquifer. Soil samples were collected continuously with 5-foot cores to confirm depth to the top of clay and proper placement of sparger; the actual borings depths were 1 to 5 feet below the top of clay. The AS points were constructed of new, unused, decontaminated, 2-inch inside-diameter Schedule 40 PVC with internal threaded flush joints and a 30-inch long, 2.5-inch diameter microbubble sparger (Mott Corporation model # 2205401-020). Once the PVC riser was set in the boring with the bottom of the sparger suspended at the base of the fluvial aquifer (top of clay), the drill casing was raised so that the annular space filled with natural formation materials to 6 to 12 inches above the top of the sparger. The field geologist measured the borehole depth using a tag line measuring tape to ensure proper collapse has occurred. If the formation materials did not collapse around and above the sparger to the desired height, then conventional filter sand was used to augment the formation materials.

A seal of hydrated bentonite three to five feet thick was installed above the formation materials/filter pack, and a bentonite-cement grout was installed with a tremie pipe to approximately 3 feet bgs. The long seal was installed to prevent pressurized air short-circuiting along the borehole and to force air into the saturated treatment zone. Boring logs and construction diagrams were not prepared.

The AS points were completed approximately 2 feet bgs with a 2-inch PVC slip tee, a 2-inch to 3/4-inch PVC reducing fitting and a 3/4-inch diameter pigtail to connect to the high density polyethylene (HDPE) conveyance lines. The slip tee connections were secured with glue. A 2-inch diameter PVC riser extends from the slip tee to just below ground surface and was capped with a PVC slip cap with threaded plug. A 12-inch steel manhole set in a 2-foot by 2-foot concrete pad was installed for access to the AS point.

3.5.1.2 SVE Wells

Twelve SVE wells (SVE-1 through SVE-12) were installed 10 July to 28 August 2009 at the locations shown on Figure 3. Well installation data are provided on Table 18.

The SVE wells were installed in 6-inch diameter soil borings advanced using rotasonic drilling methods. Continuous soil cores were collected in 10-foot intervals beginning at the ground surface. Soil borings were advanced to approximately 5 feet above groundwater; boring depths ranged from 65 to 75 feet, bgs. The borings were drilled approximately 1-foot below the target depth and backfilled with filter sand before installing the well. The soil core from the vadose zone was placed in labeled core boxes and stored at the HDR field office. Soil boring logs are provided in Appendix A.

SVE wells were constructed of new, 2-inch diameter schedule 40 PVC with 30-foot 0.006-inch, slotted screens. Well risers were 10-foot lengths of schedule 40 PVC with with internal threaded flush joints. A filter pack of washed and bagged sand with 12-20 or No.2 gradation was installed from the bottom of the borehole to approximately 5 feet above the well screen. A 5-foot seal of bentonite chips/pellets was installed above the sand and the annular space was filled with a grout mixture (Portland type II cement and 5% bentonite) to approximately 2.5 feet bgs. Centralizers were not used; the wells were checked for plumb by advancing a 10-foot 1.5-inch drill rod to the total depth of the well after completion. During the check, SVE well SVE-6 was found to be blocked with grout; the well was abandoned in place by filling to the surface with bentonite-cement grout and a new SVE well was installed a few feet away.

The SVE wells were completed with a 2-inch PVC slip tee located approximately 2 feet bgs for connection to the 4-inch HDPE conveyance piping. A 2-inch PVC to HDPE transition fitting was connected at the tee followed by a 2-inch x 4-inch HDPE reducing coupling. A 2-inch diameter PVC riser extends from the tee to just below ground surface and was capped with a PVC slip cap with threaded plug. A 12-inch steel manhole set in a 2-foot by 2-foot concrete pad was installed for access to the SVE well.

SVE well construction was performed under the supervision of an HDR field geologist. Well completion diagrams are provided in Appendix B.

3.5.1.3 VMPs

Ten pairs of nested VMPs (i.e., VMP-1A and VMP-1B) were installed 17 June to 9 July 2009 at the locations shown on Figure 3. VMP installation data are provided on Table 18.

Each VMP pair was constructed in a 6-inch diameter boring advanced using rotasonic drilling methods. Continuous soil cores were collected in 10-foot intervals beginning at the ground surface. Soil borings were advanced to approximately 5 feet above groundwater based on measurements in nearby monitoring wells and the screens were set approximately 10 feet and 25 feet above groundwater. Soil boring logs for the VMP borings are provided in Appendix A.

VMPs were constructed of new, 1-inch diameter schedule 40 PVC with a 5-foot section of 0.010-inch slotted screen. Well risers were 10-foot lengths of schedule 40 PVC with internal threaded flush joints. The filter pack, bentonite seal and grout seal in the VMPs were installed in the same manner as the SVE wells. Each VMP riser was terminated approximately 6-inches bgs and topped with a self-sealing vapor sampling cap with a brass, quick-connect coupling. An 11-inch steel manhole set in a 2-foot by 2-foot concrete pad was installed for access to the VMP.

VMP construction was performed under the supervision of an HDR field geologist. VMP completion diagrams are provided in Appendix B.

3.5.2 Conveyance Piping and Trenching

Individual conveyance piping was installed from each SVE well and AS point to the equipment compound to provide operational flexibility and the ability to adjust vapor and sparge flow rates from a central location. Conveyance piping for both systems was placed in common trenches. The SVE lines were installed first for level placement on the trench floor. The trench locations are shown on Figure 3.

The trench depths were set to allow a 2-foot covering of soil after the lines from the SVE wells and AS points were installed. The trench floors were visually checked to maintain a gradual slope back to the SVE wells and to minimize low spots that would collect condensate. SVE wells in the eastern half of the TA (8, 9, 10, 11, and 12) had to pass over a buried electrical vault which interrupted the slope back to the wells. The trenches were extended between the two concrete pads for the SVE and AS control buildings within the fenced equipment compound.

The piping was labeled at several points and the trenches were backfilled as each section was completed because of safety concerns; the construction area could not be fenced to prevent access after working hours. Locating tape was placed approximately 6 to 12 inches above the piping. The excavated soil stockpiled next to the trenches was used for backfill and was compacted in 1-foot lifts using a vibratory device. Excess soil was spread in low spots around the construction area.

SVE conveyance piping is 4-inch diameter standard dimension ratio 11 HDPE (DriscoPlex® Pipe Series manufactured by Performance Pipe, Plano, TX). Piping sections were 40 feet and all sections were butt-fusion welded by a certified welder. The piping was connected to the 4-inch transition coupling at the SVE well head.

The approximate piping lengths from each well to the control building are as follows:

Well	Piping Length (feet)	Well	Piping Length (feet)
SVE-1	100	SVE-7	291
SVE-2	60	SVE-8	361
SVE-3	74	SVE-9	330
SVE-4	127	SVE-10	367
SVE-5	185	SVE-11	422
SVE-6	232	SVE-12	519

Once above grade at the equipment compound, the piping transitions to 3-inch flexible PVC hose with camlock connections.

AS conveyance piping is 3/4-inch diameter HDPE (DriscoPlex® Pipe Series). All connections were butt-fusion welded by a certified welder. The AS piping was obtained in 500-foot rolls which decreased the number of fusion welds and created a more efficient installation. The piping was connected to the 3/4-inch transition coupling at each AS point. Once above grade at the equipment compound, the 3/4-inch diameter HDPE piping transitions to 3/8-inch flexible PVC hose installed by the AS/SVE contractor. The line from each AS point was labeled and grouped in bunches of ten with stainless steel slip connectors. While making connections, two lines were found to have the same AS number. Jones Brothers used a portable compressor to blow air through the connection at each wellhead to confirm all lines were properly labeled.

3.5.3 Equipment Compound and Control Buildings

The equipment compound has a 38 by 38-foot, 6-inch thick slab-on-grade steel-reinforced concrete pad adjacent to Menager Road. The concrete pad is surrounded by an 8-feet high fencing with 3-feet high 3-strand barbed wire. The fence has three pedestrian gates, one on the north side and two on the east side, and two 8-feet wide gates on the west side for machinery access. A separate, fenced enclosure for the MLGW utility connection was added on the northeast corner of the compound.

There are separate buildings for the AS compressor and the SVE blowers. The custom-manufactured steel buildings (26 feet by 10 feet by 8 feet high) have a 3/16-inch steel floor with non-slip floor paint; motion-controlled security lighting was installed on selected corners. The buildings were constructed and equipment installed at Tetrasolv's facility in Anderson, Indiana.

The equipment compound was constructed by Jones Brothers. Concrete pads for the buildings were constructed 12 to 14 August. Placement of conveyance lines to the building pads was completed 2 October and the final section of trench was filled and compacted. The remainder of the equipment compound pad was poured with fence posts set in concrete and the fencing was installed 12 to 16 October 2009. The control buildings were delivered to Memphis and placed in the fenced compound by Barnhart Crane on 19 and 20 October 2009. Electrical power was installed by MLGW on 22 October; connections for electrical and internet service, and initial start-up of the PLCs was completed 28 October 2009.

As-built drawings for the buildings and the process and instrument flow diagrams for the SVE system and AS system are provided in Appendix D. The buildings and equipment are discussed in the following sections.

3.5.3.1 SVE Building and Equipment

The SVE building contains an equipment room and an office, separated by an interior wall and doorway. Access to the equipment room from the outside is through double doors on the west side of building. Ventilation in is provided by two fans, which pull air into the building through wall louvers located above the piping manifold. The equipment room contains the primary SVE system equipment including blowers, air-water separator and transfer pump. The piping manifold was to be installed inside the building but was moved outside on the southwest wall due to limited space in the building. The office contains the control panel for the SVE equipment and AS solenoids, computer, fold-down desk, air-conditioning unit and power receptacles. Access to the office from the outside is through a single door on the southeast corner. The office has ceiling florescent lighting and the equipment room has explosion proof incandescent lighting.

Individual SVE piping runs connect to the SVE manifold which is protected by a galvanized steel cover. The manifold contains 15 legs with 12 legs used for the individual SVE wells. The three remaining legs can be used for future expansion of the SVE system. Each individual SVE manifold leg contains the following elements (mounted in the order listed, from bottom up):

- 4-inch diameter HDPE transition fitting

- 4-inch 90° steel elbow
- 4-inch to 3-inch steel bushing
- 3-inch PVC threaded to male fitting
- 3-inch PVC flex hose (DURAVENT model 0358-0300-0002-60)
- Sample port and Pressure indicator (0.25-inch National Pipe Thread [NPT], -30-0 inches of mercury [in. Hg], 2.5-inch Dial (Wika Type 212))
- 3-inch differential pressure air flow meter (ERDCO PN# 3211-12F5, 0 to 200 actual cubic feet per minute [acfm])
- 3-inch manually actuated diaphragm valves (G.I.E., Inc, Model WFDX223N30)

The manifold legs connect to a 6-inch galvanized steel header pipe, which carries extracted vapor to the air/water separator (AWS).

Two Kaeser EB 420 C rotary blowers were installed in a parallel configuration for the SVE system. Each 40-horsepower (hp) blower is capable of producing 485 scfm at approximately 10 in. Hg and 2,460 revolutions per minute. Each blower motor includes a variable frequency drive which automatically deactivates the blower in the event of a low voltage condition and protect the motor and wiring. The dual blower configuration permits uninterrupted SVE system operation (at lower flow rates) if one of the units is being serviced**.**

Condensate from SVE operations is collected in a 160-gallon cylindrical AWS. The volume was decreased from the 400-gallon AWS in the RD for improved access to equipment in the building; additional condensate storage was provided outside the building. The AWS system separates entrained liquid and debris within the air stream; heavier particles drop to the floor of the tank, lighter debris and water droplets are segregated from the air stream by a mist pad located within the AWS vessel. The airstream enters the AWS at a 6-inch inlet on the side of the tank and exits via a 6-inch outlet at the top of the tank. The AWS vessel also has drain valve, bleed valve, vacuum relief valve and a sight glass for visual water level monitoring.

Condensate is transferred from the AWS to a 505-gallon freestanding polyethylene tank (located outside of the SVE building) via a 3-point float switch (LOW, HI and HI/HI) and transfer pump. The switch consists of three floats connected to a single rod and are used to indicate liquid level within the tank and control the on/off operation of the transfer pump. The HI/HI level acts as a “fail-safe” measure by cutting power to the blowers and heat exchangers. The horizontal, single-stage, end-suction transfer pump (AMT, Model 285P-95, 3/4-hp) is mounted to the SVE building floor. A direct-read water meter (Neptune Model #T-10) is located downstream of the transfer pump (inside the SVE Building).

AWS system piping within the SVE building is galvanized steel with 1.25-inch diameter piping from the AWS tank to the transfer pump and 1-inch diameter piping with a bronze check-valve (Strata-Flo No. 400) downstream of the transfer pump. Piping on the exterior of the SVE building is 1-inch rubber hose. A trailer-mounted storage tank is used to transfer the condensate from the AS/SVE equipment compound to a storage tank on Dunn Field prior to analysis and disposal.

Extracted vapor is emitted to the atmosphere without treatment via discharge piping and stack. Extracted vapor exits each blower via 6-inch steel piping and combines to a single 8-inch steel pipe outside the SVE building. All discharge piping is fastened to the exterior of the north wall of the SVE Building. There is a horizontal run of pipe that contains a sampling port, temperature transmitter (McMaster Carr Part # 40705K3), Pitot tube (Dwyer, Model #DS-300), and a flow meter (Sierra Mass Flow Meter, Model 640S). The exhaust pipe then takes a 90° turn upward. There is an 8-inch inline silencer (Systemair Silencer, Model LDC 200-600) and a custom silencer attached to the top of the stack to dampen noise from the SVE system. The custom silencer (TetraSolv) is a modified 18-gallon drum filled with acoustic foam and attached to the top of the stack. There is a gap between the bottom of the drum and the top of the stack to allow the air to escape. The stack height is approximately 7 feet above the equipment compound floor.

3.5.3.2 AS Building and Equipment

The AS building holds the primary AS equipment including compressor, air filters, equalization tank, air dryer and sparge manifold. Access from the outside is through double doors on the west side of the building and a single door on the northeast corner. The single door was initially installed on the southeast corner but it interfered with the AS lines entering the building and was moved. Ventilation is provided by two external vents (40-inch x 60-inch x 2-inch) each with an air filter (20-inch x 30-inch x 2-inch). The AS manifold is located on the interior south wall. The equipment room has explosion proof incandescent lighting.

Ambient air is supplied to the AS system by a Kaeser CSD 100 screw compressor. The compressor can produce 494 cfm at 125 pounds per square inch gauge (psig) and is controlled by an integrated Sigma Controller that allows computerized entry of compressor settings. Air is drawn into the compressor through an inlet on the south side of the compressor. The compressed air exits the compressor via a 2-inch steel pipe.

Initial operation of the AS compressor was limited due to overheating and system shut-down. A vent with a hood that exits through the roof of the building was added directly above the compressor on 3 December. Due to freezing of condensate lines in the building, a louver was added to the vent on 28 January 2010. The louver is attached to an actuator controlled by a Honeywell T775A/B/M Series 2000 Electronic Stand-Alone Controller to open and close the vent based on temperature inside the AS building; the louvers close during cold weather and open when temperature in the building rises. The hood was custom-built by Lipford Sheetmetal (Memphis, TN) and the louver was custom-made by Kele (Memphis, TN).

Air passes through three air filters prior to entering the Sparge manifold; one located directly downstream of the compressor (Kaeser, KFS 485) and two downstream of the equalization tank (Kaeser, KPF 485 and KOR 485). The filters remove oil, water, and particulates from the air prior to the manifold system and discharge to the subsurface. All air filters are equipped with automatic magnetic drains (Kaeser, Model AMD 1550) which transfer condensate to a single containment tank with an oil absorbent pad (Kaeser, Model KCF 100). Due to the volume of condensate being greater than planned, a 26-gallon holding tank (Protank) was added to the system. The holding tank discharges to the SVE system exterior holding tank through a sump pump with a float switch (McMaster Carr).

Compressed air is transferred to the 30-inch diameter 400-gallon equalization tank. There is a ball valve with an air dump silencer attached on the lower portion of the tank. The tank is tapped at the bottom with a magnetic drain that discharges directly to the KCF 100 containment tank. There is also an emergency pressure relief valve on the tank.

After leaving the equalization tank, air flows through a Kaeser TE 141 Cycling Refrigerated Air Dryer to condense moisture out of the air stream before the AS solenoid and manifold system. The dryer consists of an internal heat exchanger, thermal storage, AWS and electronic demand drain. The drain discharges to the KCF 100 containment tank.

The AS system has individual solenoid valves for each manifold leg; DIN rail-mounted solenoids (SMC part # VV5Q2-4-08C-DN-00T (5/16-inch), 2000 Series) were installed in a dedicated NEMA 4 panel, approximately 48-inch (tall) x 36-inch (wide) x 10-inch (deep). Proper operation of the pneumatic control for each solenoid valve was checked by the contractor prior to shipment to the site. Each cassette-style solenoid is powered (24 V DC) using #18 wire (3/4-inch conduit inlet, 1.5-meter SMC Corporation). The panel-mounted solenoid valves (Metal Work Multimatch Model M51-3-8-18) for each of the AS points are actuated by the programmable logic controller (PLC) (Micrologix 1400).

Each individual AS point has a manifold leg containing the following elements (mounted in the order listed, from bottom up):

- 5/16-inch diameter red polyurethane tubing (SMC part #TU0805R-33)
- 5/16-inch diameter tube to 3/8-inch diameter NPT adaptor (McMaster Carr part #5111K672)
- 3/8-inch speed control valve
- 3/8-inch pressure regulator, modular, backflow (with integrated check valve) (Metal Work MR Bit, 0-170 psi)
- 3/8-inch nickel plated bushing
- 1/2-inch rotameter (Environmental World Products, Model LZT-10A24G, 2.4-24 scfm)
- Glycerin-filled stainless steel pressure gauge (0-30 psi, 0.25-inch center back mount, 2.5-inch face) (McMaster Carr part #4053K18) mounted on 1/2-inch NPT nickel plated tee
- 1/2-inch diameter NPT to 3/8-inch tubing adaptor (McMaster Carr #5111K677)
- 3/8-inch diameter red polyurethane tubing (SMC Part #TIUB13R-33)

3.5.3.3 System Controls

System controls for the SVE system are housed within the control panel enclosure located in the SVE building office. An Ethernet port on the right side of the control panel provides connection to a notebook computer in the office. The control panel includes the PLC, control switches and general circuitry of the SVE system. The PLC and control systems allow the SVE system to run with minimal personnel oversight by limiting (or shutting off) operation during certain system conditions (known as “faults” or “alarms”) which could be detrimental to key system components. There is also a PLC in the AS building that controls operation of the AS points; the AS PLC is connected to the computer in the SVE building via an Ethernet cable run through conduit under the concrete pad. The notebook computer displays real-time system parameters (system flow rates, hour meters, temperatures, pressures), displays tripped faults (or alarms), and allows personnel to control key components (i.e., operation of individual blowers and/or AS point operation). The computer has internet access to communicate alarm conditions to the operator via email or cell phone text message. System controls and PLC programming were designed by Process Logic Corporation (Muncie, IN).

3.5.4 Site Restoration and Demobilization

The decontamination pad on Dunn Field was removed and debris disposed by WDC. All equipment and remaining well materials were removed by WDC on 30 August 2009. Debris from construction and installation of the buildings and conveyance lines were removed and the construction area restored by Jones Brothers. Disturbed areas were graded smooth and uniform with the surrounding area. The area was hydro-mulched to minimize erosion, and site restoration was completed on 16 October 2009.

3.6 AS-BUILT SURVEY

The monitoring wells were surveyed for location and elevation (ground surface and top of casing) by BWSC on14 July 2009. In addition, wells MW-160, MW-166, and MW-166A which had been altered due to site grading were re-surveyed.

BWSC, a Tennessee Registered Land Surveyor, determined final as-built locations for the monitoring wells, VMPs, SVE wells, AS points, conveyance piping trenches and the equipment compound on 20 October 2009. The survey established ground surface and top of casing elevations for each well and VMP relative to mean sea level. Horizontal and vertical coordinates are based on the North American Datum, 1927 used for all survey data at DDMT and horizontal coordinates were provided in the Tennessee State Plane coordinate system. Horizontal control is within 0.1 foot and vertical control is within 0.01 foot. The survey drawings and coordinates are provided in Appendix E.

3.7 INSPECTION AND START-UP TESTING

3.7.1 Construction Inspection

The Off Depot RAWP required an inspection upon completion of construction to determine whether AS/SVE system installation was complete and consistent with the RD. Outstanding items or deficiencies discovered during the inspection were to be noted and an itemized list prepared for follow-up. The inspection was held at DDMT on 29 October 2009 with representatives from DLA, USEPA, TDEC and HDR.

The inspection began with a review of construction activities and deviations from the RAWP followed by an on-site inspection of the AS-SVE system and discussion of system components. Summary tables were provided for VMPs, SVE wells and AS points and changes to drilling locations; figures showing planned and actual locations were also provided. None of the AS points, SVE wells or VMPs were moved more than 10 feet.

Other than well locations, there were only two deviations from the RAWP.

- Use of a power washer and soil vacuum unit for the first 6 feet of borings within 2 feet of a marked utility. Several AS and SVE well locations were near underground gas and electric lines.
- Pipe glue was used to connect the AS and SVE well heads to the riser. The construction drawings only indicated a slip-tee and a tighter connection was required.

Two changes in the construction of the AS and SVE control buildings were made following discussion and agreement between the AS/SVE subcontractor (Onion/Tetrasolv), the RD engineer (CH2M HILL) and HDR.

- Due to space constraints, the SVE manifold was moved to the building exterior and the layout of equipment inside the building was adjusted.
- The AS solenoid valves and manifold components were modified and a different supplier (Metal Works Pneumatic) was used.

Construction inspection forms from the Construction Quality Assurance Plan (CQAP - Pre-Shipment, Pre-Startup, and Startup/Performance) were discussed. Due to delays in system delivery and power connection, the inspections were not complete and the system was not yet operational on 29 October. The CQAP checklists showing system status as of 30 October are included in Appendix F-1.

Following the discussion, the AS-SVE equipment compound was visited to view system components. The programmable controls were still being finalized and only the AS compressor could be operated. However, the components were reviewed and general operations were discussed.

A post-startup list of action items was provided on the last page of the checklist. It was agreed that a summary of the final activities would be provided once key actions were completed and system checks were made.

3.7.2 Post-Start-Up Review

Per discussions at the construction inspection on 29 October, a memorandum was provided to summarize tasks performed from 23 October until system operations began on 21 December 2009. The updated CQAP Table C-3 for Startup and Performance, included in the memorandum, is provided in Appendix F-2.

The SVE blowers were operated briefly after electrical power was connected on 28 October until the AS compressor was fully operational. Because of overheating, the AS compressor was operated for only short periods until a vent was installed on 3 December. For the next few days, the system was operated only during the workday because of noise complaints from the resident immediately west of the AS-SVE buildings. The system was operated with two blowers and all AS points for 2 hours on 3 December and for 6.5 hours on 4 December; adjustments were made to the AS manifolds to equalize flow to the individual sparge points.

On 7 December, the AS points were switched to pulsed operation with 1/3 of the 90 AS points operating at any one time. The PLC was set to operate the AS manifolds in three groupings (A: AS-1, AS-4, AS-7...; B: AS-2, AS-5, AS-8...; and C: AS-3, AS-6, AS-9...). Each AS group is operated for four hours before the system switches to the next group. The AS-SVE system was operated for 9 hours on 7 December and 7 hours on 8 December.

3.7.2.1 Startup Operations

All day operations began on 9 December with both blowers operated during the workday and one blower operated in the evenings and on weekends; AS points remained in pulsed operation with no change to pressure or flow rates. Use of a single blower on nights and weekends was continued after the second silencer was installed on the exhaust on 16 December, because the system was able to maintain a vacuum at all VMPs with a single blower.

Regular AS/SVE operations began on 21 December 2009 following completion of system checks on 19 December. System parameters (flow rates, vacuum and PID readings) were recorded daily (weekdays only) for the first two weeks of operation and weekly thereafter.

The average total AS air injection rate at startup was approximately 220 scfm, or an average of 7.3 scfm at each AS point, which is approximately half the design rate of 15 scfm. The lower air injection rate may be sufficient based on the lower groundwater concentrations. The design flow rates and estimated time to achieve RGs were based on TeCA concentrations of 5000 parts per billion (ppb); the maximum TeCA concentration in the baseline groundwater event was 1620 ppb (MW-244).

Individual air extraction rates at SVE wells were 58 to 166 acfm with both blowers operating, above the design rate was 55 scfm from each well. The combined air extraction rate at start-up was approximately 1,135 scfm with both blowers, over 5 times the average total air injection rate (220 scfm).

The VMPs had vacuums of 16.3 to 32.2 inches of water (in. H_2O) with both blowers operating, indicating capture of injected air throughout the TA.

A baseline effluent sample was collected from the SVE system on 11 December 2009. Total CVOCs were 1,200 parts per billion by volume (ppbv). The corresponding VOC discharge rate, at an average SVE flow rate of 977 scfm, was 0.025 lb/hr, below the MSCHD *de minimus* standard of 0.1 lb/hr.

3.7.2.2 AS System

The AS system consists of an air compressor, equalization tank, refrigerated dryer, solenoid panel, 100-leg sparge manifold, and 90 AS points. Compressed air is fed to each solenoid bank (consisting of 20 solenoid valves each) via 3/8-inch tubing. As the solenoid valves opens, compressed air travels through individual 5/16-inch tubing to each manifold leg (one leg for each AS point). Each manifold leg consists of a check valve, speed control valve, rotameter and pressure regulator. The speed control valve is used to adjust the speed of the air flow to the well. The rotameter is used for air flow measurement. The pressure regulator allows air pressure leaving the manifold to be adjusted for a constant output pressure to the AS points. Air travels to the AS points from the manifold via individual 5/16-inch tubing inside the AS building and then transitions to 1/2-inch HDPE to the 2-inch AS points.

At startup, all speed control valves were set in the 100% open position allowing unrestricted flow. All pressure regulators were set to 30 psi to provide sufficient line pressure to overcome friction losses and the water column (up to 30 feet) at each AS point.

With 1/3 of the AS points in operation (normal operating configuration), AS compressor flow rates was approximately 220 scfm, or an average flow rate to each manifold leg of 7.3 scfm, which is approximately half the 15 scfm design rate.

Operating conditions were recorded each workday during the first two weeks of operations and then weekly. The parameters recorded include pressure and air temperature at the compressor and at the AS manifold, maximum and minimum air flow rates at the manifold, and pressure and flow rate at each operating AS point.

The initial flow rate from the AS compressor was 220 scfm, lower than the target of 450 scfm. The lower flow rates was apparently due to greater than expected friction loss in the AS lines. After consultation with the AS/SVE subcontractor (Tetrasolv) and the RD engineer (CH2M HILL), a second 3/8-inch feed line was added to each solenoid bank on 10 December. AS compressor flow rates increased approximately 15% with the additional feed lines, although later readings showed flow rates near the initial rates.

AS injection rates ranged from 190 to 266 scfm and averaged 229 scfm during the first quarter. System tests were run during the first quarter to evaluate the lower flow rate from the compressor. The AS compressor was run with 'unrestricted' flow to confirm that it met the manufacturer specification of 500 scfm at 125 psi. With three 0.5-inch outlet ports on the header pipe open, the flow rate averaged approximately 700 scfm at 75 psi for the 60-second test. The result indicates the AS compressor provides the expected air flow. Tests were then performed with different settings for the speed control valves (100% open and removed) and pressure regulators (30 psi, 100% open and removed). All tests were run with AS group "B" in use and the system was allowed to equilibrate for 10 minutes after settings were changed before readings were collected. The greatest increase in flow rate was achieved by altering the pressure regulator, either having it 100% open for maximum psi or removed. There was limited impact from removal of the speed control.

Following the AS system tests, the speed control valves were removed on 3 March 2010 and the pressure regulators were fully opened on 25 May 2010. Following the changes on 25 May, AS injection rates during the second quarter ranged from 344 to 361 scfm and averaged 349 scfm.

Following startup, the rotameters were generally reading below 5 scfm, at the low end of the meter's scale (0 to 30 scfm). Although the rotameters were installed per the design specification, it was determined they can not provide accurate air flow rates under pressure. Replacement of the rotameters was discussed with the RD engineer, but it was determined that the general information provided was sufficient.

3.7.2.3 SVE Air Flow Meter

The original SVE mass flow meter could not be calibrated and was removed in December 2009; a pitot tube was installed as an interim measure to allow SVE system flow rate measurements. A replacement meter was installed 14 April 2010 but gave erratic flow rates and was returned to the manufacturer for repair.

Further trials indicated interference from the overhead power lines prevented proper operation of the mass flow meter. The electrical subcontractor grounded the exhaust manifold to the blowers on 30 September, but grounding did not improve the meter readings. The pitot tube installed as an interim measure will be used for SVE system flow rate measurements.

The initial readings from the pitot tube indicated the average combined flow from the SVE wells with both blowers operating was approximately 1,700 scfm at 9 in. Hg, which was much higher than the manufacturer specifications for the blowers. It was determined an incorrect factor was used in estimating the flow rate from the pressure measurements in the pitot tube and the correct rate (1135 scfm) was approximately 66 percent of the initial reported rate.

3.8 AS/SVE OPERATIONS

AS/SVE operations, maintenance and monitoring from the start of regular operations on 21 December 2009 through the end of Year 1 on December 31, 2010 are described in the following sections.

3.8.1 Operations Summary

The system design was based on pulsed AS operation with 1/3 of the 90 AS points operating at the maximum planned air injection rate of 15 scfm for a total air injection rate up to 450 scfm and all 12 SVE wells online with a total flow of approximately 800 scfm. The AS-SVE system is operated through PLCs in the AS and SVE control buildings. The AS PLC operates the solenoids to direct air to the individual AS points for the programmed daily schedule, to monitor operations and to trigger alarms or shut downs as necessary. The SVE PLC monitors blower operations and sends alarm notifications or shuts down the blowers if necessary.

The AS PLC operates the wells in three groupings (A: AS-1, AS-4, AS-7...; B: AS-2, AS-5, AS-8...; and C: AS-3, AS-6, AS-9...). Each AS group is operated for four hours before the system switches to the next group. AS operating parameters are recorded weekly including pressure and air temperature at the compressor and at the AS manifold, maximum and minimum air flow rates at the manifold, and pressure and flow rate at operating AS points. The AS injection rates are included on Table 19. AS injection rates from 21 December 2009 through 31 December 2010 ranged from 171 to 367 scfm and averaged 285 scfm; the average AS injection rate after 25 May 2010 was 344 scfm.

The SVE system was initially operated with two blowers during the day and one blower on nights and weekends due to noise complaints from a nearby resident during system startup. The SVE system was operated with both blowers full-time beginning 7 May 2010. The SVE wells were operated in the 100% open position until adjustments were made at the manifold on 17 August 2010 to increase flow rates at SVE-7 and SVE-9; further adjustments to equilibrate flow were made on 10 September and 11 November 2010.

Review of the groundwater contours and concentrations from third quarter monitoring in September 2010 indicated the plume may be partially diverted around the southern edge of the AS-SVE TA, possibly due to decreased permeability from the air injection. Beginning 24 November 2010, normal operations with the AS compressor and both SVE blowers was reduced to two days per week with one blower operated at other times.

SVE system flow rates are measured using a pitot tube and flow rates at individual wells are measured by a vane-type meters at the well manifold. Vacuum measurements are made using a digital manometer. Vapor flow rates and vacuum at the SVE well manifold and the system effluent recorded weekly are listed on Table 19. Average combined flow from all SVE wells was 1093 scfm at 9.8 in. Hg with both blowers and 693 scfm at 5.8 in. Hg with a single blower. Average flow rates at individual wells averaged 49 to 148 acfm with both blowers operating; average flow rates exceeded 90 acfm at all wells except SVE-7 and SVE-9, which had flow rates near 50 acfm.

The design combined flow rate with both blowers in operation was 675 scfm, or 1.5 times the target injection rate of 450 scfm. Based on the average AS injection rate of 344 scfm (after 25 May), the SVE system extracted approximately 3 times the AS injection rate with both blowers in operation. The design vapor extraction rate was 55 acfm from each well.

3.8.2 System Maintenance

General preventative maintenance is performed after each weekly reading: checking the oil level in the compressor and adding oil as necessary, checking and cleaning air filter mats in the compressor control panel, and checking automatic drains in the refrigerated dryer. Monthly preventative maintenance includes cleaning the compressor and dryer heat exchange radiators, emptying moisture from the compressor vacuum line, checking air intake filters for the AS building, checking and tightening blower v-belts, and checking SVE blower oil levels and adding oil as necessary. The system is shutdown during maintenance. The system uptime and maintenance activities during the first three quarters of system operations are summarized below.

The AS/SVE system uptime was 98% during the first quarter. The following additional maintenance activities and operating adjustments were completed during the first quarter:

- Oil was changed in both SVE blowers on 18 January.

- Sub-freezing temperatures caused condensate lines in the in the AS building to freeze in January; a temperature-controlled louver was installed on the AS compressor exhaust vent on 28 January. Sound reducing foam was also installed in the exhaust vent.
- Lipford Sheet Metal installed the SVE manifold cover 2 February and the AS tubing cover on 12 February
- A louver motor for the AS compressor exhaust vent and fold-down desks in the control building were installed 1 February.
- A leaking gasket on AS solenoid block 2 was replaced on 5 February.
- The system was shutdown on 11 to 12 March while MLGW installed a replacement power meter.
- AS cooling oil was added 29 March
- Latch guards and door sweeps were added to control building doors on 26 March and an ADT security system was installed on 5 April.

The AS/SVE system uptime was 99% during the second quarter. The following additional maintenance activities and operating adjustments were completed during the second quarter:

- Condensate generated by the AS compressor was greater than assumed in design. A condensate storage and transfer system was installed the week of June 14 with a 26-gallon storage tank (Protank) and a 9-gallons per minute sump pump (McMaster Carr) which pumps directly to the 505-gallon exterior tank.
- AS compressor was shut down on 3 May because it was running continuously and opening the pressure relief valve. A Kaeser technician inspected the compressor on 4 May and determined a vacuum line that signals the compressor inlet valve to open and close was affected by condensate. The line was cleared and the compressor re-started. A monthly check of the vacuum line was added to the maintenance schedule.
- Solenoids were replaced for AS70/71 on 8 April and for AS1/2 and AS21/22 on 7 May.
- AS compressor cooling oil was replaced 18 June.

The AS/SVE system uptime was 92% during the third quarter. The following additional maintenance activities and operating adjustments were completed during the third quarter:

- The coupler on the compressor was found broken during an inspection on 24 July. The compressor was turned off and oily water on the building floor was cleaned up. A Kaeser technician replaced the coupler on 27 July. The AS compressor was down from 1100 on 24 July to 1130 on 27 July. Only one SVE blower was operated part of this time due to a high exhaust temperature alarm, 1327 on 25 July to 0558 on 26 July. The oily water observed was found to be leaking from a filter in the air line; the connection was tightened.

- Three AS points failed under pressure, AS-81 on 12 August, AS-34 on 20 September and AS-52 on 20 October. In each case, the manhole was apparently lifted off the well and the pigtail connection with the AS piping blown off; a locking cap was placed on each well riser and the manhole replaced.
- Following the break at AS-34, the pressure regulators, which had been fully opened on 25 May to increase vapor injection rates, were closed slightly to reduce pressure at all AS points. Further adjustments were made as needed to maintain pressures at or below 70 psi.
- Electrical subcontractor, Overton, grounded the exhaust manifold to the blowers on 30 September to address problem with the mass flow meter. Electrical grounding did not improve the meter readings.

The AS/SVE system uptime was approximately 99% during the fourth quarter. The following additional maintenance activities and operating adjustments were completed during the fourth quarter:

- The rubber hoses between the blower outlets and the exhaust manifolds were observed on 8 October to have deteriorated due to the high temperatures; small holes in the hoses were sealed with duct tape.
- AS-52 failed under pressure on 22 October. A locking cap was placed on the well riser and the manhole replaced. AS pressures were re-checked and adjustments made as needed to maintain pressures at or below 70 psi.
- AS wells with near 0 acfm flow rates (26, 39, 42, 55 and 86) were operated continuously 1 to 12 November to see if steady pressure (restricted to 70 psi) could improve air injection. Some improvement was observed at AS-42 and AS-55.
- SVE 4 had no measureable air flow during system readings on 11 November. The manifold valves for SVE wells with flow above 100 acfm were closed slightly to increase vacuum to wells with low air flow: SVE-4, SVE-7, and SVE-9. Total system vacuum increased and flow decreased in response to the changes.

- System maintenance was performed on 18 November. The oil, oil filter, oil separator, controller air filter mats, and air filter were changed on the AS compressor. The oil was changed and the v-belts were tightened on both SVE blowers. The AWS low level sensor was cleaned on 19 November.

3.8.3 System Monitoring

AS/SVE system monitoring consists of vacuum measurements at VMPs; PID readings at the system effluent, SVE wells and VMPs; and laboratory analysis of vapor samples from the system effluent. PID readings at the SVE well manifold and the system effluent were recorded weekly; PID readings and vacuum measurements at VMPs were collected weekly during the first quarter and then monthly; and vapor samples at the system effluent were collected monthly during the first quarter and then quarterly.

3.8.3.1 Vacuum Measurements

Vacuum measurements are collected at VMPs by connecting a digital manometer (Dwyer Series 475 Mark 3) to a quick-connect fitting in the sealed cap of each VMP well casing. The vacuum measurements are shown on Table 20. Average vacuum at VMPs ranged from 18.2 to 34.4 in. H_2O with both blowers operating. The vacuum measurements demonstrate air injected during sparging is captured throughout the TA by the SVE wells.

3.8.3.2 PID Readings

VOC concentrations are estimated through field measurements at individual SVE wells, system effluent, and VMPs with a MiniRae 2000 (10.6 eV lamp) PID. PID measurements are made by drawing vapor into a tedlar bag. The tedlar bag is then attached to a calibrated PID and the maximum reading for that bag is recorded.

For measurements at the SVE wells and VMPs, a pump is used to draw the vapor stream into a tedlar bag. No pump is needed at the system effluent location as it is under positive pressure. PID measurements at SVE wells and system effluent are shown on Table 21. The PID measurements decreased during the first month of operations. The highest initial measurements were 4.5 ppm at SVE-3 and 4.7 ppm at SVE-5 and the effluent was 1.4 ppm. PID measurements at the system effluent and SVE wells were generally less than 1 ppm after January. Higher measurements were observed sporadically during 2010, with the highest being up to 8 ppm on 24 June.

The VMPs are first purged of three tubing volumes using the sampling pump. Multiple PID readings are collected at each VMP using dedicated a Tedlar bag until three consecutive readings are within 10%. The final PID readings from VMPs are shown on Table 22. PID measurements at VMPs were generally less than 1 ppm from system startup through April 2010. Higher measurements, up to 24 ppm, were observed in the monthly measurement on 12 May. It was not clear why PID readings increased before the AS injection rate was increased on 25 May; it was possibly a cumulative effect of the air sparging. Increased vacuum extraction through full-time use of both SVE blowers beginning in May resulted in reduced PID measurements at VMPs.

3.8.3.3 Vapor Samples

The quarterly system effluent samples for laboratory analysis were collected in 6-liter Summa canisters with a flow regulator at 200 ml/min. The Summa canisters were shipped from the laboratory with negative pressure; thus, a sampling pump was not required. The samples were submitted to Accutest Laboratories in Dayton, NJ for analysis of VOCs by USEPA Method TO-15.

The complete analytical results are presented in Appendix C. Table 23 lists the analytical results for the primary CVOCs historically detected at Dunn Field and for other VOCs detected above the RL in the sample. The totals for primary CVOCs and for all VOCs detected are also listed.

Total primary CVOCs in the system effluent decreased from 1201 ppbv at start-up in December 2009 to 48.2 ppbv in September 2010; the concentration increased slightly to 58.4 ppbv. System effluent concentration trends from PID measurements and analytical results are shown on Figure 13. The CVOCs detected at the highest concentrations were TCE and TeCA; TCE was 40% to 70% of total CVOCs, while TeCA was 10% to 35% of total CVOCs.

3.8.3.4 Mass Removal Estimate

The VOC mass removed from the Off Depot TA is estimated from the average VOC concentrations in the effluent sample (based on TCE), system operating hours and flow rates. The mass emission calculations are shown on Table 24.

Estimated VOC emission rates in the effluent decreased from 0.025 lb/hr at startup to 0.001 lb/hr in the fourth quarter. The emissions are below the de minimus standard of 0.1 lb/hr for a MSCHD operating permit. The AS/SVE system removed approximately 71 pounds of VOCs from startup through December 2010.

3.9 PERFORMANCE MONITORING

Groundwater performance monitoring results are used to assess the effectiveness of the AS/SVE system. The treatment goal for the AS/SVE system is to reduce groundwater concentrations downgradient of AS/SVE barrier below 50 µg/L for individual CVOCs. Performance monitoring consists of water level measurements and sampling and analysis of groundwater from PMWs.

The 36 PMWs were sampled quarterly during Year 1 operations and will be sampled semiannually during Year 2. After two years, the PMWs will be assigned a sampling frequency and incorporated in LTM. The PMWs are listed on Table 7 with the sample schedule, and the well locations are shown on Figure 4.

The AS/SVE system was scheduled to begin operation in October 2009 but normal operations did not begin until 21 December 2009 due to construction delays. The first quarterly performance monitoring was conducted in October 2009 to coordinate sampling with the final IRA semiannual sample event and to provide more recent sample results prior to system operations. Quarterly samples were then collected in March, June and September 2010 and January 2011 after AS/SVE operations began. The January 2011 sample event was added because of the change in AS/SVE system operations to two days per week in November 2010.

3.9.1 Water Level Measurements

Groundwater levels were measured in PMWs and selected IRA/LTM wells prior to sampling events. Measurements were made using Solinist Model 101 water level meters with electronic sensors and tapes graduated in 0.01-foot increments. The water level measurements are shown on Table 25.

Water level measurements are shown on Figures 14 to 18 for the fluvial aquifer. Groundwater elevation contours indicate flow is to the west from Dunn Field with decreasing gradient toward the trough in the underlying clay near MW-246. Groundwater flow diverges to the north and the south in the vicinity of the Off Depot TA.

3.9.2 Groundwater Sampling

Off Depot groundwater samples are collected from PMWs using PDBs where the saturated screened interval is 5 feet or greater and by low-flow sampling with bladder pumps for other wells. Sampling is performed in accordance with the *Remedial Action Sampling and Analysis Plan* (MACTEC, 2005b) and the *User's Guide for Polyethylene-based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells* (U.S. Geological Survey, 2001).

Water levels are checked in designated wells two to four weeks prior to sample collection. If the saturated thickness is less than 5 to 10 feet, the well is considered for low-flow sampling. If saturated thickness of the well screen is greater than 10 feet, a PDB is installed, if not already present. Where necessary, PDBs already installed are shifted such that the midpoint depth is at least 2 feet below the water surface.

During sampling, the PDB is removed from the well and a sample of water is transferred to 40-ml vials preserved with hydrochloric acid. Following sample collection, a new PDB is filled with de-ionized water and placed in the middle of the saturated section of well screen. Water quality parameters are not measured in wells sampled using PDBs.

At wells sampled with bladder pumps, the pumping rate is set such that the water levels do not decline more than 1.2 inches (0.1 foot). The wells have dedicated Teflon® bladders and Teflon®-lined polyethylene tubing, which are placed in sealed plastic bags after use and stored for future sample events. Water quality parameters are measured at approximately 5 to 10 minute intervals during purging using a flow-through cell with an YSI 600XLM and a LaMotte 2020e turbidity meter, or similar equipment. The units are calibrated each morning prior to sampling, and if abnormal readings are observed during the day, the instruments are recalibrated in the field. All measurements are recorded on the field sampling forms.

Purging continues at each well for up to 2 hours to meet the stabilization criteria: three successive readings within 0.1 for pH, 10 milliVolts for ORP, 3 percent for specific conductance, 10 percent for DO and <20 NTUs for turbidity. The sample is collected in 40-ml vials preserved with hydrochloric acid when stabilization criteria are met or the field team leader approves the variance.

Based on water level measurements, 35 PMWs were selected for sampling with PDBs and one PMW was selected for low-flow sampling in October 2009, March 2010 and January 2011. All PMWs were selected for sampling with PDBs in June and September 2010. In June 2010, the PDB in MW-160 was empty when brought to the surface and low-flow sampling was then used.

PDB sample depths are shown on Table 26. Final stabilization measurements for wells sampled with bladder pumps are shown on Table 27. The samples were sent to Microbac Laboratories in Marietta, Ohio for VOC analysis by USEPA Method SW8260B.

3.9.3 Analytical Results

The complete analytical results for performance monitoring are presented in Appendix C. Tables 28 to 32 list the analytical results for the primary CVOCs historically detected at Dunn Field and all other VOCs detected above the RL in one or more samples. The primary CVOC results are summarized on Tables 33 to 37. Total CVOC concentrations are shown on Figures 19 to 23; the figures include results for the IRA or LTM samples collected near the same dates, when available.

The total CVOC concentration maps show continued reduction in the Off Depot CVOC plume due to Source Areas and Off Depot RAs. The maximum total CVOC concentration was higher in October 2009 (4607 µg/L in MW-246) than in baseline samples in June and July 2009 (2604 µg/L in MW-246), but the number of wells with total CVOC concentrations above 1,000 µg/L was less in October (MW-159, MW-244 and MW-246) than during baseline sampling (MW-54, MW-155, MW-159, MW-242, MW-244 and MW-246). No PMW samples had total CVOC concentrations above 1,000 µg/L in March 2010 or later sample events, and the maximum total CVOC concentration decreased to 327 µg/L (MW-159) in January 2011.

The treatment goal for the AS/SVE system is to reduce groundwater concentrations downgradient of AS/SVE barrier below 50 µg/L for individual CVOCs. There are 5 PMWs immediately downgradient of the AS/SVE barrier (MW-241, MW-243, MW-245, MW-246 and MW-247). In March 2010, total CVOC concentrations in these wells ranged from 1.03 µg/L to 98.3 µg/L, and TeCA was the only CVOC above 50 µg/L, at 70.7 µg/L in MW-245 and 74.6 µg/L in MW-246. The treatment goal was met in all these wells in June 2010 and later sample events. The maximum total CVOC concentration in these 5 PMWs decreased to 22.8 µg/L in September. The decrease in the total CVOC concentration in MW-246 from October 2009 (4607 µg/L) to September 2010 (13.6 µg/L) was 99.7%. Total CVOC concentrations in some of these 5 PMWs increased slightly from September 2010 to January 2011 following the change in system operations, but the treatment goal was still met.

The total CVOC concentration maps on Figures 20 to 23 show that AS/SVE treatment split the plume core into upgradient and downgradient sections. The concentrations in each area decreased during the reporting period. In January 2011, the highest total CVOC concentration in the PMWs within each area were 327 µg/L in MW-159, upgradient of the TA, and 64.6 µg/L in MW-79, downgradient of the TA. Based on DCE concentrations in the sample results, MW-79 is representative of the off-site plume originating northeast of Dunn Field.

In January 2011, CVOC concentrations in the Off Depot plume met the treatment goal of 50 µg/L for individual CVOCs in all but five PMWs, including all wells downgradient of the AS/SVE system. The treatment goal was exceeded for TCE in MW-54, MW-149, MW-159, MW-166 and MW-166A with the highest concentration being 200 µg/L in MW-159; and the goal was exceeded for chloroform in MW-149 with 94.3 µg/L.

Total CVOC concentrations in MW-166 and MW-166A at the southern edge of the TA increased from 116 µg/L and 71.4 µg/L in June 2010 to 284 µg/L and 112 µg/L in September 2010. The groundwater contours and increased concentrations indicate groundwater flow may be partially diverted around the southern edge of the AS/SVE area, probably due to decreased permeability from the air injection. Changes in system operations made to decrease potential plume diversion are noted in Sections 3.8.1 and 7.1.3.

Performance monitoring includes three wells screened in the IAQ (MW-232, MW-250 and MW-251). Analytical results for the IAQ wells do not indicate significant vertical migration of CVOCs from the plume in the fluvial aquifer. Primary CVOCs were detected above RLs in two wells: VC was reported in MW-232, and DCE and CF were reported in MW-251. One sample had results above an MCL: VC was detected above the MCL (2 µg/L) in the June 2010 sample from MW-251 (2.11 µg/L).

3.9.4 Vapor Intrusion Monitoring

A second round of vapor samples was collected to confirm the findings from the baseline vapor probe samples and to evaluate the impact of AS/SVE operations on vapor concentrations.

Vapor sampling was performed by HDR on 8 and 9 March 2010. Each VI probe was purged of three well volumes (filter media and tubing) using the sampling pump prior to sample collection; the VMPs were purged of three tubing volumes. Multiple PID readings were collected using a dedicated Tedlar bag until three consecutive readings were within 10%. Laboratory samples were then collected in 1-liter Summa canisters with a flow regulator at 200 ml/min. The Summa canisters were shipped from the laboratory with negative pressure and the sampling pump was not required for sample collection. Samples were submitted to Accutest Laboratories in Dayton, NJ for analysis of the primary CVOCs by USEPA Method TO-15.

Samples were collected from the two vapor screens at each location, where possible. Vapor samples could not be collected at six VI probe screens: VI-3A, VI-3B, VI-4A, VI-5A, VI-7B and VI-8B. The probes could not be purged because of the fine-grained soils and moisture content, even with two sampling pumps to boost the vacuum. Vapor samples were collected from VMP-4A (62-67 feet bgs) and VMP-4B (47 to 52 feet bgs), as in baseline sampling, to obtain CVOC concentrations in the fluvial sand above the groundwater plume.

Fourteen soil vapor samples were collected from the VI probes and VMPs. Table 38 lists the analytical results with the residential screening values. The results are summarized below.

Three CVOCs were detected above the RLs in samples from the probes installed in the loess. All concentrations were below the residential screening levels.

- TCE was reported in two samples with a maximum concentration of 8.6 µg/m^3 in VI-5B. The vapor screening value (27 µg/m^3) was not exceeded.
- PCE was reported in four samples with a maximum concentration of 8.1 µg/m^3 in VI-2B. The vapor screening value (34 µg/m^3) was not exceeded.
- Methylene chloride was reported in VI-7A with a concentration of 4.2 µg/m^3. The vapor screening value (190 µg/m^3) was not exceeded.

The same three CVOCs were detected above the RLs in the two VMP samples. Reported concentrations were only slightly higher than in the vapor probe samples.

- TCE was reported in both samples with a maximum concentration of 28 µg/m^3 in VMP-4B.
- PCE was reported in the sample from VMP-4B at a concentration of 10 µg/m^3.
- Methylene chloride was reported in the sample from VMP-4B at a concentration of 10 µg/m^3.

The analytical results for samples from the vapor probes installed in the loess were similar to the baseline results; the same three CVOCs (TCE, PCE and methylene chloride) were detected at low concentrations below residential vapor screening values.

The CVOC concentrations in samples from the VMPs were significantly less than the baseline results. The sample from VMP-4A (deeper) contained only one CVOC above the RL, TCE at 1.6 µg/m^3. The baseline sample from VMP-4A contained several CVOCs with TCE at 6830 µg/m^3. The second sample from the VMP-4B (shallower) contained TCE, PCE and methylene chloride with the highest concentration being TCE at 28 µg/m^3. The baseline sample from VMP-4B contained several CVOCs with TCE at 2950 µg/m^3. The results demonstrate the success of the SVE system in removing CVOCs from the fluvial vadose zone, even with the increase in CVOCs from air sparging in the fluvial aquifer.

The results indicate that AS/SVE operations have significantly reduced CVOC concentrations in the fluvial sands and that the CVOCs in the groundwater plume do not present a VI problem for nearby residences.

The RAWP provided for baseline VI sampling and, at minimum, a second round of soil vapor sampling within three months of startup of the AS/SVE system with the results used to determine requirements for additional vapor sampling and frequency. Based on the analytical results for the baseline and March 2010 samples, VI above the Off Depot plume is not a significant concern.

Following approval from the BCT, the vapor probes were abandoned on 13 and 14 September 2010. VI-1, in the abandoned lot off Rozelle St., was located on an asphalt pad. The concrete well pad was left in place and the man hole was filled with concrete after the sample tubes had been cut off about 8 inches bgs. VI-2 through VI-9 were located near residences. At these locations, the concrete pad was pried up using a crowbar and the VI sample tubes were pulled out and cut at 1-1.5 feet bgs. The locations were patched with sand, a layer of top soil, and sod.

3.10 LONG-TERM MONITORING

LTM is performed to document changes in plume concentrations, detect potential plume migration to off-site areas or into deeper aquifers, and track progress toward RGs.

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

Beginning in 2010, groundwater monitoring was conducted in accordance with the Off Depot RD and consists of performance monitoring in the AS/SVE TA and LTM in the remainder of the plume. There are 36 monitoring wells used for performance monitoring and 58 monitoring wells used for LTM. Another 20 monitoring wells are used for water level measurements during LTM events.

The LTM plan classified the monitoring wells in three categories:

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

The LTM plan also established an initial sampling frequency (biennial, annual or semiannual) for the 58 existing wells: biennial, annual and semiannual. The PMWs will be added to the LTM program after Year 2 of AS/SVE operations. Performance monitoring and LTM sample events are coordinated with a single water level sweep of the wells prior to sample collection.

The results from the final IRA sample events in 2009 and the Off Depot LTM events in 2010 are included in the total CVOC concentration data shown on Figures 10, 19, 20 and 22. The sampling activities and analytical results are fully reported in *2009 Operations and Closure Report, Dunn Field Groundwater Interim Remedial Action* (HDR, 2010) and *Off Depot Groundwater Annual Long Term Monitoring Report -2010* (HDR, 2011).

Of the 32 Off Depot LTM wells sampled in March 2010, 10 wells had primary CVOC concentrations above an MCL or above the TC for TeCA. Five of the wells (MW-6, MW-15, MW-57, MW-87, and MW-225) are located on Dunn Field near the western property line in the central portion of the source areas; CVOC concentrations exceeded the MCL for TCE in three wells (7.57 µg/L to 13.8 µg/L) and exceeded the TC for TeCA in four wells (2.67 µg/L to 12 µg/L). Four of the off-site wells (MW-32, MW-71, MW-144 and MW-190) are located west of the source areas in the central portion of the Off Depot plume; CVOC concentrations exceeded the MCLs for TCE in three wells (8.58 µg/L to 109 µg/L) and for CT in one well (6.71 µg/L) and exceeded the TC for TeCA in three wells (8.26 µg/L to 150 µg/L). The highest concentrations in the off-site wells were in MW-144, which is in the central portion of the plume; total CVOC concentrations in MW-144 have decreased from 601 µg/L in April 2009 to 69.4 µg/L in April 2011, the most recent sample. The fifth off-site well (MW-31) is located northeast of Dunn Field and is within the plume originating from an off-site source northeast of Dunn Field; CVOC concentrations exceeded the MCLs for PCE (22.7 µg/L), TCE (20.4 µg/L) and DCE (22.7 µg/L).

Concentrations and isopleths are shown for TeCA and TCE on Figures 24 and 26 for the October 2009 sample event prior to startup of the AS/SVE system and on Figures 25 and 27 for the March 2010 sample event after system operations began in December 2010. Other sampling events described in this report included only one or none of the LTM wells.

The RAs on Dunn Field have resulted in significant reduction of CVOC concentrations in groundwater, as seen in total CVOC plume maps for April 2007, April 2008, April 2009 and March 2010 shown in Figure 28.

3.11 IDW MANAGEMENT

The waste generated during construction and operation of the AS/SVE system, well installation and groundwater sampling was classified as either non-investigative waste or investigation-derived waste (IDW). Non-investigative waste, such as packaging materials, personal protective equipment (PPE), disposable sampling supplies, and other inert refuse, was collected, and placed in the dumpster located at the HDR field office for disposal as municipal waste. The IDW consisted of soil cuttings from the borings for PMWs, SVE wells, AS points and VMPs, waste water from equipment decontamination, and groundwater from PMW development and purging prior to sampling. No development or purge water was generated from the SVE wells, AS points or VMPs, and no water was pumped from the trenches during construction.

Soil cuttings collected from borings were initially placed in a roll-off container. Since drill locations were not in areas of known soil contamination and observations during drilling did not indicate contamination, the soil cuttings were used to fill low areas on Dunn Field. Wastewater generated from decontamination of the drill rig and down hole equipment between borings and of well construction materials prior to installation was collected in a 20,000-gallon fractionation tank supplied by WDC. The well development water was also transported to the fractionation tank. A wastewater grab sample was collected on 24 August 2009 upon completion of all drilling and well installation. The sample was collected from the midpoint of the tank using a disposable Teflon® bailer and submitted to Microbac for analysis of VOCs, semi-volatile organic compounds (SVOCs), and metals in accordance with discharge permit. The analytical results were compared to the concentration limits in the permit and a request for a one-time discharge was submitted to the City of Memphis. The discharge was approved in a letter dated 9 September 2009 and the wastewater (2,962 gallons) was pumped from the tank to the sanitary sewer on 14 September 2009. The storage tank was cleaned and returned to the vendor by WDC.

During performance monitoring, wastewater from equipment decontamination and groundwater from low-flow purging prior to sampling was collected in 5-gallon buckets with lids and added to the FSVE storage tank. When the FSVE storage tank nears capacity, the wastewater will be discharged through an approved procedure; disposal alternatives are currently being reviewed with TDEC. Waste disposal activities will be described in annual reports.

4.0 CHRONOLOGY OF EVENTS

Date	Event
12 April 2004	Dunn Field ROD final.
19 March 2009	Dunn Field ROD Amendment final
10/8/2008	Off Depot RD final
4/15/2009	Off Depot RAWP final
6/6/2009	Location survey for MWs and VMPs
6/8-7/30/2009	Baseline groundwater performance monitoring
6/9/2009	Access agreement with MLGW finalized
6/15/2009	Site drilling and grading contractors mobilized equipment and personnel
6/17/2009	Notification of Off Depot mobilization
6/16-22/2009	Clearing and grading of the abandoned railroad tracks
6/17-7/17/2009	Drilling and installation of new performance monitoring wells
7/27-29/2009	Abandonment of designated monitoring wells
6/17-7/9/2009	Drilling and installation of VMPs
7/7-8/29/2009	Drilling and installation of AS points and SVE wells
8/31-10/2/2009	Trenching and installation of conveyance piping
9/14-15/2009	Baseline vapor intrusion monitoring
10/15-16/2009	Pre-startup quarterly groundwater performance monitoring
10/19-20/2009	Delivery and installation of AS and SVE control buildings
10/20/2009	Final as-built location survey

Date	**Event**
10/23/2009	AS piping connected to AS building
10/26/2009	SVE piping connected to SVE manifold
10/27/2009	Exterior SVE condensate tank delivered and installed. Utility power pole installed adjacent to compound.
10/28/2009	Electrical service installed and utility inspection completed by City of Memphis. Internet service connection completed. Communication established between the AS and SVE PLC units and system computer. System online for startup activities.
10/29/2009	Construction inspection with DLA, USEPA and TDEC.
11/4/2009	Equipment buildings bolted to slab
11/2-5/2009	Final programming of system computer completed. AS point sequencing programming issues addressed and completed.
11/3-4/2009	Excess AS tubing (at exterior of building) shortened.
11/4-5/2009	All AS point caps tightened to prevent air leaking. Solenoid functionality and piping was checked at 10% of AS points by confirming air flow to AS point.
11/9-11/2009	Final adjustments to speed control valves and pressure regulators completed with the purpose to get even distribution of flow and pressure at AS points.
11/11/2009	In-line muffler installed at SVE exhaust to address noise concerns
12/3/2009	Air hood installed over AS compressor to address compressor overheating issues.
12/8/2009	Plumbing of AS condensate to SVE condensate collection completed.
12/9-10/2009	Solenoid bank that split during shakedown activities repaired. Additional air line added to each solenoid bank. Small leaks to SVE system piping repaired.
12/11/2009	Baseline vapor effluent sample

Date	**Event**
12/16-17/2009	Second silencer installed at SVE exhaust to address noise issues (noise levels at 55 dB at 50 feet from system - below design specifications). Sealant/caulking added to exterior buildings to address weather related leaks. SVE air/mass meter could not be calibrated. A new air mass meter ordered. Pitot tube installed in the interim to allow air flow measurements.
12/17-19/2009	Functionality of gauges, valves, solenoid valve sequencing, system controls, alarms, and PLC logic confirmed. System operated at various scenarios (e.g., one SVE blower in operation, all AS points online, less than 12 SVE wells online, etc.) to review system operations at different operating scenarios.
12/21/2009	Full time AS/SVE operations begin.
1/25/2010	Y1Q1 monthly vapor effluent sample
2/23/2010	Y1Q1 monthly vapor effluent sample
3/8-9/2010	Final vapor intrusion monitoring
3/23-26/2010	Y1Q1 groundwater performance monitoring
3/31/2010	Y1Q1 monthly vapor effluent sample
6/17/2010	Y1Q2 vapor effluent sample
6/22-23/2010	Y1Q2 groundwater performance monitoring
9/16/2010	Y1Q3 vapor effluent sample
9/20-21/2010	Y1Q3 groundwater performance monitoring
12/7/2010	Y1Q4 vapor effluent sample
1/25-26/2011	Y1Q4 groundwater performance monitoring
Ongoing	AS/SVE operations

5.0 PERFORMANCE STANDARDS AND QUALITY CONTROL

5.1 REMEDY PERFORMANCE

The overall performance of the Off Depot RA has been excellent.

Performance of the AS/SVE system is evaluated based on system operating parameters and performance monitoring. From system start-up in December 2009 through December 2010, the system was operating approximately 97 percent of the time. Downtime was due to general maintenance and sampling activities.

AS injection rates averaged 285 scfm from December 2009 through December 2010; the average AS injection rate after 25 May 2010 was 344 scfm. System vacuum and flow rate have averaged approximately 1093 scfm at 9.8 in. Hg with both blowers and 693 scfm at 5.8 in. Hg with a single blower. Average flow rates at individual wells range from 49 acfm to 148 acfm. Average vacuum at VMPs ranged from 18.2 to 34.4 in. H_2O with both blowers operating. The vacuum measurements demonstrate air injected during sparging is captured throughout the TA by the SVE wells.

The VOC mass removed from the Off Depot TA is estimated from the average VOC concentrations in the effluent sample (based on TCE), system operating hours and flow rates. Estimated VOC emission rates in the effluent decreased from 0.025 lb/hr in December 2009 to 0.001 lb/hr in December 2010. The emissions are below the de minimus standard of 0.1 lb/hr for a MSCHD operating permit and vapor treatment is not necessary. The AS-SVE system removed approximately 71 pounds of VOCs through December 2010.

The total CVOC concentration maps show continued reduction in the Off Depot CVOC plume due to Source Areas and Off Depot RAs. The maximum total CVOC concentration in PMW samples from October 2009, prior to treatment, was 4607 µg/L in MW-246. The maximum total CVOC concentration decreased to 327 µg/L at MW-159 in January 2011. MW-159 is upgradient of the AS/SVE barrier and represents untreated groundwater.

The treatment goal for the AS/SVE system is to reduce groundwater concentrations downgradient of AS/SVE barrier below 50 µg/L for individual CVOCs. The goal was met in all 5 PMWs immediately downgradient of the AS/SVE barrier in June 2010. The total CVOC concentration in MW-246 decreased 99.7 percent from October 2009 (4607 µg/L) to January 2011 (13.5 µg/L).

In January 2011, CVOC concentrations in the Off Depot plume met the treatment goal of 50 µg/L for individual CVOCs in all but five PMWs (MW-54, MW-149, MW-159, MW-166 and MW-166A), including all wells downgradient of the AS/SVE system. These five PMWs represent the core of the Off-Depot plume.

The RAs on Dunn Field have resulted in significant reduction of CVOC concentrations in groundwater, as seen in total CVOC plume maps from 2007 to 2010 on Figure 28. However, many wells sampled for performance monitoring or LTM still exceed an MCL or the TC for TeCA, including 10 of the 32 LTM wells sampled in March 2010 and 23 of the 36 PMWs. Five of the LTM wells are located on Dunn Field near the western property line in the central portion of the source areas, four wells are located west of the source areas in the central portion of the Off Depot plume and one well is located northeast of Dunn Field within the off-site plume. Of the 25 LTM wells not sampled in 2010, only two wells exceeded an MCL or the TC for TeCA in the most recent sample. Of the 23 PMWs, 10 wells exceed only the TC for TeCA. Progress in achieving MCLs and TCs throughout the Off Depot plume will be reviewed in the annual LTM reports.

5.2 DATA QUALITY EVALUATION

The Off Depot RA included sampling and analysis of soil vapor from shallow vapor intrusion probes and AS/SVE system effluent; and groundwater from PMWs. Samples were collected during vapor intrusion sampling events in September 2009 and March 2010; baseline AS/SVE effluent sampling events in December 2009, January 2010, February 2010 and March 2010 and quarterly AS/SVE effluent sampling events in June 2010, September 2010 and December 2010; and quarterly groundwater performance monitoring sampling events in June-July 2009, October 2009, March 2010, June 2010, September 2010 and January 2011. Vapor samples were submitted to Accutest Laboratories in Dayton, New Jersey and groundwater samples were submitted to Microbac Laboratories in Marietta, Ohio. Sampling and analysis were performed in accordance with past practice and the RA SAP.

The analytical laboratories have been audited under the National Environmental Laboratory Accreditation Program. Microbac was audited by the American Association for Laboratory Accreditation and is an accredited Department of Defense Environmental Laboratory Accreditation Program laboratory with certificate valid thru 12/31/11. Accutest was audited by New Jersey Department of Environmental Protection and is an Nationally Accredited Environmental Laboratory with certificate valid thru 6/30/11. Copies of the certificates are included in Appendix G.

HDR performed data quality evaluation (DQE) of the laboratory data packages to qualify the data relative to the data quality objectives (DQOs) described in the RA SAP and the Off Depot RAWP. The DQE process involves assessment of field and laboratory procedures per the guidelines in the RA SAP and included independent data validation completed by Diane Short and Associates, Inc (DSA). DQE consisted of review of laboratory Quality Control (QC) data and field QC parameters, and flagging of the data as usable, usable with qualification, or unusable in accordance with the DQE SOPs using the criteria stated in the RA SAP for each analytical method performed. Based on the review and the project DQOs, the data are acceptable and usable. No data were rejected. The complete analytical results with data quality evaluation (DQE) flags are presented in Appendix C.

There were qualifications of VOC data, with the primary causes of the qualified data described below.

- High relative percent difference values between the samples and their field duplicates resulted in J qualifications for some analytes in the September 2009 and March 2010 vapor intrusion events.
- Several vapor samples were reported to the method detection limit (MDL) but the method blanks were reported only to the RL. Analytes reported in the associated samples between the MDL and RL may be false positives. The sample results were already qualified as estimated J because they were below the RL, and no additional qualifiers were added.
- Method blank contamination resulted in one B qualification for methylene chloride in the July 2009 and January 2011groundwater performance monitoring events.
- Trip blank contamination resulted in a number of B qualifications for 1,4-dichlorobenzene in the June 2009 groundwater performance monitoring event; methylene chloride and 1,4-dichlorobenzene in the March 2010 groundwater performance monitoring event; and methylene chloride in the September 2010 groundwater performance monitoring event.
- Rinsate blank contamination resulted in B qualifications for 1,4-Dichlorobenzene and acetone in the July 2009 groundwater performance monitoring event and for methylene chloride in the June 2010 groundwater performance monitoring event .
- Low continuing calibration verification response resulted in a few UJ qualifications for vinyl acetate and 4-chlorotoluene in the October 2009 groundwater performance monitoring event.
- High matrix spike/matrix spike duplicate (MS/MSD) recoveries resulted in a J qualification for acetone and low MS/MSD recoveries resulted in a UJ qualification for chloromethane in the September 2010 groundwater performance monitoring event.
- One sample in the effluent baseline events had an elevated associated laboratory calibration standard (LCS) recovery observed, and several samples had low LCS recoveries. When a high recovery is associated with a non-detect, no qualifier is added since the indicated bias is high.

When the target is detected, the result is qualified as estimated J. CT was detected in the December 2009 event and qualified J. The analytes that were recovered low were non-detect in all associated samples and qualification was not required.

- Low LCS recoveries resulted in a number of J and UJ qualifiers for VC, 4-chlorotoluene, and trans-1,3-dichloropropene in the October 2009 groundwater performance monitoring event; and for carbon disulfide, acetone, 2-butanone (MEK) and 4-methyl-2-pentanone (MIBK) in the March 2010 groundwater performance monitoring event.
- High or low LCS recoveries resulted in a number of J and UJ qualifiers for chloromethane, acetone, dichlorodifluoromethane, carbon disulfide, VC, MEK, [MIBK, 2-hexanone, 1,1,2,2-tetrachloroethane, and bromomethane in the September 2010 groundwater performance monitoring event.
- High or low LCS recoveries resulted in J and UJ qualifiers for acetone, MEK and hexachlorobutadiene in seven samples and for chloromethane in one sample in the January 2011 groundwater performance monitoring event.
- A high initial calibration relative standard deviation resulted in UJ qualifications for CT in the June 2010 groundwater performance monitoring event.
- Any result reported below the RL but above the method detection limit was flagged "J" and considered an estimated result (unless overridden by other QC flags).

Overall, the VOC data from the air and groundwater events met project DQOs and were determined to be sufficient to support the evaluation of remedial action. The complete DQE for the Off Depot IRACR is provided in Appendix G.

6.0 FINAL INSPECTIONS AND CERTIFICATIONS

6.1 RA INSPECTIONS

AS/SVE operations began on 21 December 2009 following start-up testing. The construction inspection, as required in the RAWP, was conducted on 29 October 2009 with representatives from DLA, USEPA, TDEC and HDR. The inspection to determine whether RA-C was complete and consistent with the plans was described in Section 3.7.1.

Due to delays in system delivery and power connection, the system was not yet operational at the time of the inspection. Construction activities and deviations from the RAWP, which were few and minor, were discussed. The AS/SVE equipment compound was visited to view system components and discuss general operations. A post-startup list of action items was provided. The action items were completed and system operations began on 21 December 2009. Completion of the action items and system status at startup was described in a memorandum as agreed during the inspection and the information is included in Section 3.7.2. There are no outstanding items or deficiencies.

AS/SVE operations were incorporated in MSCHD Permit #01030-01P issued for the FSVE. Permit conditions include maintaining VOC emissions below 5.71 lb/hr or 25 tons per year with documentation provided in an annual emissions report. Annual emissions reports for 2009 and 2010, including the FSVE and AS/SVE systems, have been submitted to MSCHD.

6.2 HEALTH AND SAFETY

Field activities were performed under the guidelines in the *Dunn Field Off Depot Groundwater Remedial Action Site Safety And Health Plan, Rev. 2* (HDR, 2009d). The plan includes general site information, key personnel responsibilities, required training and medical monitoring, PPE and respiratory protection. The plans also provide contaminant fact sheets, hazard analyses for tasks to be performed and specific safe work practices for tasks.

Health and safety issues were discussed daily and documented in the Daily Tailgate Safety Meeting notes. There was one injury during construction. A driller’s assistant fell into an 8-inch gap between the drill rig and the support truck on 22 July 2009; the worker’s arm was lacerated and required stitches. WDC reviewed the accident in accordance with their incident notification and investigation procedures and developed action items to prevent similar problems in future. AFCEE and DLA were notified. The

AFCEE contract officer's representative performed an unrelated site inspection on 27 July 2009; no other issues were identified.

6.3 INSTITUTIONAL CONTROLS

LUCs for Dunn Field are described in the Land Use Control Implementation Plan (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. LUCs will limit use of the Disposal Area to light industrial land uses, prevent residential use of Dunn Field, and prevent exposure to contaminated groundwater. 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 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 8-10 July 2009 and 22 July 2010. No deficiencies were identified. The reports were prepared and distributed in accordance with the LUCIP.

6.4 OPERATING PROPERLY AND SUCCESSFULLY

Requirements for operating properly and successfully (OPS) are described in *Guidance for Evaluation of Federal Agency Demonstrations that Remedial Actions are Operating Properly and Successfully Under CERCLA Section 120(h)(3)* (USEPA, 1996). An OPS demonstration is applicable where the federal agency is implementing an ongoing RA and desires to transfer the property before the remedial objectives have been met. Since the Off Depot area is not federal property, an OPS determination is not applicable.

7.0 OPERATION AND MAINTENANCE ACTIVITIES

The AS/SVE system is expected to operate for 5 years in order to meet RAOs. Monitoring of system operations and performance, and system maintenance will be performed regularly throughout the operating period.

7.1 AS/SVE OPERATIONS

7.1.1 Standard Operations

AS/SVE operations began 21 December 2009. System operations were described in Section 3.8 and are summarized below.

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

AS injection rates have averaged 285 scfm and combined flow from all SVE wells has averaged 1093 scfm at 9.8 in. Hg with both blowers and 695 scfm at 5.8 in. Hg with a single blower. The SVE system was initially operated with two blowers during the day and one blower on nights and weekends due to noise complaints from a nearby resident. The SVE system was operated with both blowers full-time beginning 7 May 2010. The SVE wells were initially operated in the 100% open position but adjustments have been made to balance flow rates, which averaged 49 to 148 acfm.

Extracted vapor from the individual wells combine in a single 6-inch header at the piping manifold outside the SVE building. The vapor stream passes through the AWS tank to remove entrained vapor and debris from the air stream. No other treatment is performed prior to discharge.

Condensate from SVE operations is collected in a 160-gallon cylindrical AWS, which separates entrained liquid and debris within the air stream. Condensate is transferred from the AWS to a 505-gallon polyethylene tank outside the SVE building. Once the exterior tank nears capacity, water is pumped to a trailer-mounted transfer tank and transferred to a storage tank near the FSVE building on Dunn Field. Wastewater was discharged to the City of Memphis sewer under an industrial discharge agreement until February 2011; each discharge was approved following submittal of a one-time discharge request and analytical results. The City of Memphis is currently not authorized to accept wastewater from CERCLA sites, and alternatives for disposal are being reviewed with TDEC. When the Dunn Field storage tank nears capacity, the wastewater will be discharged through an approved procedure; waste disposal activities will be described in annual reports

7.1.2 System Inspections and Maintenance

General preventative maintenance is performed after weekly system readings are recorded: checking the oil level in the compressor and adding oil as necessary, checking and cleaning air filter mats in the compressor control panel, and checking automatic drains in the refrigerated dryer. Monthly preventative maintenance includes cleaning the compressor and dryer heat exchange radiators, emptying moisture from the compressor vacuum line, checking air intake filters for the AS building, checking and tightening blower v-belts, and checking SVE blower oil levels and adding oil as necessary. Field notes are recorded on maintenance and inspection forms. General housekeeping of the AS and SVE buildings and equipment compound is performed as needed.

7.1.3 Operational Changes

Increased CVOC concentrations in groundwater at the southern edge of the TA were observed in September 2010. The groundwater contours and increased concentrations indicated groundwater flow was diverted around the AS/SVE system, probably due to decreased permeability from the air injection.

The RD assumed a groundwater flow rate of 0.1 feet/day, while the estimated rate from the reported average hydraulic conductivity (37 feet/day), groundwater gradient (0.003) and porosity (0.3) is 0.4 feet/day. If the distance between the two rows of primary AS points (15 feet) is conservatively assumed to be the treatment path; the groundwater travel time through the TA is 37.5 to 150 days. Given the reduced upgradient concentrations and the estimated travel time, operating the AS points for 2 days per week (Monday and Thursday) should provide adequate treatment while decreasing plume diversion. The change in AS operations was implemented on 24 November 2010. Both SVE blowers are operated during air injection, and one blower is operated at other times. Following review of the January 2011 performance monitoring results, system operations were increased to 3 days per week on 14 March 2011.

7.2 PERFORMANCE MONITORING

Performance monitoring of the AS/SVE operations consists of vacuum measurements at VMPs; PID readings at the system effluent, SVE wells and VMPs; and laboratory analysis of vapor samples from the system effluent. PID readings at the SVE well manifold and the system effluent are recorded weekly; PID readings and vacuum measurements at VMPs are collected monthly; and vapor samples at the system effluent are collected quarterly.

Overall effectiveness of the AS/SVE system is evaluated through groundwater performance monitoring. The treatment goal for the AS/SVE system is to reduce groundwater concentrations downgradient of AS/SVE barrier below 50 µg/L for individual CVOCs. PMWs were sampled quarterly during Year 1 and will be sampled semiannually during Year 2. After Year 2, the PMWs will be incorporated in LTM.

7.3 SYSTEM SHUTDOWN

AS/SVE system operations will be shutdown when upgradient groundwater concentrations reach 50 µg/L for individual CVOCs. Further treatment will not be necessary unless upgradient concentrations rebound.

7.4 FUTURE RESTORATION ACTIVITIES

No further RA is planned at DDMT. The NPL site status was changed to Construction Complete in May 2010. Operation of the FSVE and AS/SVE systems and natural attenuation are expected to achieve the RGs for groundwater in the Dunn Field ROD over time.

8.0 COST SUMMARY

Remedy costs were provided in the ROD Amendment, as shown in the following table.

	Capital Cost	O&M Cost	Present Worth
Original Remedy – PRB and MNA	$2,686,946	$1,067,400	$3,754,346
Amended Remedy – AS-SVE and MNA	$2,549,069	$2,369,658	$4,918,727

Costs for the Original Remedy for Off Depot groundwater were taken from the ROD (Table 2-22c) and were not adjusted for inflation since preparation of the estimate in 2003. The groundwater remedy costs in the ROD were adjusted to omit ZVI injections since that component of the groundwater remedy is included in the Source Areas RA. Costs for the Amended Remedy were taken from the Off Depot RD, Table 7-1b. The operations and maintenance (O&M) costs for the amended remedy are higher than the original remedy. The amended remedy estimated costs include operation of the AS/SVE system for 5 years and 30 years of groundwater monitoring while the ROD estimated costs include no operating costs for the PRB and only 15 years of monitoring.

The actual costs incurred or obligated for construction and operation of the AS/SVE system and the estimated costs for operations, monitoring and reporting are shown on Table 39. The AS/SVE system is in the second year of operations, therefore actual costs are only available for construction and Year 1 operations, monitoring and reporting. However, annual costs for Years 2 and 3 are established in task orders. The Year 3 costs are assumed to reflect operating, monitoring and reporting costs for the remaining period of operations (Years 4 and 5). The monitoring and reporting costs for Years 6 through 20 are estimated based on expected reductions in sampling frequency and number of monitoring wells. The present worth (PW) costs were adjusted based on real discount rates in OMB Circular A-94; costs for Years 4 and 5 were adjusted based on the 3-year discount rate (0 percent) and groundwater monitoring costs for Years 6 through 20 were adjusted based on the 20-year discount rate (2.1 percent).

Activity	Capital Costs	Annual Operations PW Cost	Total PW Cost
Actual Capital Costs and Estimated Operations			
AS/SVE	$2,217,837	$2,961,333	$5,179,170

The total PW cost for the Off Depot groundwater remedy is 105 percent of the Amended Remedy estimate. The O&M costs for the Amended Remedy in the Off Depot RD include 30 years of monitoring, while the current estimated total PW cost includes a 20-year groundwater monitoring period; the reduced monitoring period is considered appropriate based on the significant reduction in CVOC concentrations (see Figure 28) since the beginning of remedial action for subsurface soil in 2007. Also, the costs in the Off Depot RD estimate were adjusted using a 4 percent discount rate, while discount rates of 0 and 2.1 percent were used in the current estimate.

9.0 CONTACT INFORMATION

Contact information for project participants is provided below.

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TABLES

TABLE 1
REMEDIATION GOALS FROM DUNN FIELD RECORD OF DECISION
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - 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
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
ppbv = parts per billion per volume
— = Not available for groundwater cleanup goals because of low number of detections or detected values consistently less than MCLs.

TABLE 2
CHANGES TO DRILLING LOCATIONS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Change (ft)	Direction	Reason
MW-241	10	S	Overhead Power Lines
MW-242	7	SW	Power pole
MW-248	65	N	Residential driveways
MW-249	46	SW	Residential property
MW-250	36	NNW	Overhead Power Lines
SVE-6	4	SE	Underground utility
SVE-11	3	S	Underground utility
SVE- 12	8	S	Underground utility
VMP-2	10	S	Overhead Power Lines
VMP-5	4	S	Overhead Power Lines
AS-47	1	SW	Underground utility
AS-48	3	W	Underground utility
AS-49	3	S	Underground utility
AS-51	3	S	Underground utility
AS-54	3	W	Underground utility
AS-63	3	NW	Underground utility
AS-61	6	SW	Underground utility
AS-75	9	S	Underground utility
AS-76	3	S	Underground utility
AS-77	6	S	Underground utility
AS-79	4	S	Underground utility
AS-82	5	S	Underground utility
AS-86	3	N	Underground utility
AS-87	8	SSE	Underground utility
AS-88	9	SSE	Underground utility
AS-89	4	SSE	Underground utility
AS-90	3	SSE	Underground utility

Notes:
ft: feet

TABLE 3
PERFORMANCE MONITORING WELL INSTALLATION SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Completed	Northing	Easting	Location	Aquifer Screened	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Surface Casing Depth (ft, bgs)	Total Boring Depth (ft, bgs)	Groundwater Elevation (ft, msl)	Top of Clay Elevation (ft, msl)	Fluvial Aquifer Thickness (ft)	Screen Length (ft)	Total Well depth (ft, btoc)
MW-241	6/22/2009	281389.92	801396.74	Offsite DF	Fluvial	292.82	NS	NA	95.0	216.71	202.8	13.9	15	88.6
MW-242	6/21/2009	281297.31	801228.65	Offsite DF	Fluvial	295.40	295.94	NA	105.0	215.56	197.9	17.6	15	88.5
MW-243	6/28/2009	281370.62	801116.45	Offsite DF	Fluvial	292.26	292.53	NA	106.0	215.16	192.5	22.6	20	101.0
MW-244	6/29/2009	281333.49	801101.07	Offsite DF	Fluvial	288.72	289.45	NA	106.0	215.17	192.5	22.7	20	96.6
MW-245	6/29/2009	281379.56	801035.07	Offsite DF	Fluvial	290.13	290.55	NA	110.0	214.96	185.6	29.4	20	105.0
MW-246	6/29/2009	281387.26	800951.62	Offsite DF	Fluvial	288.17	288.49	NA	115.0	214.83	182.5	32.3	20	105.5
MW-247	6/17/2009	281319.67	800900.12	Offsite DF	Fluvial	285.70	286.16	NA	102.0	215.16	185.2	30.0	20	101.3
MW-248	7/7/2009	281253.66	800720.22	Offsite DF	Fluvial	275.45	275.93	NA	95.0	214.80	185.9	28.9	20	87.8
MW-249	6/17/2009	281029.63	800789.83	Offsite DF	Fluvial	285.53	285.89	NA	106.5	214.94	187.9	27.1	20	98.3
MW-250	6/29/2009	281045.53	800900.38	Offsite DF	Intermediate	289.66	290.19	106.0	185.0	158.03	190.2	NM	15	184.0
MW-251	6/28/2009	281211.70	801021.75	Offsite DF	Intermediate	285.83	286.16	105.0	175.5	158.19	191.2	NM	15	175.5

Notes:
ft: feet
ft, bgs: feet below ground surface
ft, btoc: feet below top of casing
ft, msl: feet mean sea level
NS: Not surveyed
NM: Not measured
NA: Not applicable

TABLE 4
WELL DEVELOPMENT SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

			Final Stabilization Parameters			
Well ID	Date Developed	Volume Purged (gallons)	pH	Specific Conductivity (mS/cm)	Turbidity (NTUs)	Temperature (˚C)
MW-241	7/24/2009	57	5.9	0.327	4.2	20.5
MW-242	7/21/2009	95	6.4	0.372	4.0	10.1
MW-243	7/22/2009	117	6.5	0.368	9.5	18.8
MW-244	7/21/2009	107	6.9	0.445	9.9	18.5
MW-245	7/22/2009	104	6.4	0.340	9.7	19.4
MW-246	7/23/2009	200	6.8	0.360	8.3	19.9
MW-247	7/29/2009	392	6.4	0.432	3.2	19.0
MW-248	7/22/2009	265	5.6	0.244	5.1	19.7
MW-249	7/25/2009	238	6.0	0.354	2.4	17.9
MW-250	7/25/2009	192	6.2	0.333	9.8	19.2
MW-251	7/23/2009	261	6.1	0.355	8.7	18.8

Notes:
˚C: degrees Celsius
mS/cm: milliSiemens per centimeter
NTUs: nephelometric turbidity units

TABLE 5
WELL ABANDONMENT SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Abandoned	Northing	Easting	Ground Elevation (msl)	Measured Depth (ft)
MW-02	7/27/2009	281693.78	802244.75	289.70	31.6
MW-12	7/27/2009	281067.19	802071.22	301.70	83.3
MW-29	7/27/2009	282104.92	802863.96	273.35	53.5
MW-30	7/29/2009	282229.19	802013.96	274.10	58.6
MW-35	7/27/2009	281072.31	802070.44	301.70	89.2
MW-40	7/28/2009	282460.42	800948.23	262.50	95.2
MW-56	7/27/2009	279708.26	801971.55	293.50	69.4
MW-59	7/27/2009	281333.67	802252.00	300.40	82.1
MW-60	7/27/2009	281424.39	802282.05	297.20	81.6
MW-61	7/27/2009	281585.68	802347.35	294.20	78.4
MW-95	7/28/2009	282707.50	801850.21	259.70	58.6
MW-156	7/28/2009	281143.44	800408.84	269.21	70.2
MW-168	7/29/2009	281903.51	801003.88	284.17	120.3
MW-168A	7/29/2009	281896.50	800996.51	283.56	88.0
MW-183	7/29/2009	280526.52	800613.05	272.93	174.0
MW-189	7/29/2009	281115.99	801587.43	296.65	87.2
MW-191	7/29/2009	281133.68	801546.91	292.04	77.8
MW-192	7/29/2009	281156.67	801555.48	293.59	78.0
MW-193	7/29/2009	281167.35	801531.90	293.64	82.1
MW-194	7/29/2009	281115.71	801567.74	293.64	84.2
MW-195	7/29/2009	281139.31	801566.63	294.30	80.0
MW-196	7/29/2009	281145.94	801576.20	295.30	76.1
MW-196B	7/29/2009	281152.42	801579.89	295.32	77.6
MW-196C	7/29/2009	281146.15	801552.09	293.32	80.0
MW-233	7/27/2009	280953.43	801628.61	289.68	67.8
MW-236	7/28/2009	283535.07	800762.86	261.53	35.2
MW-238	7/27/2009	280918.68	802082.45	300.70	189.7
PZ-02	7/28/2009	282748.00	803373.00	285.00	53.5

Notes:
ft: feet
msl: mean sea level

TABLE 6
BASELINE WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 27-Jul-2009 (ft, btoc)	Groundwater Elevation 27-Jul-2009 (ft, msl)
MW-03	Fluvial	292.35	226.85	65.26	227.09
MW-04	Fluvial	301.61	241.61	72.95	228.66
MW-05	Fluvial	304.64	244.64	77.46	227.18
MW-06	Fluvial	289.11	238.11	61.87	227.24
MW-07	Fluvial	295.10	228.10	64.78	230.32
MW-08	Fluvial	292.59	236.09	60.56	232.03
MW-10	Fluvial	288.79	230.19	NA	--
MW-13	Fluvial	300.01	234.01	71.75	228.26
MW-14	Fluvial	302.22	237.22	72.96	229.26
MW-15	Fluvial	295.12	231.72	67.26	227.86
MW-28	Fluvial	294.79	240.49	54.86	239.93
MW-31	Fluvial	290.37	226.27	68.11	222.26
MW-32	Fluvial	285.38	232.68	62.08	223.30
MW-33	Fluvial	280.71	236.11	54.75	225.96
MW-37	Intermediate	284.91	119.21	127.27	157.64
MW-42	Fluvial	274.83	225.83	56.37	218.46
MW-43	Intermediate	284.99	123.49	124.96	160.03
MW-44	Fluvial	269.07	205.07	54.33	214.74
MW-45	Fluvial	293.22	235.22	58.62	234.60
MW-51	Fluvial	275.23	220.23	47.90	227.33
MW-54	Fluvial	295.35	210.85	79.76	215.59
MW-57	Fluvial	290.77	230.77	62.74	228.03
MW-58	Fluvial	290.51	233.51	62.95	227.56
MW-65	Fluvial	263.22	222.42	7.87	255.35
MW-67	Memphis	278.21	18.21	121.00	157.21
MW-68[1]	Fluvial	291.69	219.19	70.94	220.75
MW-69	Fluvial	307.02	224.94	80.50	226.52
MW-70	Fluvial	304.99	224.18	78.33	226.66
MW-71	Fluvial	294.40	228.90	68.14	226.26
MW-74	Fluvial	303.68	233.68	76.46	227.22
MW-75	Fluvial	303.61	232.61	76.60	227.01
MW-76	Fluvial	302.71	229.71	83.42	219.29
MW-77	Fluvial	304.42	236.42	79.83	224.59
MW-78	Fluvial	275.00	230.50	46.40	228.60
MW-79	Fluvial	285.03	202.53	70.55	214.48
MW-80	Fluvial	273.81	220.81	59.65	214.16
MW-87	Fluvial	294.93	231.93	67.50	227.43
MW-91	Fluvial	291.99	236.99	64.42	227.57
MW-126	Fluvial	252.22	236.22	17.89	234.33
MW-127	Fluvial	268.71	208.71	59.36	209.35
MW-128	Fluvial	284.14	229.39	39.59	244.55
MW-129	Fluvial	293.01	228.01	54.50	238.51
MW-130	Fluvial	293.20	233.70	53.85	239.35
MW-132	Fluvial	300.73	227.23	73.74	226.99
MW-134	Fluvial	300.81	225.81	NA	--
MW-144	Fluvial	291.60	235.10	72.85	218.75
MW-145	Fluvial	284.72	204.72	69.77	214.95
MW-147	Fluvial	289.72	229.72	69.77	219.95
MW-148	Fluvial	294.71	224.71	77.23	217.48
MW-149	Fluvial	287.18	205.78	72.04	215.14
MW-150	Fluvial	296.81	225.61	80.83	215.98
MW-151	Fluvial	284.27	207.27	69.20	215.07

TABLE 6
BASELINE WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 27-Jul-2009 (ft, btoc)	Groundwater Elevation 27-Jul-2009 (ft, msl)
MW-152	Fluvial	289.59	198.59	NA	--
MW-153	Fluvial	279.17	203.17	64.81	214.36
MW-154	Fluvial	273.81	220.81	57.65	216.16
MW-155	Fluvial	291.65	214.65	76.06	215.59
MW-157	Fluvial	286.78	229.78	69.84	216.94
MW-158	Fluvial	294.07	203.06	79.13	214.94
MW-158A	Fluvial	293.95	216.03	79.05	214.90
MW-159	Fluvial	286.33	205.89	71.23	215.10
MW-160	Fluvial	294.00	228.13	77.72	216.28
MW-161	Fluvial	296.40	234.60	76.45	219.95
MW-162	Fluvial	299.70	233.39	80.03	219.67
MW-163	Fluvial	290.63	234.42	72.40	218.23
MW-164	Fluvial	287.48	231.86	68.56	218.92
MW-165	Fluvial	287.06	198.43	72.22	214.84
MW-165A	Fluvial	287.26	215.96	72.47	214.79
MW-166	Fluvial	283.44	199.59	67.77	215.67
MW-166A	Fluvial	283.45	215.15	67.92	215.53
MW-167	Fluvial	284.82	214.68	70.30	214.52
MW-169	Fluvial/Intermed	261.90	194.12	76.20	185.70
MW-170	Fluvial	273.75	214.14	57.44	216.31
MW-171	Fluvial	270.69	217.72	55.55	215.14
MW-172	Fluvial	300.28	232.28	72.23	228.05
MW-174	Fluvial	296.56	229.56	68.56	228.00
MW-175	Fluvial	291.63	224.13	63.59	228.04
MW-176[1]	Fluvial	299.68	223.68	75.15	224.53
MW-178	Fluvial	300.26	224.26	71.50	228.76
MW-179	Fluvial	301.16	224.16	73.63	227.53
MW-180	Fluvial	296.14	224.14	68.83	227.31
MW-182	Fluvial	275.40	213.40	63.89	211.51
MW-184	Fluvial	283.12	225.12	64.53	218.59
MW-185	Fluvial	256.71	171.71	75.42	181.29
MW-186	Fluvial	256.31	108.31	106.18	150.13
MW-187	Fluvial	302.74	226.74	74.30	228.44
MW-190	Fluvial	297.32	219.32	77.43	219.89
MW-220	Fluvial	293.29	228.35	65.50	227.79
MW-221	Fluvial	301.52	228.40	74.44	227.08
MW-222	Fluvial	303.82	229.64	75.90	227.92
MW-223	Fluvial	303.00	229.13	75.03	227.97
MW-224	Fluvial	304.13	230.42	76.42	227.71
MW-225	Fluvial	304.52	229.54	77.15	227.37
MW-226	Fluvial	303.19	228.97	75.30	227.89
MW-227	Fluvial	299.70	236.06	71.44	228.26
MW-228	Fluvial	301.65	237.56	73.38	228.27
MW-230	Fluvial	286.57	227.32	53.62	232.95
MW-231	Intermediate	289.18	121.43	131.42	157.76
MW-232	Intermediate	285.18	135.13	126.55	158.63
MW-234	Intermediate	291.50	124.91	133.26	158.24
MW-235	Fluvial	264.00	213.41	54.66	169.34
MW-237	Intermediate	289.18	122.73	130.00	159.18
MW-239	Intermediate	288.44	122.97	129.43	159.01
MW-240	Intermediate	259.28	172.71	76.11	183.17
MW-241	Fluvial	292.82	219.57	76.11	216.71

TABLE 6
BASELINE WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 27-Jul-2009 (ft, btoc)	Groundwater Elevation 27-Jul-2009 (ft, msl)
MW-242	Fluvial	295.40	222.20	79.84	215.56
MW-243	Fluvial	292.26	211.56	77.10	215.16
MW-244	Fluvial	288.72	212.39	73.55	215.17
MW-245	Fluvial	290.13	205.40	75.17	214.96
MW-246	Fluvial	288.17	202.97	73.34	214.83
MW-248	Fluvial	275.45	207.94	60.65	214.80
MW-249	Fluvial	285.53	207.49	70.59	214.94
MW-250	Intermediate	289.66	120.96	131.63	158.03
MW-251	Intermediate	285.83	125.63	127.64	158.19

Notes:
1) Measurements at MW-68 and MW-176 questionable; not used for water level contours.
ft, btoc: feet below top of casing
ft, msl: feet mean seal level
NA: Well not accessible

TABLE 7
PERFORMANCE MONITORING SCHEDULE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Baseline Jun-Jul 2009	Year 1 - Quarterly Oct 2009	Mar 2010	Jun 2010	Sep 2010	Jan 2011	Year 2 - Semiannual Mar 2011	Sep 2011
MW-54	Fluvial	S	S	S	S	S	S	P	P
MW-70	Fluvial	S	S	S	S	S	S	P	P
MW-76	Fluvial	S	S	S	S	S	S	P	P
MW-77	Fluvial	S	S	S	S	S	S	P	P
MW-79	Fluvial	S	S	S	S	S	S	P	P
MW-148	Fluvial	S	S	S	S	S	S	P	P
MW-149	Fluvial	S	S	S	S	S	S	P	P
MW-150	Fluvial	S	S	S	S	S	S	P	P
MW-151	Fluvial	S	S	S	S	S	S	P	P
MW-152	Fluvial	S	S	S	S	S	S	P	P
MW-155	Fluvial	S	S	S	S	S	S	P	P
MW-157	Fluvial	S	S	S	S	S	S	P	P
MW-158	Fluvial	S	S	S	S	S	S	P	P
MW-158A	Fluvial	S	S	S	S	S	S	P	P
MW-159	Fluvial	S	S	S	S	S	S	P	P
MW-160	Fluvial	S	S	S	LF	S	LF	P	P
MW-161	Fluvial	S	S	S	S	S	S	P	P
MW-162	Fluvial	S	S	S	S	S	S	P	P
MW-163	Fluvial	LF	LF	LF	S	S	S	P	P
MW-164	Fluvial	S	S	S	S	S	S	P	P
MW-165	Fluvial	S	S	S	S	S	S	P	P
MW-165A	Fluvial	S	S	S	S	S	S	P	P
MW-166	Fluvial	S	S	S	S	S	S	P	P
MW-166A	Fluvial	S	S	S	S	S	S	P	P
MW-232	Intermediate	S	S	S	S	S	-	P	P
MW-241	Fluvial	LF	S	S	S	S	S	P	P
MW-242	Fluvial	LF	S	S	S	S	S	P	P
MW-243	Fluvial	LF	S	S	S	S	S	P	P
MW-244	Fluvial	LF	S	S	S	S	S	P	P
MW-245	Fluvial	LF	S	S	S	S	S	P	P
MW-246	Fluvial	LF	S	S	S	S	S	P	P
MW-247	Fluvial	LF	S	S	S	S	S	P	P
MW-248	Fluvial	LF	S	S	S	S	S	P	P
MW-249	Fluvial	LF	S	S	S	S	S	P	P
MW-250	Intermediate	LF	S	S	S	S	-	P	P
MW-251	Intermediate	LF	S	S	S	S	-	P	P

Notes:
LF: Sample collected using low-flow purging methods.
P: Sample planned.
S: PDB sample collected at mid-point of saturated screened interv
-: Sample not planned or collected

TABLE 8
BASELINE WELL STABILIZATION SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Sample Date	Sample Time	Sample Depth (ft, btoc)	Water Depth (ft, btoc)	Purge Rate (mL/min)	Volume Purged (Liters)	pH	Temp (˚C)	Specific Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTUs)
MW-163	7/30/2009	11:40	74.3	72.35	160	9.7	5.9	20.9	0.263	4.0	188.2	19.7
MW-241	7/28/2009	10:55	82.8	76.04	260	30.9	5.9	18.4	0.305	5.2	185.2	16.5
MW-242	7/29/2009	14:07	84.1	79.73	320	12.8	6.5	18.8	0.364	0.4	-35.5	14.6
MW-243	7/28/2009	13:25	95.4	77.02	270	32.5	6.3	18.8	0.300	2.5	55.8	16.9
MW-244	7/30/2009	10:30	91.7	73.52	50	6.2	6.6	20.0	0.490	1.5	-44.5	69.4
MW-245	7/28/2009	16:25	99.5	75.05	140	16.9	6.4	19.8	0.305	0.0	34.3	18.2
MW-246	7/27/2009	17:25	98.8	73.29	225	27.1	6.6	19.4	0.335	3.2	39.4	46.1
MW-247	7/30/2009	9:42	97.0	71.15	160	19.7	6.1	19.9	0.359	7.1	74.1	64.6
MW-248	7/27/2009	14:32	80.8	60.65	300	11.9	5.5	21.1	0.202	6.5	185.0	20.0
MW-249	7/29/2009	16:43	73.0	70.44	280	34.0	6.2	17.8	0.348	4.3	105.6	46.9
MW-250	7/29/2009	12:45	178.6	132.11	300	36.9	6.2	18.2	0.293	3.8	57.6	33.7
MW-251	7/29/2009	10:05	170.3	125.04	300	36.0	6.1	18.1	0.320	7.4	144.2	133.0

Notes:

˚C : degrees Celsius
DO: Dissolved Oxygen
ft, btoc: feet below top of casing
L: liters
mg/L: milligrams per liter
mL/min: milliliters per minute
mS/cm: milliSiemens per centimeter
mV: millivolts
NA: not available
NTU: nephelometric turbidity unit
ORP: Oxidation Reduction Potential

TABLE 9
GROUNDWATER ANALYTICAL RESULTS SUMMARY, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MCL	TC	MW-54 L09060246-02 6/8/2009	MW-70 L09070713-01 7/30/2009	MW-76 L09070713-04 7/30/2009	MW-77 L09070713-05 7/30/2009	MW-79 L09060246-18 6/8/2009	MW-148 L09060246-04 6/8/2009	MW-149 L09060246-06 6/8/2009
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**842**	**0.594**	**1.11**	**27.2**	<0.5	0.263 J	**8.51**
1,1,2-Trichloroethane	µg/L	5	1.9	**4.15**	<1	<1	<1	<1	<1	0.355 J
1,1-Dichloroethene	µg/L	7	7	<2	<1	<1	<1	**1.17**	<1	<1
1,2-Dichloroethane	µg/L	5	--	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	0.745 J	<1	<1	<1	<1	<1	**4.46**
Chloroform	µg/L	80	12	**3.15**	<0.3	0.146 J	0.153 J	<0.3	0.137 J	**31.7**
cis-1,2-Dichloroethene	µg/L	70	35	**25.9**	<1	<1	0.52 J	<1	<1	**2.24**
Tetrachloroethene	µg/L	5	2.5	**5.01**	0.582 J	0.444 J	0.619 J	0.536 J	0.36 J	0.776 J
trans-1,2-Dichloroethene	µg/L	100	50	**4.1**	<1	<1	<1	<1	<1	0.382 J
Trichloroethene	µg/L	5	5	**744**	**2.66**	**3.26**	**23.6**	0.501 J	**1.78**	**24.9**
Vinyl chloride	µg/L	2	--	<2	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				1629	3.84	4.96	52.1	2.21	2.54	73.3
Other VOCs										
1,4-Dichlorobenzene	µg/L	--	--	<1	<0.5	<0.5	<0.5	0.168 B	0.204 B	0.14 B
Acetone	µg/L	--	--	19.2 J	**10.7 B**	**14.6 B**	**21.4 B**	**18.4**	5.57 J	**18.8**
Chlorobenzene	µg/L	100	--	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL: Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
B: Analyte detected in associated blank
J: Analyte positively identified; quantitation estimated.

Method:
8260B: Volatile Organic Compounds

TABLE 9
GROUNDWATER ANALYTICAL RESULTS SUMMARY, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MCL	TC	MW-150 / L09060246-01 / 6/8/2009	MW-151 / L09060246-12 / 6/8/2009	MW-152 / L09060246-17 / 6/8/2009	MW-155 / L09060246-03 / 6/8/2009	MW-157 / L09070713-06 / 7/30/2009	MW-158 / L09060246-15 / 6/8/2009	MW-158A / L09060246-16 / 6/8/2009
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**618**	<0.5	**3.33**	**1610**	**5.06**	**5.84**	**255**
1,1,2-Trichloroethane	µg/L	5	1.9	3.21 J	<1	<2	5.28 J	<1	<1	**5.1**
1,1-Dichloroethene	µg/L	7	7	<5	<1	<2	<10	<1	<1	<2
1,2-Dichloroethane	µg/L	5	--	<2.5	<0.5	<1	<5	<0.5	<0.5	<1
Carbon tetrachloride	µg/L	5	3	<5	0.774 J	<2	<10	**3.35**	<1	<2
Chloroform	µg/L	80	12	<1.5	**1.81**	**2.03**	<3	**9.88**	**0.758**	**0.876**
cis-1,2-Dichloroethene	µg/L	70	35	**6.26**	<1	**39.9**	**16**	**12**	**11.6**	**64.2**
Tetrachloroethene	µg/L	5	2.5	3.36 J	<1	**7.4**	7.03 J	**2.05**	**3.88**	**2.92**
trans-1,2-Dichloroethene	µg/L	100	50	<5	<1	**13.1**	<10	**2.64**	**2.76**	**3.6**
Trichloroethene	µg/L	5	5	**311**	**5.1**	**241**	**643**	**205**	**141**	**304**
Vinyl chloride	µg/L	2	--	<5	<1	<2	<10	<1	<1	**2.82**
Total Primary CVOCs				942	7.68	307	2281	240	166	636
Other VOCs										
1,4-Dichlorobenzene	µg/L	--	--	<2.5	0.128 B	<1	<5	0.167 B	<0.5	<1
Acetone	µg/L	--	--	20.6 J	**18.3**	19.3 J	<100	**33.9 B**	**17.9**	18.9 J
Chlorobenzene	µg/L	100	--	<2.5	<0.5	<1	<5	<0.5	<0.5	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL: Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
B: Analyte detected in associated blank
J: Analyte positively identified; quantitation estimated.

Method:
8260B: Volatile Organic Compounds

TABLE 9
GROUNDWATER ANALYTICAL RESULTS SUMMARY, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	**Well ID** / **Lab ID** / **Date** / **Units**	**MCL**	**TC**	MW-159 L09060246-11 6/8/2009	MW-160 L09060246-05 6/8/2009	MW-161 L09070713-07 7/30/2009	MW-162 L09070713-08 7/30/2009	MW-163 L09070713-09 7/30/2009	MW-164 L09070713-10 7/30/2009	MW-165 L09060246-13 6/8/2009
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**366**	**118**	**75.9**	**24.1**	**131**	**26.3**	**5.28**
1,1,2-Trichloroethane	µg/L	5	1.9	**92.2**	0.49 J	<1	<1	0.369 J	**1.27**	0.652 J
1,1-Dichloroethene	µg/L	7	7	<10	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<5	<0.5	<0.5	<0.5	<0.5	0.255 J	<0.5
Carbon tetrachloride	µg/L	5	3	<10	<1	<1	<1	<1	**8.71**	**2.93**
Chloroform	µg/L	80	12	<3	**0.811**	0.22 J	0.142 J	**0.4**	**79.5**	**13.5**
cis-1,2-Dichloroethene	µg/L	70	35	**248**	**1.23**	**1.34**	<1	**3.22**	**20.2**	**13.8**
Tetrachloroethene	µg/L	5	2.5	6.24 J	**1.34**	0.984 J	0.374 J	**1.23**	**1.52**	**1.93**
trans-1,2-Dichloroethene	µg/L	100	50	**17.5**	<1	<1	<1	0.327 J	**1.99**	**2.2**
Trichloroethene	µg/L	5	5	**1280**	**21.8**	**45.3**	**15.4**	**87.1**	**98.2**	**111**
Vinyl chloride	µg/L	2	--	3.83 J	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				2014	144	124	40	224	238	151
Other VOCs										
1,4-Dichlorobenzene	µg/L	--	--	<5	<0.5	<0.5	<0.5	<0.5	0.486 B	0.418 B
Acetone	µg/L	--	--	<100	**18**	**20.6 B**	**19.8 B**	<10	**18.5 B**	**18**
Chlorobenzene	µg/L	100	--	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL: Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
B: Analyte detected in associated blank
J: Analyte positively identified; quantitation estimated.

Method:
8260B: Volatile Organic Compounds

TABLE 9
GROUNDWATER ANALYTICAL RESULTS SUMMARY, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MCL	TC	MW-165A L09060246-14 6/8/2009	MW-166 L09060246-07 6/8/2009	MW-166A L09060246-08 6/8/2009	MW-169 L09060246-19 6/8/2009	MW-232 L09070713-20 7/29/2009	MW-241 L09070713-17 7/28/2009	MW-242 L09070713-21 7/29/2009
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**1.1**	**17.9**	**1.92**	<0.5	<0.5	**16.8**	**1040**
1,1,2-Trichloroethane	µg/L	5	1.9	0.388 J	0.729 J	<1	<1	<1	<1	**8**
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	**12.3**	**5**	<1	<1	<1	<1
Chloroform	µg/L	80	12	**1.94**	**95.8**	**16.4**	<0.3	<0.3	0.227 J	**0.897**
cis-1,2-Dichloroethene	µg/L	70	35	**5.3**	**5.57**	**1.85**	0.4 J	0.326 J	0.262 J	**21.6**
Tetrachloroethene	µg/L	5	2.5	0.906 J	**2.07**	0.725 J	<1	<1	<1	**4.54**
trans-1,2-Dichloroethene	µg/L	100	50	0.964 J	**1.17**	0.42 J	<1	<1	<1	**3.99**
Trichloroethene	µg/L	5	5	**91.5**	**63.3**	**22.1**	<1	0.393 J	**3.23**	**308**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	**1.51**	<1	<1
Total Primary CVOCs				102	199	48.4				
Other VOCs										
1,4-Dichlorobenzene	µg/L	--	--	<0.5	0.147 B	0.18 B	0.526 B	0.269 B	<0.5	<0.5
Acetone	µg/L	--	--	**18.6**	**20.7**	**17.7**	14.7	**17.4 B**	<10	<10
Chlorobenzene	µg/L	100	--	<0.5	<0.5	<0.5	2.32	<0.5	<0.5	<0.5

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL: Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
B: Analyte detected in associated blank
J: Analyte positively identified; quantitation estimated.

Method:
8260B: Volatile Organic Compounds

TABLE 9
GROUNDWATER ANALYTICAL RESULTS SUMMARY, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MCL	TC	MW-243 L09070713-18 7/28/2009	MW-244 L09070713-25 7/30/2009	MW-245 L09070713-19 7/28/2009	MW-246 L09070713-14 7/27/2009	MW-247 L09070713-11 7/30/2009	MW-248 L09070713-15 7/27/2009	MW-249 L09070713-22 7/29/2009
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**90**	**1620**	**312**	**1140**	**27.3**	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	**3.04**	**14.5**	**8.03**	**29.4**	**1.67**	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	**6.73**	**2.03**	**36.2**	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	0.29 J	**0.54**	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	**5.85**	<1	<1
Chloroform	µg/L	80	12	**0.315**	**1.55**	**0.438**	**0.829**	**193**	<0.3	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	**11.4**	**53.3**	**46.1**	**375**	**14.3**	<1	<1
Tetrachloroethene	µg/L	5	2.5	**2.77**	**3.17**	**6.38**	**5.3**	**3.81**	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	**3.75**	**5.4**	**14.1**	**18.1**	**2.38**	<1	<1
Trichloroethene	µg/L	5	5	**146**	**346**	**473**	**1000**	**134**	<1	<1
Vinyl chloride	µg/L	2	--	<1	**5.45**	0.503 J	**19.1**	<1	<1	<1
Total Primary CVOCs										
Other VOCs										
1,4-Dichlorobenzene	µg/L	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetone	µg/L	--	--	<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	µg/L	100	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL: Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
B: Analyte detected in associated blank
J: Analyte positively identified; quantitation estimated.

Method:
8260B: Volatile Organic Compounds

TABLE 9
GROUNDWATER ANALYTICAL RESULTS SUMMARY, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-250	MW-251
	Lab ID			L09070713-23	L09070713-24
	Date			7/29/2009	7/29/2009
Analyte	**Units**	**MCL**	**TC**		
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	**3.33**
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1
Chloroform	µg/L	80	12	<0.3	**0.313**
cis-1,2-Dichloroethene	µg/L	70	35	<1	<1
Tetrachloroethene	µg/L	5	2.5	<1	0.572 J
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1
Trichloroethene	µg/L	5	5	<1	0.707 J
Vinyl chloride	µg/L	2	--	<1	<1
Total Primary CVOCs					
Other VOCs					
1,4-Dichlorobenzene	µg/L	--	--	<0.5	<0.5
Acetone	µg/L	--	--	<10	<10
Chlorobenzene	µg/L	100	--	<0.5	<0.5

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL: Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
B: Analyte detected in associated blank
J: Analyte positively identified; quantitation estimated.

Method:
8260B: Volatile Organic Compounds

TABLE 10
SUMMARY OF PRIMARY CVOC RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - 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	28	1620	MW-244	-	24
1,1,2-Trichloroethane	5	1.9	10	92.2	MW-159	7	10
1,1-Dichloroethene	7	7	5	36.2	MW-246	1	1
1,2-Dichloroethane	5	--	1	0.54	MW-247	0	-
Carbon tetrachloride	5	3	7	12.3	MW-166	4	6
Chloroform	80	12	20	193	MW-247	2	6
cis-1,2-Dichloroethene	70	35	23	375	MW-246	2	6
Tetrachloroethene	5	2.5	16	7.4	MW-154	6	11
trans-1,2-Dichloroethene	100	50	15	18.1	MW-246	0	0
Trichloroethene	5	5	30	1280	MW-159	26	26
Vinyl chloride	2	--	4	19.1	MW-246	3	-

Notes:
µg/L: micrograms per liter
--: not listed
MCL: Maximum Contaminant Level
RL: reporting limit
TC: Target Concentration
VOC: volatile organic compound

TABLE 11
VAPOR INTRUSION SCREENING CONCENTRATIONS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Constituent	Groundwater Screening Value (µg/L)(a)	Soil Vapor Screening Value (µg/m^3) (b)	
		Residential	Non-Residential
Carbon tetrachloride	5	31	31
Chloroform	80	24	24
1,2-Dichloroethane	230	20	20
1,1-Dichloroethene	190	11,000	15,000
cis-1,2-Dichloroethene	210	1,800	2,600
trans-1,2-Dichloroethene	180	3,600	5,100
Methylene Chloride	580	190	430
1,1,2,2-Tetrachloroethane	30	34	34
Tetrachloroethene	11	34	36
1,1,2-Trichloroethane	41	27	27
Trichloroethene	5	27	27
Vinyl chloride	2.5	13	48

Notes:

(a) – Groundwater values from USEPA guidance. Table 2b in *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (2002)*

(b) – Soil vapor values from NJ DEP website.
http://www.nj.gov/dep/srp/guidance/vaporintrusion/whatsnew.htm#200703a

µg/L: micrograms per liter

µg/m^3: micrograms per cubic meter

TABLE 12
TARGET AREA PROPERTIES FOR VAPOR INTRUSION
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Owner	Address	Structure	ROE	VI Probes
Ever And Bessie L Merriweather Henderson	1796 Rozelle St	Crawl	Yes	-
Shelby County Tax Sale 0403 #9733	0 Rozelle St	None	Yes	VI-1
Bernard Moore	1803 Rozelle St	Slab	No	-
Shelby County Tax Sale 0102 #14457	1808 Rozelle St	None	Yes	-
C D & Estella M Dotson	1595 Menager Rd	Slab	No	-
Robert P Newman	1758 Meadowhill St	Slab	No	-
W F & Verda M Lowe	1764 Meadowhill St	Slab	Yes	VI-3,4,5
Oak Hill Baptist Church (Rev A. Mayes Jr.)	1725 Ragan St	Slab	No	-
Isaac And Verzelle Kennon	1729 Ragan St	Slab	Yes	-
Laverne Osborne	1733 Ragan St	Slab	Yes	VI-9
Annet Bolden	1739 Ragan St	Slab	Yes	VI-6,7,8
Frank Jones	1743 Ragan St	Slab	No	-

TABLE 13
VAPOR INTRUSION PROBE LOCATIONS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Probe ID	Property Address	Location on Property
VI-1	0 Rozelle St	Center of property, approx 67 feet from center of street.
VI-2	MLGW Property	Adjacent to MW155 and VMP-4
VI-3	1764 Meadowhill	South side, adjacent to house.
VI-4	1764 Meadowhill	East side, 38 feet from house at property line.
VI-5	1764 Meadowhill	North side, adjacent to house.
VI-6	1739 Regan	North side, near fence line approximately 27 feet ENE of house
VI-7	1739 Regan	East side, 11 feet from house near walkway.
VI-8	1739 Regan	South side, 5 feet from house on side of driveway.
VI-9	1733 Regan	East side, 6.5 feet from house near flower bed.

TABLE 14
VAPOR PROBE INSTALLATION SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Completed	Location	Bottom of Screen A (ft, bgs)	Bottom of Screen B (ft, bgs)	Screen Length (ft)	Total Well Depth (ft, bgs)	Total Boring Depth (ft, bgs)
VI-1	9/9/2009	Off Site DF	15.3	4.0	0.5	15.4	18
VI-2	9/9/2009	Off Site DF	15.3	5.3	0.5	15.4	18
VI-3	9/9/2009	Off Site DF	18.0	5.3	0.5	18.0	18
VI-4	9/10/2009	Off Site DF	15.3	5.3	0.5	15.3	18
VI-5	9/10/2009	Off Site DF	15.0	5.0	0.5	15.2	16
VI-6	9/10/2009	Off Site DF	15.3	5.3	0.5	15.4	18
VI-7	9/10/2009	Off Site DF	15.3	5.3	0.5	15.4	16
VI-8	9/10/2009	Off Site DF	15.0	5.0	0.5	15.2	16
VI-9	9/10/2009	Off Site DF	15.3	5.0	0.5	15.4	16

Notes:

ft: feet

ft, bgs: feet below ground surface

TABLE 15
SOIL SAMPLE GEOTECHNICAL RESULTS
OFF DEPOT GROUNDWATER INERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Sample ID	VI Well	Sample Depth (ft, bgs)	ASTM D 2216 Moisture Content (%)	ASTM D 2937 Bulk Density (pcf)	ASTM D 4318 Liquid Limit	Plastic Limit	Plasticity Limit	USC Classification	ASTM D 1140 Finer than #200 Seive (%)
VI-1-A	VI-1	15.5-16.5	16.2	101.9	34	22	12	CL	93.9
VI-1-B	VI-1	10.5-11.5	14.0	95.0	31	23	8	CL/ML	97.3
VI-1-C	VI-1	5.5-6.5	11.7	86.9	32	24	8	ML/CL	98.5
VI-2-A	VI-2	51-17	24.5	98.1	33	21	12	CL	94.0
VI-2-B	VI-2	10-12	23.6	96.8	28	25	3	ML	99.8
VI-2-C	VI-2	5-7	17.8	95.1	32	25	7	ML	99.4
VI-3-A	VI-3	15-17	24.5	100.0	35	22	13	CL	92.1
VI-3-B	VI-3	10-12	25.2	95.8	32	23	9	CL/ML	95.9
VI-3-C	VI-3	5-7	28.6	89.5	31	26	5	ML	99.2
VI-6-A	VI-6	15-17	13.2	98.8	31	22	9	CL	96.5
VI-6-B	VI-6	10-12	10.5	87.5	32	25	7	ML	99.2
VI-6-C	VI-6	5-7	16.8	90.4	39	24	15	CL	96.5

Notes:
200 Seive: mesh size equal to 0.0029 inches or 74 microns
%: percent
CL: Clay with a liquid limit less than 50 and more than 50 % passes through a # 200 Seive
ft, bgs: feet below ground surface
ML: Silt with a liquid limit less than 50 and more than 50 % passes through a # 200 Seive
pcf: Pounds Per Cubic Foot

TABLE 16
VAPOR ANALYTICAL RESULTS SUMMARY, VI BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Sample ID	VI-1A-BASE	VI-1B-BASE	VI-2A-BASE	VI-2B-BASE	VI-3A-BASE	VI-3B-BASE	VI-4A-BASE	VI-4B-BASE	VI-5A-BASE	VI-6A-BASE
	Lab ID	JA28198-1	JA28198-2	JA28198-3	JA28198-4	JA28198-9	JA28198-11	JA28198-12	JA28198-13	JA28198-14	JA28198-16
	Date	9/14/2009	9/14/2009	9/14/2009	9/14/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009
Primary CVOCs (μg/m^3)	Residential (a)										
1,1,2,2-Tetrachloroethane	34	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	27	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1-Dichloroethylene	11,000	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloroethane	20	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Carbon tetrachloride	31	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	24	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	2.3 J	<3.9	<3.9	<3.9
cis-1,2-Dichloroethylene	1,800	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Methylene chloride	190	4.2	7.3	2.8	2.6 J	<2.8	17	9.7	3.3	<2.8	<2.8
Tetrachloroethylene	34	5	2.9	3.7	3.5	<1.1	<1.1	5.7	<1.1	16 J	3.5
trans-1,2-Dichloroethylene	3,600	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Trichloroethylene	27	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86
Vinyl chloride	13	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Other VOCs (μg/m^3)											
1,2,4-Trimethylbenzene		97.8	3 J	9.3	30	<3.9	<3.9	69.3	2.4 J	285 J	54.6
1,3,5-Trimethylbenzene		29	<3.9	2.6 J	12	<3.9	<3.9	25	<3.9	89.5 J	19
2-Hexanone		6.1	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	3 J	<3.3
4-Ethyltoluene		13	<3.9	<3.9	3.2 J	<3.9	<3.9	12	<3.9	50.1 J	3.5 J
Acetone		105	42	29.2	24	15	35.4	33.7	14	72.2 J	37.5
Benzene		1.7 J	<2.6	<2.6	<2.6	1.6 J	4.8	1.5 J	<2.6	4.2	<2.6
Carbon disulfide		6.5	3.7	5	7.2	<2.5	1.5 J	6.9	2.6	18 J	<2.5
Chloromethane		<1.7	<1.7	<1.7	1.6 J	1.8	1.9	<1.7	1.3 J	1.5 J	<1.7
Dichlorodifluoromethane		2.8 J	2.9 J	3 J	2.6 J	3.1 J	3.7 J	2.9 J	3 J	3 J	2.2 J
Ethanol		30.7	53.1	<3.8	23.4	12 J	123	66.1	28.3	40.9	<3.8
Ethyl Acetate		<2.9	<2.9	<2.9	<2.9	<2.9	118	<2.9	<2.9	<2.9	<2.9
Ethylbenzene		15	<3.5	2.3 J	4	<3.5	1.7 J	13	<3.5	48.2 J	4.2
Freon 113		<6.1	<6.1	<6.1	<6.1	<6.1	9.2	<6.1	<6.1	<6.1	<6.1
Heptane		6.6	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	2 J	<3.3
Hexane		<2.8	<2.8	<2.8	<2.8	<2.8	7.4	<2.8	<2.8	2.2 J	<2.8
Isopropyl Alcohol		<2	<2	<2	<2	72.5 J	25.6	7.4	4.2	8.4	<2
m,p-Xylene		59.5	3 J	12	16	<3.5	6.9	50.8	3 J	215 J	14
Methyl ethyl ketone		11	5.9	2.7	2.6	<2.4	3.5	4.4	<2.4	11	5
Methyl Isobutyl Ketone		25	<3.3	<3.3	<3.3	<3.3	<3.3	1.9 J	<3.3	7	2.5 J
o-Xylene		23	<3.5	3.9	9.6	<3.5	3.5	19	<3.5	71.2 J	7.4
p-Dichlorobenzene		10	5.7	6	5.8	<4.8	<4.8	13	<4.8	2.9 J	<4.8
Propylene		<3.4	3.6	2.4 J	<3.4	<3.4	4.6	4.1	<3.4	17 J	<3.4
Tertiary Butyl Alcohol		2.5	<2.4	<2.4	2.5	<2.4	<2.4	<2.4	<2.4	<2.4	1.4 J
Tetrahydrofuran		20	3.5	7.4	5.3	<2.4	<2.4	7.7	<2.4	13 J	4.7
Toluene		40.7	3.7	5.3	5.3	1.4 J	20	10	2 J	51.3 J	3.2
Trichlorofluoromethane		2.1 J	4.4 J	<4.5	<4.5	<4.5	15	4.3 J	4 J	3.6 J	<4.5
Xylenes (total)		82.5	3 J	16	26	<3.5	10	69.9	3 J	287 J	22

Notes:
(a) Screening values from NJ DEP website
Results detected above RL shown in bold
<: Analyte not detected above RL
μg/m^3: micrograms per cubic meter
CVOC: chlorinated volatile organic compound
RL: Reporting Limit
VOC: volatile organic compound

DQE FLAGS:
J: Analyte identified; quantitation estimated.

TABLE 16
VAPOR ANALYTICAL RESULTS SUMMARY, VI BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Sample ID	VI-6B-BASE	VI-7A-BASE-1L	VI-7B-BASE	VI-8A-BASE	VI-8B-BASE	VI-9A-BASE	VI-9B-BASE	VMP-4A-BASE-1L	VMP-4B-BASE-1L
	Lab ID	JA28198-17	JA28198-18	JA28198-20	JA28198-21	JA28198-22	JA28198-23	JA28198-24	JA28198-5	JA28198-6
	Date	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/14/2009	9/14/2009
Primary CVOCs (µg/m^3)	Residential (a)									
1,1,2,2-Tetrachloroethane	34	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	1420	133
1,1,2-Trichloroethane	27	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<49	22
1,1-Dichloroethylene	11,000	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<36	<3.2
1,2-Dichloroethane	20	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<36	2.6 J
Carbon tetrachloride	31	<5	<5	<5	<5	<5	<5	<5	<57	14
Chloroform	24	3 J	<3.9	<3.9	<3.9	<3.9	<3.9	2 J	<44	15
cis-1,2-Dichloroethylene	1,800	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	801	186
Methylene chloride	190	<2.8	<2.8	6.6	<2.8	11	<2.8	<2.8	57	2.6 J
Tetrachloroethylene	34	5.9	4	2.7	2	1.2	2.3	3.3	41	20
trans-1,2-Dichloroethylene	3,600	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	85.2	31
Trichloroethylene	27	<0.86	<0.86	1.4	1	3.8	2.8	4	6830	2950
Vinyl chloride	13	<2	<2	<2	<2	<2	<2	<2	<23	<2
Other VOCs (µg/m^3)										
1,2,4-Trimethylbenzene		42	24	44	17	4.9	116	63.4	<44	<3.9
1,3,5-Trimethylbenzene		17	8.4	13	7.9	<3.9	31	18	<44	<3.9
2-Hexanone		<3.3	<3.3	<3.3	<3.3	<3.3	2.1 J	<3.3	<37	<3.3
4-Ethyltoluene		2.7 J	3 J	4	3.2 J	<3.9	11	5.4	<44	<3.9
Acetone		18	31.4	40.6	15	22	95	17	37.1	21
Benzene		<2.6	<2.6	2.6	2.1 J	1.9 J	1.4 J	0.99 J	<29	1.5 J
Carbon disulfide		3.1	2.6	1.6 J	4	4.7	4.7	2.8	<28	13
Chloromethane		<1.7	<1.7	2.3	<1.7	1.9	<1.7	<1.7	<19	4.1
Dichlorodifluoromethane		2.6 J	2.6 J	2.9 J	2.4 J	3.4 J	<4	2.8 J	<45	7.9
Ethanol		22.8	20.2	36.9	<3.8	98.2	<3.8	45.6	<41	13
Ethyl Acetate		<2.9	<2.9	24	<2.9	<2.9	<2.9	5.4	<32	<2.9
Ethylbenzene		3.1 J	4	4.8	3.2 J	<3.5	8.7	3.8	<39	<3.5
Freon 113		<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<69	<6.1
Heptane		<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<37	<3.3
Hexane		<2.8	<2.8	2 J	2 J	<2.8	<2.8	<2.8	<32	2.3 J
Isopropyl Alcohol		<2	<2	4.2	<2	9.3	<2	5.7	<22	<2
m,p-Xylene		10	18	24	13	4.8	43.9	18	<39	3.4 J
Methyl ethyl ketone		<2.4	4.1	7.1	1.9 J	<2.4	17	<2.4	<27	<2.4
Methyl Isobutyl Ketone		3.2 J	1.7 J	1.7 J	<3.3	<3.3	6.1	3.1 J	<37	<3.3
o-Xylene		6.9	5.2	9.1	3.3 J	2.1 J	16	7.8	<39	<3.5
p-Dichlorobenzene		<4.8	<4.8	6.6	7.8	<4.8	7.8	3.6 J	<54	<4.8
Propylene		<3.4	<3.4	1.3 J	<3.4	3.1 J	<3.4	<3.4	19.6 J	17
Tertiary Butyl Alcohol		3.3	<2.4	2.7	<2.4	<2.4	<2.4	2.9	<27	4.2
Tetrahydrofuran		8.8	2.4	5.9	<2.4	1.7 J	7.4	15	<27	<2.4
Toluene		3.2	6	21	4.9	5.7	12	6	<34	8.7
Trichlorofluoromethane		<4.5	<4.5	3.5 J	<4.5	15	<4.5	2.4 J	<51	5.1
Xylenes (total)		17	24	33	16	6.9	59.9	26	<39	3.4 J

Notes:
(a) Screening values from NJ DEP website
Results detected above RL shown in bold
<: Analyte not detected above RL
µg/m^3: micrograms per cubic meter
CVOC: chlorinated volatile organic compound
RL: Reporting Limit
VOC: volatile organic compound

DQE FLAGS:
J: Analyte identified; quantitation estimated.

TABLE 17
INSTALLATION SUMMARY, AIR SPARGE POINTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Installed	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Estimated Top of Clay Depth (ft, bgs)	Estimated Groundwater Depth (ft, bgs)	Boring Depth (ft, bgs)	Riser Length (ft)	Screen Length (ft)	Saturated Thickness (ft)
ODAS-01	7/10/2009	281243.53	800914.09	283.76	100.4	68.8	105.0	97.9	2.5	31.7
ODAS-02	7/21/2009	281249.49	800928.23	283.72	100.5	68.7	102.0	98.0	2.5	31.8
ODAS-03	7/13/2009	281258.68	800915.97	284.34	99.3	69.3	102.0	96.8	2.5	30.0
ODAS-04	8/5/2009	281264.74	800929.01	283.96	97.7	69.0	100.0	95.2	2.5	28.7
ODAS-05	7/12/2009	281273.97	800916.98	284.76	99.5	69.8	99.5	97.0	2.5	29.8
ODAS-06	7/27/2009	281279.78	800930.42	284.58	97.4	69.6	98.5	94.9	2.5	27.8
ODAS-07	7/11/2009	281288.85	800918.20	285.24	99.1	70.2	101.0	96.6	2.5	28.8
ODAS-08	7/26/2009	281295.10	800931.88	284.59	98.7	69.6	100.0	96.2	2.5	29.1
ODAS-09	7/11/2009	281303.48	800919.69	285.69	100.1	70.7	103.0	97.6	2.5	29.4
ODAS-10	7/25/2009	281309.83	800933.33	285.78	99.3	70.8	104.0	96.8	2.5	28.5
ODAS-11	7/8/2009	281318.51	800920.65	286.25	100.9	71.3	105.0	98.4	2.5	29.6
ODAS-12	7/24/2009	281324.76	800934.74	286.77	102.2	71.8	106.0	99.7	2.5	30.4
ODAS-13	7/9/2009	281333.39	800922.52	286.27	102.0	71.3	102.5	99.5	2.5	30.7
ODAS-14	7/15/2009	281339.73	800935.75	287.15	104.6	72.2	114.0	102.1	2.5	32.5
ODAS-15	7/9/2009	281348.08	800923.65	286.14	101.5	71.1	102.5	99.0	2.5	30.3
ODAS-16	7/8/2009	281362.59	800923.79	287.24	102.4	72.2	105.0	99.9	2.5	30.2
ODAS-17	8/6/2009	281370.56	800935.95	287.92	101.8	72.9	105.0	99.3	2.5	28.9
ODAS-18	7/14/2009	281358.54	800941.97	288.82	106.4	73.8	107.0	103.9	2.5	32.5
ODAS-19	8/7/2009	281371.09	800950.88	288.72	102.4	73.7	105.5	99.9	2.5	28.7
ODAS-20	8/7/2009	281357.09	800957.19	289.51	103.4	74.5	106.5	100.9	2.5	28.9
ODAS-21	8/12/2009	281369.48	800966.24	289.13	102.0	74.1	103.0	99.5	2.5	27.8
ODAS-22	7/22/2009	281355.60	800972.08	289.59	104.5	74.6	107.0	102.0	2.5	29.9
ODAS-23	8/13/2009	281367.90	800981.34	289.59	102.3	74.6	103.0	99.8	2.5	27.7
ODAS-24	7/23/2009	281354.39	800987.06	290.10	105.0	75.1	106.0	102.5	2.5	29.9
ODAS-25	8/18/2009	281366.77	800995.62	289.92	101.0	74.9	103.0	98.5	2.5	26.1
ODAS-26	7/24/2009	281352.79	801001.79	290.50	103.5	75.5	106.0	101.0	2.5	28.0
ODAS-27	8/20/2009	281364.98	801010.77	290.35	101.5	75.4	102.0	99.0	2.5	26.1
ODAS-28	8/4/2009	281351.70	801017.04	290.69	100.7	75.7	105.0	98.2	2.5	25.0
ODAS-29	8/21/2009	281363.97	801025.79	290.70	102.0	75.7	105.0	99.5	2.5	26.3
ODAS-30	7/30/2009	281350.29	801031.76	290.72	100.9	75.7	102.5	98.4	2.5	25.2
ODAS-31	8/23/2009	281362.49	801040.60	291.12	103.8	76.1	107.0	101.3	2.5	27.7
ODAS-32	8/6/2009	281348.50	801046.90	291.02	102.0	76.0	102.5	99.5	2.5	26.0
ODAS-33	8/22/2009	281361.05	801055.79	291.43	101.4	76.4	104.0	98.9	2.5	25.0
ODAS-34	8/7/2009	281347.49	801062.12	291.02	102.5	76.0	103.0	100.0	2.5	26.5
ODAS-35	8/12/2009	281360.16	801070.29	291.76	103.5	76.8	105.0	101.0	2.5	26.8
ODAS-36	8/8/2009	281345.70	801076.63	291.15	97.5	76.2	105.0	95.0	2.5	21.4
ODAS-37	8/13/2009	281358.58	801085.35	292.11	100.0	77.1	100.0	97.5	2.5	22.9

TABLE 17
INSTALLATION SUMMARY, AIR SPARGE POINTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Installed	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Estimated Top of Clay Depth (ft, bgs)	Estimated Groundwater Depth (ft, bgs)	Boring Depth (ft, bgs)	Riser Length (ft)	Screen Length (ft)	Saturated Thickness (ft)
ODAS-38	8/9/2009	281344.35	801091.78	291.76	100.9	76.8	103.0	98.4	2.5	24.1
ODAS-39	8/18/2009	281356.97	801100.32	292.33	102.5	77.3	103.0	100.0	2.5	25.1
ODAS-40	8/5/2009	281343.17	801106.72	291.89	101.3	76.9	105.0	98.8	2.5	24.4
ODAS-41	8/27/2009	281355.85	801117.00	292.72	101.4	77.7	102.0	98.9	2.5	23.7
ODAS-42	7/29/2009	281341.59	801121.39	292.15	102.2	77.2	105.0	99.7	2.5	25.1
ODAS-43	8/21/2009	281355.75	801130.62	292.98	100.8	78.0	102.0	98.3	2.5	22.8
ODAS-44	7/28/2009	281340.56	801136.27	292.45	99.0	77.5	105.0	96.5	2.5	21.5
ODAS-45	8/22/2009	281352.89	801145.45	292.75	98.4	76.8	99.0	95.9	2.5	21.7
ODAS-46	7/27/2009	281339.09	801151.58	292.27	98.1	76.3	105.0	95.6	2.5	21.9
ODAS-47	8/22/2009	281351.37	801159.94	292.65	100.6	76.7	105.0	98.1	2.5	24.0
ODAS-48	7/26/2009	281337.97	801163.11	292.23	96.0	76.2	100.0	93.5	2.5	19.8
ODAS-49	8/25/2009	281347.29	801174.80	292.67	98.3	76.7	100.0	95.8	2.5	21.6
ODAS-50	8/28/2009	281336.53	801181.51	292.40	94.4	76.4	95.0	91.9	2.5	18.0
ODAS-51	8/26/2009	281346.28	801189.21	292.56	95.9	76.6	98.0	93.4	2.5	19.4
ODAS-52	8/27/2009	281335.38	801196.14	292.93	94.2	76.9	96.0	91.7	2.5	17.2
ODAS-53	8/26/2009	281347.73	801205.08	293.29	94.0	77.3	96.0	91.5	2.5	16.7
ODAS-54	8/25/2009	281334.36	801208.50	294.35	96.0	78.4	97.0	93.5	2.5	17.7
ODAS-55	8/28/2009	281346.48	801219.98	293.89	95.0	77.9	97.0	92.5	2.5	17.1
ODAS-56	8/22/2009	281333.03	801225.99	294.99	95.0	79.0	96.0	92.5	2.5	16.0
ODAS-57	8/28/2009	281345.09	801234.82	294.08	94.0	78.1	95.0	91.5	2.5	16.0
ODAS-58	8/6/2009	281331.35	801241.02	295.29	94.1	79.3	100.0	91.6	2.5	14.8
ODAS-59	7/22/2009	281343.57	801249.76	294.27	90.7	78.3	105.0	88.2	2.5	12.4
ODAS-60	7/23/2009	281329.74	801255.71	295.29	90.0	79.3	94.0	87.5	2.5	10.7
ODAS-61	8/20/2009	281313.77	801228.70	295.79	95.0	79.8	96.0	92.5	2.5	15.2
ODAS-62	8/7/2009	281321.16	801217.83	295.13	95.0	79.1	95.0	92.5	2.5	15.9
ODAS-63	8/26/2009	281323.04	801199.96	293.89	93.2	77.9	97.0	90.7	2.5	15.3
ODAS-64	8/26/2009	281323.04	801187.58	292.09	89.4	76.1	95.0	86.9	2.5	13.3
ODAS-65	8/24/2009	281310.98	801179.17	291.52	88.6	75.5	95.0	86.1	2.5	13.1
ODAS-66	8/25/2009	281309.54	801194.68	293.08	93.0	77.1	96.0	90.5	2.5	16.0
ODAS-67	8/11/2009	281308.20	801208.29	295.09	112.7	79.1	113.0	110.2	2.5	33.6
ODAS-68	7/11/2009	281304.86	801224.57	295.78	93.8	79.8	96.0	91.3	2.5	14.0
ODAS-69	8/24/2009	281295.86	801200.37	294.59	98.8	78.6	100.0	96.3	2.5	20.2
ODAS-70	8/10/2009	281296.97	801185.01	291.50	90.5	75.5	93.0	88.0	2.5	15.0
ODAS-71	8/11/2009	281298.83	801169.95	291.01	92.2	75.0	93.0	89.7	2.5	17.2
ODAS-72	8/10/2009	281285.05	801176.93	291.05	91.6	75.1	95.0	89.1	2.5	16.5
ODAS-73	8/24/2009	281355.72	801258.68	293.66	90.4	77.7	91.0	87.9	2.5	12.7
ODAS-74	7/21/2009	281341.92	801264.74	294.70	89.9	78.7	95.0	87.4	2.5	11.2

TABLE 17
INSTALLATION SUMMARY, AIR SPARGE POINTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Installed	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Estimated Top of Clay Depth (ft, bgs)	Estimated Groundwater Depth (ft, bgs)	Boring Depth (ft, bgs)	Riser Length (ft)	Screen Length (ft)	Saturated Thickness (ft)
ODAS-75	7/24/2009	281345.11	801273.58	294.53	90.9	78.5	95.0	88.4	2.5	12.4
ODAS-76	7/14/2009	281337.72	801279.44	295.40	91.2	79.4	95.0	88.7	2.5	11.8
ODAS-77	7/25/2009	281346.76	801286.55	294.73	90.3	78.7	100.0	87.8	2.5	11.6
ODAS-78	7/11/2009	281339.31	801294.80	295.43	92.1	79.4	96.0	89.6	2.5	12.7
ODAS-79	7/12/2009	281347.90	801303.73	295.26	88.2	79.3	95.0	85.7	2.5	8.9
ODAS-80	8/19/2009	281365.15	801297.11	293.97	87.5	78.0	94.0	85.0	2.5	9.5
ODAS-81	8/18/2009	281364.01	801312.27	293.74	84.1	77.7	90.0	81.6	2.5	6.3
ODAS-82	8/23/2009	281372.46	801306.80	293.99	86.0	78.0	89.0	83.5	2.5	8.0
ODAS-83	8/12/2009	281375.94	801320.85	293.84	87.4	77.8	89.0	84.9	2.5	9.6
ODAS-84	8/11/2009	281374.24	801335.66	293.75	85.8	77.8	89.0	83.3	2.5	8.0
ODAS-85	8/10/2009	281373.27	801350.52	293.54	84.8	77.5	87.0	82.3	2.5	7.3
ODAS-86	8/9/2009	281375.02	801366.62	293.12	82.1	76.1	88.0	79.6	2.5	6.0
ODAS-87	7/28/2009	281363.05	801384.88	295.03	87.3	78.0	89.0	84.8	2.5	9.3
ODAS-88	8/4/2009	281366.05	801398.99	294.78	87.8	77.8	87.0	85.3	2.5	10.0
ODAS-89	7/27/2009	281375.82	801412.04	294.28	85.6	77.3	91.0	83.1	2.5	8.3
ODAS-90	7/26/2009	281380.82	801426.28	294.17	83.2	77.2	90.0	80.7	2.5	6.0

Notes:
ft: feet
ft, bgs: feet below ground surface
ft, msl: feet mean sea level

TABLE 18
INSTALLATION SUMMARY, SVE WELLS AND VMPS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well	Date Installed	Northing (ft)	Easting (ft)	Ground Elevation (ft, msl)	Groundwater Elevation (ft, msl)	Boring Depth (ft, bgs)	Riser Length (ft)	Screen Length (ft)
ODSVE-01	8/4/2009	281279.80	800920.76	284.85	215	65.4	34.5	30
ODSVE-02	7/10/2009	281318.99	800926.44	286.18	215	67.0	36.2	30
ODSVE-03	7/29/2009	281361.83	800950.39	289.46	215	72.5	39.7	30
ODSVE-04	8/19/2009	281361.41	801001.78	290.64	215	72.0	41.1	30
ODSVE-05	8/21/2009	281356.01	801061.37	291.68	215	72.0	40.7	30
ODSVE-06	8/27/2009	281351.26	801108.21	292.96	215	72.0	41.3	30
ODSVE-07	8/24/2009	281347.49	801166.74	292.55	216	72.5	42.0	30
ODSVE-08	8/25/2009	281306.56	801190.20	292.20	216	72.0	41.7	30
ODSVE-09	8/28/2009	281331.03	801202.97	294.12	216	74.5	43.5	30
ODSVE-10	8/7/2009	281341.21	801243.83	294.30	216	74.0	43.9	30
ODSVE-11	7/13/2009	281348.19	801294.56	294.91	216	76.0	44.5	30
ODSVE-12	8/5/2009	281361.05	801371.94	294.73	217	74.0	43.7	30
ODVMP-01A	6/25/2009	281360.88	801421.12	295.71	217	74.0	68.0	5
ODVMP-01B	6/25/2009	281360.88	801421.12	295.71	217	74.0	53.0	5
ODVMP-02A	6/26/2009	281365.95	801274.81	294.15	216	71.6	65.3	5
ODVMP-02B	6/26/2009	281365.95	801274.81	294.15	216	71.6	50.4	5
ODVMP-03A	6/21/2009	281275.10	801166.21	290.69	216	70.0	64.0	5
ODVMP-03B	6/21/2009	281275.10	801166.21	290.69	216	70.0	49.0	5
ODVMP-04A	6/18/2009	281327.06	801098.56	288.59	215	67.5	62.0	5
ODVMP-04B	6/18/2009	281327.06	801098.56	288.59	215	67.5	47.0	5
ODVMP-05A	6/27/2009	281366.43	801162.53	293.42	215	71.0	65.2	5
ODVMP-05B	6/27/2009	281366.43	801162.53	293.42	215	71.0	50.0	5
ODVMP-06A	7/9/2009	281430.30	800982.18	294.87	215	76.0	67.0	5
ODVMP-06B	7/9/2009	281430.30	800982.18	294.87	215	76.0	52.0	5
ODVMP-07A	6/20/2009	281366.09	800896.51	287.55	215	66.5	60.4	5
ODVMP-07B	6/20/2009	281366.09	800896.51	287.55	215	66.5	44.8	5
ODVMP-08A	6/20/2009	281255.49	800988.72	284.27	215	63.0	56.7	5
ODVMP-08B	6/20/2009	281255.49	800988.72	284.27	215	63.0	42.0	5
ODVMP-09A	6/19/2009	281319.93	801010.19	287.79	215	65.5	60.0	5
ODVMP-09B	6/19/2009	281319.93	801010.19	287.79	215	65.5	45.0	5
ODVMP-10A	6/19/2009	281261.38	800867.39	282.27	215	61.0	55.0	5
ODVMP-10B	6/19/2009	281261.38	800867.39	282.27	215	61.0	40.0	5

Notes:
ft: feet
ft, bgs: feet below ground surface
ft, msl: feet mean sea level

TABLE 19
AS/SVE FLOW RATE AND VACUUM READINGS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	AS Compressor Flow rate (scfm)	SVE Effluent Flow rate (scfm)	SVE Effluent Vacuum (in. Hg.)	SVE-1 Flow rate (acfm)	SVE-1 Vacuum (in. H_2O)	SVE-2 Flow rate (acfm)	SVE-2 Vacuum (in. H_2O)	SVE-3 Flow rate (acfm)	SVE-3 Vacuum (in. H_2O)	SVE-4 Flow rate (acfm)	SVE-4 Vacuum (in. H_2O)
11/12/2009	2	-	-	5.0	70	34	110	0	100	34	100	34
11/16/2009	2	-	-	9.0	70	27	110	27	100	34	100	34
12/4/2009	2	414	-	11.5	110	41	160	34	140	41	120	41
12/8/2009	2	220	-	7.4	120	41	160	27	150	34	130	49
12/9/2009	1	-	-	4.1	70	0	100	0	90	0	80	0
12/10/2009	1	-	-	6.5	50	67	60	66	70	65	60	66
12/10/2009	2	-	-	9.5	110	107	150	100	140	102	130	102
12/11/2009	1	194	-	5.5	60	62	90	59	70	60	80	60
12/11/2009	2	239	-	9.3	110	102	160	95	180	97	120	97
12/14/2009	2	238	-	8.7	120	95	160	88	140	90	130	90
12/15/2009	1	264	-	5.1	60	57	90	55	80	55	80	55
12/16/2009	1	256	-	5.0	60	56	100	54	90	55	100	55
12/17/2009	1	-	-	5.0	60	55	90	52	80	52	80	52
12/18/2009	2	340	-	8.8	110	93	160	86	130	89	120	88
12/21/2009	2	224	1150	8.9	110	91	150	83	140	87	130	86
12/22/2009	2	238	994	8.7	110	91	150	84	130	87	120	86
12/23/2009	2	252	1136	8.6	110	91	160	84	130	86	120	86
12/24/2009	2	208	1130	8.5	110	89	160	83	140	85	130	84
12/28/2009	2	235	1203	9.1	100	97	150	90	130	93	120	92
12/29/2009	2	251	1154	9.1	110	94	160	88	130	90	130	90
12/29/2009	2	233	1126	9.2	110	96	160	89	140	92	130	91
12/29/2009	2	252	1143	9.2	60	95	160	89	140	91	130	92
12/30/2009	1	231	670	5.0	50	51	80	49	50	50	60	50
12/30/2009	2	239	1167	8.9	110	93	150	86	130	90	120	88
12/31/2009	1	213	727	4.5	60	46	100	44	80	45	70	45
1/6/2010	2	220	1139	9.4	120	97	160	90	140	93	130	94
1/11/2010	2	200	1174	9.2	110	95	160	88	130	91	130	90
1/18/2010	2	220	1156	9.1	110	96	150	89	130	91	120	91
1/25/2010	2	200	1133	8.5	110	92	150	85	140	88	130	86
2/2/2010	2	220	1141	9.3	110	98	150	91	120	94	110	94
2/10/2010	1	220	746	5.7	50	59	90	57	70	58	70	57
2/17/2010	2	220	1134	9.8	110	97	150	91	120	93	110	94
2/23/2010	2	230	1133	9.4	120	98	150	91	130	95	120	93
2/24/2010	2	222	1036	9.4	120	98	150	91	130	94	120	93
3/1/2010	2	250	1163	9.6	110	-	150	-	130	-	120	-
3/5/2010	2	266	1161	9.9	110	104	150	98	130	100	120	100
3/10/2010	2	227	1155	8.7	120	91	160	84	130	88	135	87
3/19/2010	2	190	1151	9.2	110	98	150	92	120	95	120	94
3/26/2010	2	233	1115	9.7	120	105	130	100	120	102	120	101
3/31/2010	2	240	1117	9.6	110	103	150	98	120	100	120	99
4/9/2010	2	223	1111	9.4	110	105	150	100	120	102	120	101
4/15/2010	2	232	1163	9.2	110	97	150	91	120	94	120	93
4/22/2010	2	239	1104	9.6	100	102	150	97	110	99	120	97
4/30/2010	2	229	1107	9.3	110	100	150	95	120	98	120	96
5/7/2010	2	171	1104	9.0	110	98	150	92	120	94	120	92
5/12/2010	2	198	1107	9.2	110	104	150	99	120	101	120	99
5/25/2010	2	211	1118	9.1	110	103	150	98	120	100	120	99
5/26/2010	2	344	1110	8.8	110	99	150	94	120	97	120	95
5/28/2010	2	346	1124	8.8	110	99	150	94	120	96	120	94
6/3/2010	2	346	1126	8.9	110	97	150	93	120	95	120	93
6/10/2010	2	349	1128	8.9	110	98	150	93	120	95	120	93
6/17/2010	2	361	1133	9.1	120	98	150	93	130	96	130	93
6/24/2010	2	348	1124	8.8	110	93	140	89	120	91	120	89
7/1/2010	2	347	1094	9.1	110	94	150	90	120	92	120	90
7/1/2010	2	347	1094	9.1	110	94	150	90	120	92	120	90
7/9/2010	2	331	1115	9.0	110	93	150	88	120	91	120	89
7/16/2010	2	366	1138	8.9	110	94	150	89	120	92	120	90
7/24/2010	2	0	1133	9.3	110	96	140	92	120	94	120	92
7/30/2010	2	345	1104	8.8	110	92	140	88	120	91	120	89
8/6/2010	2	344	1115	9.1	110	94	150	89	120	92	120	90
8/13/2010	2	340	1117	8.9	110	92	150	87	120	90	120	88
8/17/2010	2	NM	NM	NM	110	93	150	88	120	91	120	88
8/17/2010	2	NM	NM	NM	110	98	140	85	120	94	120	89
8/20/2010	2	327	1117	9.4	120	97	140	85	120	93	120	88
8/27/2010	2	347	1100	9.8	110	96	140	83	130	82	120	87
8/30/2010	2	354	1117	9.6	110	96	140	84	120	92	120	88
9/3/2010	2	344	1152	9.9	120	98	130	80	130	94	120	89
9/10/2010	2	339	1077	10.1	110	96	130	78	130	82	120	87
9/10/2010	2	NM	NM	NM	110	97	120	77	120	93	120	89
9/16/2010	2	340	1075	10.5	120	96	130	76	130	93	120	90
9/24/2010	2	342	1073	10.5	120	97	120	76	130	93	120	91
10/1/2010	2	342	1070	10.8	120	98	120	78	130	94	130	91
10/8/2010	2	314	896	10.9	120	98	110	72	130	95	130	92
10/15/2010	2	344	1002	10.9	120	98	120	74	130	94	120	92
10/22/2010	2	344	1041	10.9	120	97	110	69	130	93	120	91
10/25/2010	2	338	1010	10.2	120	93	110	66	130	89	120	88
10/28/2010	2	346	1055	10.8	120	100	110	74	130	96	120	95
11/4/2010	2	342	1017	10.8	120	97	130	75	140	92	110	96
11/11/2010	2	349	1003	11.4	130	103	130	78	140	97	0	122
11/11/2010	-	-	-	-	100	83	100	63	100	72	0	151
11/19/2010	2	343	963	13.0	100	79	100	58	100	70	170	121
11/24/2010	2	353	943	12.8	100	79	100	57	70	62	170	125
11/30/2010	2	363	932	13.2	100	84	100	60	70	64	0	114
12/7/2010	2	279	964	13.7	100	83	100	60	70	64	180	120
12/17/2010	2	367	939	13.7	90	87	90	65	70	66	180	124
12/22/2010	1	0	627	8.1	60	60	60	51	50	51	120	74
12/30/2010	2	354	906	13.5	100	83	90	61	70	62	180	122

Notes:
1) Adjustments made at manifold on 8/17, 9/10 and 11/11/10 to increase flowrate at SVE-7 and SVE-9.
acfm: actual cubic feet per minute
in. Hg: inches of mercury
in. H_2O inches of water
scfm: standard cubic feet per minute

TABLE 19
AS/SVE FLOW RATE AND VACUUM READINGS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	AS Compressor Flow rate (scfm)	SVE-5 Flow rate (acfm)	SVE-5 Vacuum (in. H_2O)	SVE-6 Flow rate (acfm)	SVE-6 Vacuum (in. H_2O)	SVE-7 Flow rate (acfm)	SVE-7 Vacuum (in. H_2O)	SVE-8 Flow rate (acfm)	SVE-8 Vacuum (in. H_2O)	SVE-9 Flow rate (acfm)	SVE-9 Vacuum (in. H_2O)
11/12/2009	2	-	60	34	90	0	40	34	90	0	50	0
11/16/2009	2	-	60	41	100	27	50	34	80	20	50	20
12/4/2009	2	414	90	41	130	41	60	54	120	34	50	41
12/8/2009	2	220	110	34	-	27	50	54	130	27	30	41
12/9/2009	1	-	50	0	80	0	20	0	70	0	20	0
12/10/2009	1	-	50	67	70	65	50	67	60	65	70	66
12/10/2009	2	-	100	107	140	101	60	108	120	101	60	109
12/11/2009	1	194	50	61	90	59	40	62	60	60	20	64
12/11/2009	2	239	90	103	140	96	90	101	120	96	60	104
12/14/2009	2	238	90	95	140	90	110	93	120	89	60	97
12/15/2009	1	264	50	56	150	55	50	56	70	55	50	57
12/16/2009	1	256	50	56	100	54	60	56	70	54	40	56
12/17/2009	1	-	50	53	100	52	30	55	70	51	50	55
12/18/2009	2	340	100	94	150	87	60	94	115	88	60	95
12/21/2009	2	224	100	91	150	85	60	93	120	86	50	94
12/22/2009	2	238	90	90	150	85	60	93	120	86	60	93
12/23/2009	2	252	100	90	150	85	70	92	120	85	60	93
12/24/2009	2	208	100	89	150	84	100	91	120	84	70	91
12/28/2009	2	235	90	97	150	91	50	98	120	92	50	99
12/29/2009	2	251	100	94	150	86	50	96	120	89	50	95
12/29/2009	2	233	100	96	150	90	80	97	130	91	60	97
12/29/2009	2	252	100	96	150	91	80	98	120	90	60	97
12/30/2009	1	231	50	51	90	49	20	53	60	50	20	53
12/30/2009	2	239	90	93	150	88	80	96	120	87	50	94
12/31/2009	1	213	50	47	100	45	50	48	80	44	40	48
1/6/2010	2	220	100	97	140	92	70	99	120	91	60	99
1/11/2010	2	200	90	95	140	89	70	97	120	89	50	97
1/18/2010	2	220	100	95	150	90	70	97	120	90	60	97
1/25/2010	2	200	100	92	140	86	80	93	120	85	60	92
2/2/2010	2	220	90	98	130	93	60	100	110	93	50	100
2/10/2010	1	220	50	59	100	57	20	60	70	56	20	60
2/17/2010	2	220	90	98	130	93	60	100	110	93	50	100
2/23/2010	2	230	100	98	140	93	60	100	120	92	70	100
2/24/2010	2	222	100	98	140	93	60	100	120	93	70	100
3/1/2010	2	250	90	-	130	-	50	-	110	-	60	-
3/5/2010	2	266	90	104	130	99	70	105	120	98	60	105
3/10/2010	2	227	100	92	140	87	80	94	120	86	70	94
3/19/2010	2	190	90	100	80	94	60	101	120	9	60	101
3/26/2010	2	233	100	105	140	100	80	107	120	99	70	107
3/31/2010	2	240	80	104	130	99	60	105	120	97	60	105
4/9/2010	2	223	90	106	130	101	60	107	120	99	60	107
4/15/2010	2	232	80	99	130	93	50	100	120	92	50	100
4/22/2010	2	239	120	103	180	98	50	104	120	96	50	105
4/30/2010	2	229	80	102	130	96	60	104	120	95	60	104
5/7/2010	2	171	90	98	130	93	50	100	120	92	50	100
5/12/2010	2	198	80	105	130	99	50	107	120	98	50	107
5/25/2010	2	211	80	104	130	99	40	107	120	97	30	106
5/26/2010	2	344	70	101	130	95	20	103	120	93	30	102
5/28/2010	2	346	100	100	130	94	50	102	130	92	50	102
6/3/2010	2	346	80	99	130	93	30	101	120	91	20	101
6/10/2010	2	349	70	99	130	94	20	101	120	92	30	101
6/17/2010	2	361	90	100	140	99	50	102	130	92	20	101
6/24/2010	2	348	70	95	130	90	20	97	120	88	30	97
7/1/2010	2	347	70	96	130	91	20	99	130	89	30	98
7/1/2010	2	347	70	96	130	91	20	99	130	89	30	98
7/9/2010	2	331	80	95	130	90	50	97	130	88	50	97
7/16/2010	2	366	80	96	130	90	50	98	130	88	50	97
7/24/2010	2	0	80	98	130	93	50	101	130	91	50	100
7/30/2010	2	345	80	95	130	90	40	97	120	88	50	97
8/6/2010	2	344	70	96	130	91	20	98	120	88	20	98
8/13/2010	2	340	70	94	130	89	20	96	120	87	20	95
8/17/2010	2	NM	80	95	130	90	20	97	120	87	20	96
8/17/2010	2	NM	80	100	130	95	40	103	120	87	40	102
8/20/2010	2	327	90	99	140	94	40	102	120	86	50	101
8/27/2010	2	347	80	98	130	93	40	101	120	85	40	101
8/30/2010	2	354	80	99	130	93	20	101	120	86	30	101
9/3/2010	2	344	90	101	130	95	30	104	120	87	40	103
9/10/2010	2	339	90	98	130	93	20	101	120	85	20	101
9/10/2010	2	NM	90	105	130	98	20	108	120	85	30	108
9/16/2010	2	340	90	105	140	99	20	109	120	86	40	109
9/24/2010	2	342	100	106	130	99	40	109	120	85	40	109
10/1/2010	2	342	90	106	140	100	40	110	130	87	40	110
10/8/2010	2	314	100	107	140	100	40	111	130	88	40	111
10/15/2010	2	344	100	107	140	100	40	111	120	88	40	111
10/22/2010	2	344	100	106	140	99	40	110	130	86	50	110
10/25/2010	2	338	100	102	140	96	30	106	120	83	40	106
10/28/2010	2	346	100	108	140	102	30	113	130	89	40	111
11/4/2010	2	342	100	105	140	99	40	110	110	78	40	110
11/11/2010	2	349	110	113	150	106	50	118	130	93	50	118
11/11/2010	-	-	100	98	100	67	60	146	100	74	50	147
11/19/2010	2	343	100	95	100	61	80	140	100	67	70	140
11/24/2010	2	353	100	96	100	61	90	142	100	66	70	141
11/30/2010	2	363	100	100	100	64	90	141	100	70	70	142
12/7/2010	2	279	100	100	100	65	90	143	100	69	80	145
12/17/2010	2	367	100	103	100	73	90	146	100	73	70	150
12/22/2010	1	0	60	67	51	100	50	81	70	57	60	81
12/30/2010	2	354	100	99	100	64	80	144	100	69	60	148

Notes:
1) Adjustments made at manifold on 8/17, 9/10 and 11/11/10 to increase flowrate at SVE-7 and SVE-9.
acfm: actual cubic feet per minute
in. Hg: inches of mercury
in. H_2O inches of water
scfm: standard cubic feet per minute

TABLE 19
AS/SVE FLOW RATE AND VACUUM READINGS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	AS Compressor Flow rate (scfm)	SVE-10 Flow rate (acfm)	SVE-10 Vacuum (in. H_2O)	SVE-11 Flow rate (acfm)	SVE-11 Vacuum (in. H_2O)	SVE-12 Flow rate (acfm)	SVE-12 Vacuum (in. H_2O)
11/12/2009	2	-	110	27	130	0	130	0
11/16/2009	2	-	110	20	12	0	140	0
12/4/2009	2	414	150	34	170	20	160	14
12/8/2009	2	220	160	34	170	0	170	0
12/9/2009	1	-	100	0	110	0	100	0
12/10/2009	1	-	90	62	110	61	100	61
12/10/2009	2	-	155	95	170	90	160	91
12/11/2009	1	194	110	57	110	55	110	55
12/11/2009	2	239	160	89	170	85	160	87
12/14/2009	2	238	160	83	170	79	160	80
12/15/2009	1	264	110	53	110	50	120	50
12/16/2009	1	256	110	51	110	50	110	50
12/17/2009	1	-	110	50	120	47	120	48
12/18/2009	2	340	160	81	170	77	170	78
12/21/2009	2	224	150	80	160	76	150	77
12/22/2009	2	238	150	80	160	76	160	77
12/23/2009	2	252	150	79	160	75	160	77
12/24/2009	2	208	150	78	170	74	160	76
12/28/2009	2	235	150	85	170	81	160	82
12/29/2009	2	251	160	83	170	78	160	80
12/29/2009	2	233	160	85	170	81	160	82
12/29/2009	2	252	150	85	170	81	160	82
12/30/2009	1	231	100	47	110	45	110	45
12/30/2009	2	239	150	81	160	78	160	79
12/31/2009	1	213	100	42	110	40	100	40
1/6/2010	2	220	150	85	160	81	160	82
1/11/2010	2	200	150	82	170	78	160	79
1/18/2010	2	220	150	84	160	80	160	81
1/25/2010	2	200	150	80	160	76	160	76
2/2/2010	2	220	150	86	160	82	160	83
2/10/2010	1	220	100	54	100	52	100	52
2/17/2010	2	220	150	86	160	82	160	82
2/23/2010	2	230	150	86	160	82	160	83
2/24/2010	2	222	150	86	160	83	160	83
3/1/2010	2	250	150	-	160	-	160	-
3/5/2010	2	266	150	92	160	88	160	88
3/10/2010	2	227	150	81	160	77	160	78
3/19/2010	2	190	150	87	160	83	160	83
3/26/2010	2	233	155	94	160	90	160	90
3/31/2010	2	240	160	92	170	88	170	88
4/9/2010	2	223	150	94	160	90	150	90
4/15/2010	2	232	150	87	160	83	150	83
4/22/2010	2	239	150	91	160	87	160	87
4/30/2010	2	229	150	89	160	85	160	85
5/7/2010	2	171	150	87	160	82	150	83
5/12/2010	2	198	150	92	160	88	150	88
5/25/2010	2	211	150	92	160	88	160	88
5/26/2010	2	344	150	88	160	84	150	84
5/28/2010	2	346	150	87	160	83	160	84
6/3/2010	2	346	150	86	160	82	150	83
6/10/2010	2	349	150	86	160	82	150	83
6/17/2010	2	361	150	87	160	82	150	84
6/24/2010	2	348	150	83	160	79	150	80
7/1/2010	2	347	150	84	160	79	150	81
7/1/2010	2	347	150	84	160	79	150	81
7/9/2010	2	331	150	83	160	79	150	80
7/16/2010	2	366	150	83	160	79	150	80
7/24/2010	2	0	150	87	160	82	150	83
7/30/2010	2	345	150	83	160	79	150	79
8/6/2010	2	344	150	84	160	80	150	80
8/13/2010	2	340	150	81	160	78	150	78
8/17/2010	2	NM	150	82	160	78	150	79
8/17/2010	2	NM	140	78	150	73	140	73
8/20/2010	2	327	140	75	150	72	140	70
8/27/2010	2	347	140	75	150	71	140	70
8/30/2010	2	354	140	75	150	72	140	70
9/3/2010	2	344	130	72	140	68	140	66
9/10/2010	2	339	130	70	140	66	140	64
9/10/2010	2	NM	120	66	120	58	120	54
9/16/2010	2	340	120	66	120	57	100	54
9/24/2010	2	342	120	65	120	57	110	53
10/1/2010	2	342	120	66	120	57	100	54
10/8/2010	2	314	120	65	130	57	100	54
10/15/2010	2	344	120	66	120	58	100	55
10/22/2010	2	344	120	65	120	56	100	52
10/25/2010	2	338	120	61	120	53	100	50
10/28/2010	2	346	120	68	130	59	100	56
11/4/2010	2	342	120	65	130	56	100	53
11/11/2010	2	349	120	64	130	60	110	56
11/11/2010	-	-	100	56	100	44	100	48
11/19/2010	2	343	110	55	80	37	90	44
11/24/2010	2	353	120	57	80	38	90	44
11/30/2010	2	363	120	60	100	43	100	49
12/7/2010	2	279	120	59	90	41	100	49
12/17/2010	2	367	120	60	90	44	90	51
12/22/2010	1	0	90	48	70	36	80	40
12/30/2010	2	354	110	57	90	40	70	38

Notes:
1) Adjustments made at manifold on 8/17, 9/10 and 11/11/10 to increase flowrate at SVE-7 and SVE-9.
acfm: actual cubic feet per minute
in. Hg: inches of mercury
in. H_2O inches of water
scfm: standard cubic feet per minute

TABLE 20
VACUUM MEASUREMENTS AT VMPs
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date	Blowers	Sparge	VMP1A	VMP1B	VMP2A	VMP2B	VMP3A	VMP3B	VMP4A	VMP4B	VMP5A	VMP5B	VMP6A	VMP6B	VMP7A	VMP7B	VMP8A	VMP8B	VMP9A	VMP9B	VMP10A	VMP10B
10/26/2009	0	N	1.8	2.0	2.0	2.0	2.2	2.2	1.8	5.0	1.8	2.2	2.0	8.4	1.8	1.4	0.0	1.8	2.0	1.8	1.6	0.0
12/10/2009	1	N	21.4	21.2	23.1	26.6	25.9	26.6	30.8	-	28.7	31.5	31.5	27.5	29.3	28.7	29.3	-	31.0	32.5	26.9	29.5
12/10/2009	2	N	24.0	23.7	30.5	31.6	33.4	32.7	39.1	38.1	35.4	39.6	38.7	35.7	36.9	37.0	35.8	36.2	41.0	41.6	34.5	36.9
12/11/2009	1	Y	2.8	19.6	18.6	19.5	19.9	22.5	25.9	26.3	23.4	26.8	-	25.9	27.0	24.7	26.5	26.5	2.3	28.1	17.9	26.5
12/11/2009	2	Y	20.0	19.7	23.0	16.0	26.5	26.9	32.0	30.8	24.8	32.5	29.6	30.9	32.0	20.4	29.3	30.7	32.6	34.4	14.7	31.5
12/14/2009	2	Y	15.0	14.4	19.7	15.6	20.4	21.9	25.6	26.3	25.0	21.4	22.9	23.2	23.0	19.4	24.8	25.0	26.8	28.1	15.3	24.4
12/15/2009	1	Y	15.1	14.9	15.1	12.1	16.9	18.0	20.5	21.9	17.4	20.9	20.8	20.4	18.0	16.6	21.2	21.3	21.9	22.7	14.3	20.7
12/16/2009	1	Y	12.5	9.8	12.7	7.5	15.7	16.8	21.4	19.4	14.3	18.0	18.5	20.0	16.6	14.7	20.0	20.0	21.1	21.2	13.0	20.0
12/18/2009	2	Y	14.1	15.1	16.2	16.5	20.4	21.6	25.3	25.7	19.7	23.7	22.2	22.8	21.3	18.4	25.0	25.1	25.4	26.7	17.5	25.5
12/21/2009	2	Y	14.0	13.4	13.9	7.3	21.4	22.3	27.2	27.5	15.3	23.5	24.7	26.0	22.8	22.3	25.8	26.8	27.7	28.8	14.9	27.5
12/29/2009	2	Y	18.4	16.7	21.8	16.8	26.3	25.2	29.6	29.3	25.2	27.5	26.8	39.5	31.2	19.0	31.2	31.1	32.9	32.9	20.5	30.2
12/31/2009	1	Y	8.4	8.7	9.4	7.7	11.6	12.1	13.2	13.8	11.9	13.6	12.2	12.5	8.8	8.8	14.2	14.1	15.7	15.9	4.6	8.8
1/6/2010	2	Y	-	-	23.7	19.8	26.5	20.0	33.5	34.5	30.0	31.9	31.6	34.7	-	-	33.4	33.3	35.0	36.0	24.6	34.6
1/11/2010	2	Y	-	-	21.1	14.4	22.3	23.0	25.7	27.7	23.8	26.2	25.1	24.1	-	-	25.7	24.8	30.0	30.1	-	-
1/18/2010	2	Y	16.9	14.5	21.9	18.1	24.2	24.7	31.0	30.8	25.4	28.0	28.6	28.3	-	14.0	28.4	29.1	33.2	33.3	26.0	31.2
1/25/2010	2	Y	14.7	13.0	20.1	15.8	21.2	22.5	27.6	27.5	22.4	24.7	26.2	25.0	26.0	21.2	24.5	24.5	29.8	30.1	16.3	26.9
2/2/2010	2	Y	17.5	14.0	18.5	19.2	23.5	24.4	29.1	28.2	22.1	26.3	29.0	28.6	0.0	25.0	28.9	29.0	32.4	32.5	21.5	31.1
2/10/2010	1	Y	17.0	16.9	17.4	14.7	20.7	21.1	24.3	23.1	20.4	23.4	21.7	20.6	10.3	22.5	23.2	23.3	26.3	0.0*	19.8	25.4
2/17/2010	2	Y	16.4	13.8	20.2	17.7	22.9	23.8	29.2	28.8	23.2	26.3	27.9	27.3	19.0	22.9	27.2	27.5	31.8	31.9	21.2	29.7
2/24/2010	2	Y	16.2	13.6	20.2	17.6	22.7	23.4	29.0	28.9	22.6	25.4	27.9	27.7	19.1	21.8	26.9	27.0	32.3	32.8	21.0	29.4
3/5/2010	2	Y	24.0	21.4	29.8	23.3	32.9	32.7	39.5	37.8	32.1	36.8	38.0	38.2	0.0	5.7	37.9	34.8	41.8	41.9	32.4	40.1
3/10/2010	2	Y	19.1	15.6	23.2	18.0	24.3	24.0	31.1	28.9	24.2	26.8	28.2	28.4	26.7	25.3	29.8	28.2	35.7	35.8	27.7	29.7
3/19/2010	2	Y	19.0	18.0	26.1	20.9	28.3	28.5	35.6	35.0	27.6	30.0	31.5	32.0	30.0	33.4	32.3	32.0	37.4	NM	25.0	34.4
3/31/2010	2	Y	29.7	24.7	30.2	19.4	34.2	33.9	40.0	38.3	31.2	37.5	38.8	41.9	40.4	14.0	39.1	38.7	43.5	43.8	32.5	42.0
4/14/2010	2	Y	27.6	27.1	35.6	35.3	36.7	35.5	43.0	43.4	40.3	41.9	40.3	42.8	43.4	39.2	42.7	39.5	46.0	46.4	36.2	44.0
5/12/2010	2	Y	26.7	26.5	31.0	33.9	35.0	35.2	42.3	41.1	36.6	39.9	38.9	39.0	40.2	25.3	38.8	38.5	43.7	43.5	43.7	52.5
5/28/2010	2	Y	25.8	22.4	-	-	-	-	36.0	36.1	-	-	-	-	-	-	-	-	-	-	-	-
6/3/2010	2	Y	22.2	22.0	25.9	28.1	29.7	29.7	36.3	35.0	31.0	33.6	32.6	33.1	35.2	22.0	34.2	31.5	38.0	38.4	36.2	38.2
7/1/2010	2	Y	22.3	22.2	23.9	28.2	29.3	29.7	35.7	35.7	29.3	32.4	33.8	33.9	36.0	21.1	34.1	31.3	37.9	38.3	38.1	40.0
8/6/2010	2	Y	21.6	20.8	21.4	19.0	28.9	29.4	35.1	35.4	26.3	31.0	32.4	32.6	35.8	20.9	33.2	31.2	37.5	38.0	37.0	38.8
8/30/2010	2	Y	29.3	31.8	24.2	27.3	23.4	24.1	28.6	28.5	35.3	35.4	30.6	30.9	34.3	21.7	39.0	39.8	37.7	31.4	37.7	38.4
10/1/2010	2	Y	17.0	16.6	13.4	9.0	25.2	24.2	32.4	31.4	9.8	27.5	29.4	30.1	32.7	10.3	30.2	26.3	32.4	35.6	17.5	41.4
10/15/2010	2	Y	17.2	16.9	17.1	11.5	26.3	25.0	31.9	29.8	13.7	28.2	28.1	27.4	29.6	13.4	30.4	26.5	31.8	34.4	27.6	33.1
10/28/2010	2	Y	12.5	12.4	11.2	8.6	22.7	21.2	27.5	25.3	15.8	24.0	25.0	24.1	25.6	18.1	26.1	21.0	26.7	29.6	26.1	27.8
11/22/2010	2	Y	12.3	12.4	10.9	9.5	19.4	19.2	23.4	21.0	12.9	19.8	23.1	22.5	20.1	15.4	23.1	20.0	24.3	26.6	15.0	23.3
12/30/2010	2	Y	18.4	9.8	8.4	6.7	17.9	17.5	23.3	20.3	15.4	26.0	23.2	25.7	24.7	28.3	22.1	16.7	26.3	26.9	32.3	27.4

Notes:
1) Vacuum measurements made with a digital manometer; units are inches of water
- No measurement

TABLE 21
PID MEASUREMENTS AT SVE WELLS AND EFFLUENT
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date	Time	Blowers	Sparge	Sparge Group	SVE1	SVE2	SVE3	SVE4	SVE5	SVE6	SVE7	SVE8	SVE9	SVE10	SVE11	SVE12	Effluent
11/16/2009	13:30	2	N	-	0.3	0.5	1.9	3.3	1.6	2.1	1.9	0.6	1.9	1.6	1.3	1.1	1.8
12/4/2009	13:00	2	Y	All	1.2	2.1	14.7	8.1	3.2	3.3	3.2	1.3	2.3	1.9	1.5	1.2	3.9
12/11/2009	12:20	2	Y	A	0.0	0.4	6.2	2.3	1.4	0.9	1.1	0.0	0.5	0.5	0.7	0.2	1.4
12/18/2009	9:30	2	Y	Half	0.0	5.8	12.6	16.3	11.4	8.2	5.2	1.1	1.0	5.9	9.0	8.5	3.0
12/21/2009	8:45	2	Y	C	0.1	0.5	4.5	4.7	1.9	1.0	0.9	0.1	0.3	0.7	0.7	0.6	1.4
12/22/2009	13:12	2	Y	A	0.1	0.6	4.5	4.6	1.8	1.0	0.8	0.1	0.3	0.6	0.7	0.6	1.2
12/23/2009	6:45	2	Y	B	0.2	0.5	3.7	4.3	1.6	0.9	0.9	0.1	0.2	0.8	0.5	0.6	1.5
12/24/2009	7:57	2	Y	C	0.1	0.5	3.6	4.0	1.7	0.8	0.8	0.2	0.2	0.8	0.5	0.5	1.0
12/28/2009	12:37	2	Y	A	0.1	0.5	3.3	3.9	1.4	0.6	0.8	0.1	0.2	0.9	0.5	0.5	1.1
12/29/2009	6:35	2	Y	B	0.0	0.5	3.3	3.9	1.5	0.5	0.8	0.0	0.1	0.9	0.5	0.4	1.1
12/29/2009	10:07	2	Y	C	0.4	0.9	3.5	3.8	1.6	1.0	1.1	0.4	0.6	1.4	0.9	0.8	1.3
12/29/2009	14:22	2	Y	A	0.3	0.7	3.3	3.7	1.4	1.0	1.3	0.6	0.6	1.3	0.9	0.9	1.0
12/30/2009	7:50	1	Y	C	0.0	0.4	3.1	3.8	1.2	0.6	0.7	0.0	0.2	0.8	0.4	0.3	0.9
12/30/2009	12:20	2	Y	A	0.2	0.5	2.8	3.5	1.2	0.6	0.8	0.2	0.3	1.0	0.6	0.5	1.0
12/31/2009	9:46	1	Y	C	0.0	0.3	2.8	3.4	1.2	0.4	0.6	0.0	0.2	0.7	0.3	0.3	0.9
1/6/2010	9:00	2	Y	C	0.2	0.5	2.1	2.4	1.0	0.3	0.6	0.0	0.3	0.8	0.4	0.3	0.9
1/11/2010	11:00	2	Y	A	0.0	0.3	1.7	2.2	0.5	0.0	0.1	0.0	0.0	0.4	0.1	0.0	0.5
1/18/2010	8:10	2	Y	C	0.0	0.4	1.3	1.9	0.4	0.1	0.3	0.0	0.2	0.5	0.3	0.2	0.4
1/25/2010	12:30	2	Y	A	0.1	0.4	1.3	1.7	0.4	0.1	0.2	0.0	0.1	0.3	0.1	0.1	0.4
2/2/2010	11:45	2	Y	A	0.2	0.5	1.2	1.5	0.5	0.2	0.3	0.1	0.3	0.3	0.2	0.2	0.6
2/10/2010	8:10	1	Y	C	0.1	0.4	1.0	1.6	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.3
2/17/2010	8:05	2	Y	C	0.2	0.4	1.3	1.6	0.4	0.2	0.2	0.1	0.2	0.4	0.1	0.1	0.4
2/23/2010	7:42	2	Y	C	0.3	0.8	1.1	1.7	0.8	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.7
2/24/2010	7:15	2	Y	C	0.3	0.8	1.0	1.8	0.7	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.7
3/5/2010	6:39	2	Y	B	0.1	0.5	0.6	0.8	0.6	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.3
3/10/2010	8:30	2	Y	C	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3/19/2010	8:00	2	Y	C	0.3	0.4	0.6	0.9	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
3/26/2010	6:40	2	Y	B	0.2	0.3	0.5	0.6	0.4	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2
3/31/2010	6:29	2	Y	B	0.5	0.3	0.4	0.6	0.3	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.2
4/9/2010	10:00	2	Y	C	0.3	0.4	0.6	0.7	0.4	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.3
4/15/2010	10:08	2	Y	C	0.3	0.4	0.6	0.7	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3
4/22/2010	830	2	Y	C	0.2	0.3	0.5	0.6	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
4/30/2010	11:20	2	Y	C	0.3	0.4	0.5	0.6	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5
5/7/2010	12:24	2	Y	A	2.3	1.5	2.1	2.2	2.0	6.6	1.9	1.6	2.0	1.7	2.3	1.6	0.2
5/12/2010	16:58	2	Y	B	2.2	1.6	2.3	2.4	2.0	2.5	1.8	1.7	1.7	1.8	1.9	1.7	0.3
5/25/2010	7:24	2	Y	B	1.0	0.6	1.1	0.7	0.4	0.3	0.5	0.4	0.4	0.4	0.4	0.4	0.1
5/26/2010	7:27	2	Y	B	1.1	1.3	1.5	1.1	0.9	1.0	1.1	0.8	0.9	1.3	0.8	0.8	0.3
5/28/2010	11:04	2	Y	C	0.8	0.8	0.9	0.8	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.3
6/3/2010	9:56	2	Y	C	0.7	0.7	0.6	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.3
6/10/2010	10:36	2	Y	C	0.6	0.8	0.7	0.8	0.5	0.5	0.5	0.4	0.6	0.6	0.5	0.6	0.2

TABLE 21
PID MEASUREMENTS AT SVE WELLS AND EFFLUENT
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date	Time	Blowers	Sparge	Sparge Group	SVE1	SVE2	SVE3	SVE4	SVE5	SVE6	SVE7	SVE8	SVE9	SVE10	SVE11	SVE12	Effluent
6/17/2010	8:26	2	Y	C	1.2	1.3	1.0	1.1	0.8	0.8	0.7	0.8	0.6	0.6	0.7	0.6	0.5
6/24/2010	13:45	2	Y	A	8.2	7.6	7.9	7.2	6.9	6.9	6.8	6.7	6.8	6.6	6.4	6.5	6.3
7/1/2010	14:13	2	Y	A	0.7	0.9	0.7	0.8	0.6	0.6	0.5	0.6	0.7	0.6	0.6	0.6	0.4
7/9/2010	12:20	2	Y	A	0.7	1.0	0.8	0.8	0.6	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.4
7/16/2010	10:10	2	Y	C	0.5	1.9	1.8	1.4	1.2	0.9	0.8	0.8	0.9	0.8	0.7	0.7	0.4
7/24/2010	12:11	2	N	-	2.2	1.8	1.7	1.5	1.1	1.4	0.8	0.8	1.1	0.9	0.8	0.8	0.5
7/30/2010	15:00	2	Y	A	1.9	1.8	1.8	1.5	1.0	1.2	0.9	0.8	1.0	1.0	0.8	0.8	0.5
8/6/2010	8:21	2	Y	C	1.7	2.5	1.7	1.5	1.7	2.2	2.0	1.8	1.4	1.5	1.6	0.9	1.0
8/13/2010	9:30	2	Y	C	0.9	1.1	0.8	0.7	0.7	0.7	0.5	0.5	0.4	0.3	0.4	0.2	0.3
8/20/2010	7:59	2	Y	C	0.8	0.8	0.7	0.6	0.5	0.6	0.5	0.5	0.6	0.4	0.4	0.3	0.2
8/27/2010	14:45	2	Y	A	0.8	0.7	0.7	0.5	0.5	0.5	0.6	0.6	0.5	0.4	0.5	0.3	0.3
8/30/2010	16:15	2	Y	B	0.9	0.9	0.8	0.7	0.5	0.5	0.5	0.4	0.5	0.5	0.3	0.3	0.3
9/3/2010	13:00	2	Y	A	0.9	0.8	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.4
9/10/2010	9:49	2	Y	C	0.9	2.3	1.4	1.5	1.7	2.6	1.5	1.3	0.9	0.7	0.5	0.2	0.9
9/16/2010	9:47	2	Y	C	1.9	1.3	1.1	0.8	0.8	2.6	1.9	1.6	1.6	1.4	1.1	0.8	0.6
9/24/2010	13:45	2	Y	A	0.9	0.5	0.4	0.7	0.7	1.9	0.8	0.7	0.7	0.5	0.6	0.7	0.5
10/1/2010	12:45	2	Y	A	0.2	0.6	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2
10/8/2010	7:50	2	Y	C	2.4	1.9	2.4	2.1	2.2	2.2	4.9	1.9	1.9	1.1	0.9	1.1	2.2
10/15/2010	10:43	2	Y	C	1.8	3.8	1.4	1.6	2.7	2.1	2.7	1.3	1.4	1.1	0.9	0.8	2.6
10/22/2010	14:04	2	Y	A	0.4	0.4	0.4	0.4	0.3	0.5	0.2	0.3	0.4	0.2	0.2	0.1	0.5
10/25/2010	16:53	2	Y	B	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.6
10/28/2010	10:37	2	Y	C	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.6
11/4/2010	8:05	2	Y	C	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.5
11/11/2010	8:53	2	Y	C	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
11/19/2010	12:05	2	Y	A	0.3	0.4	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.2
11/24/2010	9:00	2	Y	C	0.1	0.1	0.1	0.2	0.1	0.0	0.3	0.1	0.1	0.1	0.1	0.1	0.2
11/30/2010	8:42	2	Y	C	0.2	0.1	0.2	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
12/7/2010	11:34	2	Y	A	0.3	0.3	0.3	0.4	0.2	0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.2
12/17/2010	8:50	2	Y	C	0.2	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.3
12/22/2010	12:51	1	N	-	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
12/30/2010	14:00	2	Y	A	0.3	0.3	0.2	0.3	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.3

Note:

1) PID measurements made with a MiniRae 2000 (10.6 eV lamp); units are parts per million

PID: photoionization detector

TABLE 22
PID MEASUREMENTS AT VMPs
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Date	Blowers	Sparge	VMP1A	VMP1B	VMP2A	VMP2B	VMP3A	VMP3B	VMP4A	VMP4B	VMP5A	VMP5B	VMP6A	VMP6B	VMP7A	VMP7B	VMP8A	VMP8B	VMP9A	VMP9B	VMP10A	VMP10B
10/26/2009	0	N	0.3	0.8	0.7	0.9	0.3	0.9	0.3	1.3	2.6	1.4	0.6	0.7	0.5	2.0	0.5	0.5	1.2	0.8	0.3	0.6
12/21/2009	2	Y	1.2	0.5	0.4	0.4	0.7	0.5	0.4	0.4	0.4	0.6	0.3	1.0	0.4	0.4	0.4	0.3	0.5	0.3	0.9	0.4
12/29/2009	2	Y	0.3	0.3	0.2	2.9	0.3	0.4	0.3	0.3	0.0	1.7	2.0	1.3	1.0	0.2	0.3	0.1	0.3	0.2	0.3	0.2
1/6/2010	2	Y	-	-	0.3	1.0	0.3	0.4	0.2	0.5	0.3	1.0	2.7	0.9	-	-	0.2	0.9	0.3	0.4	0.4	0.7
1/11/2010	2	Y	-	-	0.2	0.5	0.3	0.2	0.2	0.3	0.1	0.3	0.8	0.5	-	-	0.1	0.3	0.2	0.2	-	-
1/18/2010	2	Y	0.5	0.3	0.4	0.6	0.5	0.3	0.5	0.4	0.4	0.5	5.6	0.7	-	0.4	0.5	0.8	0.6	0.4	1.0	0.6
1/25/2010	2	Y	0.3	0.4	0.3	0.8	0.3	0.4	0.3	0.5	0.4	0.8	0.7	0.3	0.2	0.3	0.1	0.5	0.5	0.4	0.5	0.3
2/2/2010	2	Y	0.3	0.2	0.2	0.1	0.4	0.2	0.5	0.4	0.4	0.1	2.4	0.4	2.3	0.4	0.4	0.2	0.4	0.3	0.8	0.3
2/10/2010	1	Y	0.3	0.2	0.1	0.3	0.2	0.2	0.2	0.3	0.1	0.3	0.3	0.3	0.7	0.6	0.2	0.3	0.3	0.3	0.6	0.5
2/17/2010	2	Y	0.3	0.3	0.2	0.5	0.4	0.2	0.5	0.5	0.4	0.6	2.5	0.6	1.3	0.4	0.4	0.5	0.6	0.4	0.9	0.5
2/24/2010	2	Y	0.3	0.3	0.2	0.5	0.4	0.1	0.4	0.5	0.4	0.5	2.4	0.6	1.3	0.4	0.3	0.5	0.6	0.4	0.8	0.5
3/5/2010	2	Y	0.3	0.3	0.3	0.5	1.3	0.6	0.7	0.8	0.2	0.3	2.1	1.0	2.1	1.0	1.0	0.8	0.8	0.5	1.6	0.8
3/10/2010	2	Y	0.4	0.2	0.4	0.2	0.8	1.3	0.5	0.9	0.2	0.4	1.2	0.5	2.1	1.3	0.8	1.1	1.0	0.6	1.7	1.2
3/19/2010	2	Y	0.5	0.2	0.5	0.4	1.2	2.3	1.2	1.5	0.5	0.4	1.1	0.8	1.3	1.6	1.9	2.8	1.0	1.0	1.4	1.7
3/31/2010	2	Y	0.4	0.2	0.3	0.3	2.3	1.7	2.4	1.2	0.3	0.2	3.1	1.3	4.6	1.8	3.7	2.4	2.2	0.8	3.5	1.6
4/14/2010	2	Y	1.0	0.8	1.5	0.9	6.5	3.5	4.7	1.8	1.3	0.8	3.4	1.2	4.9	1.5	6.0	3.5	4.1	1.8	4.6	1.5
5/12/2010	2	Y	24.4	14.1	22.1	15.4	21.9	16.7	17.4	13.1	32.0	16.5	9.3	7.8	16.1	12.4	16.8	14.4	16.1	12.0	12.9	3.8
5/28/2010	2	Y	21.6	6.9	-	-	-	-	10.4	4.1	-	-	-	-	-	-	-	-	-	-	-	-
6/3/2010	2	Y	11.0	5.2	12.9	4.4	10.7	8.1	8.8	5.3	19.4	5.5	3.3	3.2	4.4	3.6	8.0	7.9	7.8	6.1	4.9	6.0
7/1/2010	2	Y	3.0	4.4	4.1	6.4	3.4	5.7	3.3	5.2	5.9	8.8	2.4	4.0	1.6	3.0	2.6	4.0	2.9	4.3	3.6	6.2
8/6/2010	2	Y	3.2	3.8	3.4	3.9	3.4	4.1	2.8	4.6	3.5	9.9	3.4	3.1	2.1	2.0	3.5	2.8	2.9	3.1	3.4	5.9
8/30/2010	2	Y	0.4	0.2	0.3	0.2	0.7	0.3	2.4	1.5	2.2	1.1	2.1	1.5	3.0	1.9	3.4	2.0	2.0	2.0	1.7	1.1
10/1/2010	2	Y	2.0	1.2	2.0	1.3	2.8	1.8	2.0	1.7	1.2	1.1	1.9	1.8	1.4	1.9	1.7	1.6	2.0	1.7	2.6	3.5
10/28/2010	2	Y	0.6	2.2	0.8	0.5	0.8	2.0	1.0	2.6	0.8	1.6	1.2	1.5	0.9	1.3	1.2	1.2	1.6	4.7	2.1	2.8
11/22/2010	2	Y	0.7	1.8	0.7	0.5	1.1	1.9	1.3	2.4	1.5	1.9	1.2	1.9	1.0	1.2	1.6	1.4	2.0	2.5	2.1	2.9
12/30/2010	2	Y	0.5	0.3	0.3	0.4	1.5	0.4	0.4	0.3	0.2	0.2	0.4	0.4	0.3	0.6	0.5	0.4	0.4	0.4	0.3	0.4

Notes:

1) PID measurements made with a MiniRae 2000 (10.6 eV lamp); units are parts per million

\- No measurement

PID: photoionization detector

TABLE 23
VAPOR ANALYTICAL RESULTS SUMMARY, AS/SVE EFFLUENT
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Sample ID	OD-SVE-BASELINE-1	OD-SVE-BASELINE-2	OD-SVE-BASE3-NS	ODSVE BASELINE 4	ODSVE-2Q10	ODSVE-3Q10	ODSVE-4 Q10
	Lab ID	JA35169-1	JA38446-1	JA40428-1	JA43177-1	JA49630-1	JA56529-1	JA63577-1
	Collect Date	11-Dec-09	25-Jan-10	23-Feb-10	31-Mar-10	17-Jun-10	16-Sep-10	7-Dec-10
Analyte	Units							
1,1,2,2-Tetrachloroethane	ppbv	**113**	**90.9**	**88.7**	**61.4**	**126**	**16.5**	**6.7**
1,1,2-Trichloroethane	ppbv	**7.3**	**2.8**	<0.8	**1.5**	**6.8**	0.53 J	<0.8
1,1-Dichloroethylene	ppbv	**9.7**	**17.5**	**9.8**	**7.8**	**17.5**	**3.4**	**3.1**
1,2-Dichloroethane	ppbv	0.64 J	<0.8	<0.8	<0.2	<0.8	<0.8	<0.8
Carbon tetrachloride	ppbv	**11.5**	**1.1**	<0.8	**1**	**2.7**	<0.8	<0.8
Chloroform	ppbv	**8.5**	**11.5**	**6.7**	**6.4**	**12**	**1.6**	**1.9**
cis-1,2-Dichloroethylene	ppbv	**70.8**	**36.3**	**27.7**	**14.7**	**29.8**	**3.6**	**3**
Methylene chloride	ppbv	<0.8	<0.8	<0.8	<0.2	**3.7**	<0.8	<0.8
Tetrachloroethylene	ppbv	**134**	**3.4**	**2.8**	**2.4**	**6.5**	**1.2**	**2.2**
trans-1,2-Dichloroethylene	ppbv	**8.4**	**4.3**	**2.6**	**1.4**	**3**	<0.8	0.45 J
Trichloroethylene	ppbv	**825**	**228**	**144**	**77**	**134**	**20.7**	**40.1**
Vinyl chloride	ppbv	**11.9**	**2**	**3.7**	**2**	**5.1**	0.65 J	**0.97**
Total CVOCs*		1201	398	286	176	347	48.2	58.4
1,1,1-Trichloroethane	ppbv	**0.97**	**6.9**	**3.6**	**7.4**	**14.2**	**2.3**	**1.9**
1,1-Dichloroethane	ppbv	<0.8	**2.9**	**2.9**	**2.3**	**7.2**	**1.3**	**1.3**
2,2,4-Trimethylpentane	ppbv	<0.8	**3.8**	**7.8**	**2.1**	**11.8**	<0.8	<0.8
Acetone	ppbv	**18.7**	**2.1**	**1.9**	**8.8**	**25.5**	**7.3**	<0.8
Benzene	ppbv	<0.8	<0.8	0.5 J	**0.86**	**1.5**	<0.8	<0.8
Carbon disulfide	ppbv	**1.3**	0.69 J	<0.8	<0.2	**1.5**	<0.8	<0.8
Chloromethane	ppbv	<0.8	<0.8	<0.8	**0.2**	0.65 J	<0.8	<0.8
Cyclohexane	ppbv	<0.8	**1.6**	**1.5**	**1.3**	**6**	<0.8	<0.8
Dichlorodifluoromethane	ppbv	0.8	**1**	**1.3**	**1.4**	**3.5**	0.62 J	0.59 J
Ethanol	ppbv	**6.6**	**2**	<2	**1.8**	**9.7**	**2.1**	<2
Ethyl Acetate	ppbv	<0.8	<0.8	<0.8	<0.2	**2.2**	<0.8	<0.8
Freon 113	ppbv	**3.8**	**25.5**	**43.7**	**61.6**	**99.7**	**12.6**	**7.3**
Heptane	ppbv	<0.8	0.61 J	0.4 J	**0.59**	**6.1**	<0.8	<0.8
Hexane	ppbv	0.7 J	**3.6**	**2.1**	**2.1**	**17.4**	<0.8	<0.8
Isopropyl Alcohol	ppbv	<0.8	<0.8	<0.8	<0.2	**2.2**	<0.8	<0.8
m,p-Xylene	ppbv	<0.8	<0.8	<0.8	0.13 J	0.75 J	<0.8	0.44 J
Methyl ethyl ketone	ppbv	**2.2**	<0.8	<0.8	<0.2	**3.6**	<0.8	<0.8
p-Dichlorobenzene	ppbv	<0.8	<0.8	<0.8	<0.2	0.45 J	<0.8	<0.8
Propylene	ppbv	<0.8	<2	<2	<0.5	**54.8**	<2	<2
Tertiary Butyl Alcohol	ppbv	<0.8	<0.8	<0.8	<0.2	0.58 J	<0.8	<0.8
Tetrahydrofuran	ppbv	**2.8**	<0.8	<0.8	<0.2	<0.8	<0.8	<0.8
Toluene	ppbv	<0.8	<0.8	<0.8	**0.33**	**5**	<0.8	0.79 J
Trichlorofluoromethane	ppbv	**1.3**	0.61 J	0.74 J	**0.8**	**4.4**	<0.8	<0.8
Vinyl Acetate	ppbv	<0.8	<0.8	<0.8	<0.2	**9.1**	<0.8	<0.8
Xylenes (total)	ppbv	<0.8	<0.8	<0.8	0.13 J	0.75 J	<0.8	0.44 J
Total VOCs*		1240	447	351	267	633	73.8	68.9

Notes:
* Sum of detected analytes above reporting limit.
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
ppbv: parts per billion by volume
RL: Reporting Limit
SVE: soil vapor extraction
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positivel indentified, quantitation estimated

TABLE 24
AS/SVE MASS EMISSIONS ESTIMATE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

Start Date	End Date	Hours Operating Between Dates	Average Flow rate (scfm)	Laboratory Total VOC Influent Concentration (ppbv)	Average Influent VOC Concentration (ppbv)	Influent Emission Rate (lb/hr)	Estimated VOC Mass Removal During Period (lbs)	Cumulative Mass Removed From Fluvial Subsurface (lbs)
11/12/2009	12/11/2009	92	977	1240	1240	0.025	2.3	2.3
12/11/2009	1/25/2010	1074	1054	447	844	0.018	19.9	22.2
1/25/2010	2/23/2010	665	926	351	399	0.008	5.1	27.3
2/23/2010	3/31/2010	890	916	267	309	0.006	5.2	32.5
3/31/2010	6/17/2010	1854	1119	633	450	0.010	19.4	51.9
6/17/2010	9/16/2010	1958	1114	73.8	353	0.008	16.0	68.0
9/16/2010	12/7/2010	1695	1006	68.9	71	0.001	2.5	70.5
12/7/2010	12/31/2010	196	936	-	69	0.001	0.3	70.8

Notes:
lbs: pounds
lb/hr: pounds per hour
ppbv: parts per billion by volume
scfm: standard cubic feet per minute
VOC: volatile organic compound

Constants:
Mass of TCE: 131.4 lb/lb mol
Molar Vol Air: 379 ft^3/lbmol (@ 60 deg F)

TABLE 25
WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 19-Oct-2009 (ft, btoc)	Groundwater Elevation 19-Oct-2009 (ft, msl)	Depth to Water 22-Mar-2010 (ft, btoc)	Groundwater Elevation 22-Mar-2010 (ft, msl)	Depth to Water 23-Mar-2010 (ft, btoc)	Groundwater Elevation 23-Mar-2010 (ft, msl)	Depth to Water 21-Sep-10 (ft, btoc)	Groundwater Elevation 21-Sep-10 (ft, msl)	Depth to Water 24 to 25-Jan-11 (ft, btoc)	Groundwater Elevation 24 to 25-Jan-11 (ft, msl)
MW-03	Fluvial	292.35	226.85	64.72	227.63	64.05	228.30	63.20	229.15	62.77	229.58	-	-
MW-04	Fluvial	301.61	241.61	72.34	229.27	71.40	230.21	-	-	71.70	229.91	-	-
MW-05	Fluvial	304.64	244.64	76.90	227.74	75.96	228.68	75.21	229.43	74.71	229.93	-	-
MW-06	Fluvial	289.11	238.11	60.78	228.33	59.59	229.52	-	-	58.38	230.73	-	-
MW-07	Fluvial	295.10	228.10	64.37	230.73	63.45	231.65	-	-	62.56	232.54	-	-
MW-08	Fluvial	292.59	236.09	60.29	232.30	59.11	233.48	-	-	58.47	234.12	-	-
MW-10	Fluvial	288.79	230.19	59.80	228.99	-	-	-	-	57.74	231.05	-	-
MW-13	Fluvial	300.01	234.01	70.80	229.21	69.94	230.07	-	-	68.60	231.41	-	-
MW-14	Fluvial	302.22	237.22	73.39	228.83	72.42	229.80	-	-	71.50	230.72	-	-
MW-15	Fluvial	295.12	231.72	66.64	228.48	65.50	229.62	-	-	64.36	230.76	-	-
MW-28	Fluvial	294.79	240.49	54.66	240.13	53.18	241.61	-	-	52.73	242.06	-	-
MW-31	Fluvial	290.37	226.27	67.38	222.99	66.60	223.77	65.59	224.78	64.86	225.51	65.37	225.00
MW-32	Fluvial	285.38	232.68	61.51	223.87	61.02	224.36	60.29	225.09	59.44	225.94	-	-
MW-33	Fluvial	280.71	236.11	54.18	226.53	53.10	227.61	-	-	51.79	228.92	-	-
MW-34	Intermediate	299.97	163.37	134.95	165.02	130.32	169.65	-	-	-	-	-	-
MW-37	Intermediate	284.91	119.21	125.36	159.55	119.00	165.91	123.00	161.91	129.25	155.66	-	-
MW-42	Fluvial	274.83	225.83	55.00	219.83	53.43	221.40	-	-	51.65	223.18	-	-
MW-43	Intermediate	284.99	123.49	124.07	160.92	118.51	166.48	-	-	124.45	160.54	-	-
MW-44	Fluvial	269.07	205.07	53.62	215.45	52.59	216.48	51.34	217.73	50.40	218.67	50.63	218.44
MW-45	Fluvial	293.22	235.22	54.24	238.98	52.87	240.35	-	-	52.96	240.26	-	-
MW-51	Fluvial	275.23	220.23	39.22	236.01	37.62	237.61	-	-	37.78	237.45	-	-
MW-53	Fluvial	306.38	233.88	73.03	233.35	72.34	234.04	-	-	-	-	-	-
MW-54	Fluvial	295.35	210.85	78.85	216.50	78.07	217.28	76.56	218.79	75.49	219.86	75.49	219.86
MW-57	Fluvial	290.77	230.77	62.24	228.53	60.90	229.87	-	-	60.30	230.47	-	-
MW-58	Fluvial	290.51	233.51	62.63	227.88	61.59	228.92	-	-	60.92	229.59	-	-
MW-65	Fluvial	263.22	222.42	5.10	258.12	2.40	260.82	-	-	12.34	250.88	-	-
MW-67	Memphis	278.21	18.21	118.48	159.73	111.65	166.56	-	-	120.65	157.56	-	-
MW-68	Fluvial	291.69	219.19	-	-	64.00	227.69	63.13	228.56	62.70	228.99	63.29	228.40
MW-69	Fluvial	307.02	224.94	79.85	227.17	79.20	227.82	78.37	228.65	77.74	229.28	78.33	228.69
MW-70	Fluvial	304.99	224.18	77.66	227.33	76.95	228.04	76.11	228.88	75.47	229.52	76.05	228.94
MW-71	Fluvial	294.40	228.90	67.38	227.02	66.56	227.84	-	-	65.08	229.32	65.36	229.04
MW-74	Fluvial	303.68	233.68	75.88	227.80	75.05	228.63	74.27	229.41	73.64	230.04	-	-
MW-75	Fluvial	303.61	232.61	75.95	227.66	75.13	228.48	74.36	229.25	73.79	229.82	-	-
MW-76	Fluvial	302.71	229.71	81.59	221.12	80.53	222.18	79.33	223.38	78.58	224.13	78.94	223.77
MW-77	Fluvial	304.42	236.42	81.23	223.19	78.45	225.97	77.59	226.83	76.96	227.46	77.40	227.02
MW-78	Fluvial	275.00	230.50	-	-	-	-	-	-	44.70	230.30	-	-

TABLE 25
WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 19-Oct-2009 (ft, btoc)	Groundwater Elevation 19-Oct-2009 (ft, msl)	Depth to Water 22-Mar-2010 (ft, btoc)	Groundwater Elevation 22-Mar-2010 (ft, msl)	Depth to Water 23-Mar-2010 (ft, btoc)	Groundwater Elevation 23-Mar-2010 (ft, msl)	Depth to Water 21-Sep-10 (ft, btoc)	Groundwater Elevation 21-Sep-10 (ft, msl)	Depth to Water 24 to 25-Jan-11 (ft, btoc)	Groundwater Elevation 24 to 25-Jan-11 (ft, msl)
MW-79	Fluvial	285.03	202.53	69.82	215.21	68.71	216.32	65.79	219.24	66.97	218.06	67.10	217.93
MW-80	Fluvial	273.81	220.81	58.64	215.17	57.41	216.40	-	-	55.76	218.05	-	-
MW-87	Fluvial	294.93	231.93	66.86	228.07	65.90	229.03	65.17	229.76	64.58	230.35	-	-
MW-91	Fluvial	291.99	236.99	63.75	228.24	62.67	229.32	-	-	61.51	230.48	-	-
MW-126	Fluvial	252.22	236.22	14.78	237.44	14.03	238.19	-	-	20.00	232.22	-	-
MW-127	Fluvial	268.71	208.71	58.80	209.91	58.20	210.51	-	-	56.93	211.78	-	-
MW-128	Fluvial	284.14	229.39	39.30	244.84	35.69	248.45	-	-	39.30	244.84	-	-
MW-129	Fluvial	293.01	228.01	54.45	238.56	52.40	240.61	-	-	52.98	240.03	-	-
MW-130	Fluvial	293.20	233.70	53.84	239.36	51.88	241.32	-	-	52.00	241.20	-	-
MW-132	Fluvial	300.73	227.23	73.04	227.69	72.76	227.97	71.37	229.36	70.80	229.93	-	-
MW-134	Fluvial	300.81	225.81	72.72	228.09	-	-	71.14	229.67	70.57	230.24	-	-
MW-144	Fluvial	291.60	235.10	71.95	219.65	70.63	220.97	69.38	222.22	68.47	223.13	68.72	222.88
MW-145	Fluvial	284.72	204.72	69.81	214.91	67.69	217.03	66.55	218.17	65.70	219.02	65.79	218.93
MW-147	Fluvial	289.72	229.72	68.33	221.39	67.20	222.52	66.09	223.63	65.36	224.36	65.78	223.94
MW-148	Fluvial	294.71	224.71	76.33	218.38	75.44	219.27	73.93	220.78	72.97	221.74	73.04	221.67
MW-149	Fluvial	287.18	205.78	71.14	216.04	70.27	216.91	68.84	218.34	67.97	219.21	67.98	219.20
MW-150	Fluvial	296.81	225.61	79.89	216.92	79.06	217.75	77.50	219.31	76.47	220.34	76.41	220.40
MW-151	Fluvial	284.27	207.27	68.35	215.92	67.68	216.59	66.15	218.12	65.30	218.97	65.27	219.00
MW-152	Fluvial	289.59	198.59	74.01	215.58	73.04	216.55	71.89	217.70	71.00	218.59	71.06	218.53
MW-153	Fluvial	279.17	203.17	64.12	215.05	63.00	216.17	-	-	61.53	217.64	-	-
MW-154	Fluvial	273.81	220.81	57.58	216.23	56.00	217.81	-	-	55.59	218.22	55.50	218.31
MW-155	Fluvial	291.65	214.65	75.17	216.48	74.58	217.07	73.12	218.53	71.78	219.87	72.28	219.37
MW-157	Fluvial	286.78	229.78	68.84	217.94	67.66	219.12	66.17	220.61	65.18	221.60	65.30	221.48
MW-158	Fluvial	294.07	203.06	78.24	215.83	77.60	216.47	76.20	217.87	75.25	218.82	75.19	218.88
MW-158A	Fluvial	293.95	216.03	78.18	215.77	77.48	216.47	76.12	217.83	75.16	218.79	75.12	218.83
MW-159	Fluvial	286.33	205.89	70.39	215.94	69.84	216.49	68.12	218.21	67.30	219.03	67.23	219.10
MW-160	Fluvial	294.00	228.13	76.11	217.89	-	-	-	-	-	-	-	-
MW-160[1]	Fluvial	293.69	228.13	-	-	75.43	218.26	74.31	219.38	73.39	220.30	73.52	220.17
MW-161	Fluvial	296.40	234.60	75.61	220.79	74.48	221.92	73.26	223.14	72.45	223.95	72.69	223.71
MW-162	Fluvial	299.70	233.39	79.19	220.51	77.95	221.75	76.67	223.03	75.86	223.84	76.16	223.54
MW-163	Fluvial	290.63	234.42	71.46	219.17	70.09	220.54	-	-	67.88	222.75	68.08	222.55
MW-164	Fluvial	287.48	231.86	67.72	219.76	66.21	221.27	64.89	222.59	64.03	223.45	64.39	223.09
MW-165	Fluvial	287.06	198.43	71.40	215.66	70.98	216.08	69.62	217.44	68.53	218.53	68.12	218.94
MW-165A	Fluvial	287.26	215.96	71.58	215.68	70.92	216.34	69.56	217.70	68.63	218.63	68.62	218.64
MW-166	Fluvial	283.44	199.59	66.90	216.54	-	-	-	-	-	-	-	-
MW-166A	Fluvial	283.45	215.15	67.07	216.38	-	-	-	-	-	-	-	-

TABLE 25
WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 19-Oct-2009 (ft, btoc)	Groundwater Elevation 19-Oct-2009 (ft, msl)	Depth to Water 22-Mar-2010 (ft, btoc)	Groundwater Elevation 22-Mar-2010 (ft, msl)	Depth to Water 23-Mar-2010 (ft, btoc)	Groundwater Elevation 23-Mar-2010 (ft, msl)	Depth to Water 21-Sep-10 (ft, btoc)	Groundwater Elevation 21-Sep-10 (ft, msl)	Depth to Water 24 to 25-Jan-11 (ft, btoc)	Groundwater Elevation 24 to 25-Jan-11 (ft, msl)
MW-166[1]	Fluvial	282.72	199.59	-	-	66.19	216.53	64.65	218.79	63.90	218.82	63.91	218.81
MW-166A[1]	Fluvial	282.90	215.15	-	-	66.30	216.60	64.80	218.65	64.01	218.89	64.05	218.85
MW-167	Fluvial	284.82	214.68	69.60	215.22	67.39	217.43	67.20	217.62	66.89	217.93	66.50	218.32
MW-169	Fluvial/Intermed.	261.90	194.12	75.60	186.30	72.44	189.46	-	-	72.21	189.69	-	-
MW-170	Fluvial	273.75	214.14	56.71	217.04	55.36	218.39	-	-	53.85	219.90	-	-
MW-171	Fluvial	270.69	217.72	54.44	216.25	53.14	217.55	-	-	51.75	218.94	-	-
MW-172	Fluvial	300.28	232.28	71.33	228.95	70.24	230.04	-	-	69.17	231.11	-	-
MW-174	Fluvial	296.56	229.56	67.92	228.64	66.79	229.77	-	-	65.68	230.88	-	-
MW-175	Fluvial	291.63	224.13	72.85	218.78	71.95	219.68	-	-	60.48	231.15	-	-
MW-176	Fluvial	299.68	223.68	71.65	228.03	70.76	228.92	69.99	229.69	69.39	230.29	-	-
MW-178	Fluvial	300.26	224.26	71.74	228.52	70.72	229.54	-	-	69.53	230.73	-	-
MW-179	Fluvial	301.16	224.16	72.93	228.23	72.18	228.98	-	-	70.77	230.39	-	-
MW-180	Fluvial	296.14	224.14	68.24	227.90	67.55	228.59	66.70	229.44	66.25	229.89	-	-
MW-182	Fluvial	275.40	213.40	63.62	211.78	63.07	212.33	-	-	61.80	213.60	62.25	213.15
MW-184	Fluvial	283.12	225.12	63.65	219.47	62.71	220.41	-	-	60.11	223.01	60.43	222.69
MW-185	Fluvial	256.71	171.71	75.49	181.22	71.15	185.56	-	-	70.30	186.41	-	-
MW-186	Fluvial	256.31	108.31	82.18	174.13	77.16	179.15	-	-	80.71	175.60	-	-
MW-187	Fluvial	302.74	226.74	72.43	230.31	72.44	230.30	-	-	71.09	231.65	-	-
MW-190	Fluvial	297.32	219.32	76.74	220.58	76.03	221.29	74.75	222.57	73.84	223.48	74.01	223.31
MW-220	Fluvial	293.29	228.35	64.92	228.37	64.15	229.14	-	-	65.32	227.97	-	-
MW-221	Fluvial	301.52	228.40	73.91	227.61	73.15	228.37	72.40	229.12	71.88	229.64	-	-
MW-222	Fluvial	303.82	229.64	75.50	228.32	74.75	229.07	-	-	74.15	229.67	-	-
MW-223	Fluvial	303.00	229.13	74.51	228.49	73.92	229.08	73.08	229.92	72.48	230.52	-	-
MW-224	Fluvial	304.13	230.42	75.74	228.39	74.91	229.22	-	-	73.48	230.65	-	-
MW-225	Fluvial	304.52	229.54	76.46	228.06	75.45	229.07	74.86	229.66	74.23	230.29	-	-
MW-226	Fluvial	303.19	228.97	70.70	232.49	74.00	229.19	-	-	72.63	230.56	-	-
MW-227	Fluvial	299.70	236.06	70.84	228.86	69.69	230.01	-	-	70.55	229.15	-	-
MW-228	Fluvial	301.65	237.56	72.74	228.91	71.56	230.09	-	-	68.68	232.97	-	-
MW-229	Intermediate	311.77	123.34	151.76	160.01	144.73	167.04	-	-	-	-	-	-
MW-230	Fluvial	286.57	227.32	53.27	233.30	52.19	234.38	-	-	51.40	235.17	-	-
MW-231	Intermediate	289.18	121.43	129.47	159.71	123.12	166.06	127.09	162.09	131.31	157.87	-	-
MW-232	Intermediate	285.18	135.13	124.90	160.28	118.73	166.45	122.56	162.62	126.51	158.67	-	-
MW-234	Intermediate	291.50	124.91	131.70	159.80	125.32	166.18	128.90	162.60	133.60	157.90	-	-
MW-235	Fluvial	264.00	213.41	56.64	207.36	53.04	210.96	52.42	211.58	52.61	211.39	53.27	210.73
MW-237	Intermediate	289.18	122.73	128.93	160.25	122.86	166.32	126.00	163.18	130.37	158.81	-	-

TABLE 25
WATER LEVEL MEASUREMENTS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, msl)	Top of Screen Elevation (ft, msl)	Depth to Water 19-Oct-2009 (ft, btoc)	Groundwater Elevation 19-Oct-2009 (ft, msl)	Depth to Water 22-Mar-2010 (ft, btoc)	Groundwater Elevation 22-Mar-2010 (ft, msl)	Depth to Water 23-Mar-2010 (ft, btoc)	Groundwater Elevation 23-Mar-2010 (ft, msl)	Depth to Water 21-Sep-10 (ft, btoc)	Groundwater Elevation 21-Sep-10 (ft, msl)	Depth to Water 24 to 25-Jan-11 (ft, btoc)	Groundwater Elevation 24 to 25-Jan-11 (ft, msl)
MW-239	Intermediate	288.44	122.97	127.81	160.63	122.43	166.01	124.78	163.66	129.44	159.00	-	-
MW-240	Intermediate	259.28	172.71	76.32	182.96	72.07	187.21	-	-	71.13	188.15	-	-
MW-241	Fluvial	292.82	219.57	75.25	217.57	74.18	218.64	72.85	219.97	71.76	221.06	71.69	221.13
MW-242	Fluvial	295.40	222.20	78.85	216.55	76.09	219.31	74.61	220.79	74.50	220.90	74.34	221.06
MW-243	Fluvial	292.26	211.56	76.27	215.99	75.78	216.48	74.27	217.99	73.66	218.60	72.90	219.36
MW-244	Fluvial	288.72	212.39	72.68	216.04	72.09	216.63	70.62	218.10	69.47	219.25	69.39	219.33
MW-245	Fluvial	290.13	205.40	74.40	215.73	73.53	216.60	72.22	217.91	71.28	218.85	71.49	218.64
MW-246	Fluvial	288.17	202.97	72.51	215.66	71.88	216.29	70.45	217.72	69.33	218.84	69.63	218.54
MW-247	Fluvial	285.70	205.70	70.02	215.68	69.42	216.28	67.81	217.89	66.92	218.78	66.95	218.75
MW-248	Fluvial	275.45	207.94	59.87	215.58	58.81	216.64	57.75	217.70	56.72	218.73	56.91	218.54
MW-249	Fluvial	285.53	207.49	69.73	215.80	68.63	216.90	67.45	218.08	66.61	218.92	66.70	218.83
MW-250	Intermediate	289.66	120.96	130.03	159.63	123.93	165.73	127.83	161.83	131.81	157.85	-	-
MW-251	Intermediate	285.83	125.63	126.00	159.83	119.86	165.97	123.84	161.99	127.78	158.05	-	-
MW-1-TDEC	Fluvial	275.83	NA	27.19	248.64	24.05	251.78	-	-	-	-	-	-
MW-2-TDEC	Fluvial	272.13	NA	24.50	247.63	21.40	250.73	-	-	-	-	-	-
MW-3-TDEC	Fluvial	265.28	NA	9.53	255.75	6.12	259.16	-	-	-	-	-	-

Notes:
1) MW-160, MW-166 and MW-166A changed from stick-up to flush-mount following grading during RA construction
--: Not Measured
ft, btoc: feet below top of casing
ft, msl: feet mean sea level
NA: Not Available

TABLE 26
PDB SAMPLE INTERVALS
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Monitoring Well	Top of Screen Depth (ft, btoc)	Screen Length (ft)	October 2009 Depth to Water (ft, btoc)	October 2009 Sample Depth (ft, btoc)	March 2010 Depth to Water (ft, btoc)	March 2010 Sample Depth (ft, btoc)	June 2010 Depth to Water (ft, btoc)	June 2010 Sample Depth (ft, btoc)	September 2010 Depth to Water (ft, btoc)	September 2010 Sample Depth (ft, btoc)	January 2011 Depth to Water (ft, btoc)	January 2011 Sample Depth (ft, btoc)
MW-54	84.5	10.0	78.5	89.5	78.9	89.5	76.6	89.5	75.6	89.5	75.5	89.5
MW-70	80.8	10.0	76.8	85.8	77.6	87.7	76.0	85.8	75.5	85.8	76.1	85.8
MW-76	73.0	20.0	80.5	87.3	81.5	90.8	79.4	87.3	78.6	87.3	78.9	87.3
MW-77	68.0	20.0	78.4	83.6	79.2	85.6	77.6	83.6	77.0	83.6	77.4	83.6
MW-79	82.5	20.0	69.1	92.5	69.9	93.3	67.8	92.5	67.0	92.5	67.1	92.5
MW-148	67.1	20.0	75.8	81.7	76.2	86.4	73.9	81.7	73.0	81.7	73.0	81.7
MW-149	81.7	20.0	70.8	91.7	71.3	92.2	68.9	91.7	68.1	91.7	68.0	91.7
MW-150	70.6	20.0	79.4	85.3	80.0	88.5	77.5	85.3	76.6	85.3	76.4	85.3
MW-151	77.2	20.0	68.1	87.2	68.5	87.8	73.2	87.2	65.5	87.2	65.3	87.2
MW-152	91.2	20.0	73.4	101.2	74.1	101.8	71.9	101.2	71.1	101.2	71.1	101.2
MW-155	77.2	20.0	75.0	87.2	75.1	88.9	66.2	87.2	72.5	87.2	72.3	87.2
MW-157	57.1	20.0	67.7	72.9	68.7	76.0	64.3	72.9	65.2	72.9	65.3	72.9
MW-158	91.3	15.0	77.9	98.8	78.5	99.3	76.2	98.8	75.4	98.8	75.2	98.8
MW-158A	78.2	15.0	77.9	85.8	78.3	88.3	76.1	85.8	75.3	85.8	75.1	85.8
MW-159	80.7	20.0	70.3	87.2	70.5	81.9	68.2	90.7	67.5	90.7	67.2	90.7
MW-160	66.0	20.0	75.5	81.4	76.7	84.4	-	-	73.4	81.4	-	-
MW-161	62.1	20.0	74.4	77.9	75.5	83.5	73.2	78.8	72.4	78.8	72.7	78.8
MW-162	66.5	20.0	77.9	82.8	79.1	86.1	76.6	82.8	75.9	82.8	76.2	82.8
MW-163	56.2	20.0	-	-	-	-	69.3	73.0	67.9	73.0	68.1	73.0
MW-164	55.9	20.0	66.2	71.8	67.7	74.6	64.9	71.8	64.2	71.8	64.4	71.8
MW-165	88.9	15.0	71.0	96.4	71.6	96.9	69.4	96.4	68.5	96.4	68.1	96.4
MW-165A	71.6	15.0	71.3	79.2	71.8	81.7	69.5	79.2	68.7	79.2	68.6	79.2
MW-166	83.2	15.0	66.7	90.1	67.1	92.1	64.8	90.7	64.0	90.7	63.9	90.7
MW-166A	67.7	15.0	66.8	75.2	67.2	78.2	64.9	75.2	64.1	75.2	64.1	75.2
MW-232	150.1	20.5	119.2	160.3	124.5	161.3	123.2	160.3	127.0	160.3	-	-
MW-241	73.3	15.0	74.7	81.7	75.0	82.5	72.8	81.6	72.0	81.6	71.7	81.6
MW-242	73.2	15.5	75.9	83.8	78.8	84.5	74.6	83.8	74.5	83.8	74.3	83.8
MW-243	80.7	20.0	76.2	90.7	76.1	91.0	74.3	90.7	73.1	90.7	72.9	90.7
MW-244	76.3	20.0	72.6	86.3	72.6	91.5	70.8	86.3	69.9	86.3	69.4	86.3
MW-245	84.7	20.0	73.5	95.0	74.5	95.0	72.2	95.0	68.7	95.0	71.5	95.0
MW-246	85.2	20.0	72.2	95.2	72.7	95.5	70.4	95.2	69.6	95.2	69.6	95.2
MW-247	80.0	20.0	69.8	90.0	70.2	90.0	67.9	90.0	67.1	90.0	67.0	90.0
MW-248	67.5	20.0	59.6	77.5	60.0	77.0	57.7	77.5	56.9	77.5	56.9	77.5
MW-249	78.0	20.0	69.3	88.3	69.9	88.3	67.4	88.3	66.7	88.3	66.7	88.3
MW-250	168.7	15.0	124.4	176.2	129.7	176.5	128.4	176.2	132.4	176.2	-	-
MW-251	160.2	15.0	120.4	167.7	125.6	168.0	124.4	167.7	128.3	167.7	-	-

Notes:
1) Sample depth is to PDB mid-point
ft: feet
ft, btoc: feet below top of casing
PDB: passive diffision bag

TABLE 27
WELL STABILIZATION SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Well ID	Sample Date	Method	Time	Sample Pump Depth (ft, btoc)	Water Depth (ft, btoc)	Purge Rate (ml/min)	Volume Purged (L)	pH	Temp (C)	Specific Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTUs)
MW-163	10/16/2009	low flow	9:05	76.0	71.5	240	17.0	6.1	17.0	0.261	8.3	142	18.4
MW-163	3/25/2010	low flow	13:32	76.0	70.0	215	13.5	6.0	17.5	0.308	8.1	112	17.8
MW-160	6/23/2010	low flow	14:25	80.0	74.0	340	13.2	7.4	24.4	0.343	1.5	80	0.0
MW-160	1/26/2011	low flow	13:59	80.0	73.4	280	4.6	7.6	13.3	0.364	15.5	271	1.1

Notes:

˚C : degrees Celsius
DO: Dissolved Oxygen
ft, btoc: feet below top of casing
L: liters
mg/L: milligrams per liter
mL/min: milliliters per minute
mS/cm: milliSiemens per centimeter
mV: millivolts
NA: not available
NTU: nephelometric turbidity unit
ORP: Oxidation Reduction Potential

TABLE 28
GROUNDWATER ANALYTICAL RESULTS SUMMARY, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-54	MW-70	MW-76	MW-77	MW-79	MW-148	MW-149
	Lab ID			L09100423-07	L09100412-21	L09100412-22	L09100412-23	L09100423-08	L09100412-24	L09100423-09
	Date			10/16/2009	10/15/2009	10/15/2009	10/15/2009	10/16/2009	10/15/2009	10/16/2009
Analyte	**units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**384**	**0.971**	**1.38**	**47.5**	<0.5	**0.63**	**9.93**
1,1,2-Trichloroethane	µg/L	5	1.9	1.49 J	<1	<1	<1	<1	<1	0.387 J
1,1-Dichloroethene	µg/L	7	7	<2.5	<1	<1	<1	**3.99**	<1	<1
1,2-Dichloroethane	µg/L	5	--	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<2.5	<1	<1	<1	<1	<1	**6.36**
Chloroform	µg/L	80	12	**1.25**	<0.3	<0.3	0.175 J	<0.3	<0.3	**70**
cis-1,2-Dichloroethene	µg/L	70	35	**10.7**	<1	<1	0.94 J	<1	<1	**4.64**
Tetrachloroethene	µg/L	5	2.5	**2.52**	0.71 J	0.35 J	0.685 J	**1.38**	<1	**1.16**
trans-1,2-Dichloroethene	µg/L	100	50	1.39 J	<1	<1	<1	<1	<1	0.662 J
Trichloroethene	µg/L	5	5	**381**	**1.93**	**2.27**	**36.7**	**1.25**	0.613 J	**38.6**
Vinyl chloride	µg/L	2	--	<2.5	<1 UJ	<1 UJ	<1 UJ	<1	<1 UJ	<1
Total Primary CVOCs				782	3.61	4	86	6.62	1.24	132
Other VOCs										
1,4-Dichlorobenzene	µg/L	75	--	<1.25	<0.5	<0.5	<0.5	<0.5	0.318 J	<0.5
Styrene	µg/L	100	--	<2.5	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 28
GROUNDWATER ANALYTICAL RESULTS SUMMARY, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / units	MCL	TC	MW-150 / L09100423-10 / 10/16/2009	MW-151 / L09100423-11 / 10/16/2009	MW-152 / L09100423-14 / 10/16/2009	MW-155 / L09100412-25 / 10/15/2009	MW-157 / L09100412-26 / 10/15/2009	MW-158 / L09100423-15 / 10/16/2009	MW-158A / L09100423-16 / 10/16/2009
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**406**	<0.5	**9.85**	**263**	**3.88**	**8.22**	**156**
1,1,2-Trichloroethane	µg/L	5	1.9	0.716 J	<1	0.336 J	<2	<1	**<1**	2.52
1,1-Dichloroethene	µg/L	7	7	<2.5	<1	<1	<2	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<1.25	<0.5	<0.5	<1	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<2.5	**1.43**	<1	<2	**4.66**	<1	<1
Chloroform	µg/L	80	12	**0.913**	**2.92**	**0.962**	0.256 J	**8**	**0.294 J**	0.67
cis-1,2-Dichloroethene	µg/L	70	35	1.27 J	0.416 J	**18.3**	1.59 J	**11.6**	**1.45**	**8.93**
Tetrachloroethene	µg/L	5	2.5	1.1 J	<1	**2.89**	1.48 J	**2.1**	**2.66**	**1.96**
trans-1,2-Dichloroethene	µg/L	100	50	<2.5	<1	**1.39**	<2	**2.69**	<1	0.456 J
Trichloroethene	µg/L	5	5	**49.4**	**8.06**	**183**	**94.2**	**202**	**26.4**	**69.9**
Vinyl chloride	µg/L	2	--	<2.5	<1	<1	<2	<1	**<1**	1.15
Total Primary CVOCs				459	12.8	217	361	235	39	242
Other VOCs										
1,4-Dichlorobenzene	µg/L	75	--	<1.25	<0.5	<0.5	<1	<0.5	<0.5	<0.5
Styrene	µg/L	100	--	<2.5	<1	<1	<2	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 28
GROUNDWATER ANALYTICAL RESULTS SUMMARY, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-159	MW-160	MW-161	MW-162	MW-163	MW-164	MW-165
	Lab ID			L09100423-17	L09100412-27	L09100412-28	L09100412-29	L09100423-01	L09100412-30	L09100423-18
	Date			10/16/2009	10/15/2009	10/15/2009	10/15/2009	10/16/2009	10/15/2009	10/16/2009
Analyte	**units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**483**	**125**	**17.4**	**8.71**	**143**	**32**	**3.92**
1,1,2-Trichloroethane	µg/L	5	1.9	**33.7**	0.332 J	<1	<1	0.261 J	**1.41**	**1.62**
1,1-Dichloroethene	µg/L	7	7	2.96 J	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<2.5	<0.5	<0.5	<0.5	<0.5	0.269 J	<0.5
Carbon tetrachloride	µg/L	5	3	<5	<1	<1	<1	<1	**7.78**	<1
Chloroform	µg/L	80	12	0.923 J	**0.56**	<0.3	0.159 J	**0.974**	**79.3**	**1.04**
cis-1,2-Dichloroethene	µg/L	70	35	**82.2**	0.375 J	0.309 J	<1	**2.45**	**18.6**	**18.7**
Tetrachloroethene	µg/L	5	2.5	4.11 J	0.251 J	0.735 J	0.308 J	0.93 J	**1.33**	1.39
trans-1,2-Dichloroethene	µg/L	100	50	**8.94**	<1	<1	<1	0.321 J	**1.91**	3.26
Trichloroethene	µg/L	5	5	**983**	**8.39**	**11.3**	**4.54**	**65.8**	**89.1**	**194**
Vinyl chloride	µg/L	2	--	<5	<1 UJ	<1 UJ	<1 UJ	<1	<1 UJ	<1
Total Primary CVOCs				1599	135	29.7	13.7	214	232	52.6
Other VOCs										
1,4-Dichlorobenzene	µg/L	75	--	<2.5	<0.5	<0.5	<0.5	<0.5	0.15 J	0.809
Styrene	µg/L	100	--	<5	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 28
GROUNDWATER ANALYTICAL RESULTS SUMMARY, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-165A	MW-166	MW-166A	MW-232	MW-241	MW-242	MW-243
	Lab ID			L09100423-19	L09100423-20	L09100423-21	L09100423-22	L09100412-31	L09100423-23	L09100412-32
	Date			10/16/2009	10/16/2009	10/16/2009	10/16/2009	10/15/2009	10/16/2009	10/15/2009
Analyte	**units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**12.5**	**15.3**	**10**	<0.5	**0.744**	**229**	**89.5**
1,1,2-Trichloroethane	µg/L	5	1.9	**1.18**	0.525 J	0.319 J	<1	<1	**3.34**	0.806 J
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<2	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5
Carbon tetrachloride	µg/L	5	3	<1	**11.3**	**2.26**	<1	<1	<2	<1
Chloroform	µg/L	80	12	**1.21**	**80.9**	**24.8**	<0.3	<0.3	0.578 J	0.233 J
cis-1,2-Dichloroethene	µg/L	70	35	**1.99**	**4.42**	**1.76**	<1	<1	**15.1**	**10.3**
Tetrachloroethene	µg/L	5	2.5	**0.252 J**	2.03	**0.367 J**	<1	<1	<2	**2.48**
trans-1,2-Dichloroethene	µg/L	100	50	**<1**	0.866 J	0.266 J	<1	<1	1.75 J	**3.08**
Trichloroethene	µg/L	5	5	**35.5**	**48**	**19.1**	<1	**2.75**	**26.9**	**138**
Vinyl chloride	µg/L	2	--	<1	<1	<1	0.914 J	<1	<2	<1 UJ
Total Primary CVOCs				224	58.9	163	0.914	3.49	277	244
Other VOCs										
1,4-Dichlorobenzene	µg/L	75	--	<0.5	0.282 J	0.182 J	<0.5	<0.5	<1	<0.5
Styrene	µg/L	100	--	<1	<1	<1	1.12	<1	<2	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 28
GROUNDWATER ANALYTICAL RESULTS SUMMARY, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-244	MW-245	MW-246	MW-247	MW-248	MW-249	MW-250
	Lab ID			L09100412-33	L09100423-24	L09100423-25	L09100423-26	L09100423-27	L09100423-28	L09100423-03
	Date			10/15/2009	10/16/2009	10/16/2009	10/16/2009	10/16/2009	10/16/2009	10/16/2009
Analyte	**units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**953**	**383**	**2290**	**18.6**	**0.589**	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	**7.89**	**3.83**	**57.7**	**1.09**	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<5	1.85 J	**18.2**	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<2.5	<1	<5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<5	<2	<10	**3.04**	<1	<1	<1
Chloroform	µg/L	80	12	1.26 J	0.338 J	<3	**120**	<0.3	<0.3	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	**17**	**25.8**	**401**	**15.7**	<1	<1	<1
Tetrachloroethene	µg/L	5	2.5	<5	**4.55**	5.47 J	**3.38**	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	1.79 J	**5.99**	**24.3**	**2.12**	<1	<1	<1
Trichloroethene	µg/L	5	5	**131**	**359**	**1800**	**123**	<1	<1	<1
Vinyl chloride	µg/L	2	--	**6.23**	<2	**10.3**	<1	<1	<1	<1
Total Primary CVOCs				1118	784	4607	287	0.589	0	0
Other VOCs										
1,4-Dichlorobenzene	µg/L	75	--	<2.5	<1	<5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	100	--	<5	<2	<10	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 28
GROUNDWATER ANALYTICAL RESULTS SUMMARY, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-251
	Lab ID			L09100423-04
	Date			10/16/2009
Analyte	**units**	**MCL**	**TC**	
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1
1,1-Dichloroethene	µg/L	7	7	**3.8**
1,2-Dichloroethane	µg/L	5	--	<0.5
Carbon tetrachloride	µg/L	5	3	<1
Chloroform	µg/L	80	12	**0.311**
cis-1,2-Dichloroethene	µg/L	70	35	<1
Tetrachloroethene	µg/L	5	2.5	0.697 J
trans-1,2-Dichloroethene	µg/L	100	50	<1
Trichloroethene	µg/L	5	5	0.396 J
Vinyl chloride	µg/L	2	--	<1
Total Primary CVOCs				5.20
Other VOCs				
1,4-Dichlorobenzene	µg/L	75	--	<0.5
Styrene	µg/L	100	--	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 29
GROUNDWATER ANALYTICAL RESULTS SUMMARY, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-54	MW-70	MW-76	MW-77	MW-79	MW-148	MW-149
	Lab ID			L10030650-01	L10030693-03	L10030693-04	L10030693-05	L10030693-06	L10030650-02	L10030650-05
	Date			3/24/2010	3/25/2010	3/25/2010	3/25/2010	3/25/2010	3/24/2010	3/24/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**168**	<0.5	**0.525**	**5.34**	<0.5	<0.5	**5.47**
1,1,2-Trichloroethane	µg/L	5	1.9	0.599 J	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	**17.9**	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	<1	<1	**1.78**
Chloroform	µg/L	80	12	**0.663**	<0.3	0.134 J	0.179 J	0.152 J	<0.3	**12.9**
cis-1,2-Dichloroethene	µg/L	70	35	**4.7**	<1	<1	<1	<1	<1	**4.52**
Tetrachloroethene	µg/L	5	2.5	**1.77**	**1.04**	<1	0.4 J	**26.6**	<1	0.718 J
trans-1,2-Dichloroethene	µg/L	100	50	0.657 J	<1	<1	<1	<1	<1	0.679 J
Trichloroethene	µg/L	5	5	**170**	0.581 J	**1.35**	**5.68**	**16.9**	0.932 J	**54.7**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				346	1.62	2.01	11.6	61.6	0.932	80.8
Other VOCs										
Carbon disulfide	µg/L			<1	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 29
GROUNDWATER ANALYTICAL RESULTS SUMMARY, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-150	MW-151	MW-152	MW-155	MW-157	MW-158	MW-158A
	Lab ID			L10030650-06	L10030650-07	L10030693-07	L10030650-08	L10030693-08	L10030650-09	L10030650-10
	Date			3/24/2010	3/23/2010	3/25/2010	3/24/2010	3/25/2010	3/24/2010	3/24/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**34.7**	<0.5	**77.8**	**16.7**	**5.71**	**4.59**	**27.8**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	0.492 J	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	0.967 J	<1	<1	**4.14**	<1	<1
Chloroform	µg/L	80	12	0.246 J	**2.93**	**0.711**	<0.3	**7.72**	<0.3 J	0.155 J
cis-1,2-Dichloroethene	µg/L	70	35	0.453 J	0.369 J	**4.2**	0.303 J	**9.3**	**1.04**	0.295 J
Tetrachloroethene	µg/L	5	2.5	0.711 J	<1	0.681 J	<1	**1.81**	0.697 J	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	**2.11**	0.35 J	<1
Trichloroethene	µg/L	5	5	**16.1**	**9.9**	**40.8**	**3.17**	**175**	**16.7**	**3.87**
Vinyl chloride	µg/L	2	--	0.416 J	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				52.6	14.2	125	20.2	206	23.4	32.1
Other VOCs										
Carbon disulfide	µg/L			<1	<1 UJ	<1 UJ	<1	<1 UJ	1.06 UJ	<1 UJ

Notes:
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RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
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UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 29
GROUNDWATER ANALYTICAL RESULTS SUMMARY, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-159	MW-160	MW-161	MW-162	MW-163	MW-164	MW-165
	Lab ID			L10030650-11	L10030650-12	L10030693-09	L10030693-10	L10030693-11	L10030693-12	L10030650-13
	Date			3/24/2010	3/24/2010	3/25/2010	3/25/2010	3/25/2010	3/25/2010	3/24/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**133**	**5.63**	**2.27**	**3.56**	**11.8**	**21.3**	**25.1**
1,1,2-Trichloroethane	µg/L	5	1.9	**16.8**	<1	<1	<1	<1	**1.07**	**2.26**
1,1-Dichloroethene	µg/L	7	7	3.26 J	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<5	<1	<1	<1	<1	**6.74**	<1
Chloroform	µg/L	80	12	<1.5	<0.3	0.129 J	0.151 J	<0.3	**56.5**	**2.74**
cis-1,2-Dichloroethene	µg/L	70	35	**54**	<1	<1	<1	0.303 J	**15**	**7.7**
Tetrachloroethene	µg/L	5	2.5	2.5 J	<1	0.541 J	<1	0.487 J	**1.49**	**1.43**
trans-1,2-Dichloroethene	µg/L	100	50	**7.07**	<1	<1	<1	<1	**1.57**	**1.74**
Trichloroethene	µg/L	5	5	**505**	0.948 J	**2.92**	**3.25**	**11.1**	**75.5**	**187**
Vinyl chloride	µg/L	2	--	4.42 J	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				726	6.58	5.86	6.96	23.7	179	228
Other VOCs										
Carbon disulfide	µg/L			69 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ

Notes:
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--: Not listed
<: Analyte not detected above RL
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MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
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UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 29
GROUNDWATER ANALYTICAL RESULTS SUMMARY, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MCL	TC	MW-165A L10030650-32 3/24/2010	MW-166 L10030650-14 3/23/2010	MW-166A L10030650-15 3/23/2010	MW-232 L10030650-16 3/24/2010	MW-241 L10030650-17 3/24/2010	MW-242 L10030650-18 3/24/2010	MW-243 L10030650-21 3/24/2010
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**45.7**	**10.1**	**6.98**	<0.5	<0.5	**63.3**	**26.1**
1,1,2-Trichloroethane	µg/L	5	1.9	0.973 J	0.756 J	0.265 J	<1	<1	0.75 J	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	**6.1**	**1.88**	<1	<1	<1	<1
Chloroform	µg/L	80	12	**1.39**	**65**	**23**	<0.3	<0.3	0.188 J	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	0.421 J	**5.03**	**3.03**	<1	<1	**5.08**	**3.34**
Tetrachloroethene	µg/L	5	2.5	<1	**1.38**	0.402 J	<1	<1	0.373 J	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	0.919 J	<1	<1	<1	**1.01**	0.33 J
Trichloroethene	µg/L	5	5	**6.29**	**37.8**	**18.4**	0.308 J	**1.03**	**24.1**	**16**
Vinyl chloride	µg/L	2	--	<1	<1	<1	**1.62**	<1	<1	<1
Total Primary CVOCs				54.8	127	54.0	1.93	1.03	94.8	45.8
Other VOCs										
Carbon disulfide	µg/L			<1	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
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CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
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Method:
8263B: Volatile Organic Compounds

TABLE 29
GROUNDWATER ANALYTICAL RESULTS SUMMARY, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-244	MW-245	MW-246	MW-247	MW-248	MW-249	MW-250
	Lab ID			L10030650-22	L10030650-23	L10030650-24	L10030650-25	L10030693-01	L10030650-26	L10030650-27
	Date			3/24/2010	3/24/2010	3/24/2010	3/24/2010	3/26/2010	3/24/2010	3/24/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**52.7**	**70.7**	**74.6**	<0.5	<0.5	**5.03**	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	0.894 J	0.823 J	**3.28**	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	0.378 J	<1	<1	<1
Chloroform	µg/L	80	12	<0.3	<0.3	<0.3	0.248 J	<0.3	**0.427**	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	**1.06**	**1.95**	**5.72**	<1	<1	<1	<1
Tetrachloroethene	µg/L	5	2.5	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	0.41 J	<1	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	**4.56**	**21.5**	**14.7**	0.431 J	<1	0.703 J	<1
Vinyl chloride	µg/L	2	--	**2.37**	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				61.6	95.4	98.3	1.06	0	6.16	0
Other VOCs										
Carbon disulfide	µg/L			<1	<1	<1	<1 UJ	<1 UJ	<1 UJ	<1 UJ

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
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Method:
8263B: Volatile Organic Compounds

TABLE 29
GROUNDWATER ANALYTICAL RESULTS SUMMARY, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-251
	Lab ID			L10030650-28
	Date			3/24/2010
Analyte	**Units**	**MCL**	**TC**	
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1
1,1-Dichloroethene	µg/L	7	7	**3.15**
1,2-Dichloroethane	µg/L	5	--	<0.5
Carbon tetrachloride	µg/L	5	3	<1
Chloroform	µg/L	80	12	0.197 J
cis-1,2-Dichloroethene	µg/L	70	35	<1
Tetrachloroethene	µg/L	5	2.5	0.644 J
trans-1,2-Dichloroethene	µg/L	100	50	<1
Trichloroethene	µg/L	5	5	0.34 J
Vinyl chloride	µg/L	2	--	<1
Total Primary CVOCs				4.33
Other VOCs				
Carbon disulfide	µg/L			<1 UJ

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
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Method:
8263B: Volatile Organic Compounds

TABLE 30
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JUNE 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-54	MW-70	MW-76	MW-77	MW-79	MW-148	MW-149
	Lab ID			L10060784-01	L10060784-02	L10060784-03	L10060784-04	L10060784-05	L10060784-06	L10060784-34
	Date			6/22/2010	6/22/2010	6/22/2010	6/22/2010	6/22/2010	6/22/2010	6/23/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**83.2**	**1.03**	0.378 J	**19.6**	<0.5	<0.5	**15**
1,1,2-Trichloroethane	µg/L	5	1.9	0.312 J	<1	<1	<1	<1	<1	0.69 J
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	**26.4**	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	0.387 J	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1 UJ	<1 UJ	<1 UJ	<1	**2.02**
Chloroform	µg/L	80	12	**0.366**	<0.3	<0.3	0.181 J	0.228 J	<0.3	**41.6**
cis-1,2-Dichloroethene	µg/L	70	35	**2.5**	<1	<1	0.558 J	0.438 J	<1	**7.22**
Tetrachloroethene	µg/L	5	2.5	**1.12**	**1.3**	0.361 J	0.585 J	**50.8**	<1	0.651 J
trans-1,2-Dichloroethene	µg/L	100	50	0.308 J	<1	<1	<1	<1	<1	0.595 J
Trichloroethene	µg/L	5	5	**93.6**	**4.11**	**1.41**	**22.8**	**39**	<1	**35**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				181	6.44	2.15	43.7	117	0	103
Other VOCs										
1,1-Dichloroethane	µg/L			<1	<1	<1	<1	1.26	<1	<1

Notes:
µg/L: micrograms per liter
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Method:
8263B: Volatile Organic Compounds

TABLE 30
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OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-150	MW-151	MW-152	MW-155	MW-157	MW-158	MW-158A
	Lab ID			L10060784-09	L10060784-35	L10060784-10	L10060784-36	L10060784-11	L10060784-12	L10060784-13
	Date			6/22/2010	6/23/2010	6/22/2010	6/23/2010	6/22/2010	6/22/2010	6/22/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**4.98**	<0.5	**63.9**	**24**	**8.15**	**0.802**	**27.2**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	0.311 J	0.498 J	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	0.765 J	<1	<1	**2.9**	<1	<1
Chloroform	µg/L	80	12	0.222 J	**2.67**	**0.446**	<0.3	**6.41**	0.156 J	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	0.309 J	**1.14**	<1	**7.73**	<1	0.302 J
Tetrachloroethene	µg/L	5	2.5	0.888 J	<1	<1	<1	**1.34**	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	**1.55**	<1	<1
Trichloroethene	µg/L	5	5	**2.44**	**8.21**	**14.5**	**1.57**	**141**	**3.37**	**3.01**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				8.53	12.0	80.3	26.1	169	4.33	30.5
Other VOCs										
1,1-Dichloroethane	µg/L			<1	<1	<1	<1	<1	<1	<1

Notes:
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Method:
8263B: Volatile Organic Compounds

TABLE 30
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JUNE 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MCL	TC	MW-159 L10060784-37 6/23/2010	MW-160 L10060784-38 6/23/2010	MW-161 L10060784-14 6/22/2010	MW-162 L10060784-15 6/22/2010	MW-163 L10060784-16 6/22/2010	MW-164 L10060784-17 6/22/2010	MW-165 L10060784-18 6/22/2010
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**69.9**	**4.79**	**1.47**	0.258 J	**11.3**	**21**	**38.8**
1,1,2-Trichloroethane	µg/L	5	1.9	**10.2**	<1	<1	<1	<1	0.909 J	**1.96**
1,1-Dichloroethene	µg/L	7	7	**4.81**	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<2	<1	<1	<1	<1	**6.26**	<1
Chloroform	µg/L	80	12	<0.6	<0.3	0.142 J	0.165 J	0.142 J	**52.7**	**1.19**
cis-1,2-Dichloroethene	µg/L	70	35	**55.4**	<1	<1	<1	0.272 J	**13.2**	**3.6**
Tetrachloroethene	µg/L	5	2.5	1.29 J	<1	0.696 J	<1	0.623 J	**1.15**	0.807 J
trans-1,2-Dichloroethene	µg/L	100	50	**5.57**	<1	<1	<1	<1	**1.25**	0.699 J
Trichloroethene	µg/L	5	5	**280**	<1	**2.43**	0.322 J	**11.8**	**58.5**	**67.7**
Vinyl chloride	µg/L	2	--	**4.99**	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				432	4.79	4.74	0.745	24.1	155	115
Other VOCs										
1,1-Dichloroethane	µg/L			<2	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
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CVOC: chlorinated volatile organic compound
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Method:
8263B: Volatile Organic Compounds

TABLE 30
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OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-165A	MW-166	MW-166A	MW-232	MW-241	MW-242	MW-243
	Lab ID			L10060784-19	L10060784-39	L10060784-40	L10060784-41	L10060784-20	L10060784-21	L10060784-24
	Date			6/22/2010	6/23/2010	6/23/2010	6/23/2010	6/22/2010	6/22/2010	6/22/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**104**	**8.91**	**4.23**	<0.5	<0.5	**29.8**	**15.6**
1,1,2-Trichloroethane	µg/L	5	1.9	0.457 J	0.518 J	<1	<1	<1	0.328 J	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	**2.95**	0.996 J	<1	<1	<1	<1
Chloroform	µg/L	80	12	**0.918**	**34.7**	**7.54**	<0.3	<0.3	0.173 J	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	**6.6**	**3.85**	<1	<1	**1.94**	0.796 J
Tetrachloroethene	µg/L	5	2.5	<1	**1.22**	0.647 J	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	**1.08**	0.615 J	<1	<1	0.429 J	<1
Trichloroethene	µg/L	5	5	**4.6**	**59.6**	**53.5**	<1	0.593 J	**10.9**	**4.92**
Vinyl chloride	µg/L	2	--	<1	<1	<1	**2.11**	<1	<1	<1
Total Primary CVOCs				110	116	71.4	2.11	0.593	43.6	21.3
Other VOCs										
1,1-Dichloroethane	µg/L			<1	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 30
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JUNE 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MCL	TC	MW-244 L10060784-42 6/23/2010	MW-245 L10060784-25 6/22/2010	MW-246 L10060784-26 6/22/2010	MW-247 L10060784-43 6/23/2010	MW-248 L10060784-27 6/22/2010	MW-249 L10060784-28 6/22/2010	MW-250 L10060784-44 6/23/2010
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**13.7**	**27.9**	**24.1**	**11.4**	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	**2.91**	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	<1	0.577 J	<1
Chloroform	µg/L	80	12	<0.3	<0.3	<0.3	**3.45**	<0.3	**0.452**	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	0.549 J	0.55 J	**1.25**	0.421 J	<1	<1	<1
Tetrachloroethene	µg/L	5	2.5	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	**2.78**	**5.46**	**3.75**	**2.95**	<1	0.693 J	<1
Vinyl chloride	µg/L	2	--	0.651 J	<1	<1	<1	<1	<1	<1
Total Primary CVOCs				17.7	33.9	32.0	18.2	0	1.72	0
Other VOCs										
1,1-Dichloroethane	µg/L			<1	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 30
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JUNE 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-251
	Lab ID			L10060784-45
	Date			6/23/2010
Analyte	**Units**	**MCL**	**TC**	
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1
1,1-Dichloroethene	µg/L	7	7	**2.9**
1,2-Dichloroethane	µg/L	5	--	<0.5
Carbon tetrachloride	µg/L	5	3	<1
Chloroform	µg/L	80	12	0.254 J
cis-1,2-Dichloroethene	µg/L	70	35	<1
Tetrachloroethene	µg/L	5	2.5	0.621 J
trans-1,2-Dichloroethene	µg/L	100	50	<1
Trichloroethene	µg/L	5	5	0.256 J
Vinyl chloride	µg/L	2	--	<1
Total Primary CVOCs				4.03
Other VOCs				
1,1-Dichloroethane	µg/L			0.388 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
UJ: Non-detect, RL estimated

Method:
8263B: Volatile Organic Compounds

TABLE 31
GROUNDWATER ANALYTICAL RESULTS SUMMARY, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-54	MW-70	MW-76	MW-77	MW-79	MW-148	MW-149
	Lab ID			L10090659-01	L10090659-02	L10090659-03	L10090659-04	L10090659-28	L10090659-05	L10090659-29
	Date			9/22/2010	9/22/2010	9/22/2010	9/22/2010	9/23/2010	9/22/2010	9/23/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**44.9 J**	**1.07 J**	**1.07**	**20.4**	<0.5	<0.5	**29.8**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	<1	<1	<1	<1	**1.3**
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	**35.7**	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	0.35 J	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	<1	<1	**6.98**
Chloroform	µg/L	80	12	0.286 J	<0.3	0.139 J	0.238 J	0.17 J	<0.3	**92.3**
cis-1,2-Dichloroethene	µg/L	70	35	**2.65**	<1	<1	0.592 J	<1	<1	**17.7**
Tetrachloroethene	µg/L	5	2.5	**1.28**	**1.25**	0.376 J	0.405 J	**25**	<1	**1.92**
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	<1	<1	**1.54**
Trichloroethene	µg/L	5	5	**60**	**3.78**	**2.51**	**23.6**	**20.2**	<1	**87.9**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1 J
Total Primary CVOCs	µg/L			109	6.10	4.10	45.2	81.4	0	239
Other VOCs										
Acetone	µg/L			6.67 J	6.02 J	6.6 J	5.63 J	9.96 J	4.23 J	4.61 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 31
GROUNDWATER ANALYTICAL RESULTS SUMMARY, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-150	MW-151	MW-152	MW-155	MW-157	MW-158	MW-158A
	Lab ID			L10090659-08	L10090659-30	L10090659-31	L10090659-09	L10090659-10	L10090659-32	L10090659-33
	Date			9/22/2010	9/23/2010	9/23/2010	9/22/2010	9/22/2010	9/23/2010	9/23/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**0.917**	0.315 J	**5.35**	**4.58**	**3.55**	**1.82**	**5.03**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	0.735 J	<1	<1	**2.25**	<1	<1
Chloroform	µg/L	80	12	0.16 J	**2.36**	<0.3	<0.3	**5.85**	<0.3	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	0.309 J	<1	<1	**5.44**	<1	<1
Tetrachloroethene	µg/L	5	2.5	0.976 J	<1	<1	<1	**1.03**	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	**1.03**	<1	<1
Trichloroethene	µg/L	5	5	0.515 J	**7.24**	**1.55**	0.408 J	**88.3**	**6.04**	**1.3**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1
Total Primary CVOCs	µg/L			2.57	11.0	6.90	4.99	107	7.86	6.33
Other VOCs										
Acetone	µg/L			4.83 J	7.08 J	5.09 J	4.1 J	6.33 J	5.64 J	6.17 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 31
GROUNDWATER ANALYTICAL RESULTS SUMMARY, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-159	MW-160	MW-161	MW-162	MW-163	MW-164	MW-165
	Lab ID			L10090659-11	L10090659-34	L10090659-12	L10090659-13	L10090659-14	L10090659-15	L10090659-35
	Date			9/22/2010	9/23/2010	9/22/2010	9/22/2010	9/22/2010	9/22/2010	9/23/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**75**	**0.764**	**3.28**	<0.5	**5.32**	**11.9**	**34.7**
1,1,2-Trichloroethane	µg/L	5	1.9	**12.4**	<1	<1	<1	<1	0.524 J	**1.93**
1,1-Dichloroethene	µg/L	7	7	**8.51**	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	<1	**4.32**	<1
Chloroform	µg/L	80	12	**0.568**	<0.3	0.141 J	0.135 J	0.181 J	**29.5**	**0.927**
cis-1,2-Dichloroethene	µg/L	70	35	**62**	<1	<1	<1	<1	**8.57**	**1.15**
Tetrachloroethene	µg/L	5	2.5	**1.49**	<1	0.664 J	<1	0.634 J	0.962 J	0.418 J
trans-1,2-Dichloroethene	µg/L	100	50	**6.69**	<1	<1	<1	<1	0.703 J	0.324 J
Trichloroethene	µg/L	5	5	**293**	0.323 J	**4.78**	0.278 J	**6.53**	**39.7**	**35.4**
Vinyl chloride	µg/L	2	--	**40.3**	<1	<1	<1	<1	<1	<1
Total Primary CVOCs	µg/L			500	1.09	8.87	0.413	12.7	96.2	74.8
Other VOCs										
Acetone	µg/L			4.7 J	<10	7.18 J	5.15 J	10.2	7.96 J	5.21 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 31
GROUNDWATER ANALYTICAL RESULTS SUMMARY, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-165A	MW-166	MW-166A	MW-232	MW-241	MW-242	MW-243
	Lab ID			L10090659-36	L10090659-37	L10090659-38	L10090659-16	L10090659-17	L10090659-18	L10090659-21
	Date			9/23/2010	9/23/2010	9/23/2010	9/22/2010	9/22/2010	9/22/2010	9/22/2010
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**44.7**	**11.4**	**12.6**	<0.5	<0.5	**15.7**	**12.2**
1,1,2-Trichloroethane	µg/L	5	1.9	0.28 J	0.458 J	0.503 J	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	**6.16**	**2.99**	<1	<1	<1	<1
Chloroform	µg/L	80	12	<0.3	**22.8**	**26.5**	<0.3	<0.3	0.198 J	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	**15.4**	**9.91**	<1	<1	0.804 J	<1
Tetrachloroethene	µg/L	5	2.5	<1	**1.99**	0.748 J	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	**2.97**	0.912 J	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	**2.3**	**223**	**57.5**	0.335 J	0.573 J	**7.16**	**1.76**
Vinyl chloride	µg/L	2	--	<1	<1	<1	0.531 J	<1	<1	<1
Total Primary CVOCs	µg/L			47.3	284	112	0.866	0.573	23.9	14.0
Other VOCs										
Acetone	µg/L			5.88 J	6.69 J	6.3 J	5.31 J	4.53 J	5.39 J	5.51 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 31
GROUNDWATER ANALYTICAL RESULTS SUMMARY, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MCL	TC	MW-244 / L10090659-22 / 9/22/2010	MW-245 / L10090659-23 / 9/22/2010	MW-246 / L10090659-39 / 9/23/2010	MW-247 / L10090659-40 / 9/23/2010	MW-248 / L10090659-41 / 9/23/2010	MW-249 / L10090659-42 / 9/23/2010	MW-250 / L10090659-43 / 9/23/2010
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**2.88**	**10.7**	**11.1**	**20.4**	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	0.936 J	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	<1	0.437 J	<1
Chloroform	µg/L	80	12	<0.3	<0.3	<0.3	0.229 J	<0.3	**0.399**	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	<1	0.359 J	<1	<1	<1	<1
Tetrachloroethene	µg/L	5	2.5	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	0.389 J	**2.31**	**1.17**	**2.21**	<1	0.519 J	<1
Vinyl chloride	µg/L	2	--	<1	<1	<1 J	<1 J	<1 J	<1 J	<1 J
Total Primary CVOCs	µg/L			3.27	13.0	13.6	22.8	0	1.36	0
Other VOCs										
Acetone	µg/L			5.65 J	6.01 J	4.19 J	4.22 J	5.43 J	6.7 J	4.22 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 31
GROUNDWATER ANALYTICAL RESULTS SUMMARY, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-251
	Lab ID			L10090659-24
	Date			9/22/2010
Analyte	**Units**	**MCL**	**TC**	
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1
1,1-Dichloroethene	µg/L	7	7	**3.77**
1,2-Dichloroethane	µg/L	5	--	<0.5
Carbon tetrachloride	µg/L	5	3	<1
Chloroform	µg/L	80	12	**0.306**
cis-1,2-Dichloroethene	µg/L	70	35	<1
Tetrachloroethene	µg/L	5	2.5	0.699 J
trans-1,2-Dichloroethene	µg/L	100	50	<1
Trichloroethene	µg/L	5	5	0.366 J
Vinyl chloride	µg/L	2	--	<1
Total Primary CVOCs	µg/L			5.14
Other VOCs				
Acetone	µg/L			4.02 J

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration
VOC: volatile organic compound

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 32
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JANUARY 2011
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-54	MW-70	MW-76	MW-77	MW-79	MW-148	MW-149
	Lab ID			L11010698-19	L11010698-20	L11010698-21	L11010698-22	L11010698-01	L11010698-23	L11010698-24
	Date			1/26/2011	1/26/2011	1/26/2011	1/26/2011	1/25/2011	1/26/2011	1/26/2011
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**28.5**	**1.05**	**0.853**	**25**	<0.5	<0.5	**24.8**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	<1	<1	<1	<1	**1.07**
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	**28.7**	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	0.27 J	<0.5	0.265 J
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	<1	<1	**7.91**
Chloroform	µg/L	80	12	**0.422**	<0.3	0.138 J	0.234 J	0.211 J	0.186 J	**94.3**
cis-1,2-Dichloroethene	µg/L	70	35	**1.11**	<1	<1	0.516 J	<1	<1	**13.2**
Tetrachloroethene	µg/L	5	2.5	**1.31**	**1.21**	0.322 J	0.452 J	**18.1**	<1	**2.16**
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	<1	<1	**1.33**
Trichloroethene	µg/L	5	5	**55.6**	**3.09**	**1.79**	**23.7**	**17.3**	<1	**66.6**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1
Total Primary CVOCs	µg/L			86.9	5.35	3.10	49.9	64.6	0.186	212

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 32
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JANUARY 2011
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-150	MW-151	MW-152	MW-155	MW-157	MW-158	MW-158A
	Lab ID			L11010698-25	L11010698-02	L11010698-03	L11010698-09	L11010698-27	L11010698-06	L11010698-07
	Date			1/26/2011	1/25/2011	1/25/2011	1/25/2011	1/26/2011	1/25/2011	1/25/2011
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**11.4**	**0.846**	**2.01**	**3.75**	**1.29**	**0.677**	**0.771**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	0.766 J	<1	<1	0.644 J	<1	<1
Chloroform	µg/L	80	12	0.178 J	**4.65**	<0.3	<0.3	**4.43**	<0.3	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	0.61 J	<1	<1	**1.8**	<1	<1
Tetrachloroethene	µg/L	5	2.5	0.678 J	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	**13.5**	**7.69**	**1.07**	**1.07**	**13.3**	**1.17**	0.426 J
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1	<1
Total Primary CVOCs	µg/L			25.8	14.6	3.08	4.82	21.5	1.85	1.20

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 32
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JANUARY 2011
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-159	MW-160	MW-161	MW-162	MW-163	MW-164	MW-165
	Lab ID			L11010698-08	L11010698-26	L11010698-28	L11010698-29	L11010698-30	L11010698-31	L11010698-10
	Date			1/25/2011	1/26/2011	1/26/2011	1/26/2011	1/26/2011	1/26/2011	1/25/2011
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**37.8**	0.254 J	**2.28**	<0.5	**1.78**	**5.48**	**14.5**
1,1,2-Trichloroethane	µg/L	5	1.9	**6.14**	<1	<1	<1	<1	0.284 J	**1.46**
1,1-Dichloroethene	µg/L	7	7	**5.86**	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<2	<1	<1	<1	<1	**2.53**	<1
Chloroform	µg/L	80	12	0.285 J	<0.3	<0.3	<0.3	0.165 J	**15.6**	**0.618**
cis-1,2-Dichloroethene	µg/L	70	35	**45.6**	<1	<1	<1	<1	**4.74**	0.456 J
Tetrachloroethene	µg/L	5	2.5	1.15 J	<1	0.968 J	<1	0.553 J	0.637 J	0.327 J
trans-1,2-Dichloroethene	µg/L	100	50	**4.82**	<1	<1	<1	<1	0.381 J	<1
Trichloroethene	µg/L	5	5	**200**	<1	**3.62**	<1	**3.4**	**23.5**	**19.8**
Vinyl chloride	µg/L	2	--	**25.7**	<1	<1	<1	<1	<1	<1
Total Primary CVOCs	µg/L			327	0.254	6.87	0	5.90	53.2	37.2

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 32
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JANUARY 2011
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-165A	MW-166	MW-166A	MW-241	MW-242	MW-243	MW-244
	Lab ID			L11010698-11	L11010698-12	L11010698-13	L11010698-32	L11010698-33	L11010698-34	L11010698-37
	Date			1/25/2011	1/25/2011	1/25/2011	1/26/2011	1/26/2011	1/26/2011	1/26/2011
Analyte	**Units**	**MCL**	**TC**							
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**35.6**	**9.34**	**6.27**	<0.5	**2.83**	**4.53**	**1.48**
1,1,2-Trichloroethane	µg/L	5	1.9	<1	0.435 J	0.344 J	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	**6.04**	**2.4**	<1	<1	<1	<1
Chloroform	µg/L	80	12	0.15 J	**17.9**	**18.6**	<0.3	0.165 J	<0.3	<0.3
cis-1,2-Dichloroethene	µg/L	70	35	<1	**13.4**	**7.69**	<1	<1	<1	<1
Tetrachloroethene	µg/L	5	2.5	<1	**2.03**	0.973 J	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	**2.06**	**1.05**	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	**3.64**	**154**	**85.9**	0.741 J	**3.57**	**1.89**	0.753 J
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1	<1 U	<1
Total Primary CVOCs	µg/L			39.4	205	123	0.741	6.57	6.69	2.23

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 32
GROUNDWATER ANALYTICAL RESULTS SUMMARY, JANUARY 2011
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID			MW-245	MW-246	MW-247	MW-248	MW-249
	Lab ID			L11010698-14	L11010698-15	L11010698-16	L11010698-38	L11010698-39
	Date			1/25/2011	1/25/2011	1/25/2011	1/26/2011	1/26/2011
Analyte	**Units**	**MCL**	**TC**					
1,1,2,2-Tetrachloroethane	µg/L	--	2.2	**3.81**	**9.79**	**44.8**	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5	1.9	<1	**1.27**	0.272 J	<1	<1
1,1-Dichloroethene	µg/L	7	7	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	5	--	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5	3	<1	<1	<1	<1	**1.19**
Chloroform	µg/L	80	12	<0.3	<0.3	**2.39**	<0.3	**2.23**
cis-1,2-Dichloroethene	µg/L	70	35	<1	**1.52**	0.826 J	<1	0.263 J
Tetrachloroethene	µg/L	5	2.5	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	100	50	<1	<1	<1	<1	<1
Trichloroethene	µg/L	5	5	**1.59**	**1.75**	**12.1**	<1	**1.88**
Vinyl chloride	µg/L	2	--	<1	<1	<1	<1	<1
Total Primary CVOCs	µg/L			5.4	14.3	60.4	0	5.56

Notes:
µg/L: micrograms per liter
--: Not listed
<: Analyte not detected above RL
Results detected at or above RL shown in bold
CVOC: chlorinated volatile organic compound
MCL: Maximum Contaminant Level
RL:Reporting Limit
TC: Target Concentration

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

Method:
8263B: Volatile Organic Compounds

TABLE 33
SUMMARY OF PRIMARY CVOC RESULTS, OCTOBER 2009
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - 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	30	2290	MW-246	-	25
1,1,2-Trichloroethane	5	1.9	10	57.7	MW-246	3	6
1,1-Dichloroethene	7	7	3	18.2	MW-246	1	1
1,2-Dichloroethane	5	--	0	0.269	MW-164	0	-
Carbon tetrachloride	5	3	7	11.3	MW-166	3	5
Chloroform	80	12	16	120	MW-247	2	5
cis-1,2-Dichloroethene	70	35	19	401	MW-246	2	2
Tetrachloroethene	5	2.5	13	4.55	MW-245	0	5
trans-1,2-Dichloroethene	100	50	9	24.3	MW-246	0	0
Trichloroethene	5	5	30	1800	MW-246	25	25
Vinyl chloride	2	--	3	10.3	MW-246	2	-

Notes:
µg/L: micrograms per liter
--: not listed
MCL: Maximum Contaminant Level
RL: reporting limit
TC: Target Concentration
VOC: volatile organic compound

TABLE 34
SUMMARY OF PRIMARY CVOC RESULTS, MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - 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	26	168	MW-54	-	25
1,1,2-Trichloroethane	5	1.9	4	16.8	MW-159	1	3
1,1-Dichloroethene	7	7	2	17.9	MW-79	1	1
1,2-Dichloroethane	5	--	0	0	-	0	-
Carbon tetrachloride	5	3	5	6.74	MW-164	2	3
Chloroform	80	12	11	65	MW-166	0	4
cis-1,2-Dichloroethene	70	35	15	54	MW-159	0	1
Tetrachloroethene	5	2.5	7	26.6	MW-79	1	1
trans-1,2-Dichloroethene	100	50	5	7.07	MW-159	0	0
Trichloroethene	5	5	27	505	MW-159	20	20
Vinyl chloride	2	--	2	4.42	MW-159	2	-

Notes:
µg/L: micrograms per liter
--: not listed
MCL: Maximum Contaminant Level
RL: reporting limit
TC: Target Concentration
VOC: volatile organic compound

TABLE 35
SUMMARY OF PRIMARY CVOC RESULTS, JUNE 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

VOC Analyte	MCL (µg/L)	TC (µg/L)	Number of Locations with Analyte Above RL	Maximum Concentration (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	25	104	MW-165A	--	22
1,1,2-Trichloroethane	5	1.9	3	10.2	MW-159	1	2
1,1-Dichloroethene	7	7	3	26.4	MW-79	1	1
1,2-Dichloroethane	5	--	0	0.387	MW-79	0	--
Carbon tetrachloride	5	3	4	6.26	MW-164	1	1
Chloroform	80	12	12	52.7	MW-164	0	3
cis-1,2-Dichloroethene	70	35	11	55.4	MW-159	0	1
Tetrachloroethene	5	2.5	6	50.8	MW-79	1	1
trans-1,2-Dichloroethene	100	50	4	5.57	MW-159	0	0
Trichloroethene	5	5	27	280	MW-159	15	15
Vinyl chloride	2	--	2	4.99	MW-159	2	--

Notes:
µg/L: micrograms per liter
--: not listed
MCL: Maximum Contaminant Level
RL: reporting limit
TC: Target Concentration
VOC: volatile organic compound

TABLE 36
SUMMARY OF PRIMARY CVOC RESULTS, SEPTEMBER 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – Defense Depot Memphis, Tennessee

VOC Analyte	MCL (µg/L)	TC (µg/L)	Number of Locations with Analyte Above RL	Maximum Concentration (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	26	75	MW-159	--	21
1,1,2-Trichloroethane	5	1.9	3	12.4	MW-159	1	2
1,1-Dichloroethene	7	7	3	35.7	MW-79	2	2
1,2-Dichloroethane	5	--	0	0.35	MW-79	0	--
Carbon tetrachloride	5	3	5	6.98	MW-149	2	3
Chloroform	80	12	10	92.3	MW-149	1	4
cis-1,2-Dichloroethene	70	35	8	62	MW-159	0	1
Tetrachloroethene	5	2.5	7	25	MW-79	1	1
trans-1,2-Dichloroethene	100	50	4	6.69	MW-159	0	0
Trichloroethene	5	5	24	293	MW-159	14	14
Vinyl chloride	2	--	1	40.3	MW-159	1	--

Notes:
µg/L: micrograms per liter
--: not listed
MCL: Maximum Contaminant Level
RL: reporting limit
TC: Target Concentration
VOC: volatile organic compound

TABLE 37
SUMMARY OF PRIMARY CVOC RESULTS, JANUARY 2011
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field – 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	26	44.8	MW-247	--	17
1,1,2-Trichloroethane	5	1.9	4	6.14	MW-159	1	1
1,1-Dichloroethene	7	7	2	28.7	MW-79	1	1
1,2-Dichloroethane	5	--	0	0.27	MW-79	0	--
Carbon tetrachloride	5	3	5	7.91	MW-149	2	2
Chloroform	80	12	8	94.3	MW-149	1	4
cis-1,2-Dichloroethene	70	35	8	45.6	MW-159	0	1
Tetrachloroethene	5	2.5	6	18.1	MW-79	1	1
trans-1,2-Dichloroethene	100	50	4	4.82	MW-159	0	0
Trichloroethene	5	5	26	200	MW-159	13	13
Vinyl chloride	2	--	1	25.7	MW-159	1	--

Notes:
µg/L: micrograms per liter
--: not listed
MCL: Maximum Contaminant Level
RL: reporting limit
TC: Target Concentration
VOC: volatile organic compound

TABLE 38
VAPOR ANALYTICAL RESULTS SUMMARY, VI MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Location	VI-1A	VI-1B	VI-2A	VI-2B	VI-4B	VI-5B	VI-6A	VI-6A	VI-6B
	Lab Sample ID	JA41416-1	JA41416-2	JA41416-3	JA41416-19	JA41416-7	JA41416-9	JA41416-10	JA41417-1	JA41416-11
	Date	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/9/2010	3/9/2010	3/8/2010	3/8/2010	3/9/2010
	Field Sample ID	VI-1A-1Q10	VI-1B-1Q10	VI-2A-1Q10	VI-2B-1Q10	VI-4B-1Q10	VI-5B-1Q10	VI-6A-1Q10	DUP-1	VI-6B-1Q10
Primary CVOCs (µg/m3)	Residential (a)									
1,1,2,2-Tetrachloroethane	34	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	27	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1-Dichloroethylene	11,000	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloroethane	20	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Carbon tetrachloride	31	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	24	2.6 J	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
cis-1,2-Dichloroethylene	1,800	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Methylene chloride	190	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Tetrachloroethylene	34	**4.7**	**1.2**	<1.1	**8.1**	<1.1	<1.1	<1.1	<1.1	<1.1
trans-1,2-Dichloroethylene	3,600	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Trichloroethylene	27	<0.86	<0.86	<0.86	0.75 J	<0.86	**8.6**	<0.86	<0.86	<0.86
Vinyl chloride	13	<2	<2	<2	<2	<2	<2	<2	<2	<2

Notes:
(a) Screening values from NJ DEP website
Results detected above RL shown in bold
µg/m^3: micrograms per cubic meter
<: Analyte not detected above RL
RL: Reporting Limit

DQE FLAGS:
J: Analyte identified; quantitation estimated.

TABLE 38
VAPOR ANALYTICAL RESULTS SUMMARY, VI MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Location	VI-7A	VI-8A	VI-9A	VI-9B	VMP-4A	VMP-4B
	Lab Sample ID	JA41416-12	JA41416-14	JA41416-16	JA41416-20	JA41416-17	JA41416-18
	Date	3/8/2010	3/8/2010	3/8/2010	3/9/2010	3/8/2010	3/8/2010
	Field Sample ID	VI-7A-1Q10	VI-8A-1Q10	VI-9A-1Q10	VI-9B-1Q10	VMP-4A-1Q10	VMP-4B-1Q10
Primary CVOCs (µg/m3)	Residential (a)						
1,1,2,2-Tetrachloroethane	34	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	27	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1-Dichloroethylene	11,000	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloroethane	20	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Carbon tetrachloride	31	<5	<5	<5	<5	<5	<5
Chloroform	24	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
cis-1,2-Dichloroethylene	1,800	<3.2	<3.2	<3.2	<3.2	<3.2	1.9 J
Methylene chloride	190	**4.2**	<2.8	<2.8	<2.8	<2.8	**10**
Tetrachloroethylene	34	**1.8**	<1.1	<1.1	1 J	<1.1	**2.5**
trans-1,2-Dichloroethylene	3,600	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Trichloroethylene	27	<0.86	<0.86	**5.9**	<0.86	**11**	**28**
Vinyl chloride	13	<2	<2	<2	<2	<2	<2

Notes:
(a) Screening values from NJ DEP website
Results detected above RL shown in bold
µg/m^3: micrograms per cubic meter
<: Analyte not detected above RL
RL: Reporting Limit

DQE FLAGS:
J: Analyte identified; quantitation estimated.

TABLE 39
COST SUMMARY
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Task	Labor	Subcontracts	Other Direct Cost	Total
Actual Costs				
Construction Project Management and Coordination	$205,463	$0	$5,930	$211,393
Vapor Intrusion and Baseline Groundwater Monitoring	$71,961	$163,452	$14,067	$249,480
AS/SVE Construction and Reporting	$343,932	$1,351,109	$61,923	$1,756,964
			Capital Costs	**$2,217,837**
Year 1 AS/SVE Operations and Reporting	$205,833	$8,830	$119,774	$334,437
Year 1 GW Monitoring and Reporting	$145,851	$18,816	$44,840	$209,507
			Annual Operations, Year 1	**$543,944**
Year 2 AS/SVE Operations and Reporting	$268,715	$1,205	$127,677	$397,597
Year 2 GW Monitoring and Reporting	$102,267	$10,725	$28,112	$141,104
			Annual Operations, Year 2	**$538,701**
Year 3 AS/SVE Operations and Reporting	$124,463	$1,032	$82,718	$208,213
Year 3 GW Monitoring and Reporting	$96,828	$14,089	$11,497	$122,414
			Annual Operations, Year 3	**$330,627**
Estimated Costs				
Years 4-5 AS/SVE Operations and Reporting	$124,463	$1,032	$82,718	$208,213
Years 4-5 GW Monitoring and Reporting	$96,828	$14,089	$11,497	$122,414
			Annual Operations, Years 4-5	**$330,627**
Years 6-10 GW Monitoring and Reporting	$72,621	$10,567	$8,623	$91,811
Years 11-20 GW Monitoring and Reporting	$48,414	$7,045	$5,749	$61,207

	Annual Cost	Present Worth
Capital Costs	**$2,217,837**	**$2,217,837**
Annual Operating and GW Monitoring Costs Y1-Y3	$1,413,272	$1,413,272
Annual Operating and GW Monitoring Costs Y4	$330,627	$330,627
Annual Operating and GW Monitoring Costs Y5	$330,627	$330,627
GW Monitoring Costs Y6	$91,811	$86,261
GW Monitoring Costs Y7	$91,811	$84,487
GW Monitoring Costs Y8	$91,811	$82,749
GW Monitoring Costs Y9	$91,811	$81,047
GW Monitoring Costs Y10	$91,811	$79,380
GW Monitoring Costs Y11	$61,207	$51,832
GW Monitoring Costs Y12	$61,207	$50,766
GW Monitoring Costs Y13	$61,207	$49,721
GW Monitoring Costs Y14	$61,207	$48,699
GW Monitoring Costs Y15	$61,207	$47,697
GW Monitoring Costs Y16	$61,207	$46,716
GW Monitoring Costs Y17	$61,207	$45,755
GW Monitoring Costs Y18	$61,207	$44,814
GW Monitoring Costs Y19	$61,207	$43,892
GW Monitoring Costs Y20	$61,207	$42,990
Annual Operating and Monitoring Costs	**$5,363,486**	**$2,961,333**

FIGURES

Figure 1

SITE LOCATION MAP

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 0.6 1.2 1.8 2.4 3 Miles

Date: March 2011
Edition: Rev 0

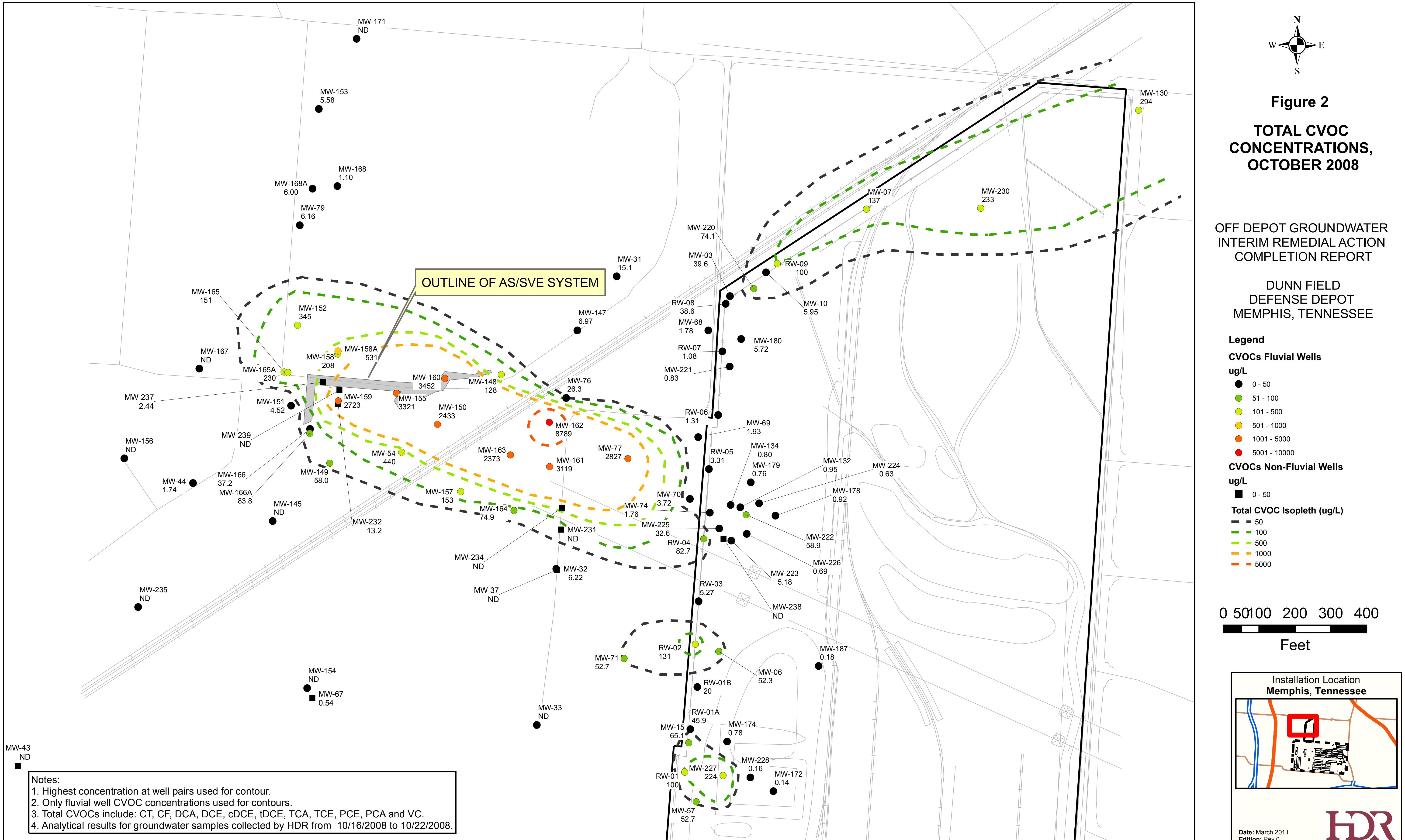
G:\121842\1002_OD IRACR\GIS\Figure 1.mxd

Figure 2

TOTAL CVOC CONCENTRATIONS, OCTOBER 2008

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE



Notes:
1. Highest concentration at well pairs used for contour.
2. Only fluvial well CVOC concentrations used for contours.
3. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
4. Analytical results for groundwater samples collected by HDR from 10/16/2008 to 10/22/2008.

Date: March 2011
Edition: Rev 0

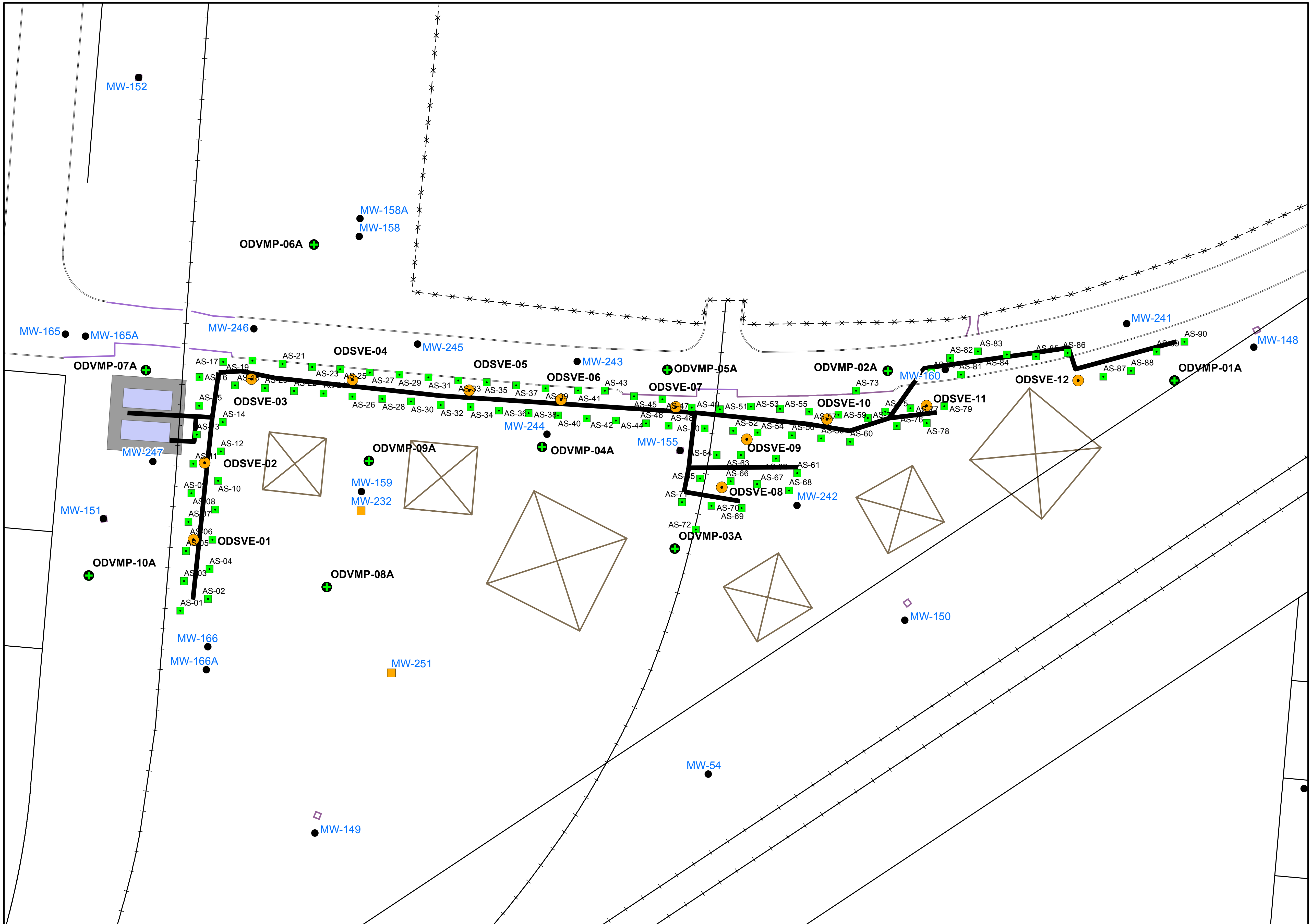


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Figure 3

AS-SVE SYSTEM PLAN MAP

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD DEFENSE DEPOT MEMPHIS, TENNESSEE

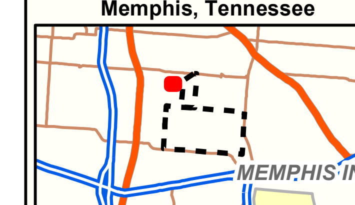
Legend

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

0 25 50 75 100

Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0

G:\121842\002_OD IRA\CR\GIS\Fig 3 -OD SVE SYSTEM LAYOUT.mxd

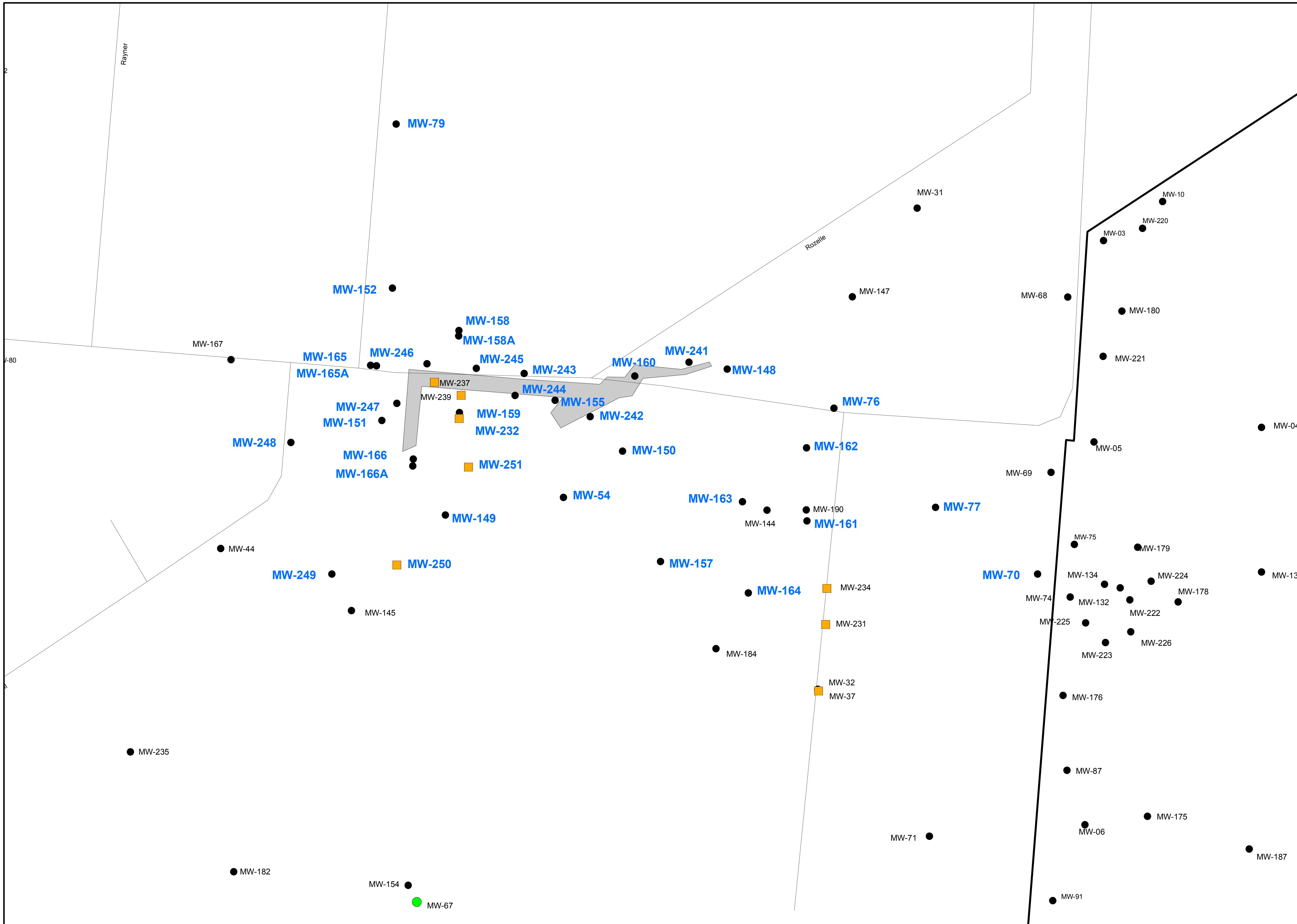


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Figure 4

PERFORMANCE MONITORING WELL LOCATION MAP

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
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

MW-241 Performance Monitoring Well

Dunn Field Boundary

Air Sparge Well Area

0 50 100 150 200

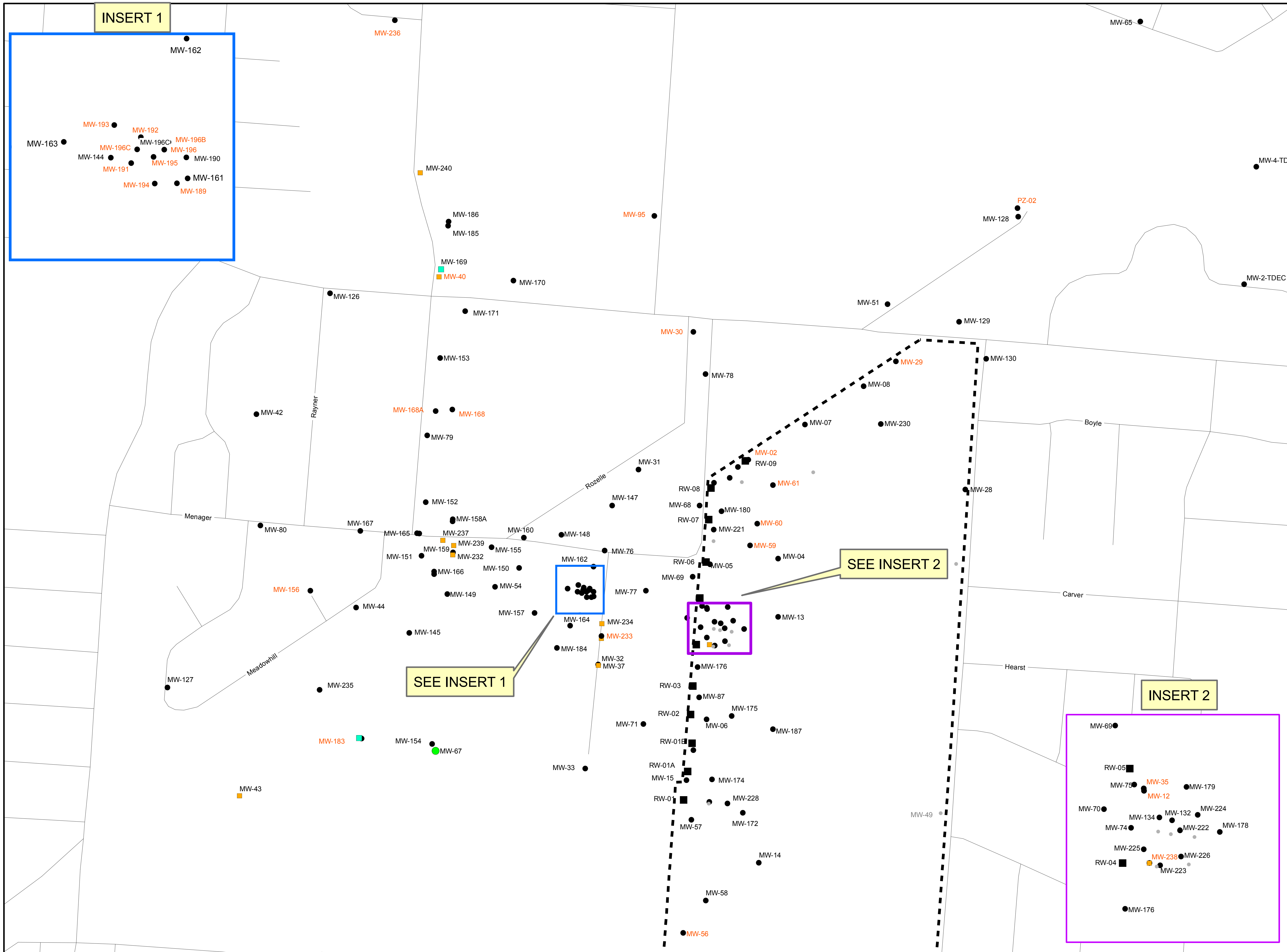
Feet

Installation Location
Memphis, Tennessee

HDR

Date: March 2011
Edition: Rev 0

G:\121842\002_OD IRACR\GIS\Fig 4 -Performance Well Loc Map.mxd



G:\1218421002_OD IRACR\GIS\Fig 5 -Aband Wells Loc Map.mxd

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Figure 5

ABANDONED WELL LOCATION MAP

OFF DEPOT GROUNDWATER
INTERIM REMEDIAL ACTION
COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

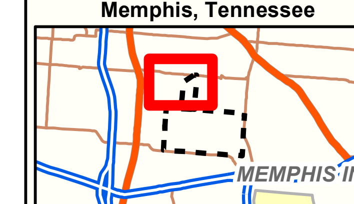
- Monitoring Well Screened in the Fluvial Aquifer
- Recovery Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Transition Zone
- Monitoring Well Screened in the Memphis Aquifer

MW-03 Abandoned Well

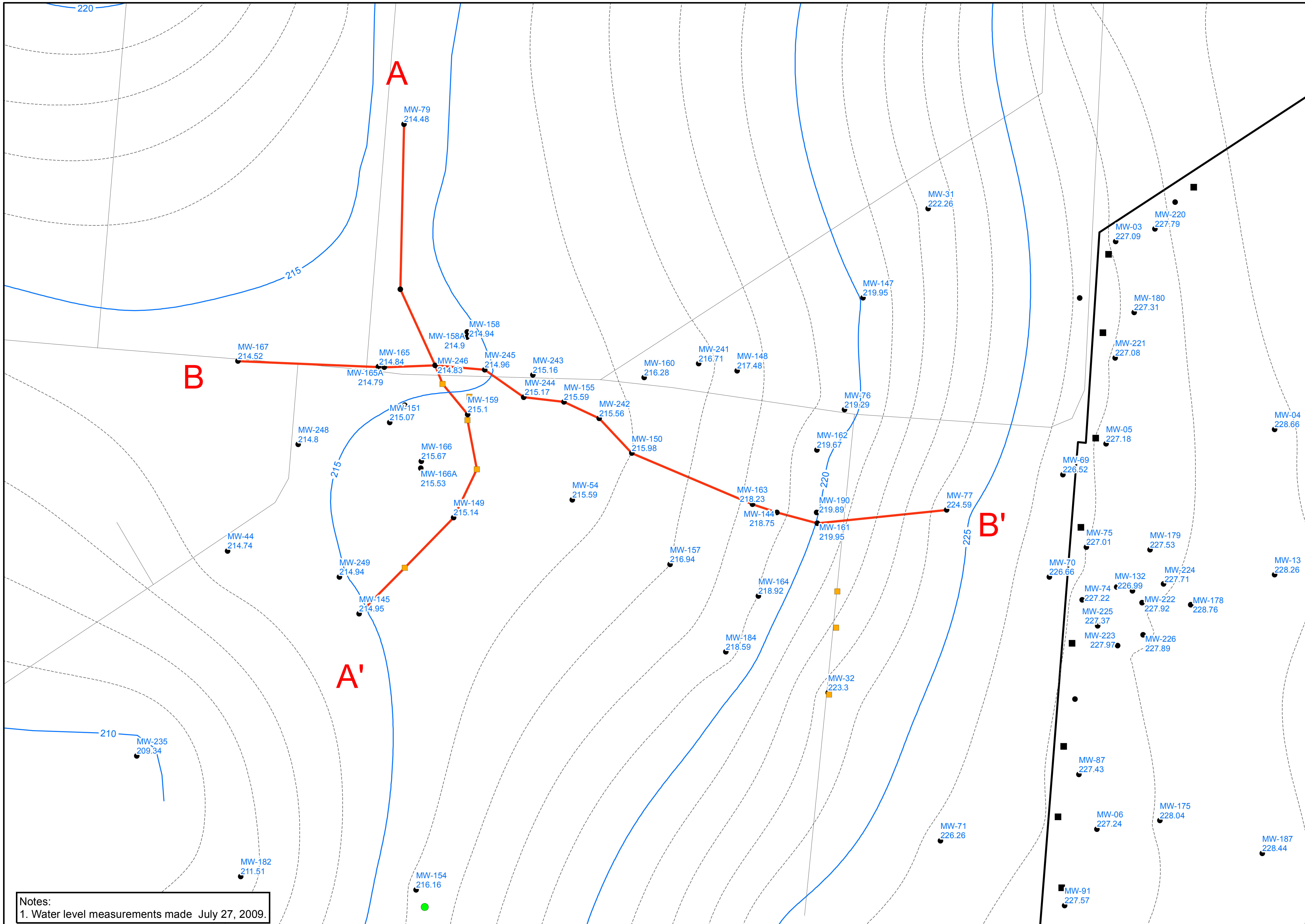
Dunn Field Boundary

0 200 400 600 800
Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0



Notes:
1. Water level measurements made July 27, 2009.

G:\121842\002_OD IRACR\GIS\Fig 6 - Fluvial GW Contour Map.mxd

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Figure 6

GROUNDWATER ELEVATION CONTOUR MAP FLUVIAL AQUIFER, JULY 2009

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Recovery 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
- Dunn Field Boundary

MW-03 100.12 Value used for groundwater contours

Cross Section (shown of Figures 5 and 6)

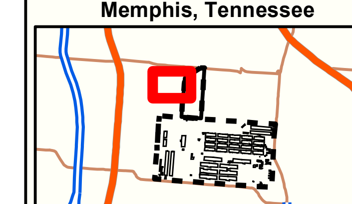
Groundwater Contours

- 1-ft Contour
- 5-ft Contour

Original Dunn Field Property Boundary

0 100 200 300
Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0

HDR

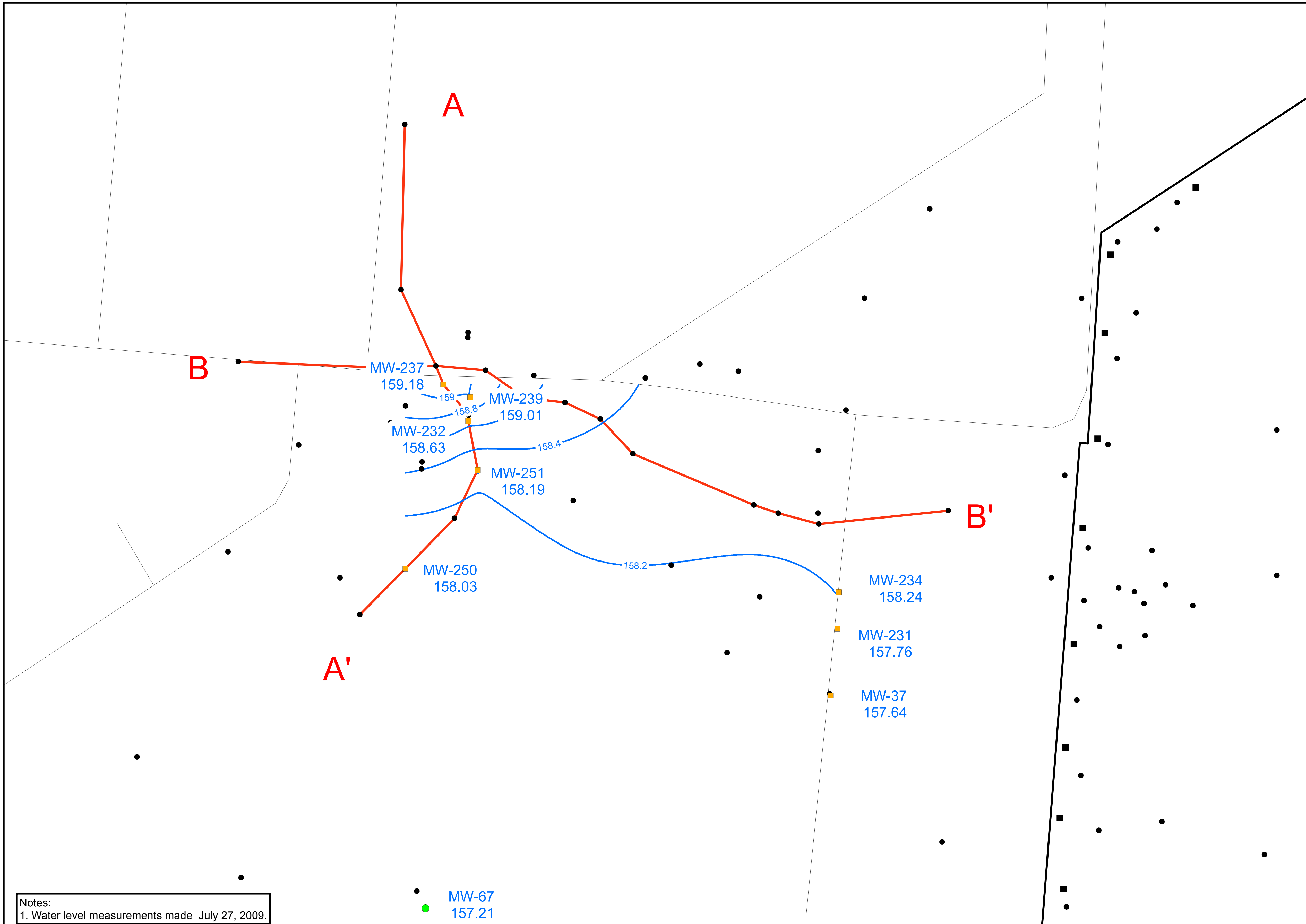


Figure 7

GROUNDWATER ELEVATION CONTOUR MAP INTERMEDIATE AQUIFER, JULY 2009

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Recovery 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
- Dunn Field Boundary

MW-03 100.12 Value used for groundwater contours

Cross Section

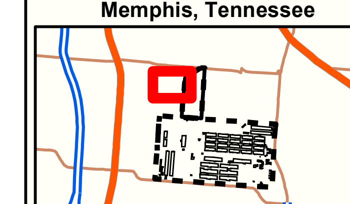
Groundwater Contours

0.2-ft Contour

Original Dunn Field Property Boundary

0 100 200 300
Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0

HDR

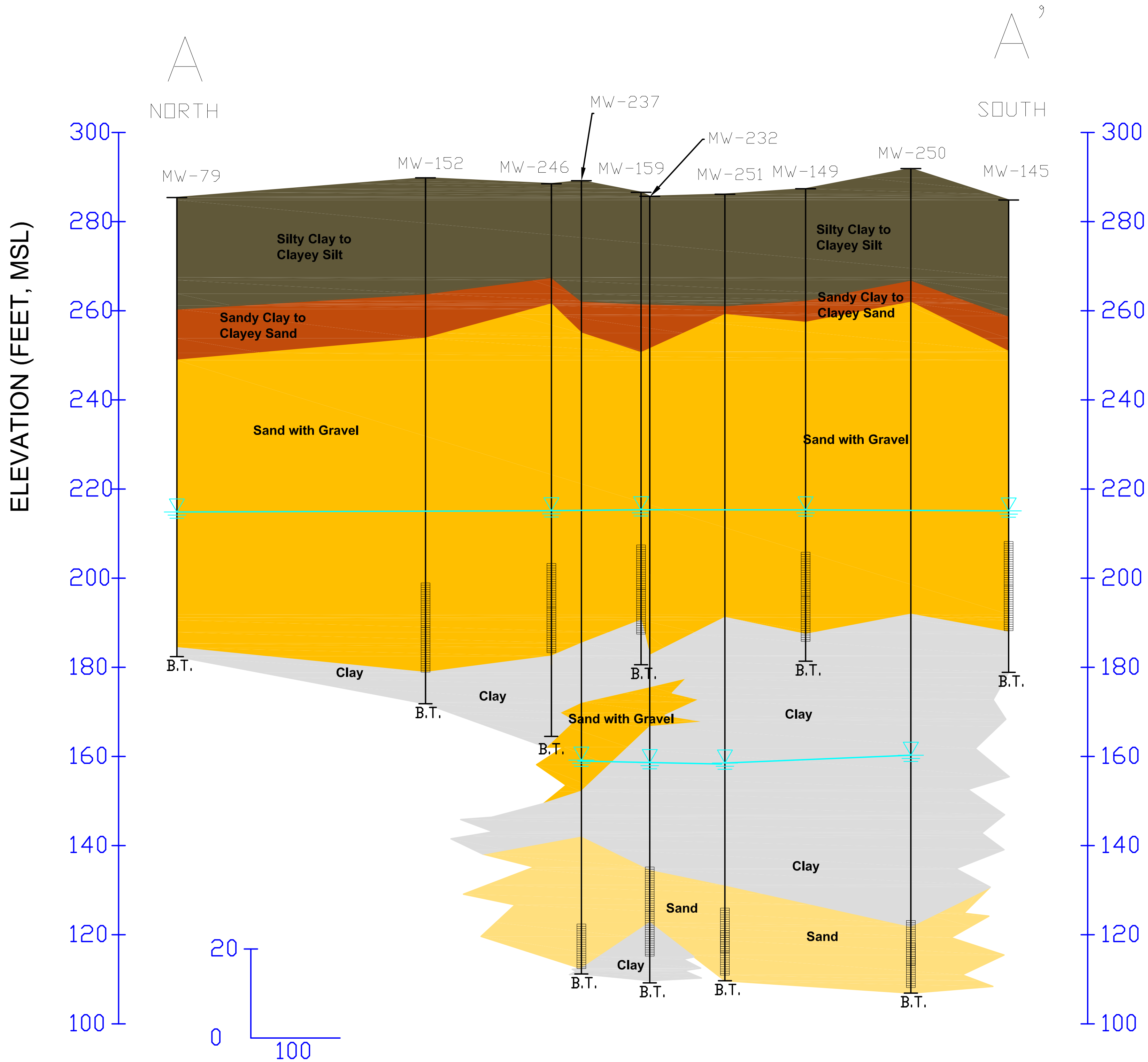
G:\121842\002_OD IRACR\GIS\Fig 7 - Intermed Pot Map.mxd

Figure 8

LITHOLOGIC CROSS-SECTION A TO A', MW-79 TO MW-145

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD 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

Groundwater Elevation 7/27/2009

Well Screen Interval

Installation Location
Memphis, Tennessee

Date: March 2011
Edition: Rev 0

G:\121842\002_OD IRACR\GIS

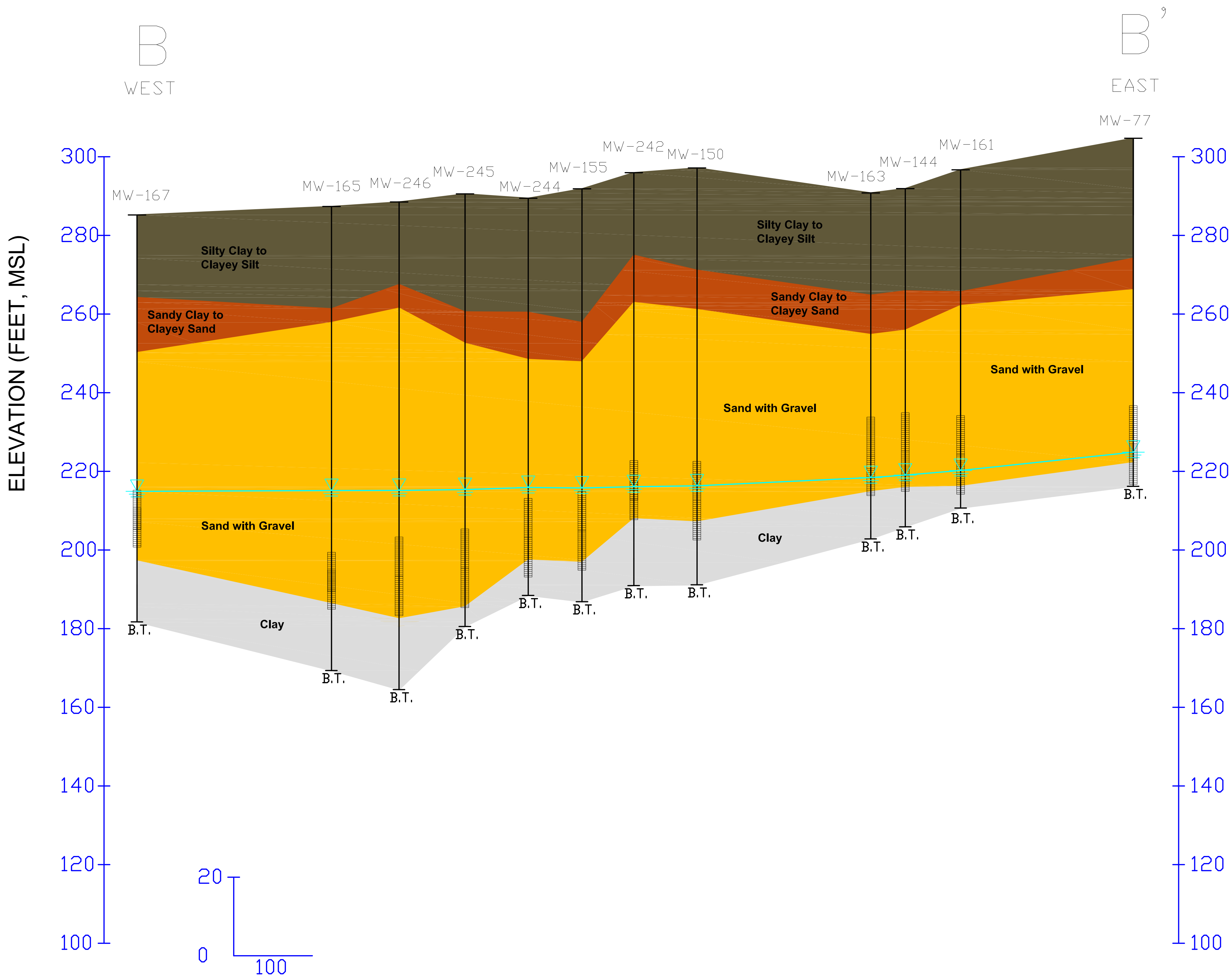


Figure 9

LITHOLOGIC CROSS-SECTION B TO B', MW-167 TO MW-77

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD 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

Groundwater Elevation 7/27/2009

Well Screen Interval

Date: March 2011
Edition: Rev 0

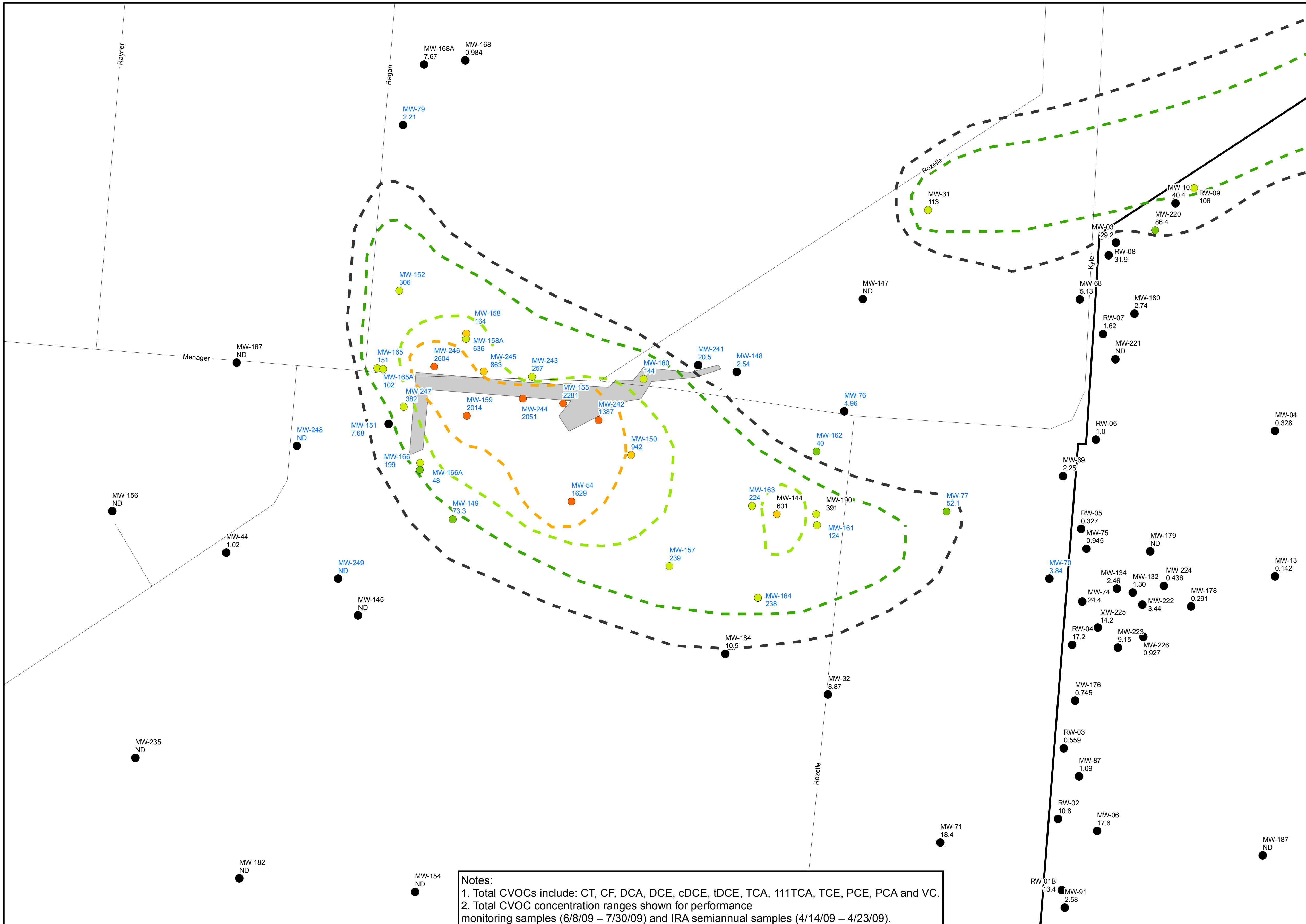
G:\3202\064\Cross Sections

Figure 10

TOTAL CVOC CONCENTRATIONS, JUNE-JULY 2009

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD DEFENSE DEPOT MEMPHIS, TENNESSEE



Notes:
1. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, 111TCA, TCE, PCE, PCA and VC.
2. Total CVOC concentration ranges shown for performance monitoring samples (6/8/09 – 7/30/09) and IRA semiannual samples (4/14/09 – 4/23/09).

N W E S

Legend

Total CVOC Ranger (ug/L)
- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000
- 1000 - 5000

Total CVOC Isopleth (ug/L)
- 50
- 100
- 500
- 1000

MW-241 Performance Monitoring Well

Original Dunn Field Property Boundary

Air Sparge Well Area

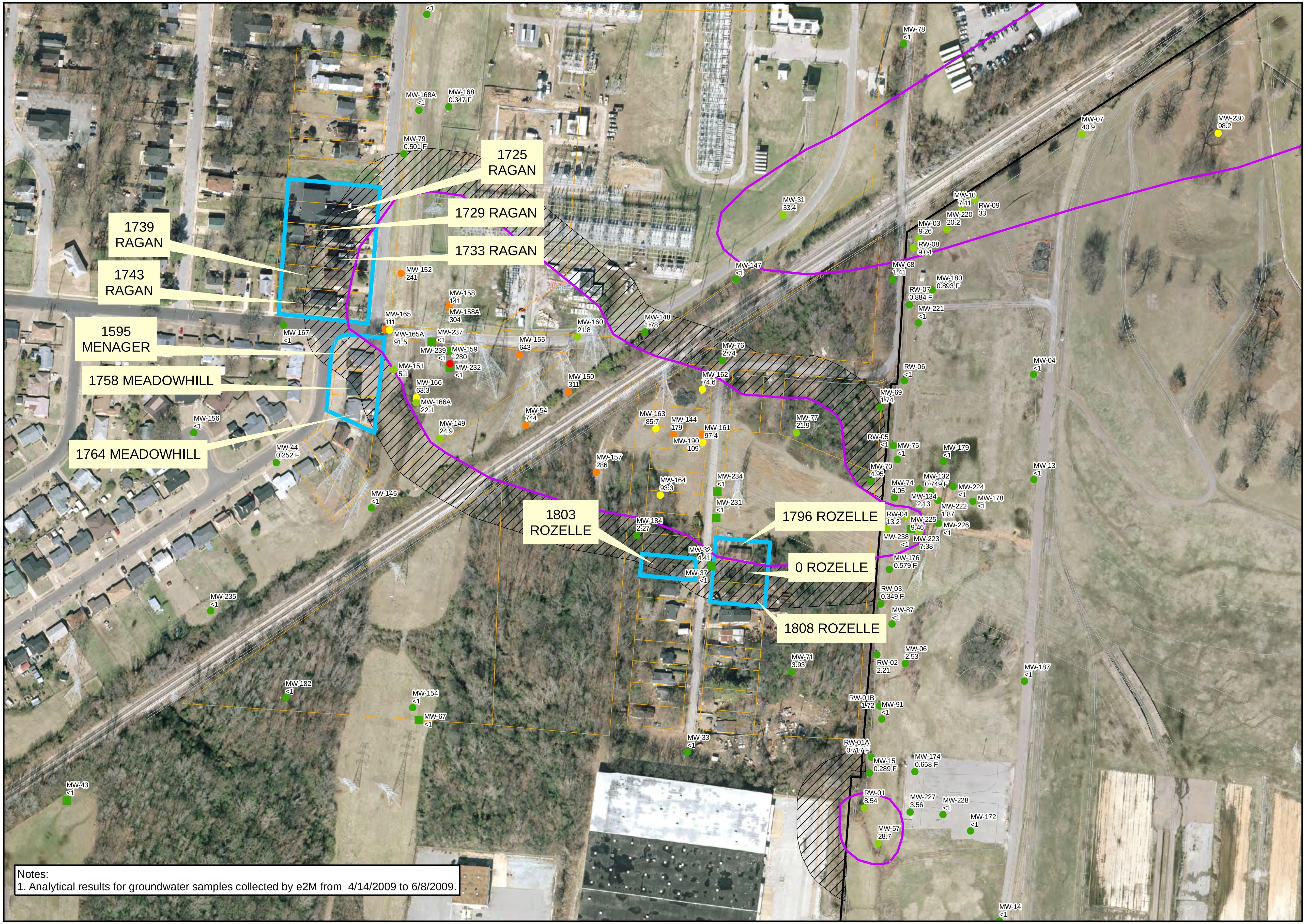
0 100 200 300
Feet

Installation Location
Memphis, Tennessee

HDR

Date: March 2011
Edition: Rev 0

G:\121842\002_OD IRACR\GIS\Fig 10 TOTAL CVOCcombined.mxd



G:\121842\002_OD IRACR\GIS\Fig 11 VI Target Areas.mxd

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Figure 11

VAPOR INTRUSION TARGET AREAS

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE

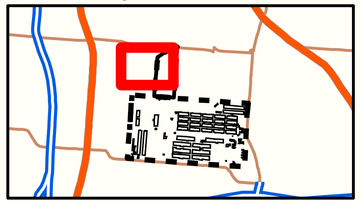
ug/L

- 0 - 5
- 6 - 50
- 51 - 100
- 101 - 1000
- 1001 - 2000
- TCE Non-Fluvial Wells
- TCE 5ppb
- Target Areas
- Parcels
- 100-ft Buffer
- SVE -Soil Vapor Extraction Point
- Original Dunn Field Property Boundary

0 50 100 200 300 400

Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0

HDR

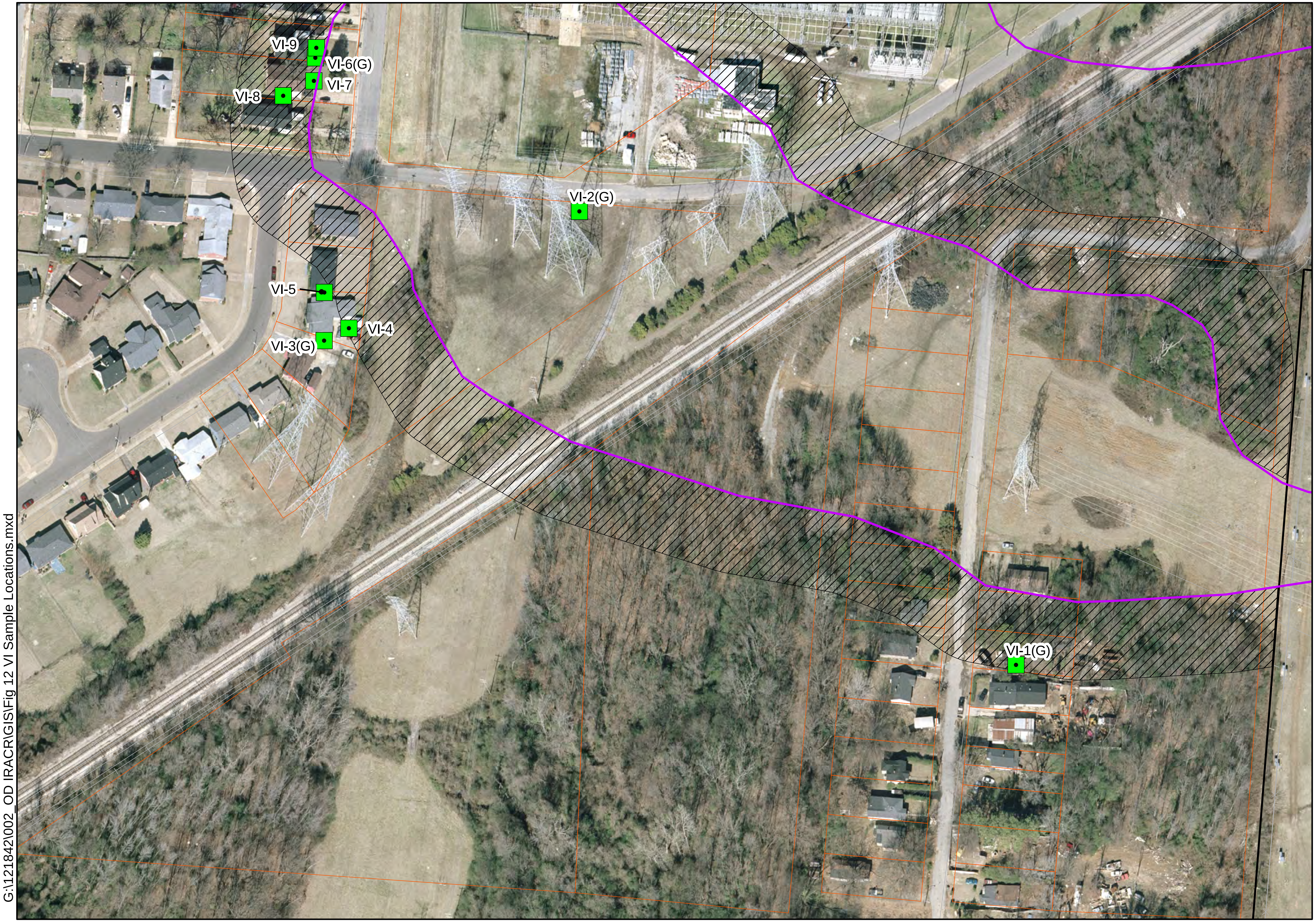


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Figure 12

VAPOR INTRUSION PROBE LOCATIONS

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

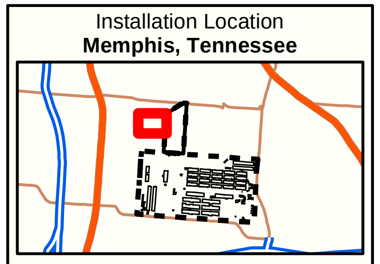
DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- TCE 5ppb
- Vapor Point
- 100-ft Buffer
- Parcels

G: Geotechnical Sample Location

0 25 50 100 150 200
Feet



Date: March 2011
Edition: Rev 0

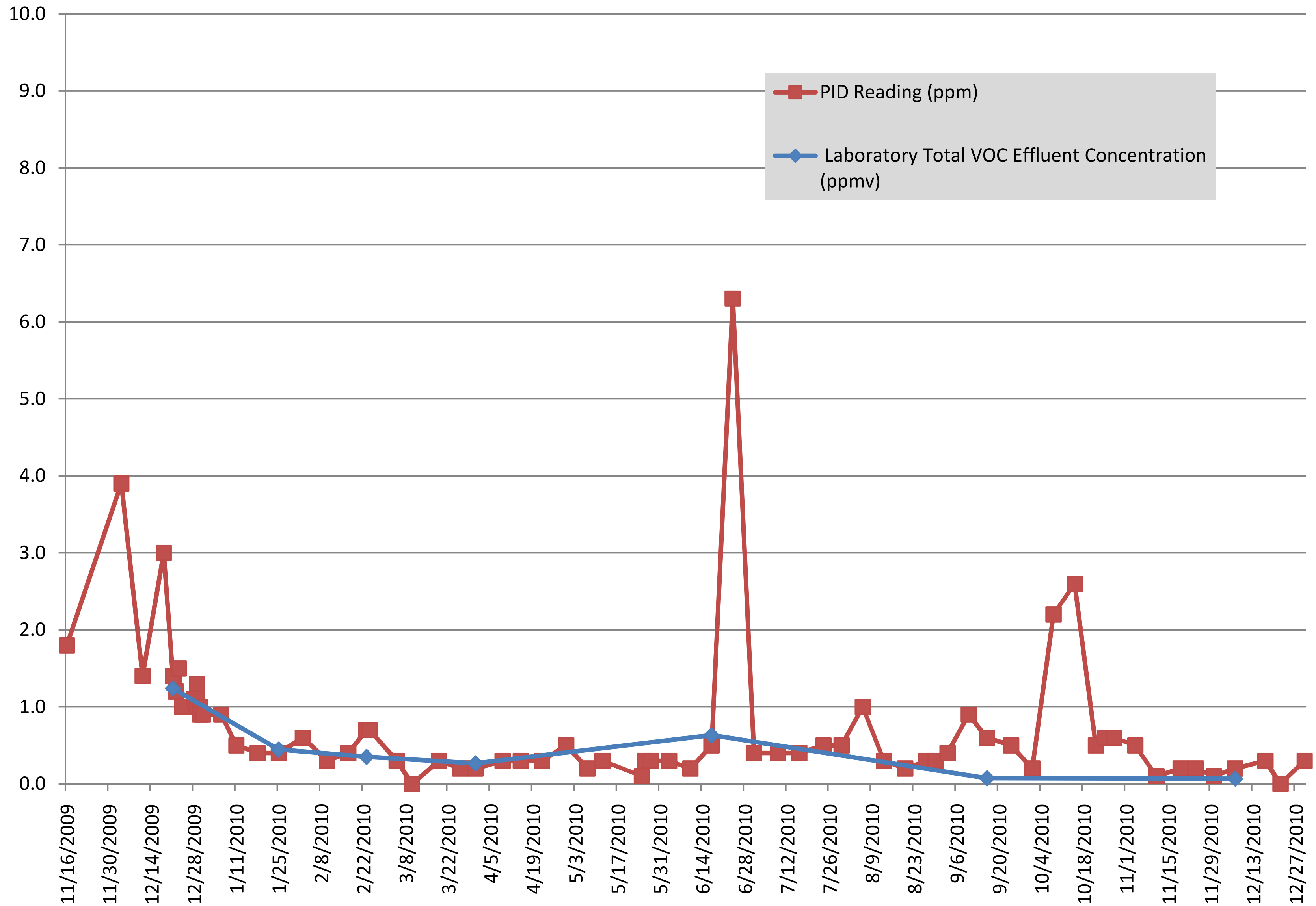


Figure 13

AS/SVE EFFLUENT CONCENTRATION TREND - ANALYTICAL RESULTS AND FIELD PID MEASUREMENTS

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

Dunn Field – Defense Depot Memphis, Tennessee

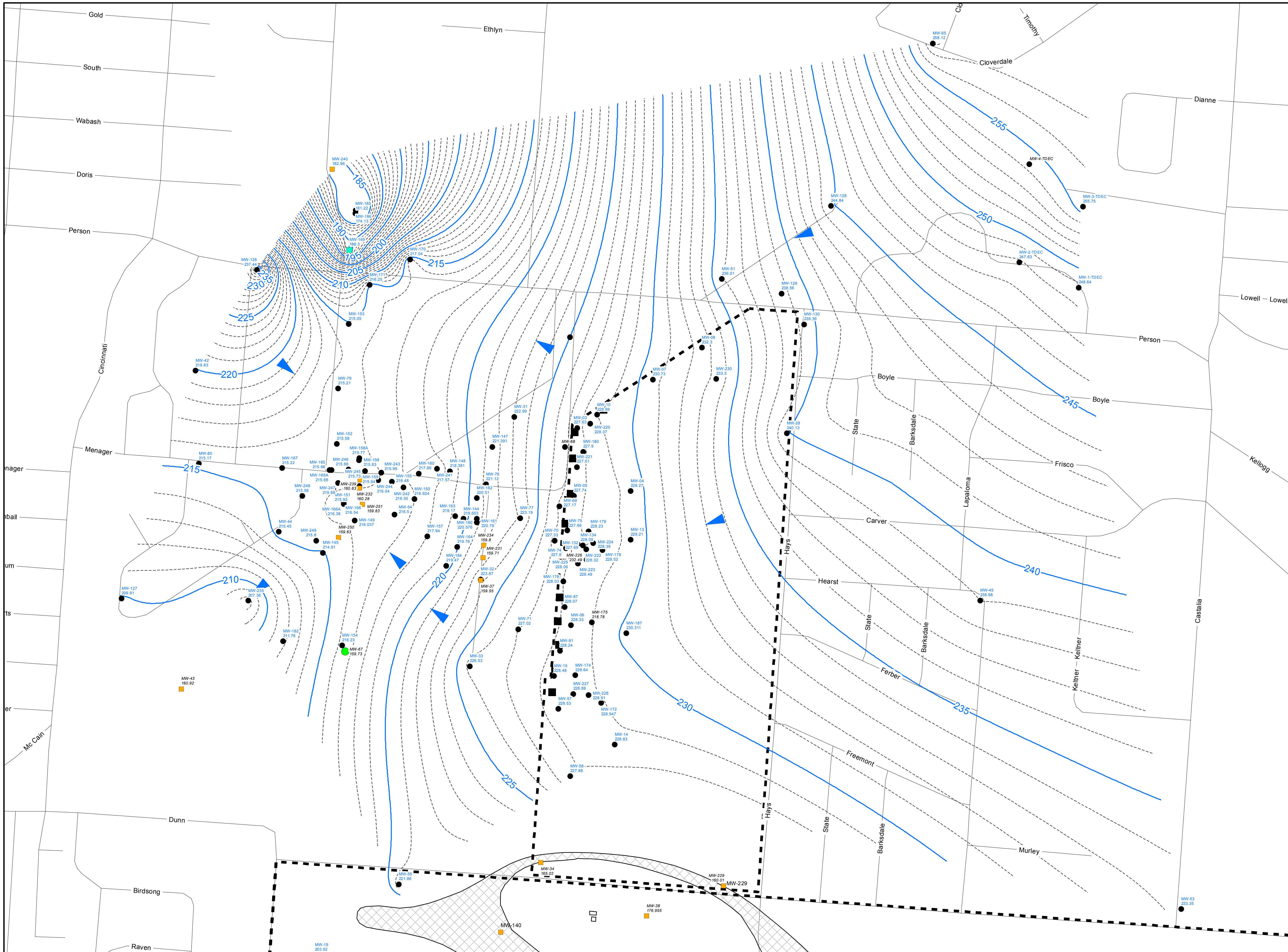


Figure 14

GROUNDWATER ELEVATION CONTOUR MAP, FLUVIAL AQUIFER OCTOBER 2009

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
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
- Dunn Field Boundary
- *Clay Elevation Exceeds Groundwater Elevation*

MW-03 100.12 — Blue non-italics: value used for groundwater contours

Groundwater Contours

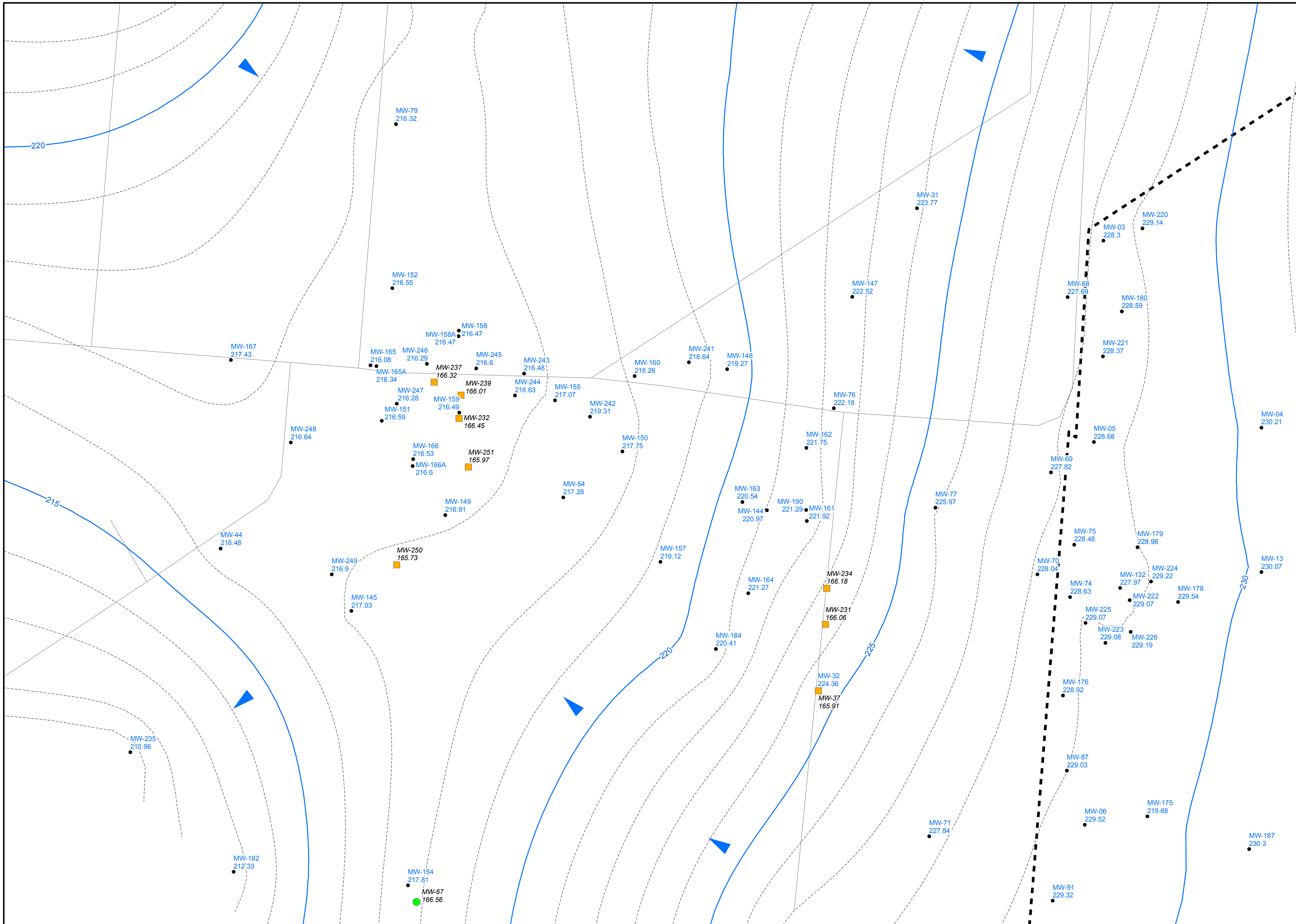
- 1-ft Contour
- 5-ft Contour
- Groundwater Flow Direction

0 200 400 600 800
Feet

Installation Location
Memphis, Tennessee

Date: July 2011
Edition: Rev 1

G:\121842\002_OD IRACR\GIS\Fig 14 GW EleMap Oct09.mxd



G:\121842\002_OD IRACR\GIS\Fig 15 GW EleMap FluvAq Mar2010.mxd

Figure 15

GROUNDWATER ELEVATION CONTOUR MAP, FLUVIAL AQUIFER MARCH 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
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
- Dunn Field Boundary

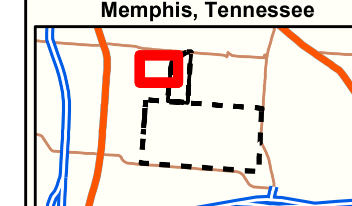
MW-03 100.12 Blue non-italics: value used for groundwater contours

Groundwater Contours

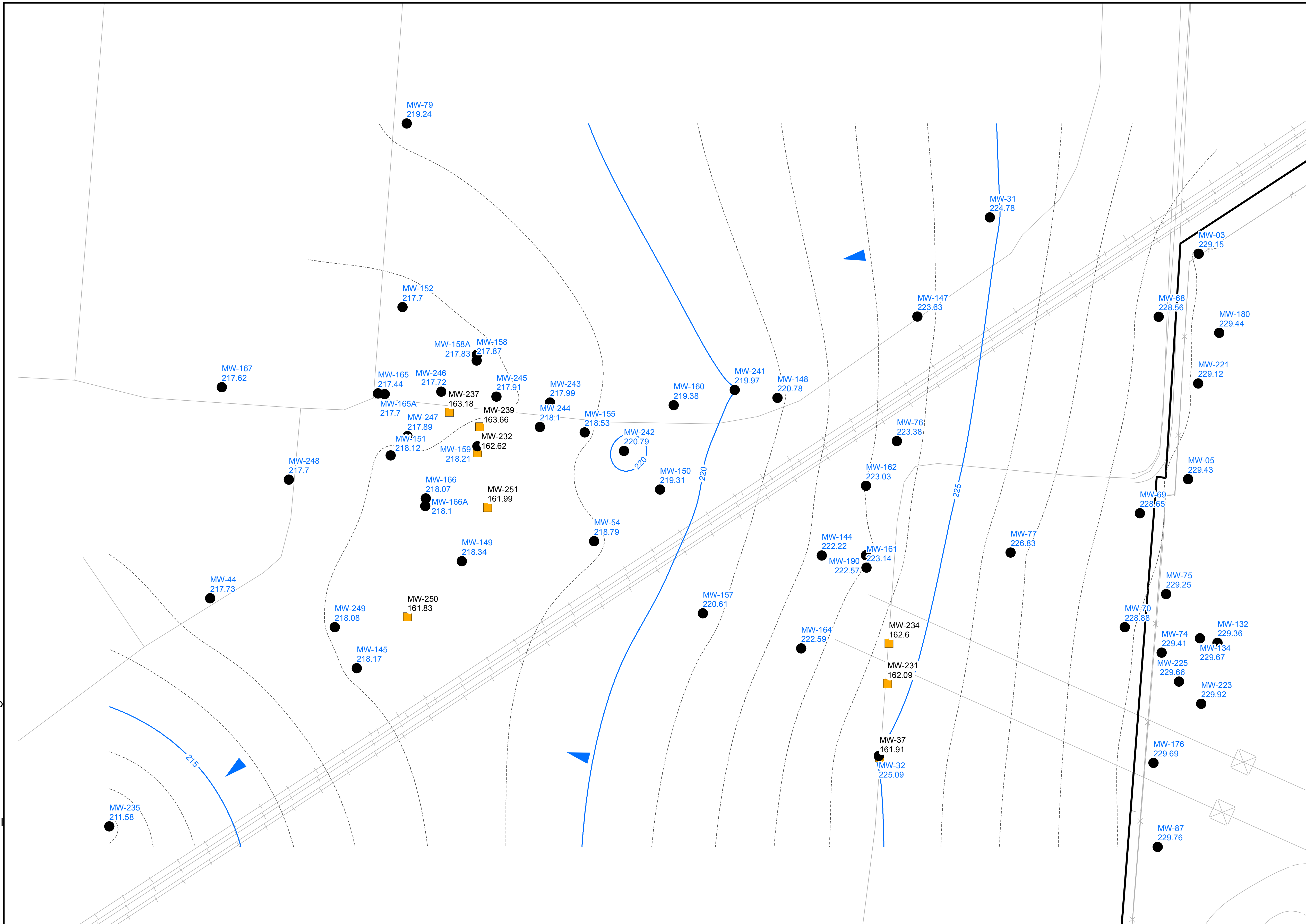
- 1-ft Contour
- 5-ft Contour
- Groundwater Flow Direction

0 50 100 150 200
Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0



G:\121842\002_OD IRACR\GIS\Fig 16 GW elevationJune2010.mxd

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Figure 16
GROUNDWATER ELEVATION CONTOUR MAP, FLUVIAL AQUIFER JUNE 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Dunn Field Boundary

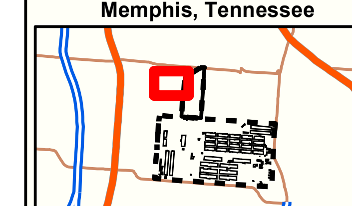
MW-03
229.15 Blue values used for groundwater contours

Groundwater Contours

- 1-ft Contour
- 5-ft Contour

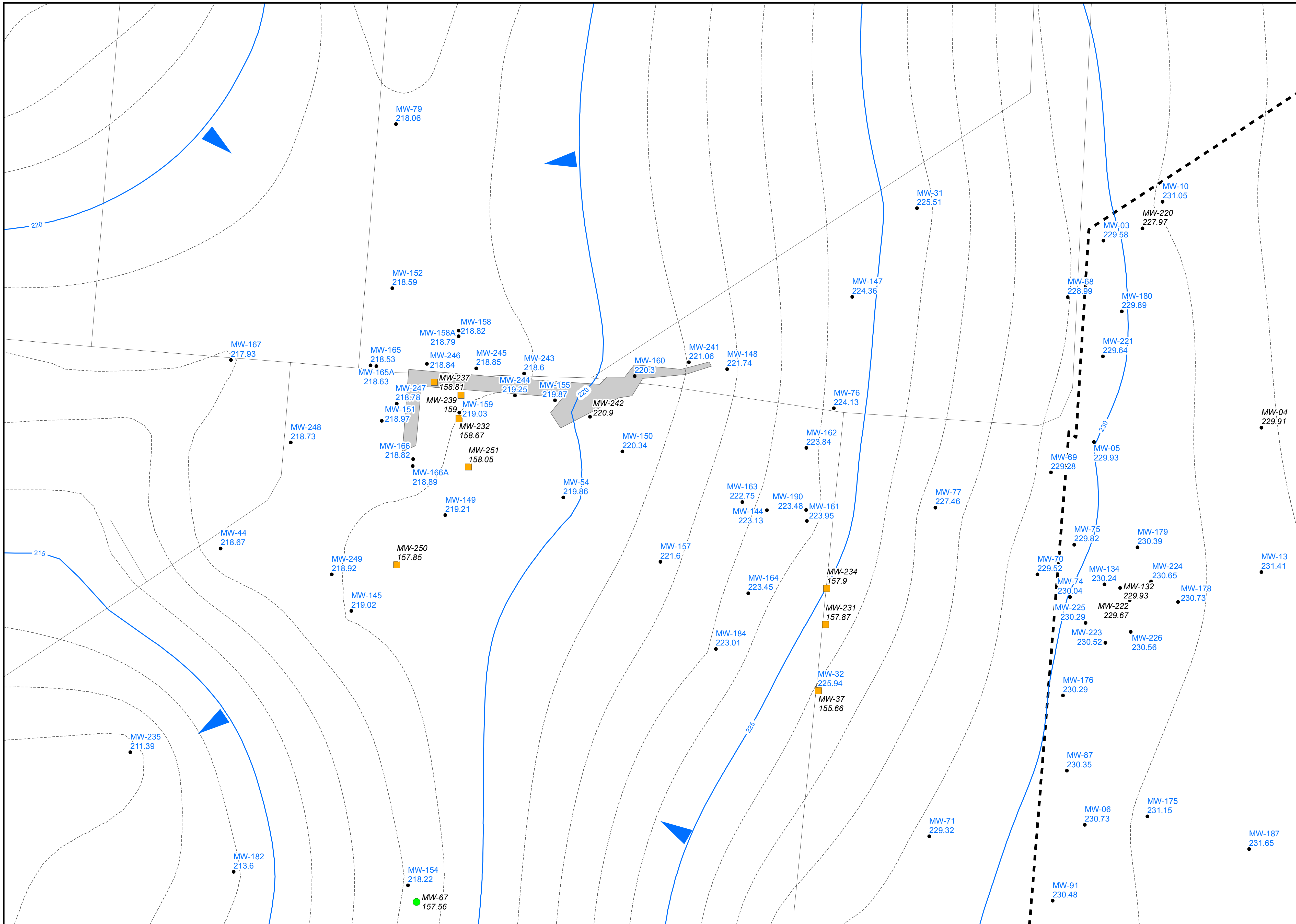
0 50 100 150 200 250
Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0

HDR



G:\121842\002_OD IRACR\GIS\Fig 17 GW EleMap FluvAq Sep2010.mxd

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Figure 17

GROUNDWATER ELEVATION CONTOUR MAP, FLUVIAL AQUIFER SEPTEMBER 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
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
- Dunn Field Boundary

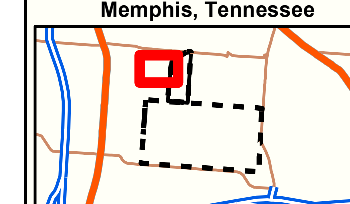
MW-03 100.12 — Blue non-italics: value used for groundwater contours

Groundwater Contours

- 1-ft Contour
- 5-ft Contour
- Groundwater Flow Direction

0 50 100 150 200
Feet

Installation Location
Memphis, Tennessee



Date: March 2011
Edition: Rev 0

HDR

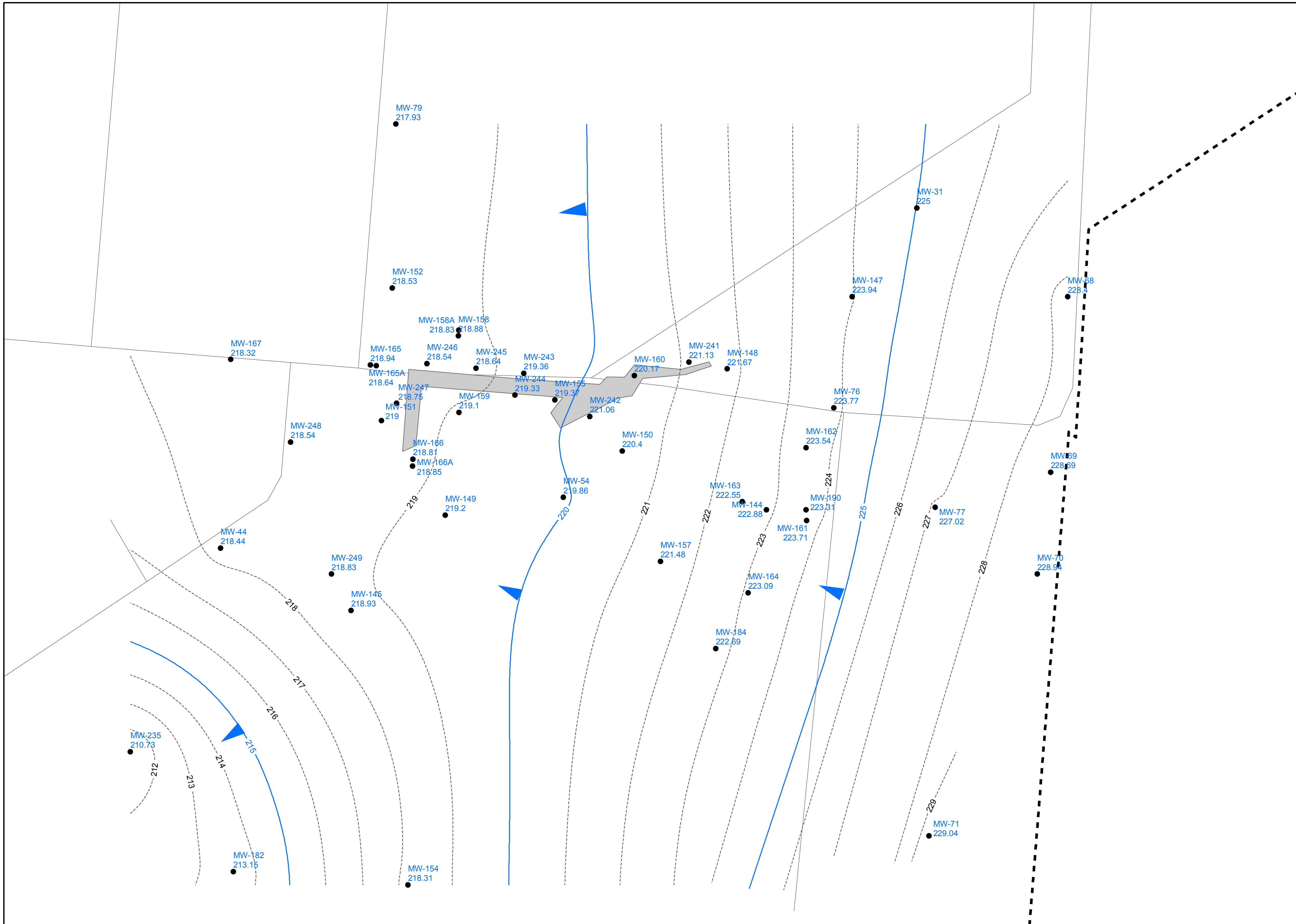


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Figure 18

GROUNDWATER ELEVATION CONTOUR MAP, FLUVIAL AQUIFER JANUARY 2011

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
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
- Dunn Field Boundary

MW-03
100.12
Blue: value used for groundwater contours

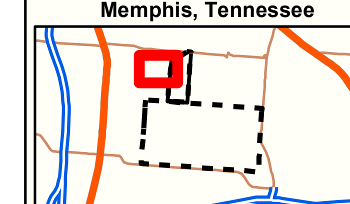
Groundwater Contours

- 1-ft Contour
- 5-ft Contour
- Groundwater Flow Direction

0 50 100 150 200

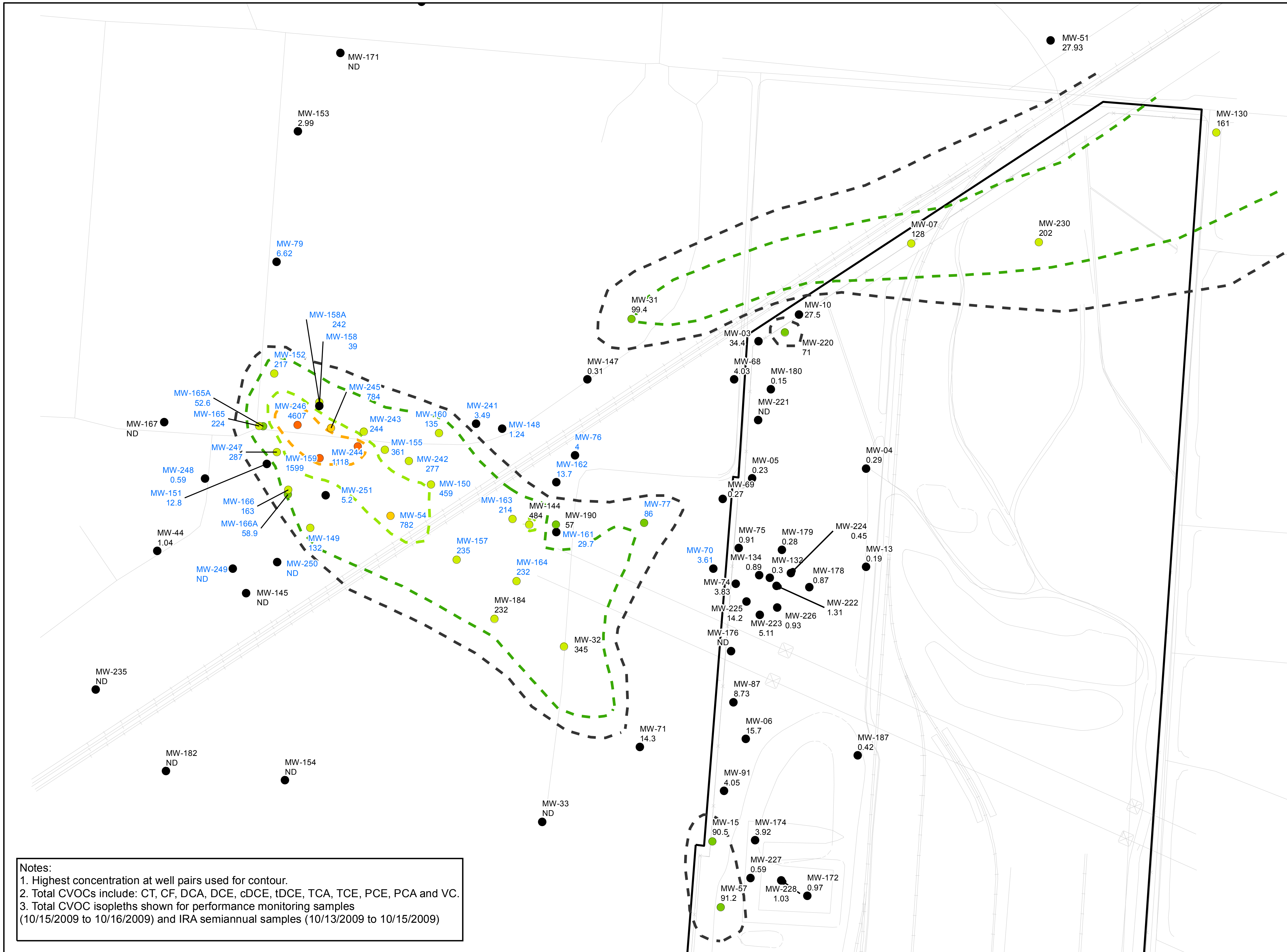
Feet

Installation Location
Memphis, Tennessee



Date: July 2011
Edition: Rev 0

G:\121842\002_OD IRACR\GIS\Fig 18 GW EleMap FluvAq Jan2011.mxd



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Total CVOC isopleths shown for performance monitoring samples (10/15/2009 to 10/16/2009) and IRA semiannual samples (10/13/2009 to 10/15/2009)

G:\121842\002_OD IRACR\GIS\Fig 19 TOTAL CVOC Oct 2009.mxd

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Figure 19

TOTAL CVOC CONCENTRATIONS, OCTOBER 2009

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

CVOCs Fluvial Wells

ug/L

- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000
- 1000 - 5000

Total CVOC Isopleth (ug/L)

- 50
- 100
- 500
- 1000

Original Dunn Field Property Boundary

MW-249
100
Blue: Off Depot Performance Monitoring Sample Event

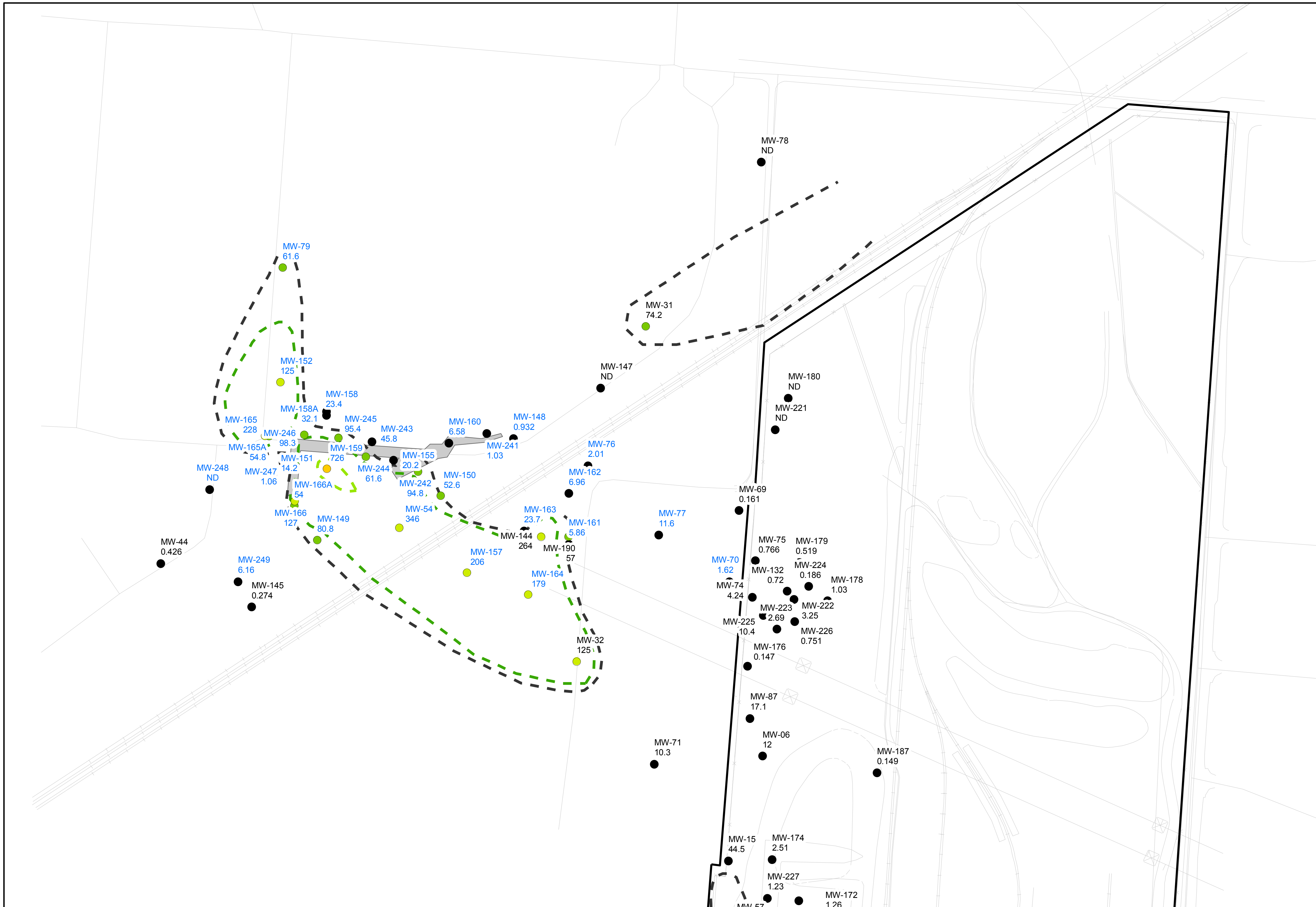
MW-05
100
Black: IRA Sample Event

0 100 200 300 400
Feet

Installation Location
Memphis, Tennessee

Date: June 2011
Edition: Rev 1

HDR



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Samples collected 3/23/2010 to 3/29/2010.

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Figure 20

TOTAL CVOC CONCENTRATIONS, MARCH 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

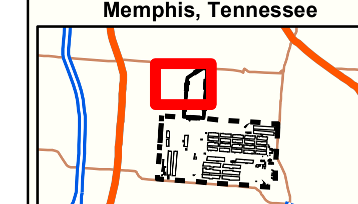
Legend

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

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

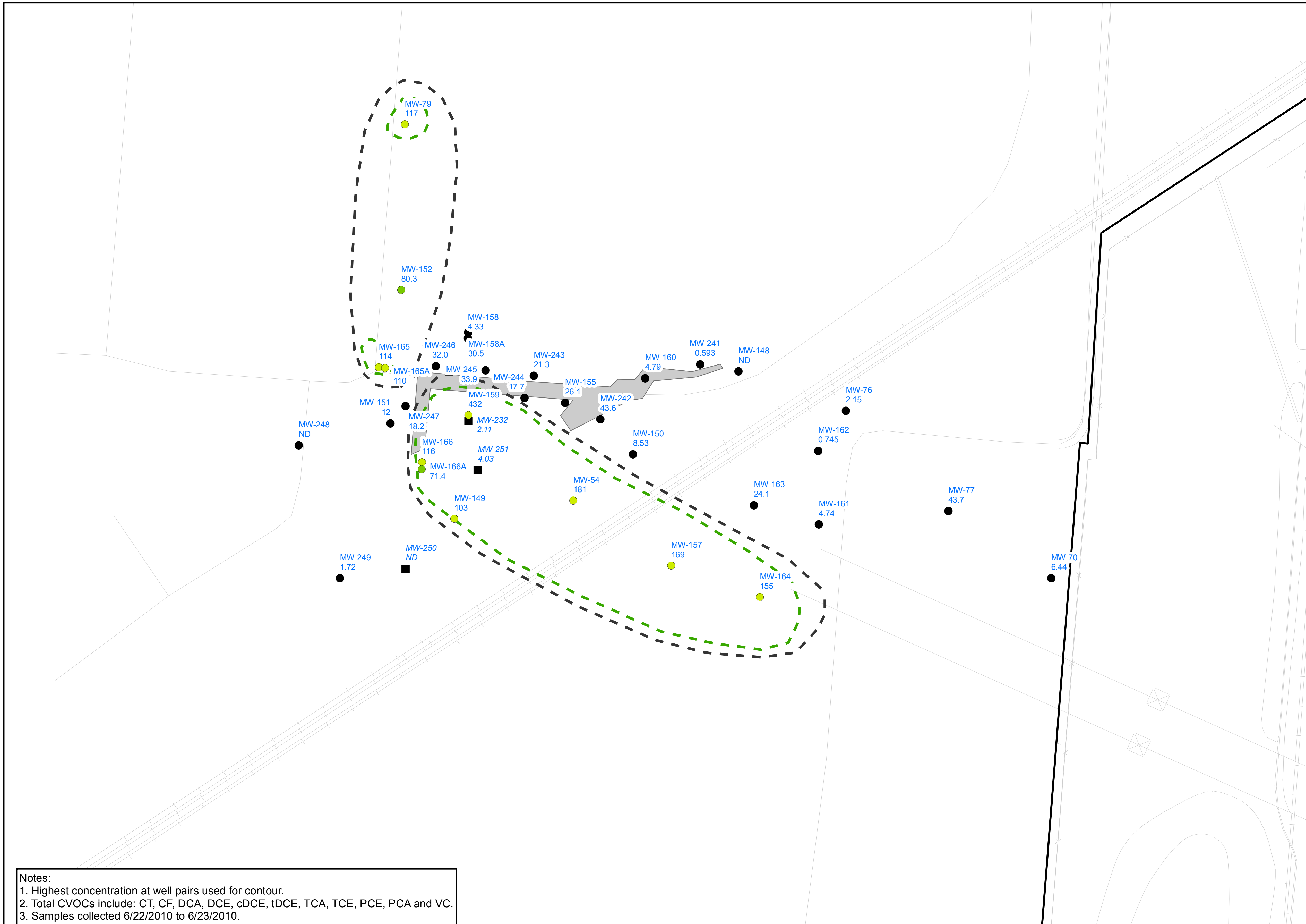
Air Sparge Well Area
Original Dunn Field Property Boundary
MW-249 100 — Blue: Off Depot Performance Monitoring Sample Event (Non-Fluvial Wells - Italics)
MW-05 100 — Black: Off Depot LTM Sample Event

0 100 200 300 400
Feet



Date: June 2011
Edition: Rev 1

G:\121842002_OD IRACR\GIS\Fig 20 TOTAL CVOC Mar2010.mxd



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Samples collected 6/22/2010 to 6/23/2010.

G:\121842002_OD IRACR\GIS\Fig 21 TOTAL CVOC June2010.mxd

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Figure 21

TOTAL CVOC CONCENTRATIONS, JUNE 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

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

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

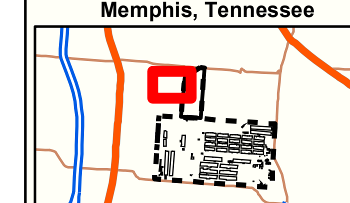
CVOCs Non-Fluvial Wells
ug/L
- 0 - 50

Original Dunn Field Property Boundary

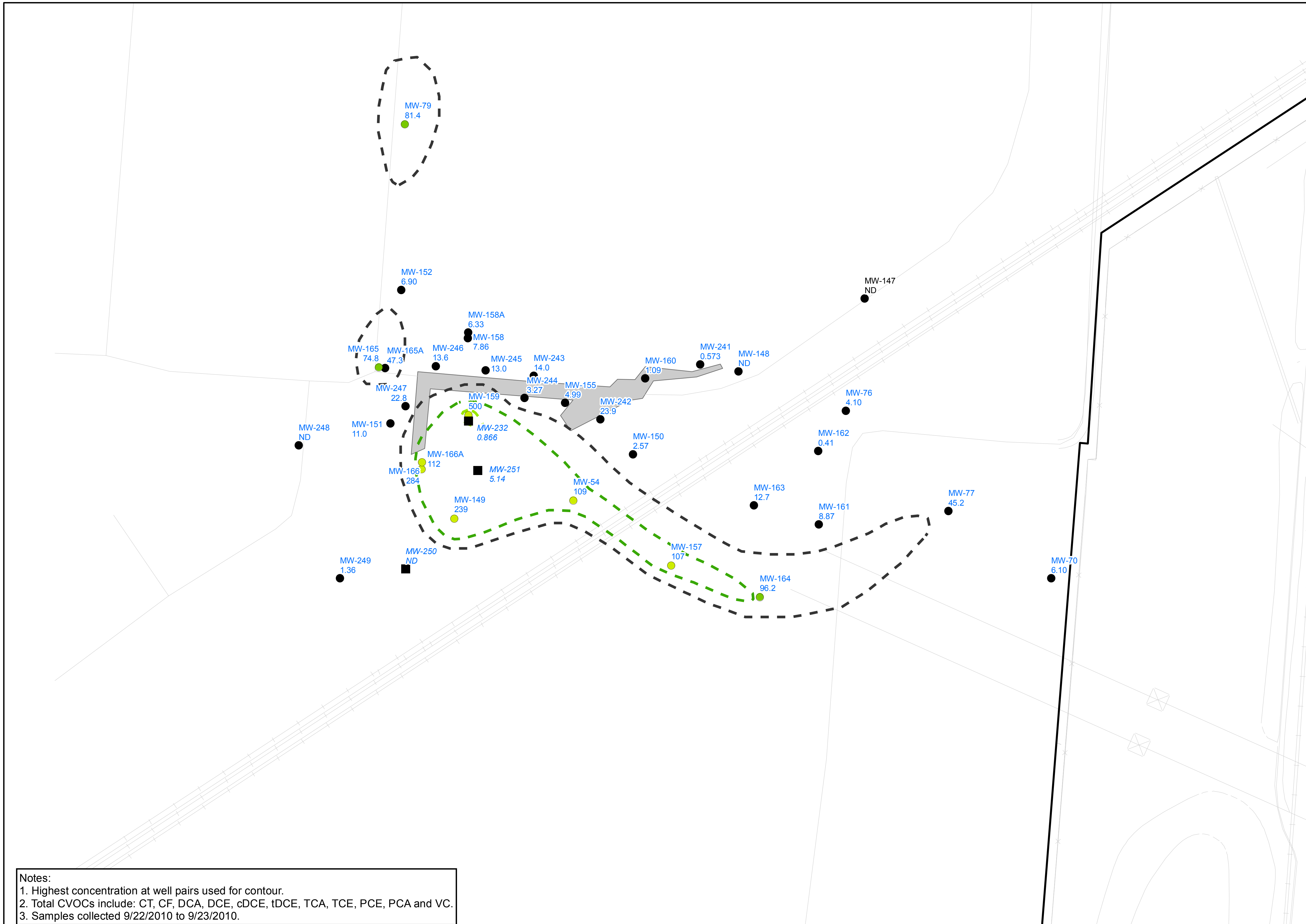
MW-249
100
Blue: Off Depot Performance Monitoring Sample Event (Non-Fluvial Wells - Italics)

0 50 100 150 200
Feet

Installation Location
Memphis, Tennessee



Date: July 2011
Edition: Rev 1



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Samples collected 9/22/2010 to 9/23/2010.

G:\121842002_OD IRACR\GIS\Fig 22 TOTAL CVOC Sept2010.mxd

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Figure 22

TOTAL CVOC CONCENTRATIONS, SEPTEMBER 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

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

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

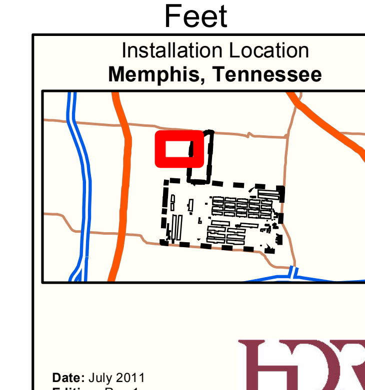
CVOCs Non-Fluvial Wells
ug/L
- 0 - 50

Original Dunn Field Property Boundary

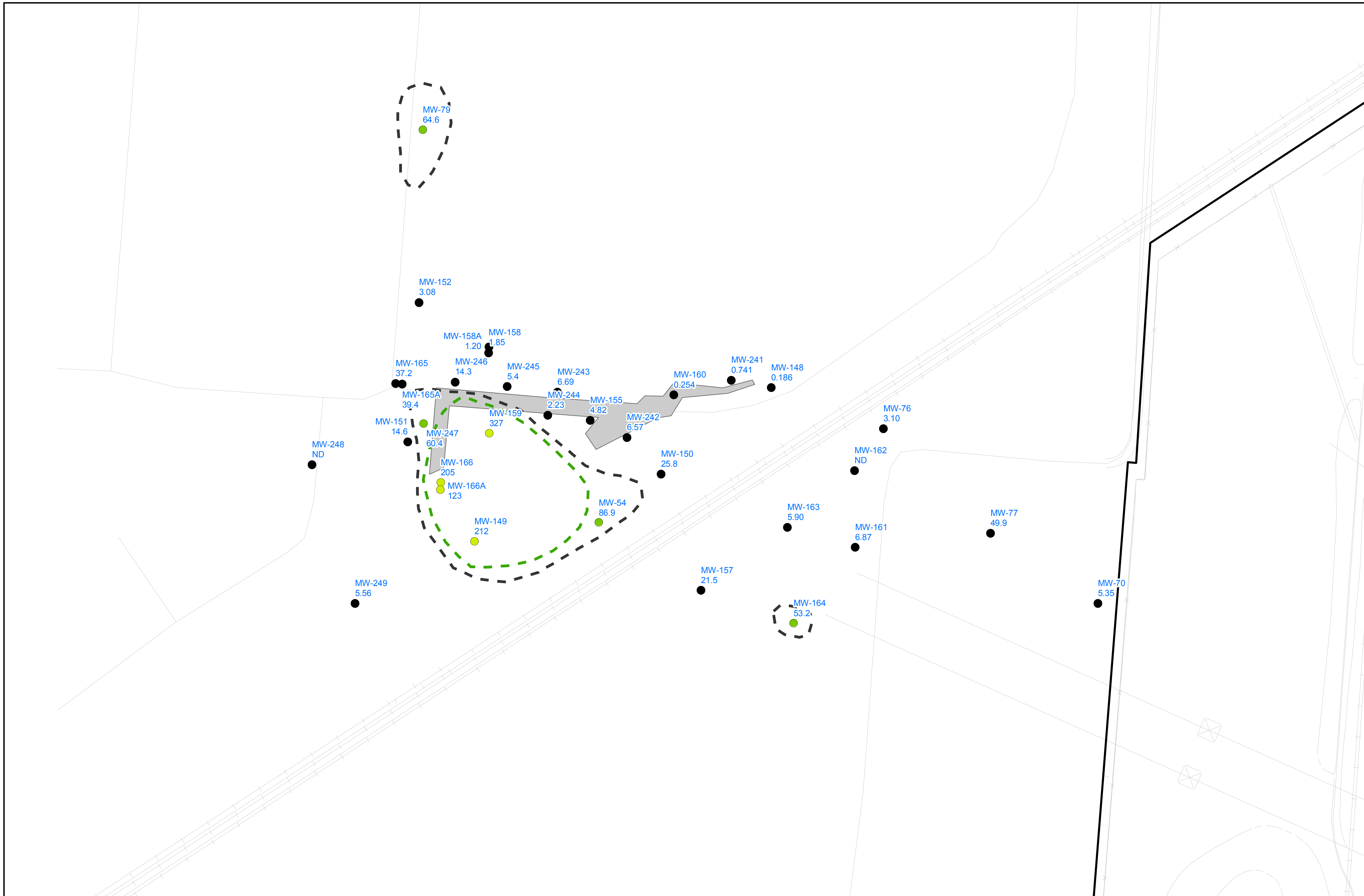
MW-249 100 — Blue: Off Depot Performance Monitoring Sample Event (Non-Fluvial Wells - Italics)

MW-05 100 — Black: Off Depot LTM Sample Event

0 50 100 150 200
Feet



Date: July 2011
Edition: Rev 1



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Samples collected 1/25/2011 to 1/26/2011.

G:\121842002_OD IRACR\GIS\Fig 23 TOTAL CVOC Jan2011.mxd

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Figure 23

TOTAL CVOC CONCENTRATIONS, JANUARY 2011

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD DEFENSE DEPOT MEMPHIS, TENNESSEE

Legend

CVOCs Fluvial Wells

ug/L

- 0 - 50
- 50 - 100
- 100 - 500

Total CVOC Isopleth (ug/L)

- 50
- 100

Original Dunn Field Property Boundary

MW-249 100 Blue: Off Depot Performance Monitoring Sample Event

0 50 100 150 200

Feet

Installation Location
Memphis, Tennessee

Date: July 2011
Edition: Rev 1

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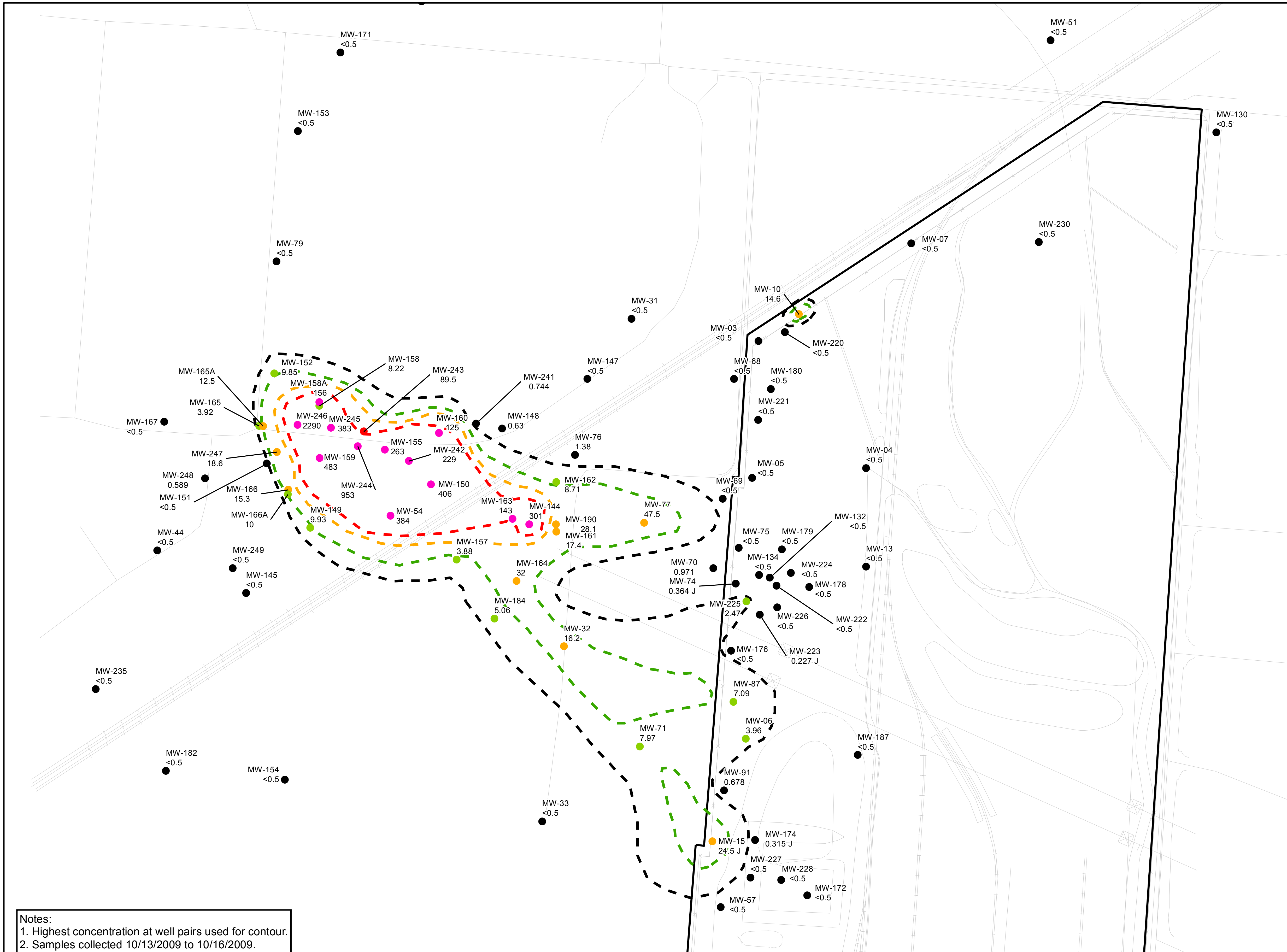

Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 10/13/2009 to 10/16/2009.

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Figure 24

TeCA CONCENTRATIONS, OCTOBER 2009

OFF DEPOT GROUNDWATER
INTERIM REMEDIAL ACTION
COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TeCA Ranges
ug/L

- 0-2
- 2-10
- 10-50
- 50-100
- >100

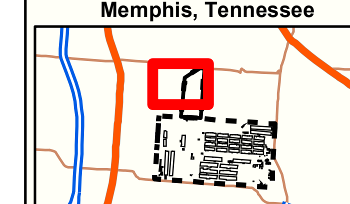
TeCA Contour
ug/L

- 2.2
- 10
- 50
- 100

Original Dunn Field Property Boundary

0 100 200 300
Feet

Installation Location
Memphis, Tennessee



Date: June 2011
Edition: Rev 1

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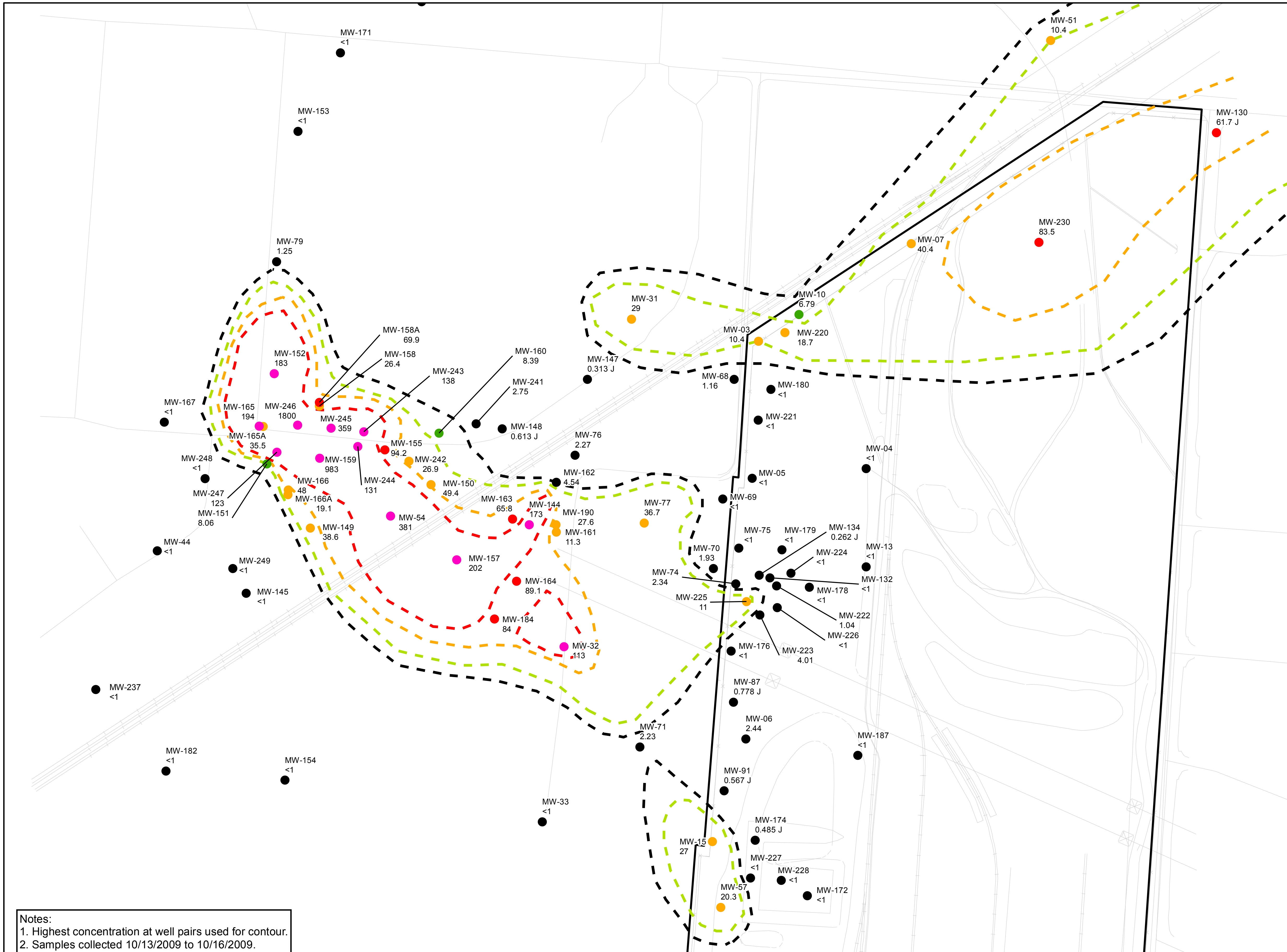

Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 10/13/2009 to 10/16/2009.

G:\121842\002_OD IRACR\GIS\TCE TeCA\Oct 2009\Fig 25 TCE OCT 2009.mxd

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Figure 25

TCE CONCENTRATIONS, OCTOBER 2009

OFF DEPOT GROUNDWATER
INTERIM REMEDIAL ACTION
COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges
ug/L

- 0-5
- 5-10
- 10-50
- 50-100
- >100

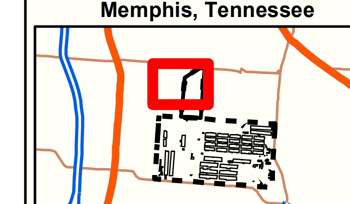
TCE Contour
ug/L

- 5
- 10
- 50
- 100

Original Dunn Field Property Boundary

0 100 200 300
Feet

Installation Location
Memphis, Tennessee



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Date: June 2011
Edition: Rev 1

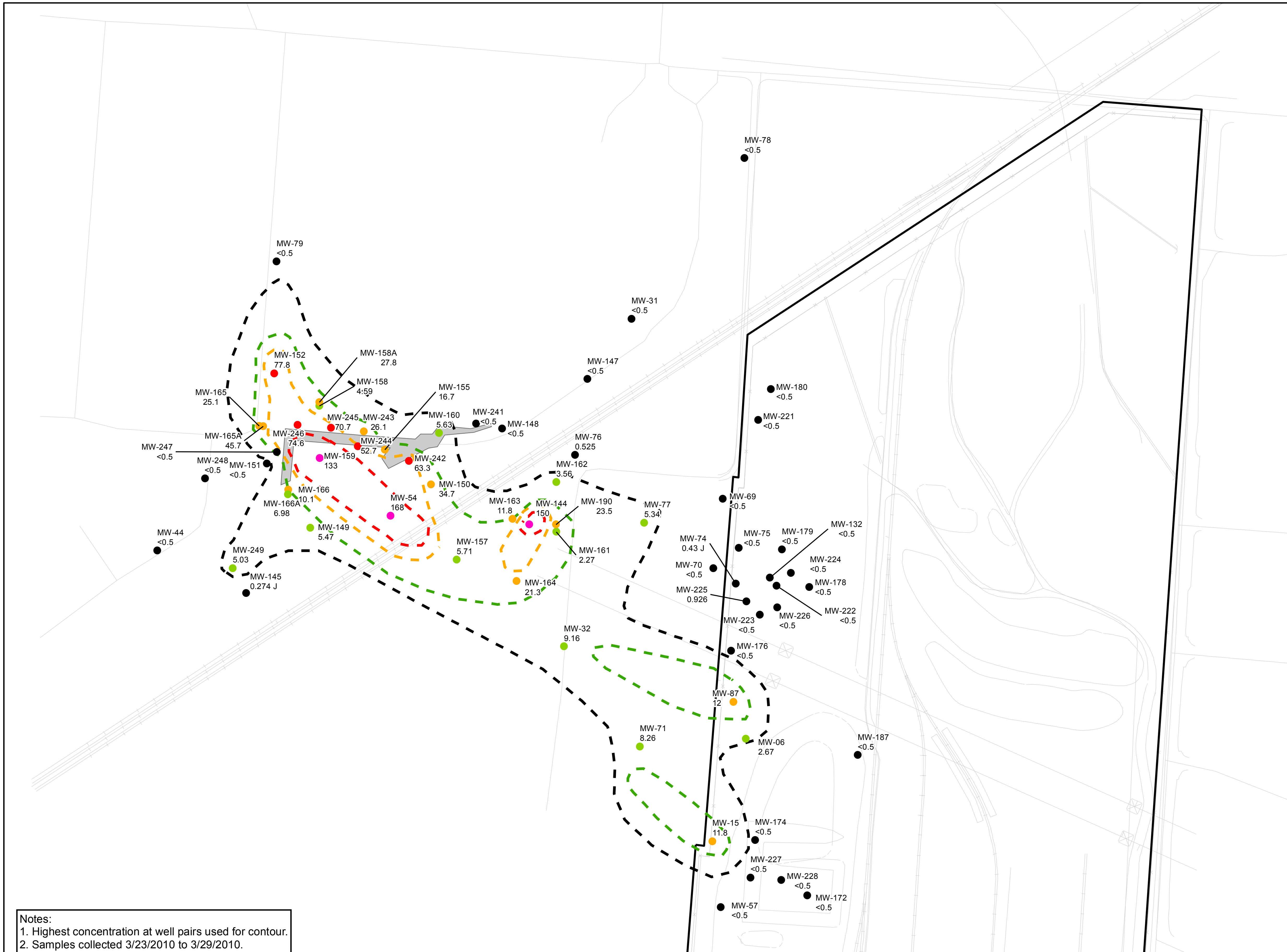

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Figure 26

TeCA CONCENTRATIONS, MARCH 2010

OFF DEPOT GROUNDWATER
INTERIM REMEDIAL ACTION
COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TeCA Ranges
ug/L

- 0-2
- 2-10
- 10-50
- 50-100
- >100

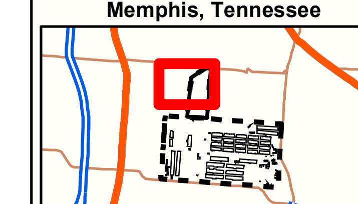
TeCA Contour
ug/L

- 2.2
- 10
- 50
- 100

Air Sparge Well Area

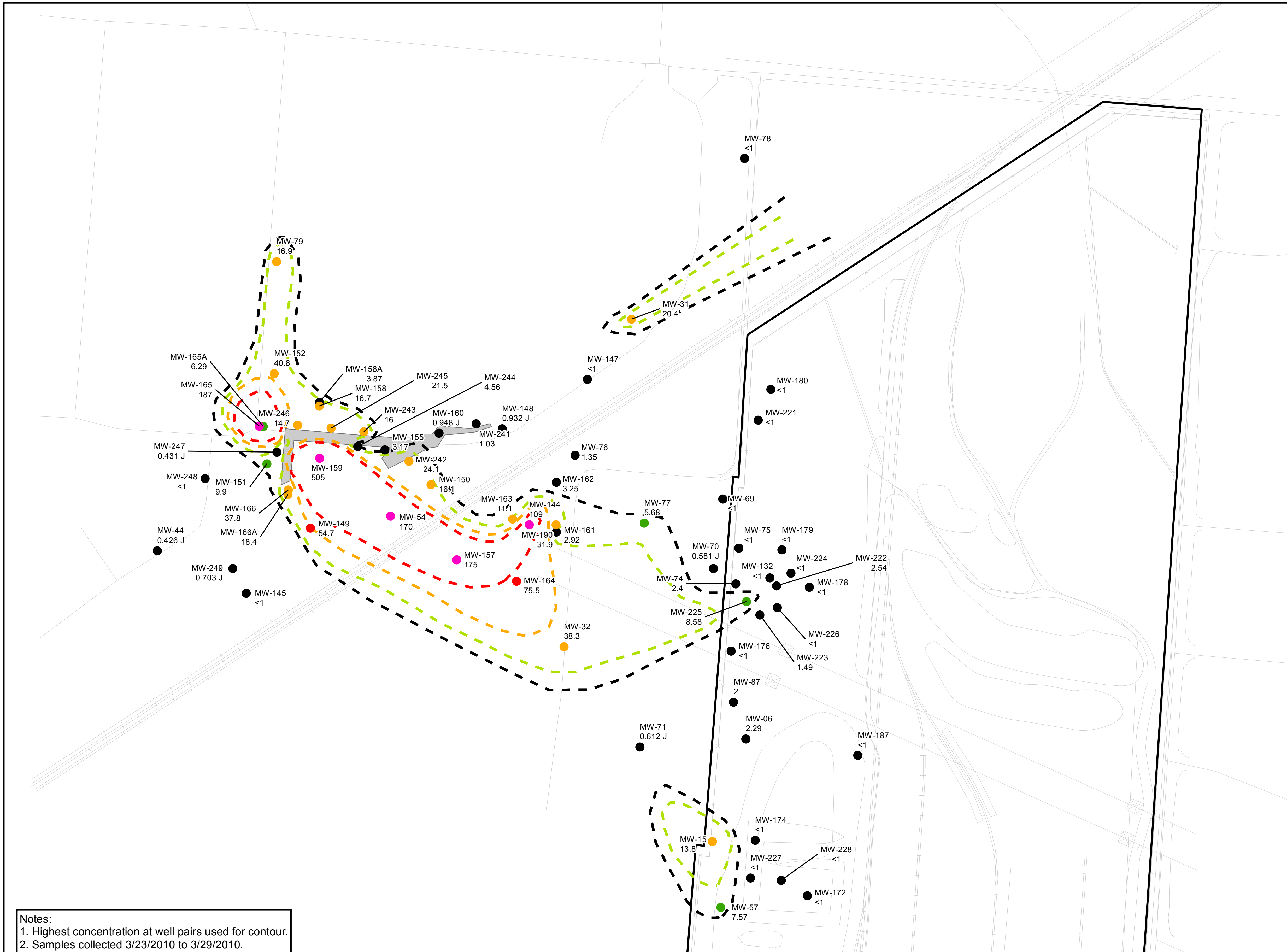
Original Dunn Field Property Boundary

0 100 200 300
Feet



Date: June 2011
Edition: Rev 1

HDR



Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 3/23/2010 to 3/29/2010.

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Figure 27

TCE CONCENTRATIONS, MARCH 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges

ug/L

- 0-5
- 5-10
- 10-50
- 50-100
- >100

TCE Contour

ug/L

- 5
- 10
- 50
- 100

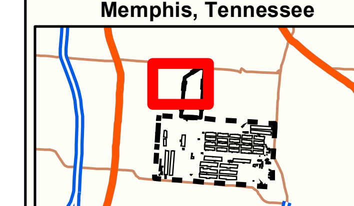
Air Sparge Well Area

Original Dunn Field Property Boundary

0 100 200 300

Feet

Installation Location
Memphis, Tennessee



Date: June 2011
Edition: Rev 1

HDR

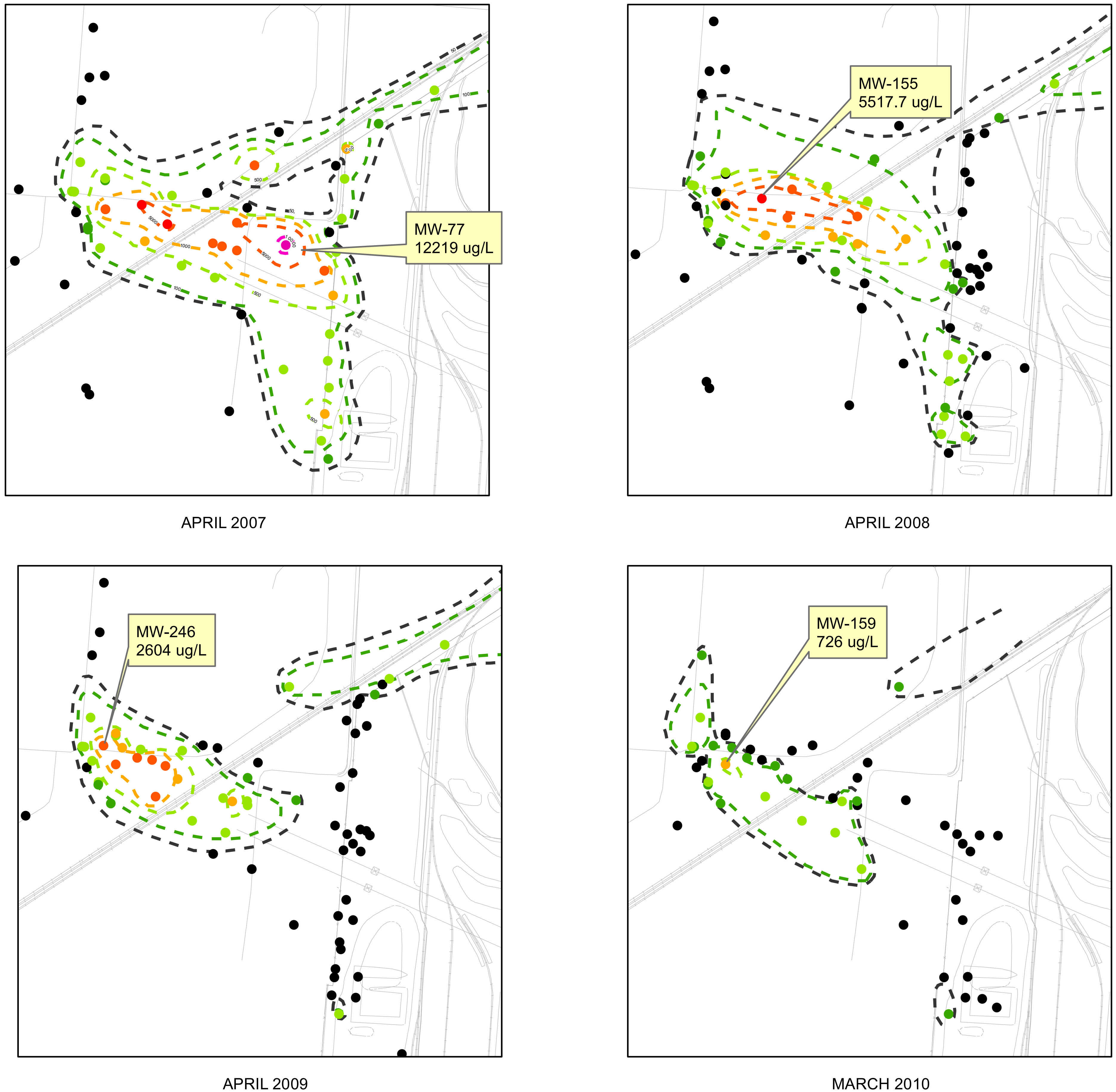


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Figure 28

TOTAL CVOC CONCENTRATIONS, 2007 - 2010

OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

Total CVOC Isopleth (ug/L)

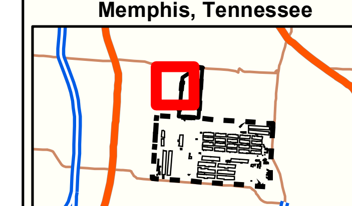
- 50
- 100
- 500
- 1000
- 5000
- 10000

Total CVOC Ranges (ug/L)

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

0 200 400 600 800
Feet

Installation Location
Memphis, Tennessee



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Date: July 2011
Edition: Rev 1

G:\121842\002_OD IRACR\GIS\Fig 28 TOTAL CVOC Time Series.mxd

APPENDIX A

SOIL BORING LOGS

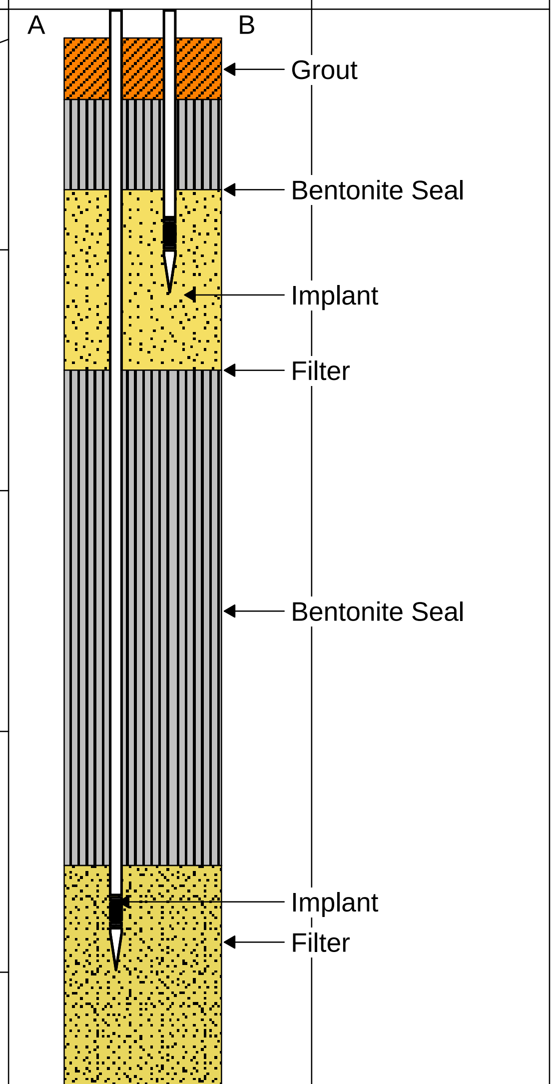
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-1
TOTAL DEPTH: 18

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Vapor Intrusion	DRILLING CO.: Boart Longyear
PROJECT NO.: 3200-064-01-06	DRILLER: T. Stanners
SITE LOCATION: 0 Rozelle	DRILLING METHOD/RIG: Direct Push
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 2-inches
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION: Not Surveyed
BOREHOLE STARTED: 9/10/2009	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 9/10/2009	BOREHOLE USE: Vapor Monitoring

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		asphalt		
		CL Silty Clay - bluish grey Gley (2 5/10B), low plasticity, moderately stiff		
		CL Silty Clay - pink 7.5YR (7/4), stiff, dry		
10		**CL** Silty Clay - light brown 7.5YR (6/4), stiff, very dry		
		CL Silty Clay - light brown 7.5YR (6/3), stiff, dry		
		CL Silty Clay - light brown 7.5YR (6/4), stiff, hard, dry		
20		End of Log		



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Checked By: J. Sperry

PAGE: 1 of 1

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-2
TOTAL DEPTH: 18

PROJECT INFORMATION

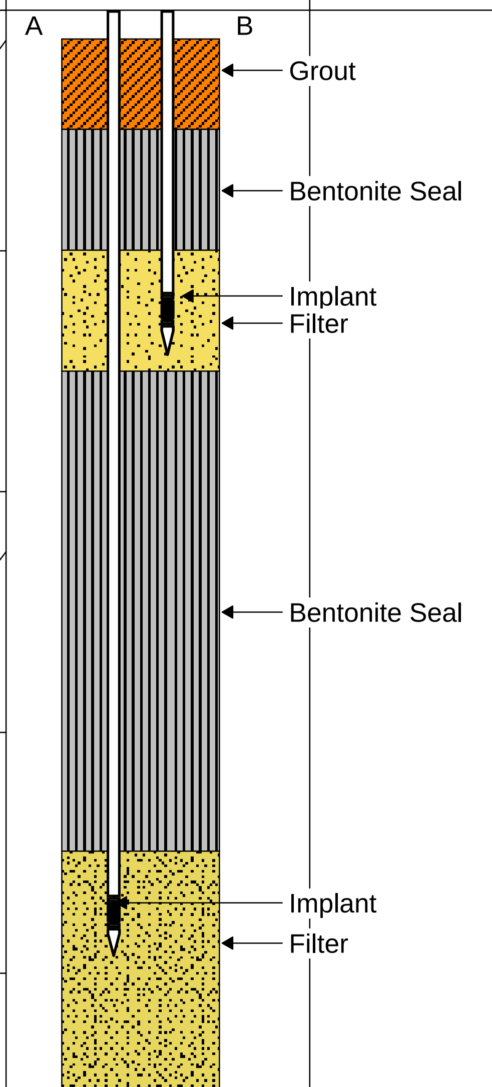
PROJECT: Vapor Intrusion
PROJECT NO.: 3200-064-01-06
SITE LOCATION: Between VMP-4 and MW-144
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Sperry
BOREHOLE STARTED: 9/9/2009
BOREHOLE FINISHED: 9/9/2009

DRILLING INFORMATION

DRILLING CO.: Boart Longyear
DRILLER: T. Stanners
DRILLING METHOD/RIG: Direct Push
BOREHOLE DIAMETER: 2-inches
GROUND SURFACE ELEVATION: Not Surveyed
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Vapor Monitoring

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		OH Topsoil - brown 7.5YR (5/2), organics.		
		CL Silty Clay - light brown 7.5YR (6/4), low plasticity, stiff		
		CL Silty Clay - light brown 7.5YR (6/4), low plasticity, stiff		
		CL Silty Clay - light brown 7.5YR (6/4), low plasticity, stiff		
10		**CL** Clay - strong brown 7.5YR (5/6), stiff, moderately plastic		
		CL Clay - strong brown 7.5YR (5/6), stiff, moderately plastic		
		CL Clay - strong brown 7.5YR (5/6), stiff, moderately plastic		
		End of Log		
20				



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Checked By: J. Sperry

FIELD BOREHOLE LOG

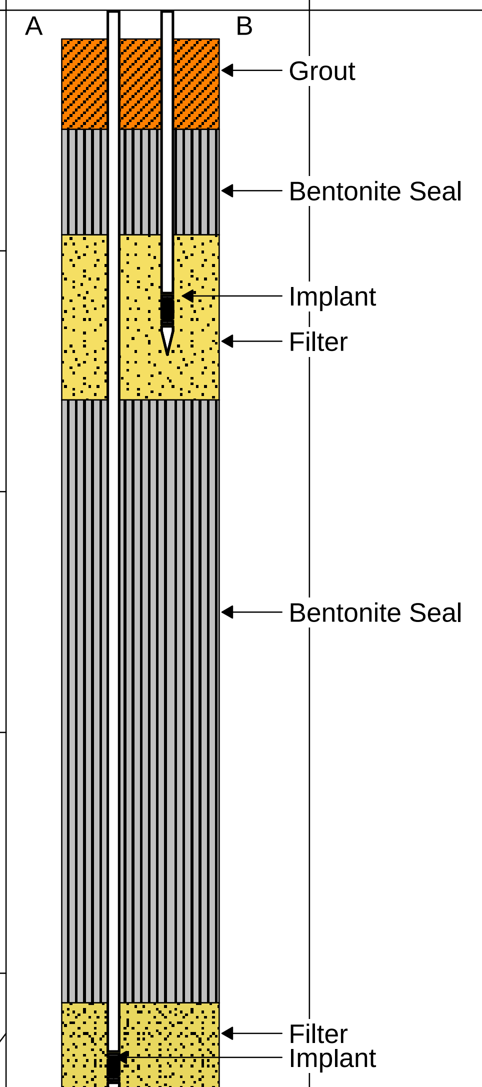
BOREHOLE NO.: ODVI-3
TOTAL DEPTH: 18

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Vapor Intrusion	**DRILLING CO.:** Boart Longyear
PROJECT NO.: 3200-064-01-06	**DRILLER:** T. Stanners
SITE LOCATION: 1764 Meadowhill	**DRILLING METHOD/RIG:** Direct Push
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER:** 2-inches
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION:** Not Surveyed
BOREHOLE STARTED: 9/9/2009	**WATER DEPTH/ DATE:** N/A
BOREHOLE FINISHED: 9/9/2009	**BOREHOLE USE:** Vapor Monitoring

NOTES:

Depth	Soil Symbol	Soil Description
		CL Cilty Clay - strong brown 7.5YR (5/8), plastic, slightly stiff.
		CL Silty Clay - strong brown 7.5YR (5/8), plastic, slightly stiff.
10		**CL** Silty Clay - strong brown 7.5YR (5/8), plastic, slightly stiff.
		CL Silty Clay - strong brown 7.5YR (5/8), plastic, slightly stiff.
		CL Silty Clay - strong brown 7.5YR (5/8), plastic, slightly stiff.
		CL Gravelly Clay - reddish brown 7.5YR (6/8), hard, gravel is subrounded
20		End of Log

Well Completion / **Well Description**



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PAGE: 1 of 1

FIELD BOREHOLE LOG

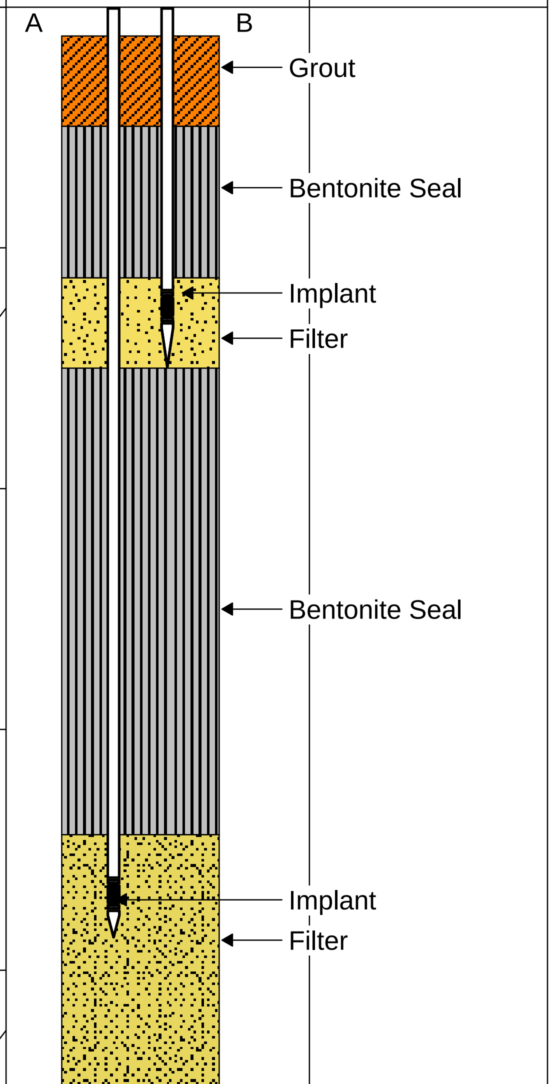
BOREHOLE NO.: ODVI-4
TOTAL DEPTH: 18

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Vapor Intrusion	DRILLING CO.: Boart Longyear
PROJECT NO.: 3200-064-01-06	DRILLER: T. Stanners
SITE LOCATION: 1764 Meadowhill	DRILLING METHOD/RIG: Direct Push
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 2-inches
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION: Not Surveyed
BOREHOLE STARTED: 9/10/2009	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 9/10/2009	BOREHOLE USE: Vapor Monitoring

NOTES:

Depth	Soil Symbol	Soil Description
		CL Silty Clay - light brown 7.5YR (6/4), medium plasticity, slightly stiff
		CL Silty Clay - light brown 7.5YR (6/4), medium plasticity, slightly stiff
		CL Silty clay - light brown 7.5YR (6/4), high plasticity, stiff
10		**CL** Silty clay - light brown 7.5YR (6/4), high plasticity, stiff
		CL Silty clay - light brown 7.5YR (6/4), high plasticity, stiff
		CL Silty clay - light brown 7.5YR (6/4), high plasticity, stiff
		CL Silty Clay - strong brown 7.5YR (5/8) with pinkish grey 7.5YR (7/2) mottles
20		End of Log

Well Completion / **Well Description**



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Checked By: J. Sperry

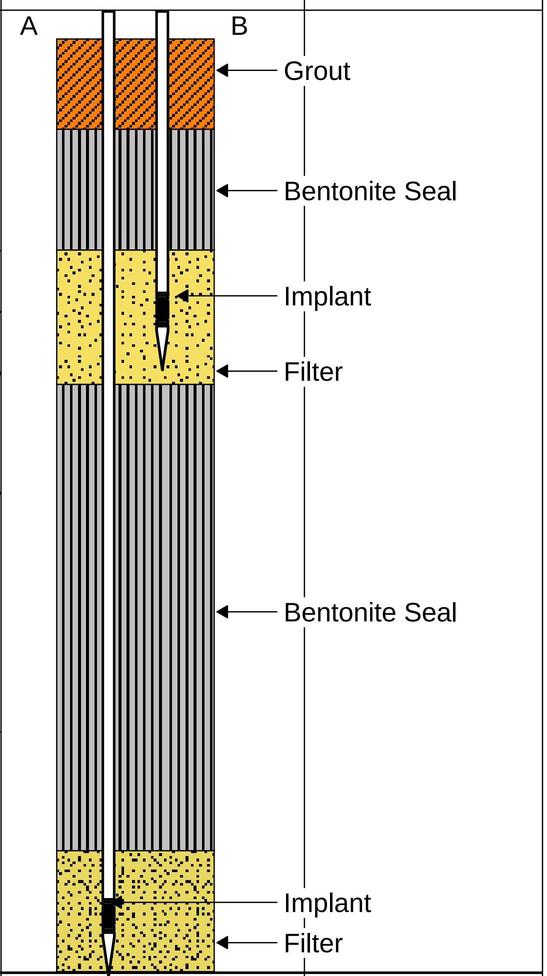
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-5
TOTAL DEPTH: 16

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Vapor Intrusion	**DRILLING CO.: Boart Longyear**
PROJECT NO.: 3200-064-01-06	**DRILLER: T. Stanners**
SITE LOCATION: 1764 Meadowhill	**DRILLING METHOD/RIG: Direct Push**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 2-inches**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION: Not Surveyed**
BOREHOLE STARTED: 9/10/2009	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 9/10/2009	**BOREHOLE USE: Vapor Monitoring**

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Hand augered. No recovery		Grout Bentonite Seal
		CL Silty Clay - brown 7.5YR (5/4), stiff, moderately plastic		Implant
		SP Sand - yellow 10YR (8/8), loose, placed in hole when installing pipe, man made.		Filter
		CL Silty Clay - brown 7.5YR (5/3), stiff, moderately plastic		
10		**CL** Silty Clay - light brown 7.5YR (6/4), stiff, low plasticity		Bentonite Seal
		CL Silty Clay - light brown 7.5YR (6/4), stiff, low plasticity		Implant Filter
		End of Log		
20				



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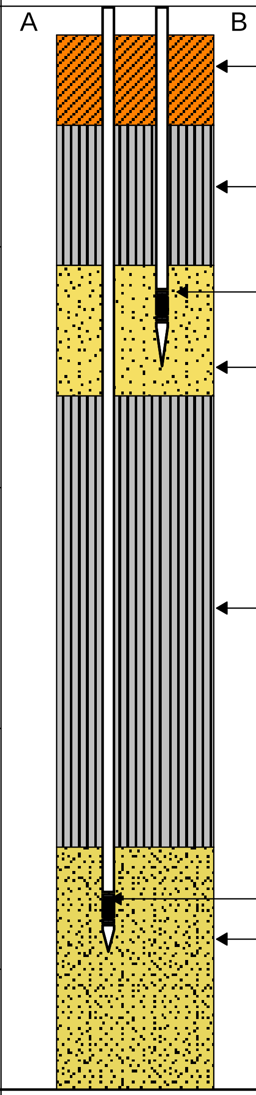
Checked By: J. Sperry

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-6
TOTAL DEPTH: 18

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Vapor Intrusion	**DRILLING CO.: Boart Longyear**
PROJECT NO.: 3200-064-01-06	**DRILLER: T. Stanners**
SITE LOCATION: 1739 Regan	**DRILLING METHOD/RIG: Direct Push**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 2-inches**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION: Not Surveyed**
BOREHOLE STARTED: 9/10/2009	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 9/10/2009	**BOREHOLE USE: Vapor Monitoring**

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		Hand augered. No recovery		Grout Bentonite Seal
		CL Silty Clay - brown 7.5YR (5/4), stiff and dry		Implant Filter
10		**CL** Silty Clay - brown 7.5YR (5/4), stiff and dry		Bentonite Seal
		CL Silty Clay - light brown, very dry		Implant Filter
		CL Silty Clay - light brown, very dry		
20		End of Log		

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Checked By: J. Sperry

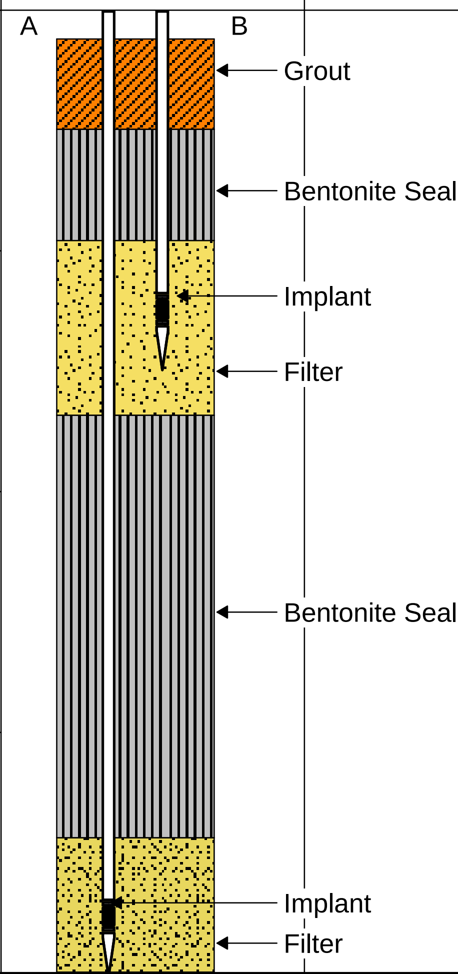
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-7
TOTAL DEPTH: 16

PROJECT INFORMATION	**DRILLING INFORMATION**
PROJECT: Vapor Intrusion	**DRILLING CO.: Boart Longyear**
PROJECT NO.: 3200-064-01-06	**DRILLER: T. Stanners**
SITE LOCATION: 1739 Regan	**DRILLING METHOD/RIG: Direct Push**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 2-inches**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION: Not Surveyed**
BOREHOLE STARTED: 9/10/2009	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 9/10/2009	**BOREHOLE USE: Vapor Monitoring**

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		Hand augered. No recovery		
		CL Silty Clay - strong brown 7.5YR (4/6), stiff, low plasticity		
10		**CL** Silty Clay - strong brown 7.5YR (4/6), stiff, low plasticity		
		CL Silty Clay - strong brown 7.5YR (4/6), stiff, low plasticity		
20		End of Log		



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Checked By: J. Sperry

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-8
TOTAL DEPTH: 16

PROJECT INFORMATION

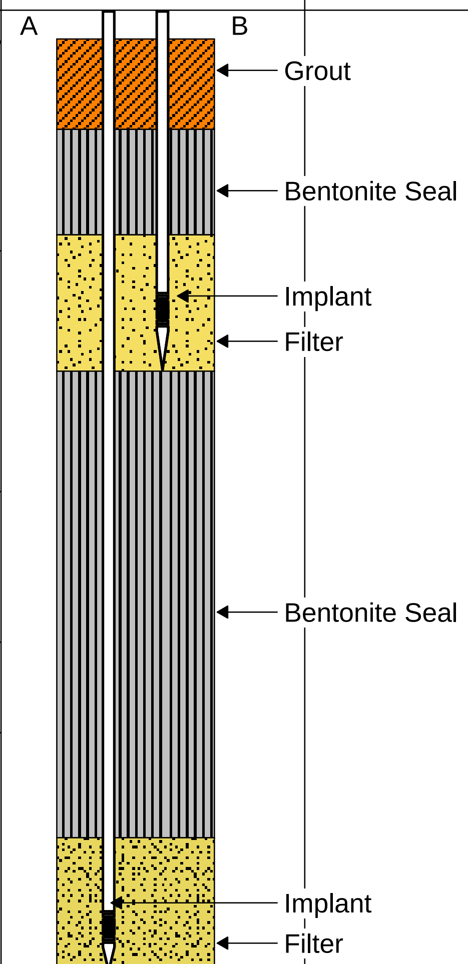
PROJECT: Vapor Intrusion
PROJECT NO.: 3200-064-01-06
SITE LOCATION: 1739 Regan
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Sperry
BOREHOLE STARTED: 9/10/2009
BOREHOLE FINISHED: 9/10/2009

DRILLING INFORMATION

DRILLING CO.: Boart Longyear
DRILLER: T. Stanners
DRILLING METHOD/RIG: Direct Push
BOREHOLE DIAMETER: 2-inches
GROUND SURFACE ELEVATION: Not Surveyed
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Vapor Monitoring

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		OL Silty Soil - dark brown 7.5YR (3/2), lots of organic material, soft, roots		
		CL Silty Clay - strong brown 7.5YR (4/6), stiff, moderately plastic		
		CL Silty Clay - strong brown 7.5YR (4/6), stiff, moderately plastic		
10		**CL** Silty Clay - strong brown 7.5YR (4/6), stiff, moderately plastic		
		CL Silty Clay - strong brown 7.5YR (4/6) quite stiff, high plasticity		
		CL Silty Clay - strong brown 7.5YR (4/6) quite stiff, high plasticity		
20		End of Log		



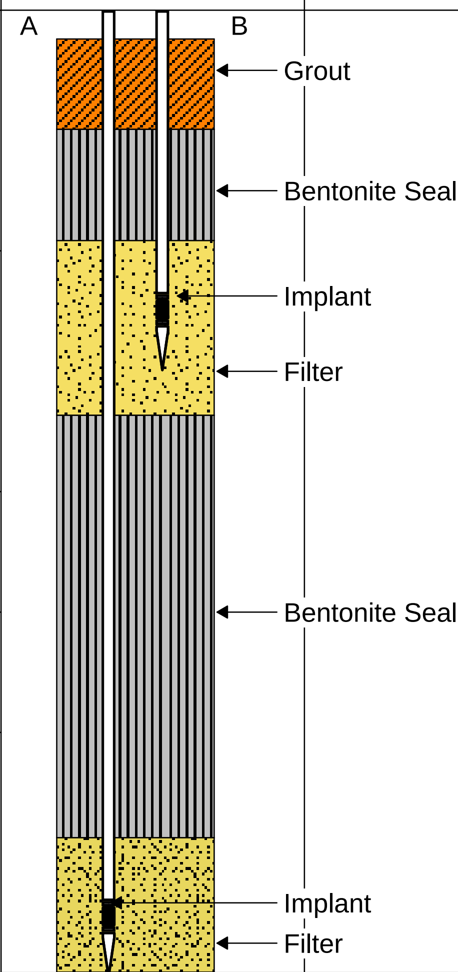
Created By: WTR
Checked By: J. Sperry

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVI-9
TOTAL DEPTH: 16

PROJECT INFORMATION	**DRILLING INFORMATION**
PROJECT: Vapor Intrusion	**DRILLING CO.: Boart Longyear**
PROJECT NO.: 3200-064-01-06	**DRILLER: T. Stanners**
SITE LOCATION: 1733 Regan	**DRILLING METHOD/RIG: Direct Push**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 2-inches**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION: Not Surveyed**
BOREHOLE STARTED: 9/10/2009	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 9/10/2009	**BOREHOLE USE: Vapor Monitoring**

NOTES:

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		Hand augered. No recovery		
		CL Silty Clay - brown 7.5YR (5/4), hard, slightly plastic		
		CL Silty Clay - brown 7.5YR (5/4), hard, slightly plastic		
10		**CL** Silty Clay - strong brown 7.5YR (5/8), stiff, slightly plastic		
		CL SiltyClay - strong brown 7.5YR (5/8), stiff, slightly plastic		
20		End of Log		

Created By: WTR
Checked By: J. Sperry

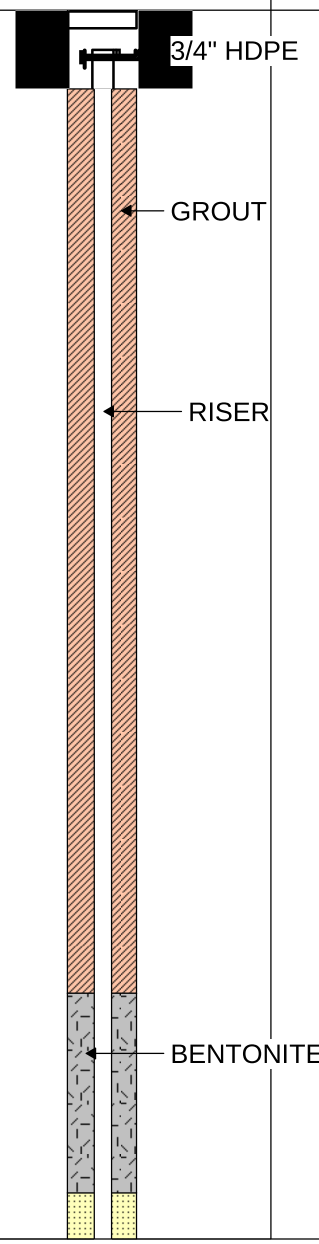
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-1
TOTAL DEPTH: 65.4

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: C. Rockhill
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION (FT MSL): 284.85
BOREHOLE STARTED: 8/4/2009 09:00	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 8/4/2009 14:45	BOREHOLE USE: Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
0–15		**CL** Silty clay - brown 7.5 YR (5/4) low plasticity,soft.		
10				
15–25		**CL** Silty clay - brown 7.5YR (5/4) low plasticity, soft, trace subangular gravel.		
20				
25–29		**CL** Gravelly clay - brown 7.5YR (5/8) stiff with subangular chert, trace sand.		
30				



Created By: WTR

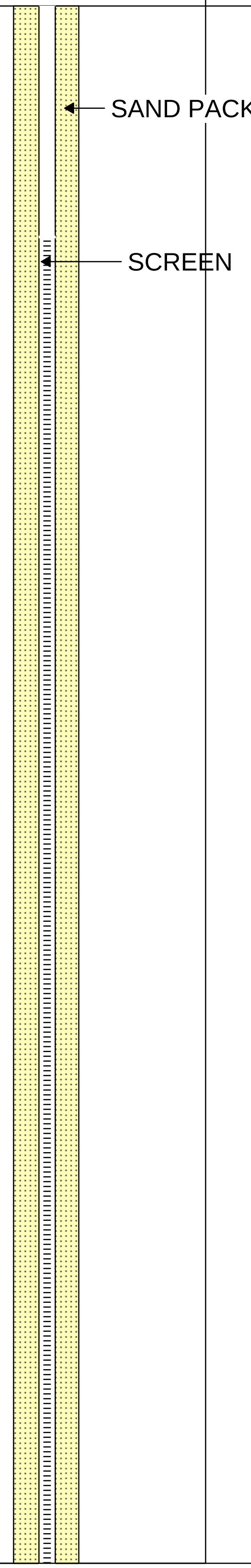
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-1

TOTAL DEPTH: 65.4

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - red 2.5YR 5/8 low plasticity trace gravel.		
		CL Gravelly clay - brown 7.5YR (5/3) gravel is subangular chert.		
40		**SW** Sand - light red 2.5YR (6/8) fine to medium grained.		
50		**SW** Sand - yellow 10YR (5/8) fine to medium grained sand with trace gravel.		
		SC Clayey sand - brown 7.5YR (8/3) stiff formation with trace gravel.		
60				



FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-1

TOTAL DEPTH: 65.4

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - very pale brown 10YR (7/4) fine grained.	END CAP	
70		End of Log		
80				
90				

Created By: WTR

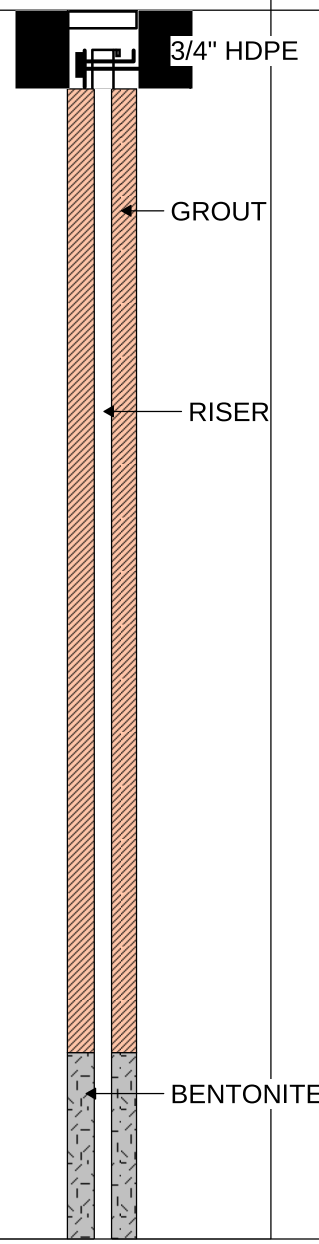
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-2
TOTAL DEPTH: 67

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: C. Rockhill**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION (FT MSL): 286.18**
BOREHOLE STARTED: 7/10/2009 07:00	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 7/10/2009 14:55	**BOREHOLE USE: Soil Vapor Extraction**

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Silty clay - brown 7.5YR (5/4) low plasticity.		
10		**CL** Silty clay - brown 7.5YR (5/4) low plasticity, stiff.		
20		**CL** Silty clay with trace sand - strong brown 7.5YR (5/8) medium plasticity, very stiff.		
		CL Silty clay with trace sand - strong brown 7.5YR (5/8) medium plasticity, very stiff.		
30		**CL** Sandy clay with trace gravel - red 10R (4/8).		

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Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-2

TOTAL DEPTH: 67

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand with trace gravel - reddish yellow 7.5YR (6/6) medium grained.	SAND PACK	
		SW Sand - light red 10R (6/8) medium to fine grained.	SCREEN	
40				
		SW Sand - reddish yellow 7.5YR (5/8) fined grained.		
		SW Sand - yellowish red 5YR (6/8) medium to coarse grained.		
50				
		SW Sand with trace gravel - reddish yellow 7.5YR (6/6) fine to medium grained.		
60				

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FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-2

TOTAL DEPTH: 67

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand with trace gravel - reddish yellow 7.5YR (6/6) fine to medium grained.	END CAP	
		End of Log		
70				
80				
90				

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Checked By: JBS

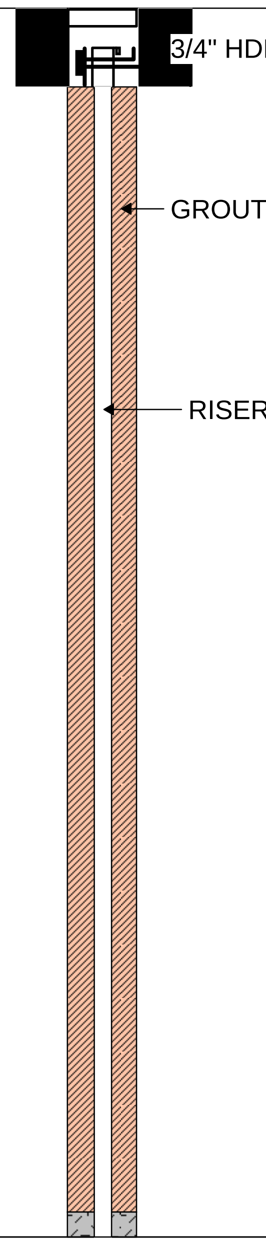
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-3
TOTAL DEPTH: 72.5

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: R. Knight**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION (FT MSL): 289.46**
BOREHOLE STARTED: 7/28/2009 08:00	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 7/28/2009	**BOREHOLE USE: Soil Vapor Extraction**

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
0		**CL** Silty Clay - 7.5YR (5/6) low plasticity, medium stiffness.		
10		**CL** Silty Clay - 7.5YR (5/4) moist, slightly stiff, medium plasticity.		
20		**CL** Clay - strong brown 7.5YR (5/4) moist, plastic, with trace sand.		
30				



Created By: WTR

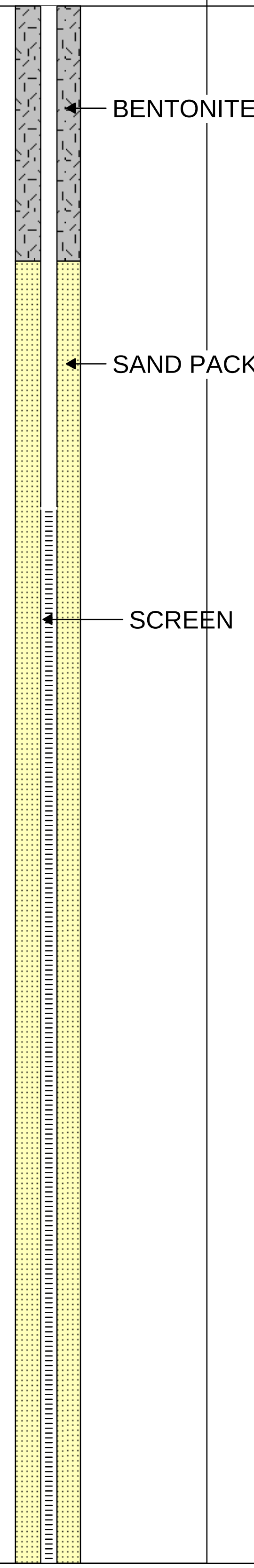
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-3

TOTAL DEPTH: 72.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Clayey gravelly sand - red 2.5YR (5/8) very fine grained with subangular gravel.		
		SW Sand - light red 2.5YR (6/8) fine grained, loosely packed.		
40		**SW** Sand with gravel - red 10R (5/8) fine to medium grained with subangular gravel.		
50				
		SW Sand with trace gravel - yellow 10YR (7/6) fine to medium grained.		
60				



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-3

TOTAL DEPTH: 72.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Gravelly sand - reddish yellow 5YR (6/8) fine grained with subanular gravel.		
		SW Sand - yellow 10YR (7/8) fine to medium grained.	END CAP	
70		**SW** Sand - yellow 10YR (7/8) fine to medium grained, with trace subangular gravel.		
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

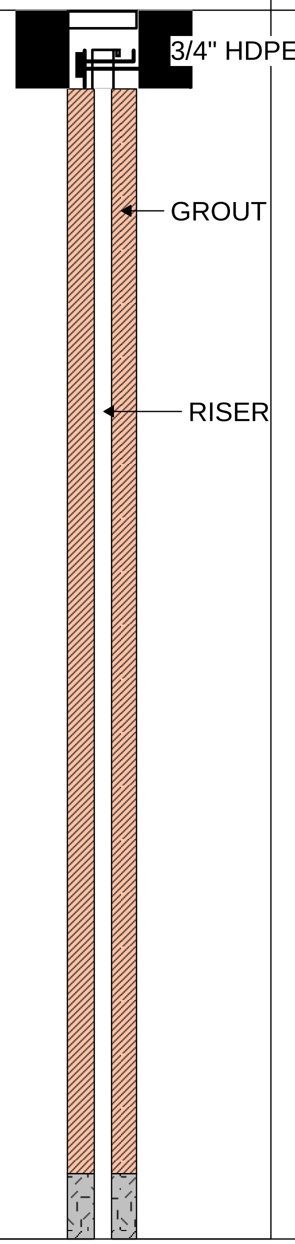
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-4
TOTAL DEPTH: 72

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: T. Minor
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION (FT MSL): 290.64
BOREHOLE STARTED: 8/19/2009 07:30	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 8/19/2009 13:00	BOREHOLE USE: Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		No Recovery Vacuumed Drilled for safety		
10	CL	**CL** Clay - strong brown 7.5YR (4/6) medium plasticity, moist.		
	CL	**CL** Clay - strong brown 7.5YR (4/6) medium plasticity, moist.		
20	CL	**CL** Clay - brown 7.5YR (5/4) low plasticity, slightly moist, hard.		
30	CL	**CL** Clay - brown 7.5YR (5/4) low plasticity, slightly moist, hard.		



Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-4

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - light red 2.5YR (6/6) hard, moist with subangular trace gravel.	BENTONITE	
		CL Sandy clay - light red 2.5YR (6/6) hard, moist with subangular trace gravel.	SAND PACK	
40		**SP** Sand - red 10R (4/8) medium grained, well sorted.		
		SP Sand - red 10R (4/8) medium grained, well sorted.	SCREEN	
50		**SP** Sand - light red 10R (6/8) medium to fine grained with subangular gravel.		
60		**SP** Sand - light red 10R (6/8) medium to fine grained with subangular gravel.		

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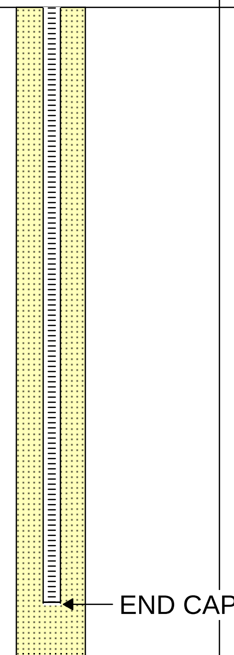
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-4

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - yellow 10YR (7/8) fine to medium grained, poorly sorted.		
70				
		End of Log		
80				
90				



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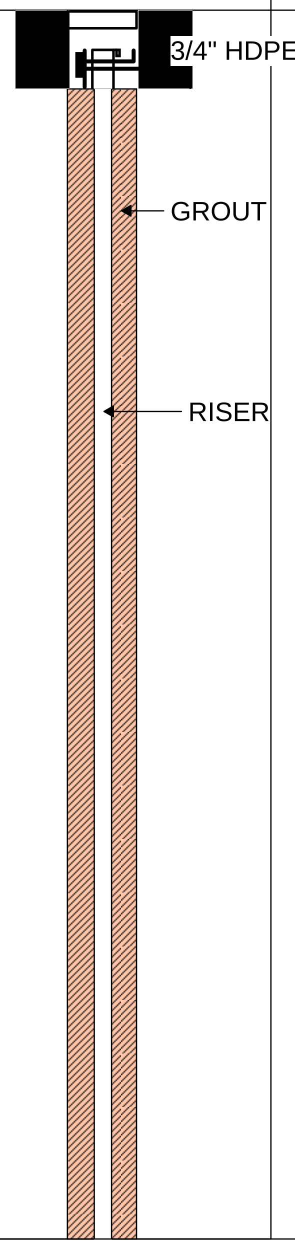
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-5
TOTAL DEPTH: 72

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: T. Minor
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION (FT MSL): 291.68
BOREHOLE STARTED: 8/21/2009 12:35	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 8/21/2009 15:00	BOREHOLE USE: Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		No Recovery		
10		**CL** Silty clay - strong brown 7.5YR (4/6) hard, low plasticity.		
		CL Silty clay - strong brown 7.5YR (4/6) hard, low plasticity with light bluish grey (Gley 2 7/5PB) mottles.		
20		**CL** Clay - brown 7.5YR (5/4) medium plasticity, stiff.		
30				

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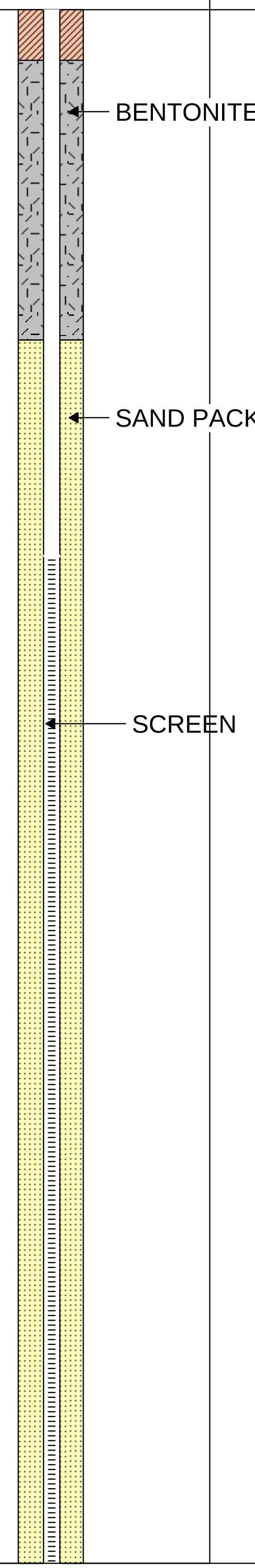
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-5

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - red 3.5YR (4/8) medium grained with trace subrounded gravel.		
40		**CL** Sandy clay - red 3.5YR (4/8) medium grained with trace subrounded gravel.		
		SC Clayey sand - red 2.5YR (5/8) medium grained.		
		SC Clayey sand - red 2.5YR (5/8) medium grained.		
50		**SM** Silty sand - reddish yellow 7.5YR (6/8) trace subrounded gravel, very hard.		
60		**SM** Silty sand - reddish yellow 7.5YR (6/8) trace subrounded gravel, very hard.		



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-5
TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - yellow 2.5YR (7/8) fine grained.		
70		**SW** Sand - light red 2.5YR (6/8) fine grained.	END CAP	
		End of Log		
80				
90				

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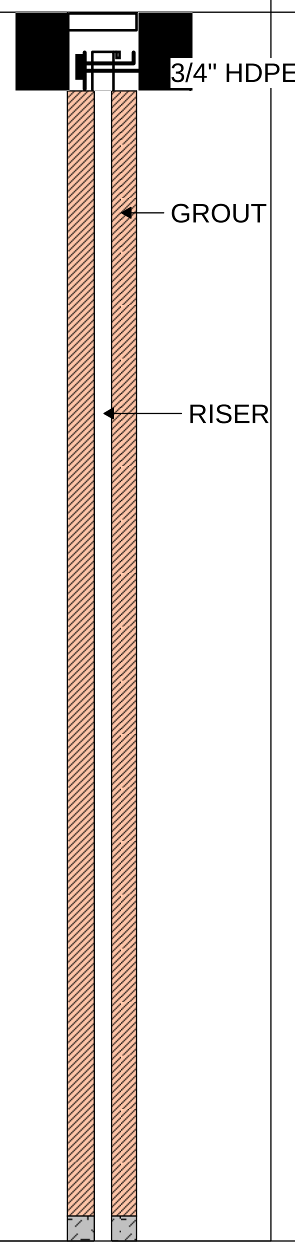
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-6
TOTAL DEPTH: 72

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: R. Knight**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: S. Gillet	**GROUND SURFACE ELEVATION (FT MSL): 292.96**
BOREHOLE STARTED: 8/19/2009 07:30	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 8/19/2009 11:44	**BOREHOLE USE: Soil Vapor Extraction**

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Silty clay - dark yellowish brown 10YR (4/6), moist, low plasticity.		
10		**CL** Silty clay - dark yellowish brown 10YR (4/4), moist, low plasticity.		
20		**CL** Silty clay - yellowish brown 10YR (5/4), with strong brown 7.5YR (5/8) mottles, moist , low plasticity.		
		CL Silty clay - yellowish brown 10YR (5/4), trace coarse sand, moist, low plasticity.		
30				

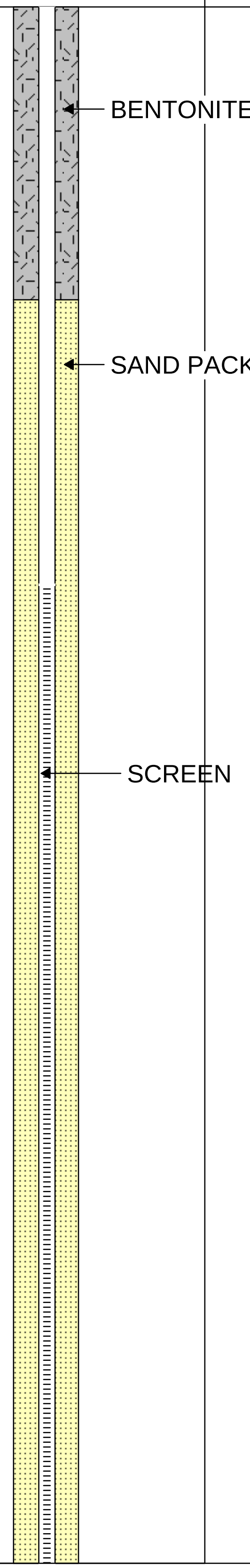
![HDR]

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-6

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - yellowish brown 10YR (5/4), with red 2.5YR (5/8) mottles, sand is fine grained, moist, low plasticity.		
		SW Gravelly sand - yellowish red 5YR (5/6), gravel is fine to medium, sand is fine to coarse, moist, loose.		
		SP Sand - red 2.5YR (5/8), moist, loose, fine grained.		
		SW Gravelly sand - yellowish red 5YE (5/6), gravel and sand is fine to medium, moist, loose.		
40		**SP** Sand - yellowish red 5YR (5/8), fine to medium grained, moist, loose.		
		SW Gravelly sand - yellowish red 5YR (5/6), gravel is fine to coarse, sand is fine to medium, moist, loose.		
		SP Sand - reddish yellow 7.5YR (6/8) medium grained with trace of medium gravel, moist, loose.		
50		**SP** Sand - reddish yellow 7.5YR (6/8), medium grained with some medium gravel, moist, loose.		
60				



Created By: WTR

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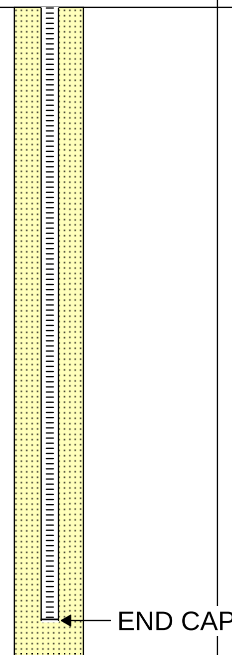
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-6

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
70		**SP** Sand - very pale brown 10YR (8/3), medium grained with trace of gravel, dry, loose.		
80		End of Log		
90				

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Checked By: JBS

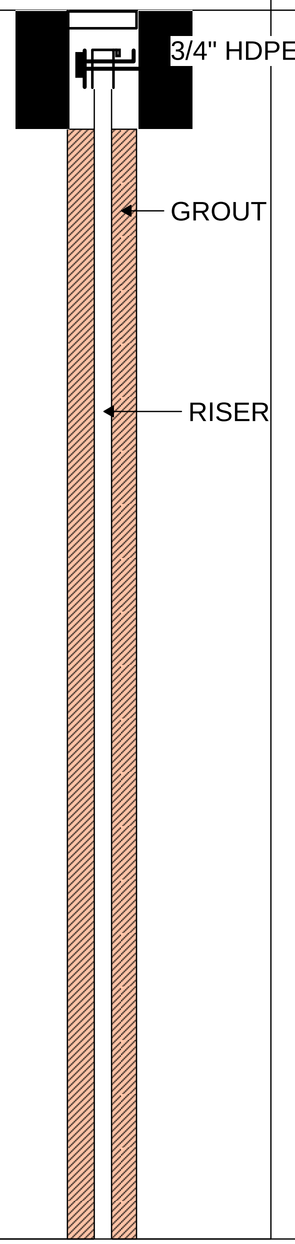
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-7
TOTAL DEPTH: 72.5

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: R. Knight**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: S. Gillet	**GROUND SURFACE ELEVATION (FT MSL): 292.55**
BOREHOLE STARTED: 8/24/2009 12:30	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 8/24/2009 15:37	**BOREHOLE USE: Soil Vapor Extraction**

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Silty clay - dark yellowish brown 10YR (4/6) moist, low plasticity.		
10		**CL** Silty clay - dark yellowish brown 10YR (4/6) with grayish brown 10YR (5/2) mottles, moist, low plasticity.		
20		**CL** Silty clay - yellowish brown 10YR (5/4) with yellowish red 5YR (5/8) and dark grayish brown 10YR (4/2) mottles, moist, low plasticity.		
30				



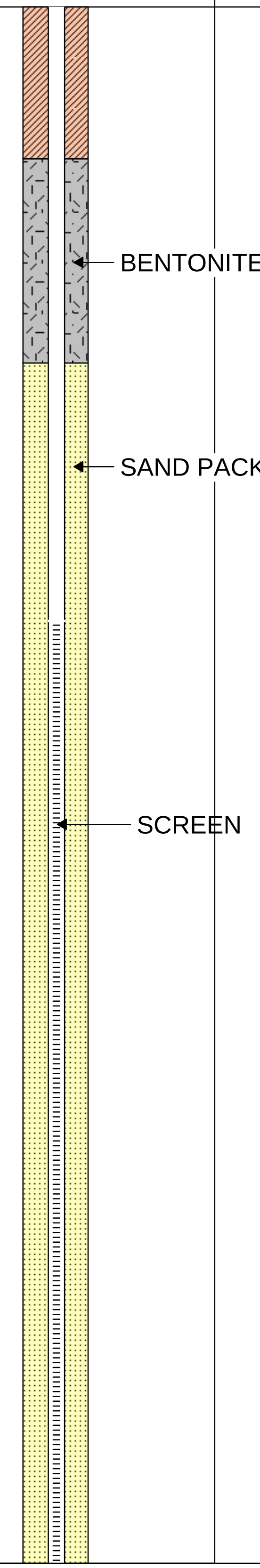
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-7

TOTAL DEPTH: 72.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - yellowish brown (5/6) low plasticity, moist.		
40		**SP** Sand - yellowish red 5YR (5/8) fine to medium with some coarse gravel.		
50		**SW** Gravelly sand - strong brown 7.5YR (5/8) fine to coarse, loose, moist.		
		SP Sand with some gravel - brownish yellow 10YR (6/8) coarse grained sand, moist, loose.		
60		**SW** Sand with some gravel - brownish yellow 10YR (6/6) fine to coarse grained sand, fine grained gravel, loose, moist.		



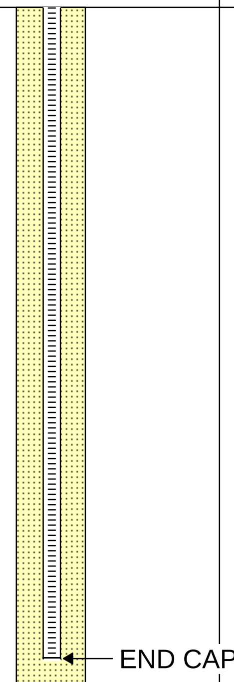
Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-7

TOTAL DEPTH: 72.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
				
70		**SP** Sand - yellow 10YR (7/6) loose, moist, fine grained with some coarse gravel.		
		End of Log		
80				
90				

Created By: WTR

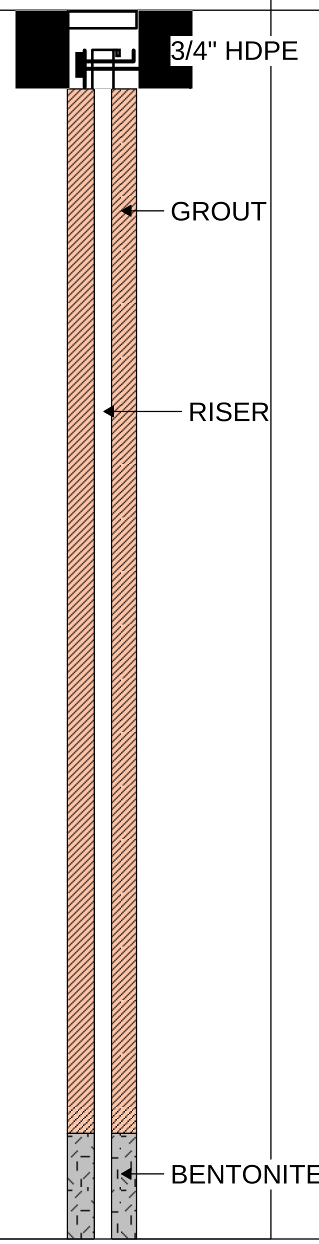
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-8
TOTAL DEPTH: 72

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.:** WDC
PROJECT NO.: 121716	**DRILLER:** T. Minor
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG:** Sonic
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER:** 6-in.
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION (FT MSL):** 292.2
BOREHOLE STARTED: 8/25/2009 06:30	**WATER DEPTH/ DATE:** N/A
BOREHOLE FINISHED: 8/25/2009 10:30	**BOREHOLE USE:** Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Silty clay - yellowish brown 10YR (5/8) low plasticity, soft.		
10				
20				
		CL Clay - yellowish brown 10YR (5/6) with light gray 10YR (7/2) mottles, medium plasticity, stiff.		
		CL Sandy clay - light yellowish brown 10YR (6/4) soft, medium plasticity.		
30				

Created By: WTR

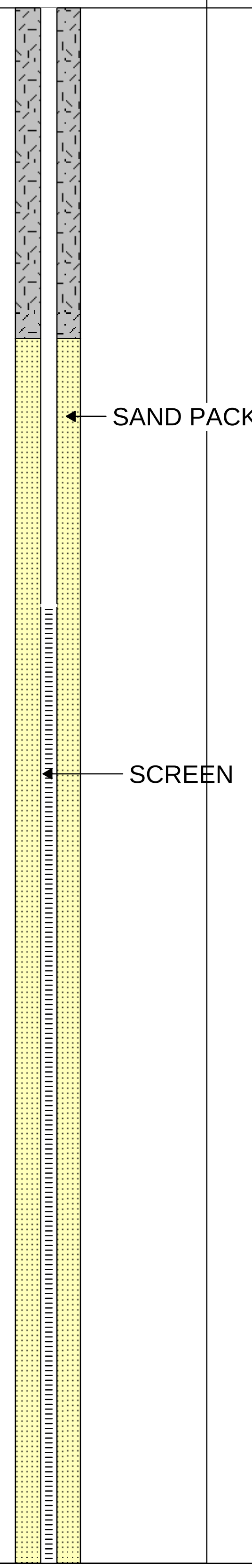
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-8

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SC Clayey sand - red 2.5YR (4/8) hard with low plasticity, trace subrounded gravel.		
40		**SC** Clayey sand - red 2.5YR (5/8) medium to fine grained, hard.		
50		**SW** Sand - reddish yellow 7.5YR (7/8) fine to medium grained.		
60				



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-8

TOTAL DEPTH: 72

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - reddish yellow 7.5YR (7/8) fine to medium grained.		
70			END CAP	
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-9
TOTAL DEPTH: 74.5

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: R. Knight
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION (FT MSL): 294.12
BOREHOLE STARTED: 8/28/2009 14:00	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 8/28/2009 16:30	BOREHOLE USE: Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		Hand augered. No recovery	3/4" HDPE	
		CL Silty clay - brown 7.5YR (5/4) soft, low plasticity.	GROUT	
10			RISER	
		CL Silty clay - brown 7.5YR (5/4) with light grey 7.5YR (7/1) mottles, low plasticity.		
		CL Silty clay - brown 7.5YR (5/4) soft with medium plasticity.		
20		**CL** Silty clay - light brown 7.5YR (6/3) slightly stiff, low plasticity.		
30				

Created By: WTR

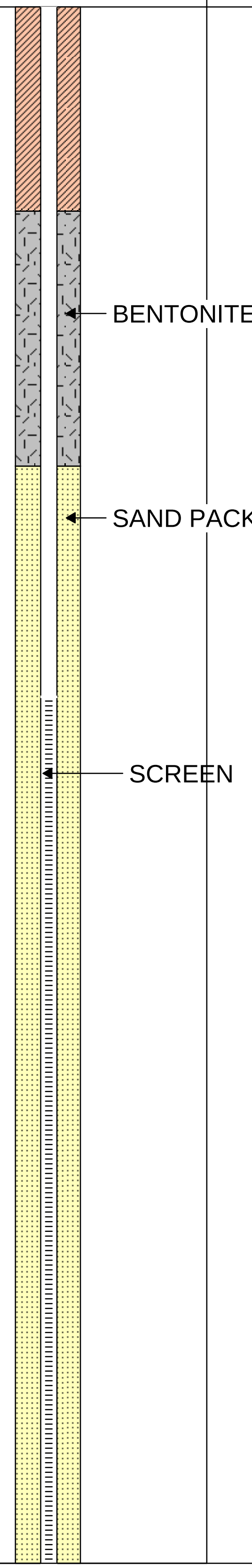
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-9

TOTAL DEPTH: 74.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - light brown 7.5YR (6/3) slightly stiff, sand is medium to fine grained.		
		SC Clayey sand - red 10R (4/8) trace gravel, soft, sand is fine to medium grained.		
40		**SP** Sand - reddish yellow 5YR (6/8), fine to medium grained, soft, with trace gravel.		
50		**SP** Sand - reddish yellow 7.5YR (7/6), soft, fine to medium grained.		
60				



FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-9

TOTAL DEPTH: 74.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
70		**SP** Sand - yellow 10YR (7/6), fine to medium grained with trace subrounded gravel.	END CAP	
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

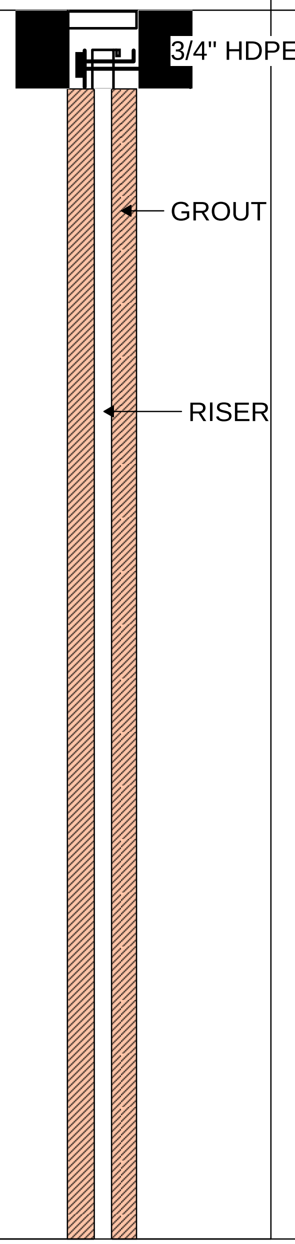
HDR

BOREHOLE NO.: ODSVE-10
TOTAL DEPTH: 74

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: R. Knight
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Ruffing	GROUND SURFACE ELEVATION (FT MSL): 294.3
BOREHOLE STARTED: 8/7/2009 15:45	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 8/8/2009 08:30	BOREHOLE USE: Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
0–9		**CL** Silty clay - dark yellow brown 10YR (4/6) with grey brown 10YR (5/2) mottling, soft, dry, low to medium plasticity.		
9–15 (10)		**CL** Silty clay - dark yellow brown 10YR (4/6) with grey brown 10YR (5/2) mottling, soft, moist, low to medium plasticity.		
15–30 (20, 30)		**CL** Silty clay - dark yellow brown 10YR (4/6) with grey brown 10YR (5/2) mottling, low to medium plasticity, medium stiff, soft, moist.		

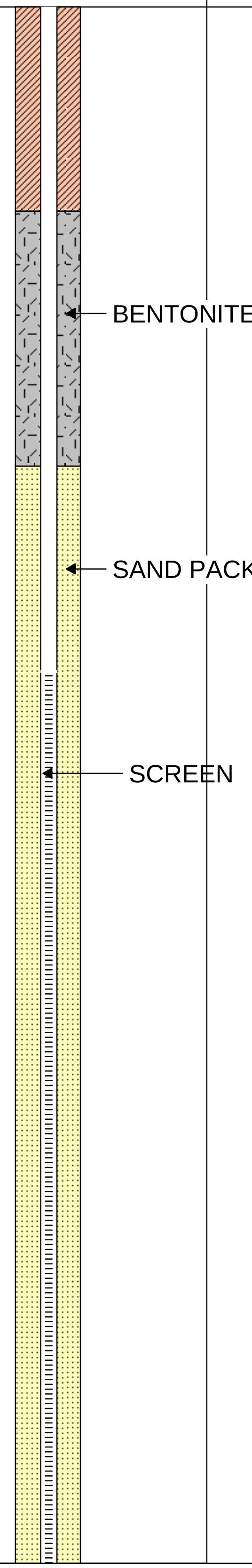


FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-10

TOTAL DEPTH: 74

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		GC Gravelly sandy clay - dark yellow brown 10YR (4/6) with red brown and grey brown, fine to medium grained sand, fine gravel, soft, medium to low plasticity, subrounded to subangular sand, subround gravel, moist, well graded.		
40		**SW** Clayey gravelly sand - weak red 7.5YR (4/4) fine to medium grained sand, fine to coarse gravel, loose, subrounded to subangular sand, subrounded gravel, moist, well graded.		
		SP Sand - 7.5YR (4/4) fine grained, loose, sub-rounded, poorly graded, moist.		
		SW Clayey gravelly sand - weak red 7.5YR (4/4) fine to medium grained sand, fine to coarse gravel, very loose, subrounded to sub angular sand, subround gravel, moist, well graded.		
50		**SW** Gravelly sand - olive yellow 2.5YR (6/6) fine grained sand and gravel, both subrounded, moderately graded, very loose, moist.		
		SP Sand - 2.5Y (6/6) fine grained, poor grading, subrounded, dry to moist.		
60		**SW** Gravelly sand - 2.5Y (6/6) fine grained sand, fine to coarse grained gravel, subrounded, very loose.		



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-10

TOTAL DEPTH: 74

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
70				
		SW Gravelly sand - 2.5Y (6/6) fine grained sand, fine to coarse grained gravel, subrounded, very loose, trace silt and clay.	END CAP	
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

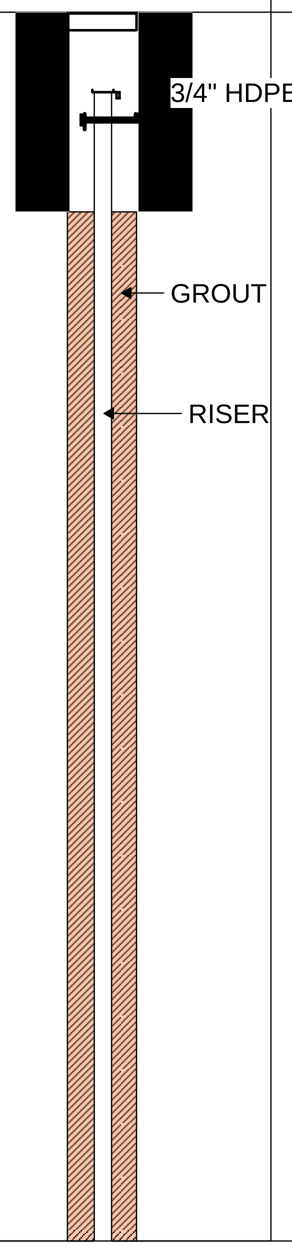
FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-11
TOTAL DEPTH: 76

PROJECT INFORMATION	**DRILLING INFORMATION**
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: R. Knight**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: S. Gillet	**GROUND SURFACE ELEVATION (FT MSL): 294.91**
BOREHOLE STARTED: 7/13/2009 07:50	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 7/13/2009 15:31	**BOREHOLE USE: Soil Vapor Extraction**

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		Topsoil		
		ML Clayey silt - dark yellowish brown 10YR (4/6) moist, low plasticity.		
		ML Clayey silt - dark yellowish brown 10YR (4/6) with 10YR (5/2) grayish brown laminations, moist, low plasticity.		
10				
20				
		ML Clayey silt - yellowish brown 10YR (5/6) moist, low plasticity, trace of coarse sand.		
30				



Created By: WTR

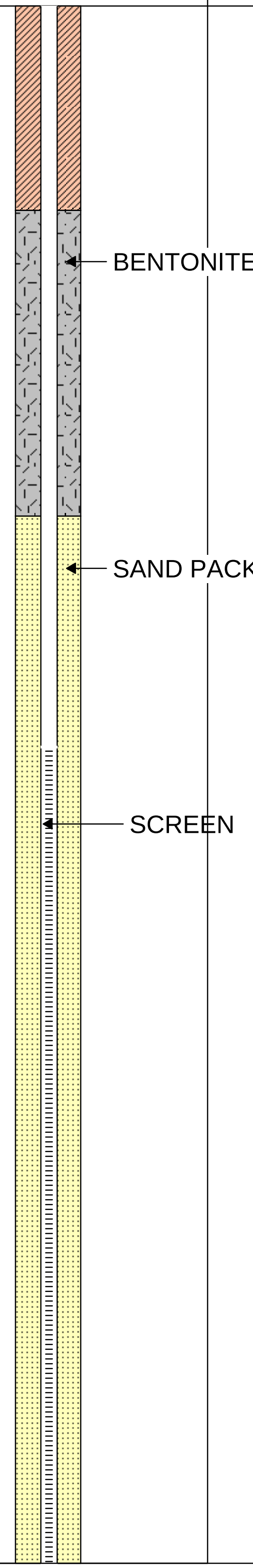
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-11

TOTAL DEPTH: 76

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
40		**SW** Sand with some fine gravel - reddish yellow 7.5YR (6/8) fine to medium grained, loose, moist.		
		SW Sand with trace of gravel - yellow 10YR (7/6) medium to coarse grained.		
50				
		SW Sand with some gravel - brownish yellow 10YR (6/6) medium to coarse grained, moist, loose.		
60		**SP** Sand with trace of gravel - yellow 10YR (7/6) fine to medium grained, moist, loose.		



Created By: WTR

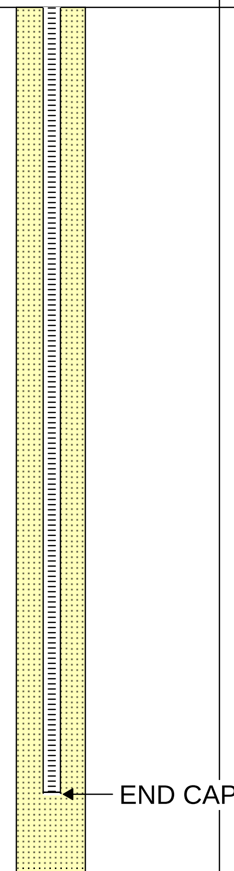
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-11

TOTAL DEPTH: 76

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SP Sand - yellow 10YR (7/8) fine grained with some medium, moist, loose.		
		SP Sand with some fine gravel - yellowish red 5YR (5/8) coarse grained, moist, loose.		
70		**SP** Sand with trace of gravel - yellow 10YR (8/6) fine grained, moist, loose.		
		End of Log		
80				
90				



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-12
TOTAL DEPTH: 74

PROJECT INFORMATION

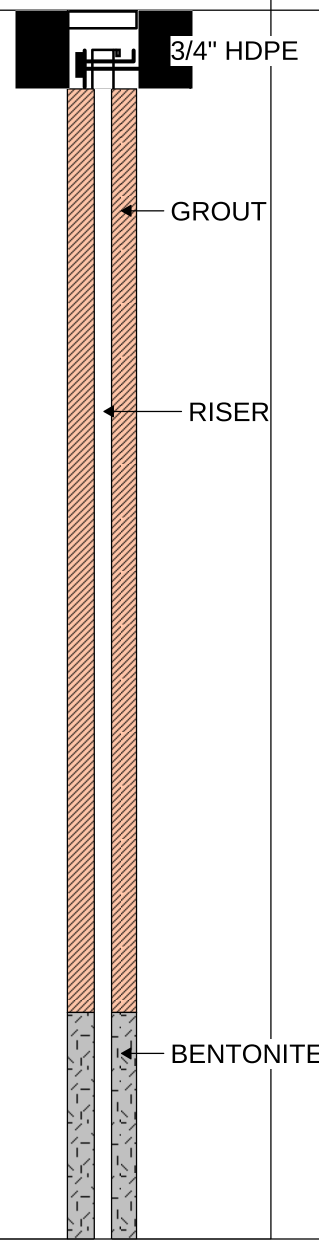
PROJECT: Off Depot RA
PROJECT NO.: 121716
SITE LOCATION: West of Dunn Field
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Ruffing
BOREHOLE STARTED: 8/5/2009 09:00
BOREHOLE FINISHED: 8/5/2009 17:00

DRILLING INFORMATION

DRILLING CO.: WDC
DRILLER: R. Knight
DRILLING METHOD/RIG: Sonic
BOREHOLE DIAMETER: 6-in.
GROUND SURFACE ELEVATION (FT MSL): 294.73
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Soil Vapor Extraction

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access. See well installation diagram.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Clay with trace silt - grey brown 2.5YR (5/2) medium plasticity, stiff to very stiff, moist.		
10		**CL** Clay with trace silt - dark yellow brown 10YR (4/4) medium plasticity, stiff, moist.		
20		**CL** Clay with trace silt - grey brown 2.5YR (5/2) with dark yellow brown 10YR (4/6) mottling, medium plasticity, stiff, moist.		
		CL Clay with trace silt - 10YR (4/6) with 10YR (4/4) mottling, medium plasticity, stiff, moist.		
30		**CL** Sandy silty clay - 10YR (4/6) medium plasticity, medium stiff to stiff, dry to moist.		



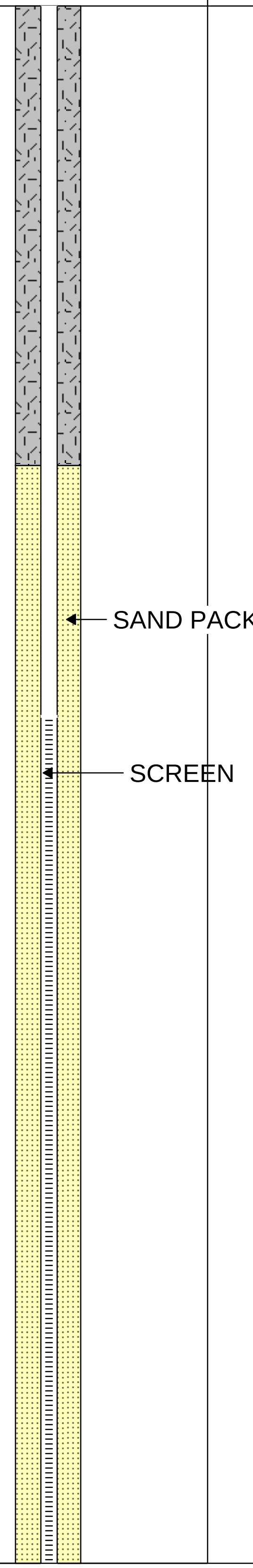
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-12

TOTAL DEPTH: 74

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SC Clayey sand - red brown 5YR (4/4), low plasticity, fine to medium grained, moderately graded, dense, dry.		
40		**SW** Gravelly sand - red brown 5YR (4/4) with bright orange hue, fine to medium grained, well graded, loose, dry.		
		SW Gravelly sand yellow brown 10YR (5/6), fine to medium grained, well graded, loose, dry.		
50				
		SW Gravelly sand - 10YR (5/6), with grey brown 2.5Y (5/2) mottling, fine to medium grained, well graded, loose, dry.		
60				



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODSVE-12

TOTAL DEPTH: 74

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SP Sand - red brown 5YR (4/4), medium grained, poorly graded, loose, moist.		
70		**SP** Yellow brown 10YR (5/6) fine grained sand, fine to coarse gravel, loose, dry.	END CAP	
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-01
TOTAL DEPTH: 74

PROJECT INFORMATION

PROJECT: Off Depot RA
PROJECT NO.: 121716
SITE LOCATION: West of Dunn Field
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Sperry
BOREHOLE STARTED: 6/25/2009 10:50
BOREHOLE FINISHED: 6/25/2009 14:10

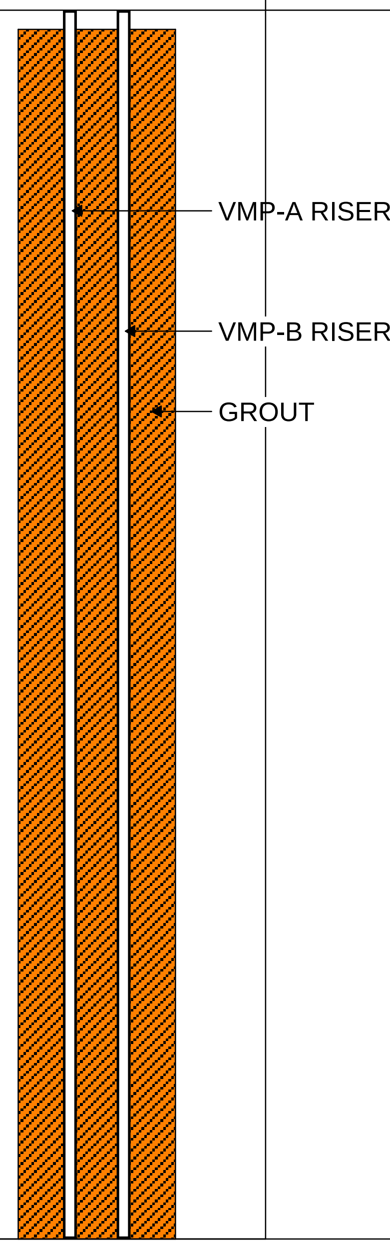
DRILLING INFORMATION

DRILLING CO.: WDC
DRILLER: C. Rockhill
DRILLING METHOD/RIG: Sonic
BOREHOLE DIAMETER: 6-in.
GROUND SURFACE ELEVATION (FT MSL): 295.71
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description
		ML Clayey silt - light grey (5YR 7/1) soil, organic material.
10		**ML** Clayey silt - light grey (5YR 7/1).
		CL Silty clay - light brown (7.5YR 6/4), low plasticity, Iron oxide staining.
20		**CH** Clay - reddish grey (10R 6/1), high plasticity, Iron oxide staining.
30		**CL** Silty clay - reddish yellow (7.5YR 6/6) with trace sand.

Well Completion | **Well Description**



Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-01

TOTAL DEPTH: 74

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SC Clayey sand - red (10R 5/8) medium grained, light grey (10R 7/1) mottles throughout.		
		SC Clayey sand - red (10R 5/8) medium grained with trace gravel.		
40		**SW** Sand - red (10R 5/8) medium to fine grained sand with trace gravel.		
		SW Sand - reddish yellow (5YR 6/8) fine to medium grained sand with trace gravel.		
		SW Sand - reddish yellow (7.5YR 7/8) fine grained sand with trace gravel.		BENTONITE
50				SAND PACK
		SW Sand - light brown (7.5YR 6/3) coarse grained sand, sand wet due to drilling water.		SCREEN INTERVAL
60				

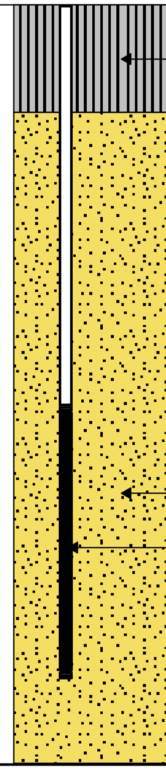
Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-01

TOTAL DEPTH: 74

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - light brown (7.5YR 6/4) fine to medium grained sand with trace gravel.		BENTONITE
70				SAND PACK SCREEN INTERVAL
		ML Rock flour - pink (7.5YR 8/3) very fine, possible rock flour, could be from a silt or mudstone.		
		SW Sand - strong brown (7.5YR 6/8) medium to coarse grained sand.		
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-02
TOTAL DEPTH: 71.6

PROJECT INFORMATION

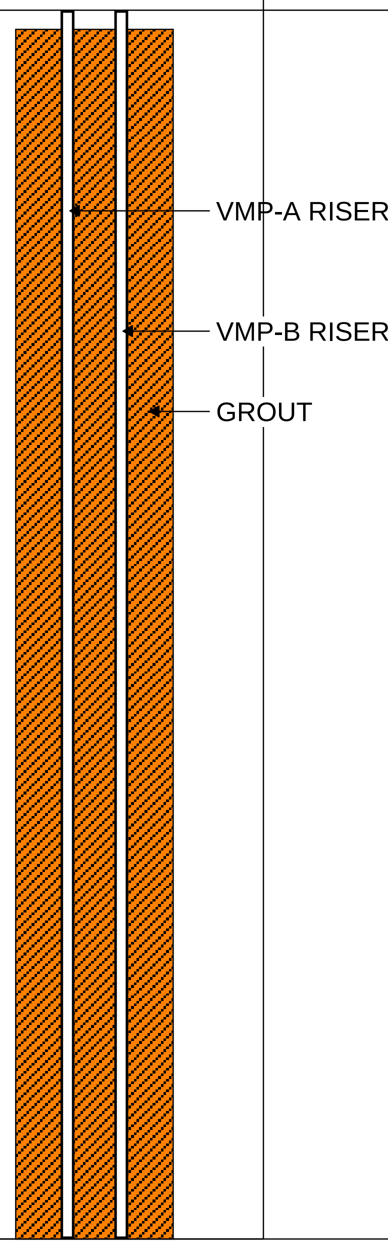
PROJECT: Off Depot RA
PROJECT NO.: 121716
SITE LOCATION: West of Dunn Field
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Sperry
BOREHOLE STARTED: 6/26/2009 07:15
BOREHOLE FINISHED: 6/26/2009 14:30

DRILLING INFORMATION

DRILLING CO.: WDC
DRILLER: C. Rockhill
DRILLING METHOD/RIG: Sonic
BOREHOLE DIAMETER: 6-in.
GROUND SURFACE ELEVATION (FT MSL): 294.15
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Silty clay - brown (7.5YR 4/4) some oxidized nodules.		
		CL Silty clay - strong brown (7.5YR 5/6) some light colored mottles.		
10				
		CL Silty clay - brown (7.5YR 5/4).		
20				
30				



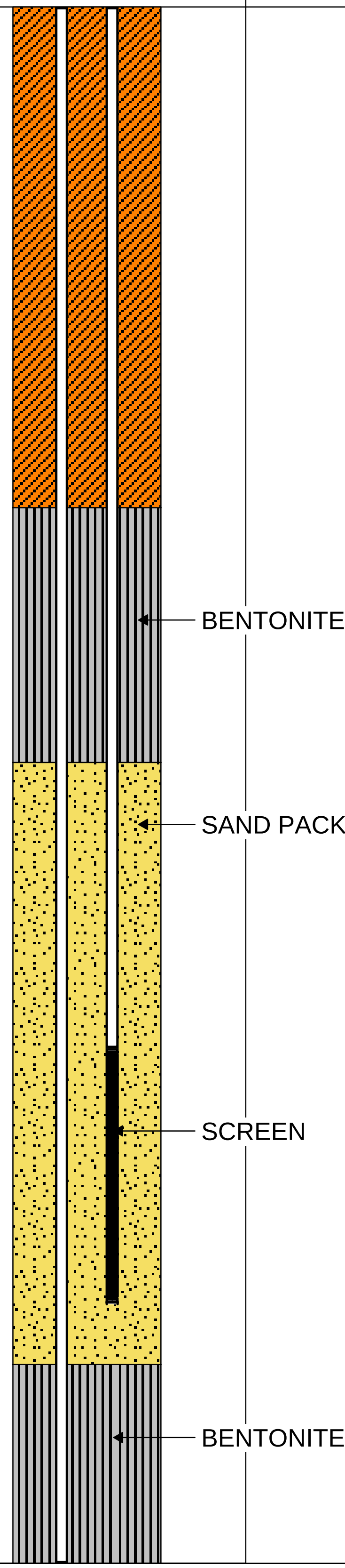
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-02

TOTAL DEPTH: 71.6

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - brown (7.5YR 5/4) sand grains are fine.		
		SC Clayey sand - red (2.5YR 5/6) with trace gravel.		
40		**SW** Sand - red (2.5YR 5/8) fine to medium grained sand.		
50		**SW** Sand - pink (5YR 8/4) medium to coarse grained sand with trace gravel.		
		SW Sand - reddish yellow (7.5YR 7/6) medium to coarse grained sand with trace gravel.		
60		**SW** Sand - reddish yellow (7.5YR 7/8) fine to medium grained sand with trace gravel.		



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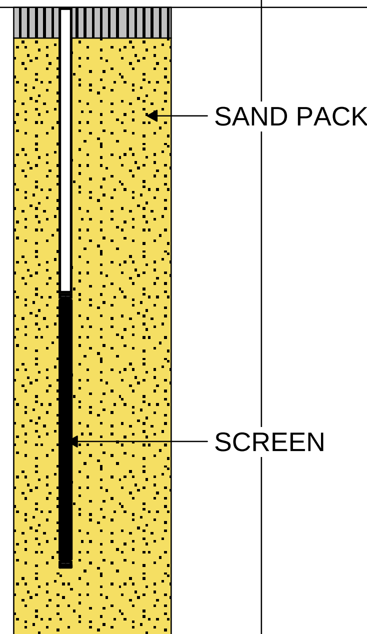
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-02

TOTAL DEPTH: 71.6

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		ML Rock flour - pinkish grey (5YR 7/2) rock flour from a possible siltstone or mudstone.		
70		**SW** Sand - reddish brown (5YR 5/4) med to fine grained sand.		
80		End of Log		
90				



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-03
TOTAL DEPTH: 70

PROJECT INFORMATION

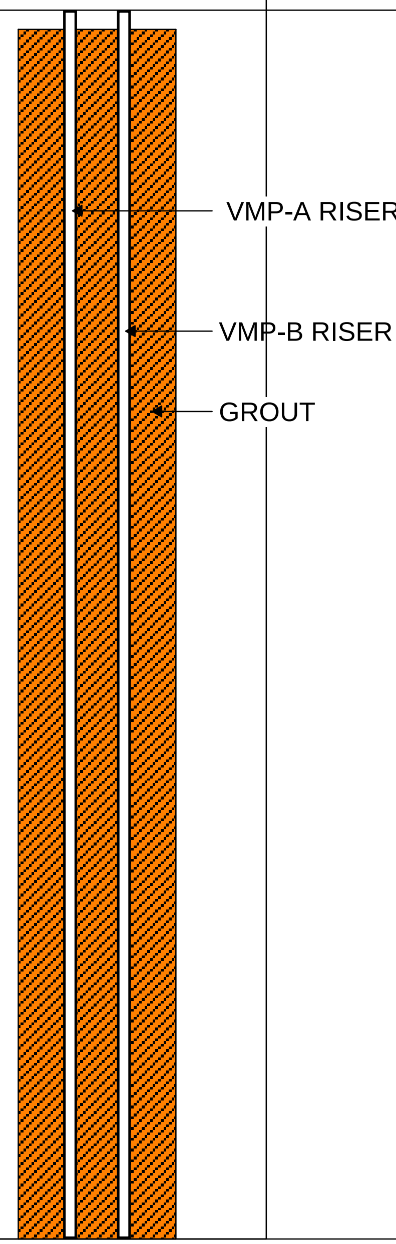
PROJECT: Off Depot RA
PROJECT NO.: 121716
SITE LOCATION: West of Dunn Field
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Sperry
BOREHOLE STARTED: 6/20/2009 07:30
BOREHOLE FINISHED: 6/21/2009 14:00

DRILLING INFORMATION

DRILLING CO.: WDC
DRILLER: C. Rockhill
DRILLING METHOD/RIG: Sonic
BOREHOLE DIAMETER: 6-in.
GROUND SURFACE ELEVATION (FT MSL): 290.69
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		ML Clayey silt - brown 10YR (5/3) soil, trace organics		
10		**CL** Clayey silt - reddish brown 7.5YR (4/3) soil		
20		**CL** Silty clay - yellowish brown 10YR (5/6) very fine grained medium plasticity		
30		**CL** Silty clay - brown 7.5YR (5/4) with trace subangular gravel, clay has low plasticity		



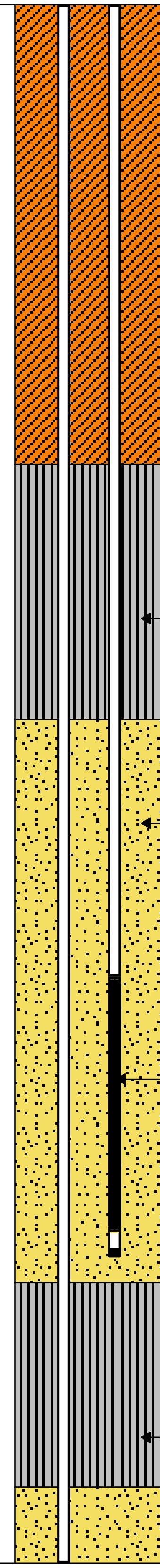
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-03

TOTAL DEPTH: 70

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SC Clayey sand - red 2.5YR (4/6) medium to coarse grained, trace subangular gravel		
		CL Sandy clay - brown 7.5YR (4/4) low plasticity, sand is medium to fine grained, trace gravel		
40		**SW** Sand - reddish yellow 7.5YR (6/6) fine to medium grained with trace gravel		
		SW Sand - red 10YR (5/6) medium to fine grained with trace gravel		BENTONITE
				SAND PACK
50				SCREEN
		SW Sand - reddish yellow 7.5YR (6/8) fine to medium grained with trace gravel		BENTONITE
60				



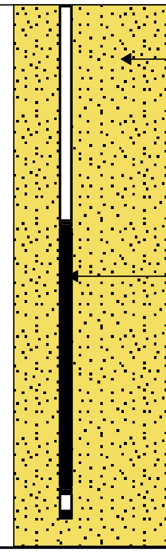
Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-03

TOTAL DEPTH: 70

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
				
		No Recovery		
70		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

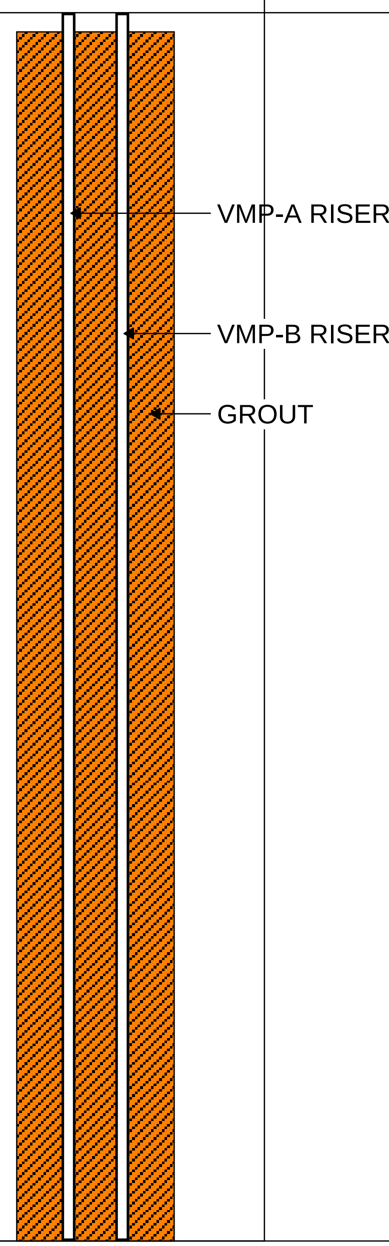
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-04
TOTAL DEPTH: 67.5

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: R. Knight
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: S. Gillet	GROUND SURFACE ELEVATION (FT MSL): 288.59
BOREHOLE STARTED: 6/17/2009 15:16	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 6/18/2009 08:00	BOREHOLE USE: Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		Topsoil		
		CL Silty clay - 10YR (3/6) dry, hard, low plasticity.		
		CL Silty clay - 10YR (3/6) moist, low plasticity.		VMP-A RISER
10				VMP-B RISER, GROUT
		CL Silty clay - 10YR (5/6) with a trace of coarse sand and gravel, moist, low plasticity.		
20				
		SC Clayey sand - 5YR (5/8) coarse with some gravel, moist, loose.		
30				



Created By: WTR
Checked By: JBS

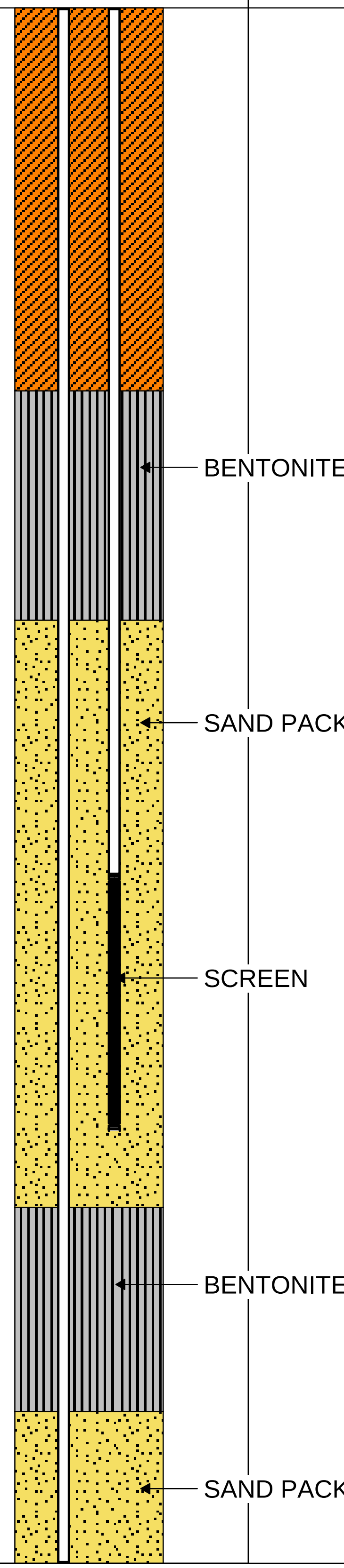
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-04

TOTAL DEPTH: 67.5

Depth	Soil Symbol	Soil Description
		SP Sand - 5YR (5/8) fine grained with traces of fine gravel, moist, loose.
40		**SW** Sand - 10YR (5/8) medium grained with some gravel and silt, dry, loose.
50		**SP** Sand - 7.5YR (5/8) medium grained with some fine gravel, dry, loose.
60		**SW** Sand - 10YR (5/8) medium grained with fine to medium gravel and a trace of silt, moist, loose.

Well Completion / **Well Description**



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-04

TOTAL DEPTH: 67.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
			SCREEN	
		SP Sand - 10YR (7/8) fine to medium grained, moist, loose.		
		End of Log		
70				
80				
90				

Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-05
TOTAL DEPTH: 71

PROJECT INFORMATION

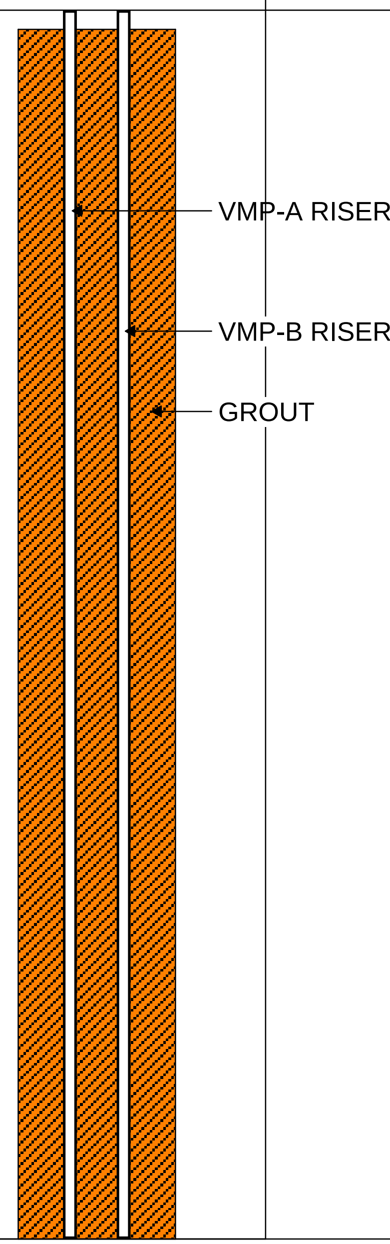
PROJECT: Off Depot RA
PROJECT NO.: 121716
SITE LOCATION: West of Dunn Field
PROJECT MANAGER: T. Holmes
FIELD STAFF: J. Sperry
BOREHOLE STARTED: 6/27/2009
BOREHOLE FINISHED: 6/27/2009

DRILLING INFORMATION

DRILLING CO.: WDC
DRILLER: C. Rockhill
DRILLING METHOD/RIG: Sonic
BOREHOLE DIAMETER: 6-in.
GROUND SURFACE ELEVATION (FT MSL): 293.42
WATER DEPTH/ DATE: N/A
BOREHOLE USE: Vapor Monitoring Point

NOTES: Sands caved in borehole prior to installation of lower bentonite seal; only 0.5 feet of bentonite installed to avoid interference with upper VMP screen.

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
0–10		**CL** Silty clay - brown (7.5YR 4/4) low plasticity.		
10		**CL** Silty clay - brown (7.5YR 4/4) medium plasticity.		
20		**CL** Silty clay - brown (7.5YR 4/4) medium plasticity, light grey (7.5YR 7/1) moddles.		
30				



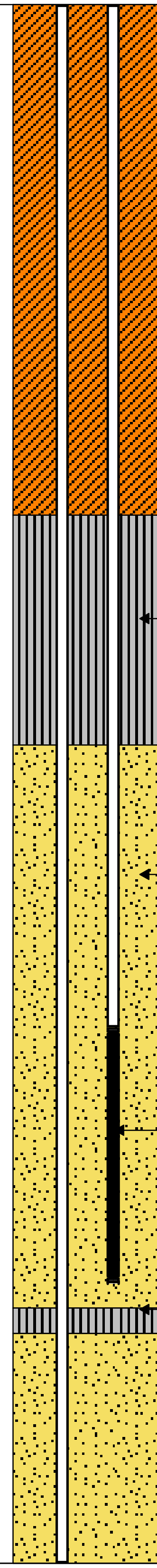
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-05

TOTAL DEPTH: 71

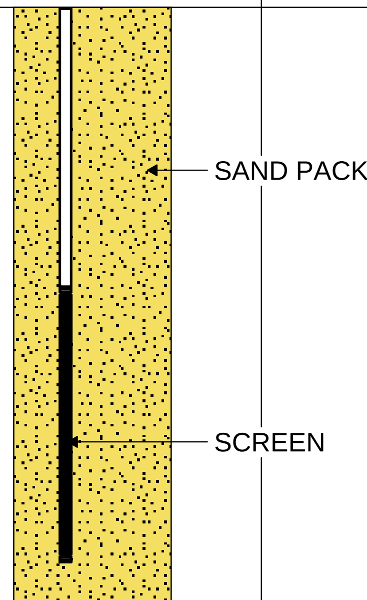
Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Sandy clay - yellowish red (5YR 5/8) medium plasticity.		
40		**SC** Clayey sand - red (2.5YR 5/8) with trace gravel.		BENTONITE
50		**SW** Sand - reddish yellow (7.5YR 6/6) fine to medium grained sand with trace gravel.		SAND PACK SCREEN BENTONITE
60		**SW** Sand - reddish yellow (5YR 6/8) fine to medium grained sand with trace gravel.		



FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-05

TOTAL DEPTH: 71

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
70		**SW** Sand - reddish yellow (7.5YR 6/8) fine to medium grained sand.		
		End of Log		
80				
90				

Created By: WTR

Checked By: JBS

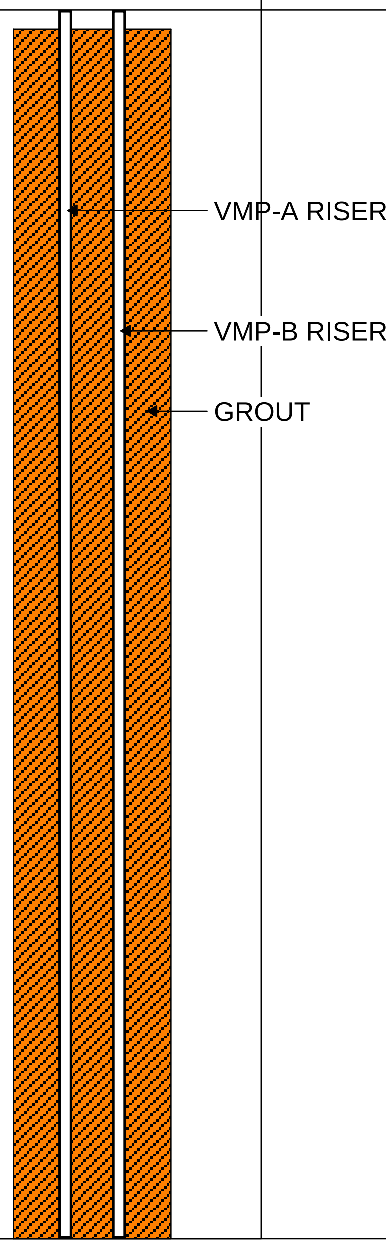
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-06
TOTAL DEPTH: 76

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: R. Knight
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION (FT MSL): 294.87
BOREHOLE STARTED: 7/9/2009 09:12	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 7/9/2009 11:15	BOREHOLE USE: Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		Topsoil		
		ML Clayey silt - dark yellowish brown 10YR (4/6) with gray 10YR (5/1) mottles, moist, low plasticity.		VMP-A RISER
10		**ML** Clayey silt - dark yellowish brown 10YR (4/6) moist, low plasticity.		VMP-B RISER GROUT
20				
30				



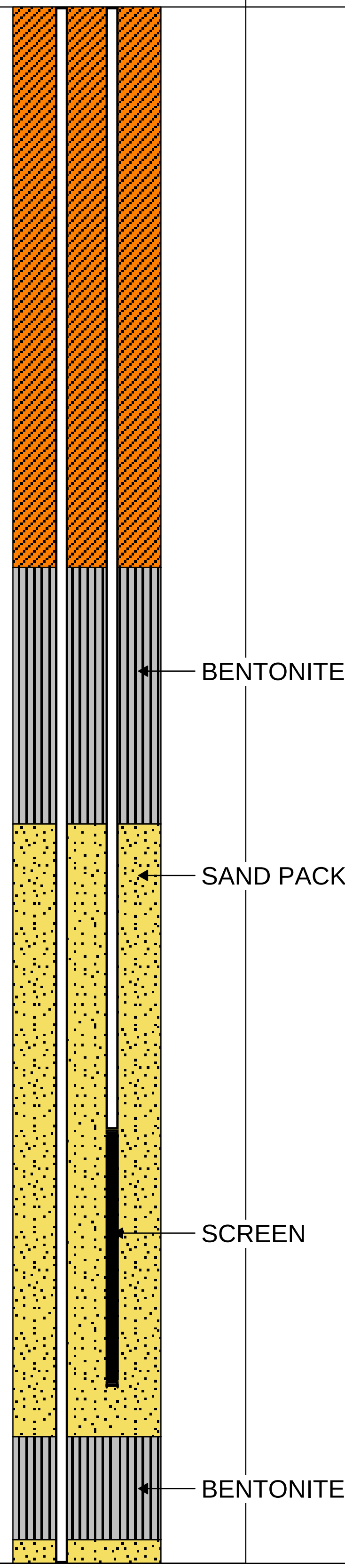
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-06

TOTAL DEPTH: 76

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SP Sand with trace clay - red 2.5YR (4/8) with lenses of gray 10YR (5/1) and reddish yellow 7.5YR (6/8) sand, fine grained, moist, and loose.		
		SW Sand with some gravel and trace clay - strong brown 7.5YR (5/8) medium grained, moist, loose.		
40		**SP** Sand - red 2.5YR (5/8) medium grained, moist, loose.		
50		**SP** Sand - reddish yellow 5YR (6/8) medium to coarse grained, some gravel, moist, loose.		
60				

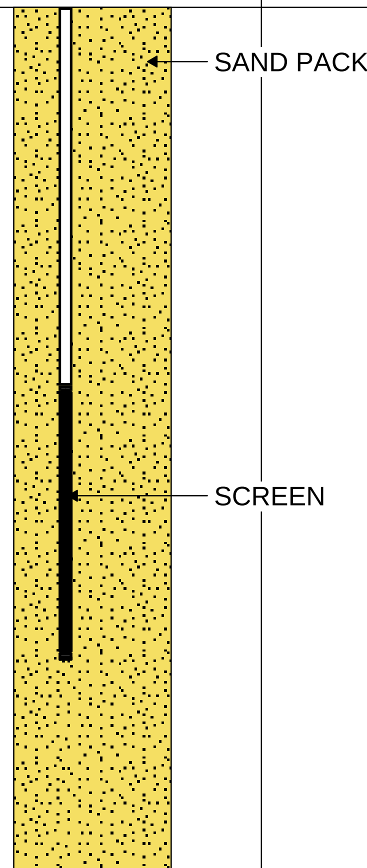


FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-06

TOTAL DEPTH: 76

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SP Sand - yellowish red 5YR (5/8) fine to medium grained, trace gravel, moist, loose.		
		SP Sand - red 2.5YR (5/8) medium grained with a trace of coarse grained sand, moist, loose.		
70		**SP** Sand - strong brown 7.5YR (5/8) fine to medium grained, moist, loose.		
		End of Log		
80				
90				



FIELD BOREHOLE LOG

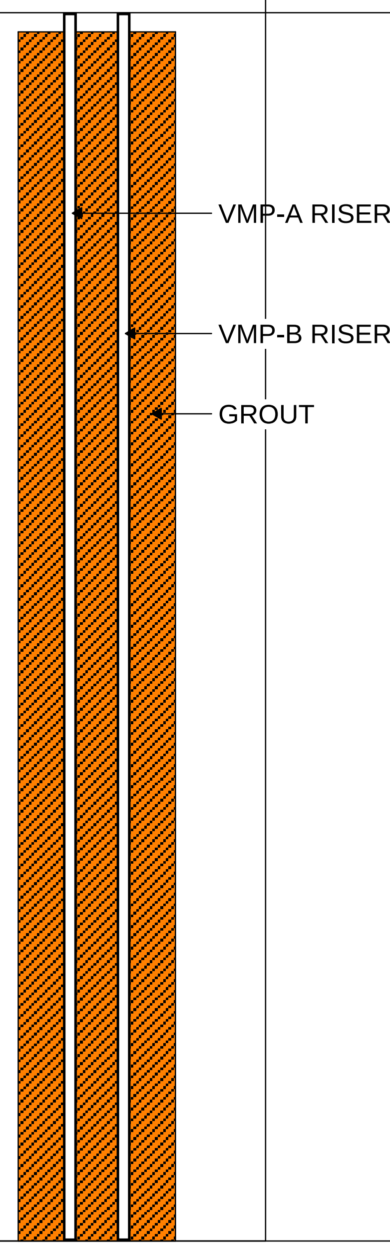
HDR

BOREHOLE NO.: ODVMP-07
TOTAL DEPTH: 65.5

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: C. Rockhill**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: J. Sperry	**GROUND SURFACE ELEVATION (FT MSL): 287.55**
BOREHOLE STARTED: 6/19/2009 07:30	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 6/20/2009 15:00	**BOREHOLE USE: Vapor Monitoring Point**

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		ML Clayey silt - yellowish brown 10YR (5/8) soil with organic material (roots).		
10		**CL** Silty clay - brown 7.5YR (4/4) low plasticity.		
20		**CL** Silty clay - brown 7.5YR (4/4) medium plasticity, trace sand.		
30		**CL** Sandy clay - red 2.5YR (5/8) with medium grained sand, low plasticity.		



Created By: WTR

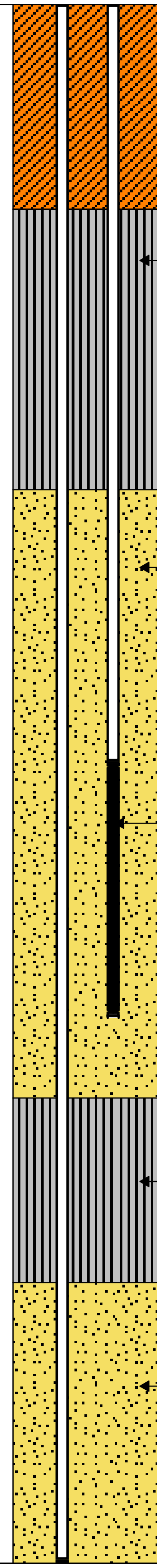
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-07

TOTAL DEPTH: 65.5

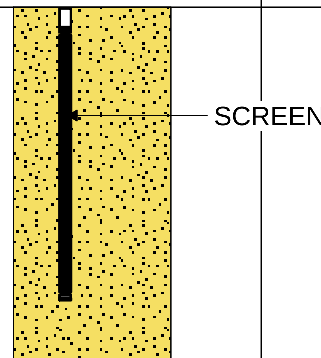
Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Clayey sand - red 2.5YR (4/8) medium to coarse grained sand, trace subangular gravel.		
		SW Sand - red 2.5YR (5/8) medium to fine grained with trace subangular gravel.		BENTONITE
40				SAND PACK
		CL Sandy clay - yellowish red 5YR (5/6) with trace subangular gravel, sand is medium grained.		SCREEN
50		**SW** Sand - reddish yellow 5YR (6/6) medium to coarse grained sand with trace subangular gravel.		BENTONITE
		SW Sand - yellowish red 5YR (5/6) fine to medium grained, trace gravel.		SAND PACK
60				



FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-07

TOTAL DEPTH: 65.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - reddish yellow 5YR (7/6) fine to medium grained.		
		End of Log		
70				
80				
90				

Created By: WTR

Checked By: JBS

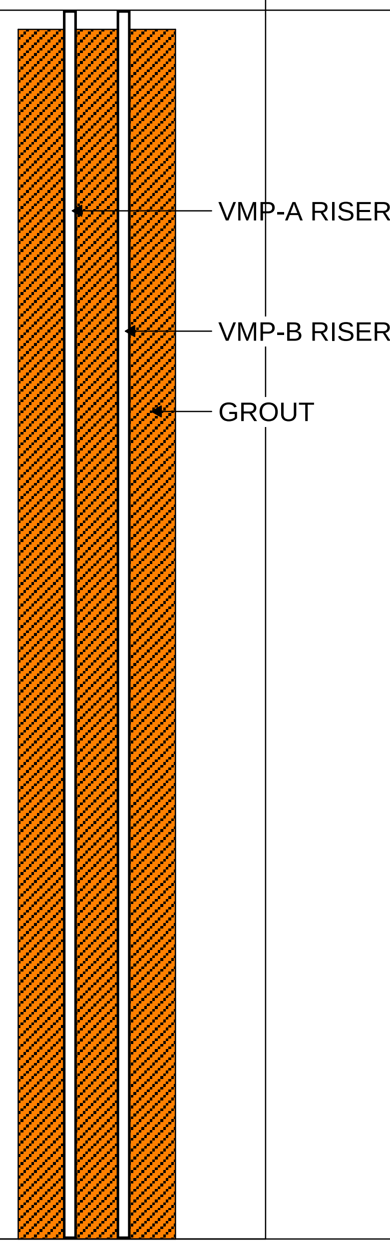
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-08
TOTAL DEPTH: 63

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.: WDC**
PROJECT NO.: 121716	**DRILLER: R. Knight**
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG: Sonic**
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER: 6-in.**
FIELD STAFF: S. Gillet	**GROUND SURFACE ELEVATION (FT MSL): 284.27**
BOREHOLE STARTED: 6/19/2009 13:30	**WATER DEPTH/ DATE: N/A**
BOREHOLE FINISHED: 6/20/2009 09:20	**BOREHOLE USE: Vapor Monitoring Point**

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		Topsoil		
		ML Clayey silt-10YR (4/6) moist, low plasticity.		
10		**CL** Silty clay - 10YR (4/4) with 7.5 YR (5/8) and 10YR (5/2) mottles, moist, low plasticity.		
20		**CL** Gravelly clay - 10YR (5/4) moist, low plasticity.		
		SP Sand - 5YR (5/8) fine to medium, moist, low plasticity.		
30				



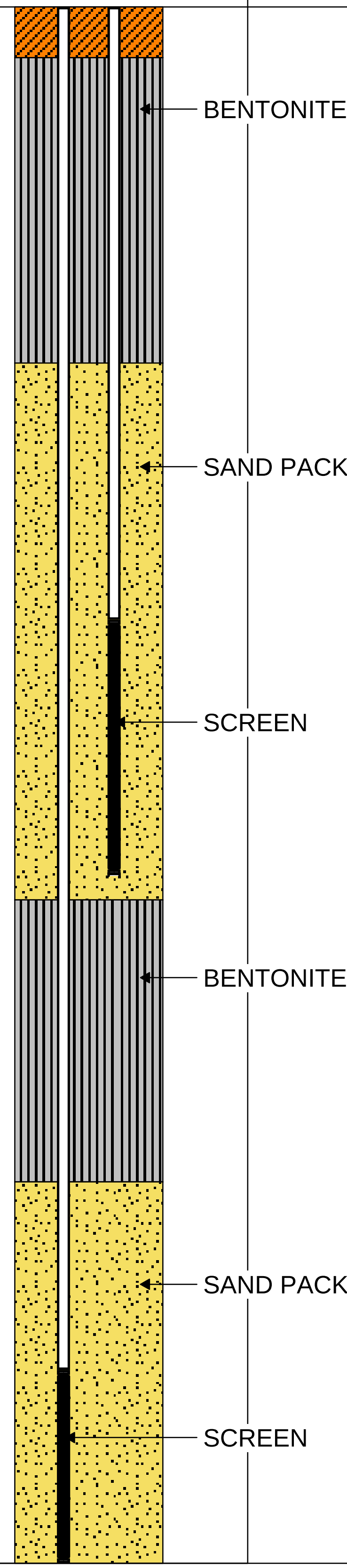
Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-08

TOTAL DEPTH: 63

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SP Sand - 10 YR (5/8) with 10YR (5/1) and 5YR (5/8) banding, fine to medium, trace clay, moist, loose.		
		SP Sand - 5YR (5/8) fine to medium, moist, loose.		
40		**SW** Gravelly sand - 10YR (7/8) medium grained sand, trace of gravel, moist, loose.		
		GW Sandy gravel - 10YR (5/6) gravel is medium to coarse grained, moist, loose.		
50		**SP** Sand - color varialble 10YR (7/8) to 7.5YR (6/8) medium grained, moist, loose.		
60		**SP** Sand - 7.5YR (5/8) medium grained with a trace of gravel, moist, loose		



FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-08
TOTAL DEPTH: 63

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		End of Log		
70				
80				
90				

Created By: WTR
Checked By: JBS

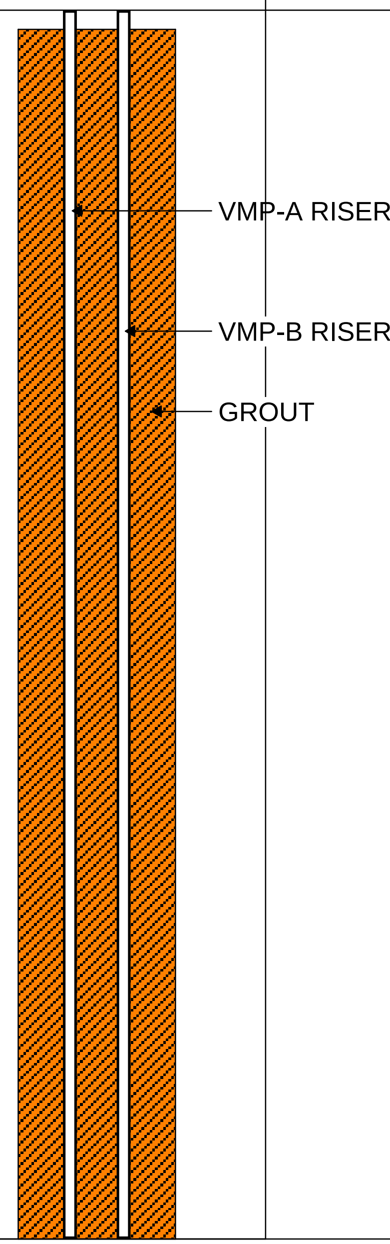
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-09
TOTAL DEPTH: 65.5

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	**DRILLING CO.:** WDC
PROJECT NO.: 121716	**DRILLER:** R. Knight
SITE LOCATION: West of Dunn Field	**DRILLING METHOD/RIG:** Sonic
PROJECT MANAGER: T. Holmes	**BOREHOLE DIAMETER:** 6-in.
FIELD STAFF: S. Gillet	**GROUND SURFACE ELEVATION (FT MSL):** 287.79
BOREHOLE STARTED: 6/18/200916:30	**WATER DEPTH/ DATE:** N/A
BOREHOLE FINISHED: 6/19/2009 09:25	**BOREHOLE USE:** Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		Topsoil		
		CL Silty clay - 10YR (4/6) dry, low plasticity.		
10		**ML** Clayey silt - 10YR (4/4) moist, low plasticity.		
20		**CL** Silty clay - 10YR (5/6) with some fine gravel, moist, low plasticity.		
30		**SW** Sand - 5YR (5/8) fine to medium grained with some medium gravel and trace of silt, moist, loose.		

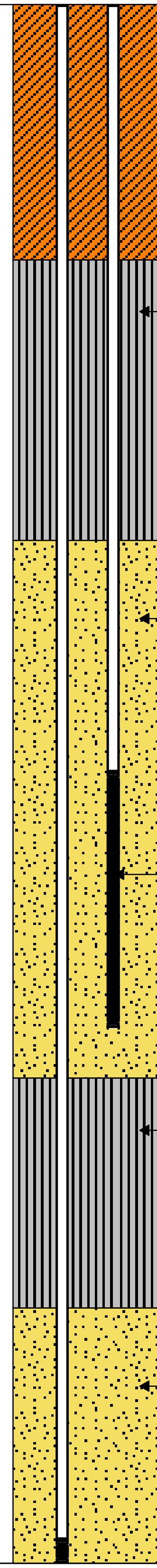


Created By: WTR
Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-09

TOTAL DEPTH: 65.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
				
40		**SP** Sand - 5YR (5/8) fine to medium grained, moist, loose.		BENTONITE
50		**SW** Sand, fine to medium grained with some medium gravel, moist, loose.		SAND PACK SCREEN BENTONITE
		SP Sand - 10YR (7/8) medium grained with some gravel, moist, loose.		SAND PACK
60		**SP** Sand - 10YR (7/8) medium grained, dry, loose.		

Created By: WTR

Checked By: JBS

HDR

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-09

TOTAL DEPTH: 65.5

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
			SCREEN	
		End of Log		
70				
80				
90				

Created By: WTR

Checked By: JBS

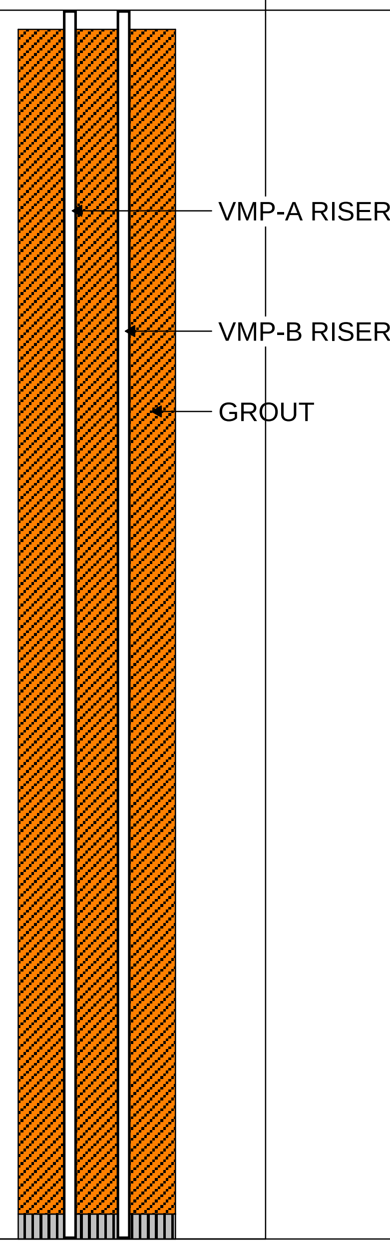
FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-10
TOTAL DEPTH: 61

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: Off Depot RA	DRILLING CO.: WDC
PROJECT NO.: 121716	DRILLER: C. Rockhill
SITE LOCATION: West of Dunn Field	DRILLING METHOD/RIG: Sonic
PROJECT MANAGER: T. Holmes	BOREHOLE DIAMETER: 6-in.
FIELD STAFF: J. Sperry	GROUND SURFACE ELEVATION (FT MSL): 282.27
BOREHOLE STARTED: 6/19/2009 07:15	WATER DEPTH/ DATE: N/A
BOREHOLE FINISHED: 6/19/2009 13:35	BOREHOLE USE: Vapor Monitoring Point

NOTES:

Depth (ft, bgs)	Soil Symbol	Soil Description	Well Completion	Well Description
		CL Silty clay - brown 7.5YR (4/4) with organic material (roots).		
10		**CL** Silty clay - brown 7.5YR (4/3) low plasticity.		
		CL Silty clay - dark brown 7.5YR (3/4) low to medium plasticity.		
20		**CL** Silty clay - brown 7.5YR (4/4) with subangular quartz and chert gravel.		
30				



Created By: WTR
Checked By: JBS

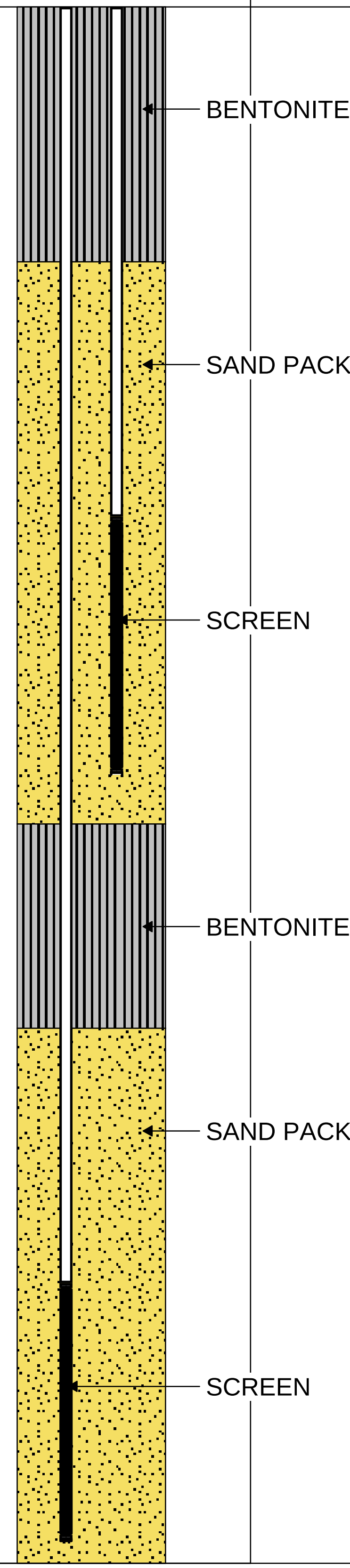
![HDR]

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-10

TOTAL DEPTH: 61

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		SW Sand - reddish yellow 5YR (6/6) fine to medium grained with subangular gravel.		
		SW Sand - reddish yellow 5YR (6/8) medium to coarse grained sand with subangular gravel.		
		CL Sandy clay - strong brown 7.5YR (4/6) with trace gravel.		
40		**SW** Sand - reddish yellow 7.5YR (6/8) medium to coarse grained sand with trace subangular gravel.		
50		**SW** Sand - strong brown 7.5YR (5/8) medium to fine grained sand with trace gravel.		
60		**SW** Sand - red 2.5YR (4/8) medium to fine grained sand with trace subangular gravel.		



Created By: WTR

Checked By: JBS

FIELD BOREHOLE LOG

BOREHOLE NO.: ODVMP-10
TOTAL DEPTH: 61

Depth	Soil Symbol	Soil Description	Well Completion	Well Description
		End of Log		
70				
80				
90				

Created By: WTR
Checked By: JBS

APPENDIX B

WELL INSTALLATION DIAGRAMS

VI-1

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-1

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 0 Rozelle St.

LOCATION DESCRIPTION: Center of Lot

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 0800

END TIME 1000

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 18'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.875

(B) DIAMETER: 1/4"

(B) LENGTH: 4.458

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

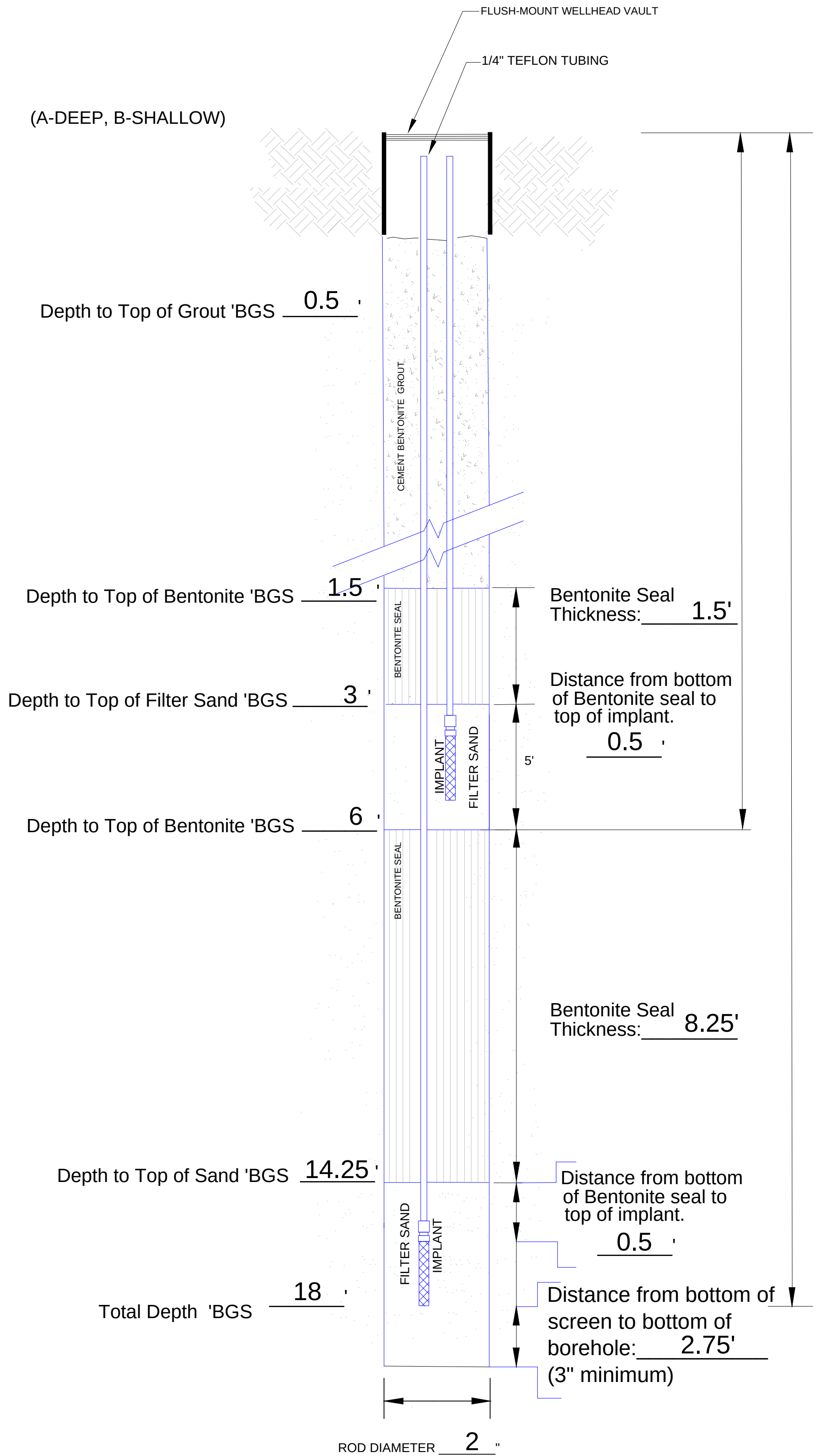
TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag



VI-2

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-2

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: NA

LOCATION DESCRIPTION:
Between VMP4 and MW-144

INSTALLATION DETAILS

DATE(S) 9/9/2009

START TIME 11:00

END TIME 13:00

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 18'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 16.375

(B) DIAMETER: 1/4"

(B) LENGTH: 5.708

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

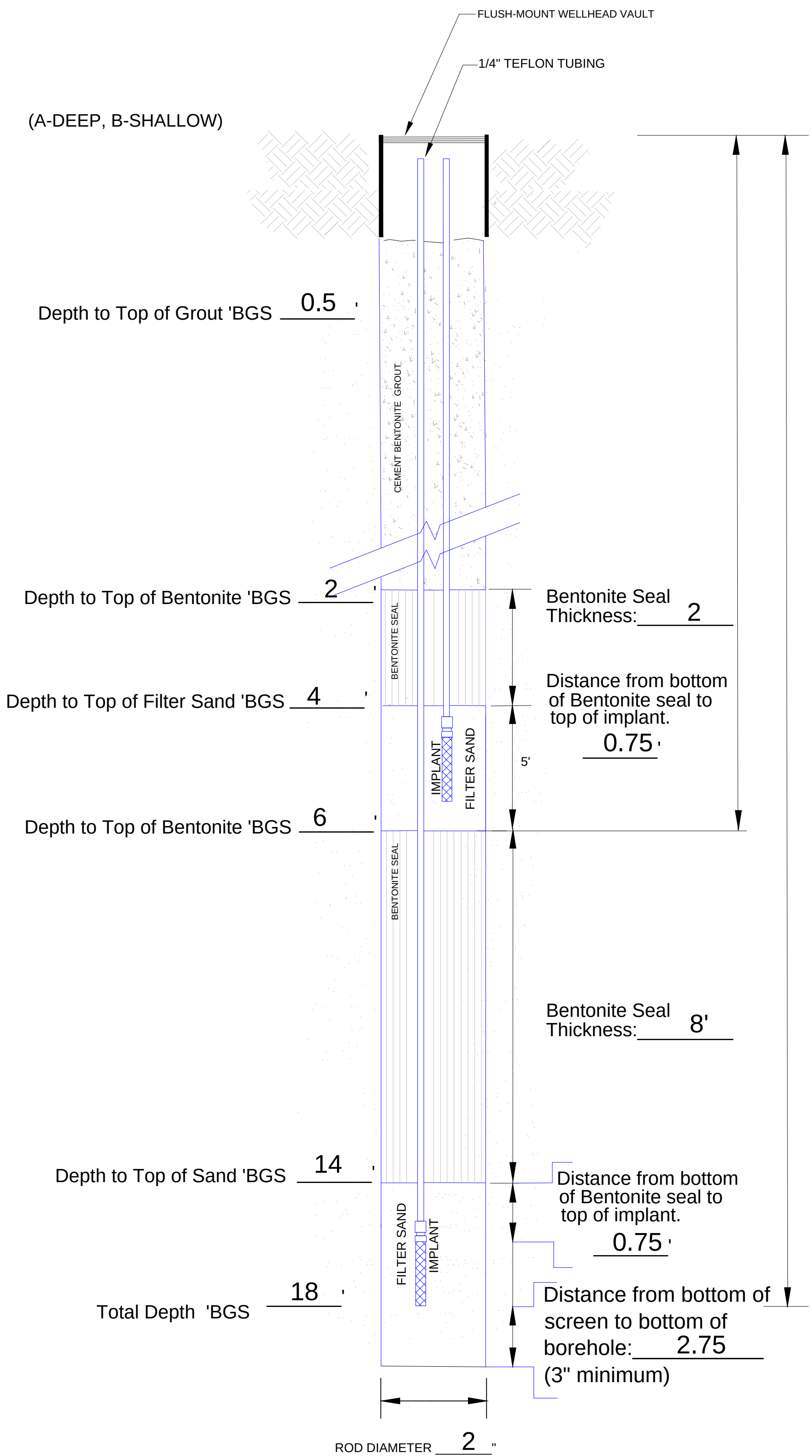
TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag



VI-3

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-3

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1764 Meadowhill

LOCATION DESCRIPTION: South Side of home

INSTALLATION DETAILS

DATE(S) 9/9/2009

START TIME 15:00

END TIME 17:00

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 18'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 18.583

(B) DIAMETER: 1/4"

(B) LENGTH: 5.700

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

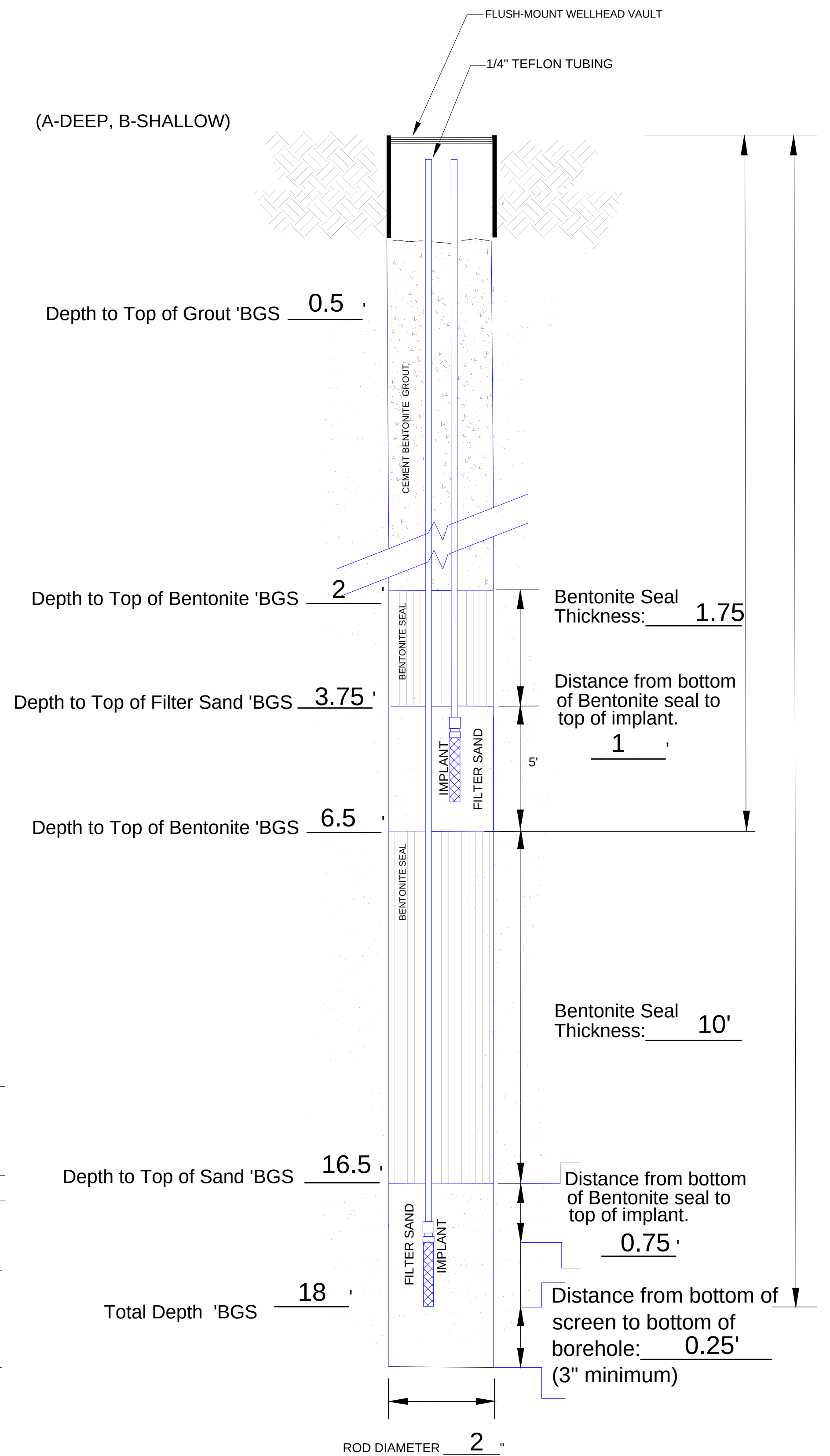
TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag



VI-4

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-4

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1764 Meadowhill

LOCATION DESCRIPTION:

Rear of home

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 07:55

END TIME 08:15

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 18

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.83

(B) DIAMETER: 1/4"

(B) LENGTH: 5.791

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

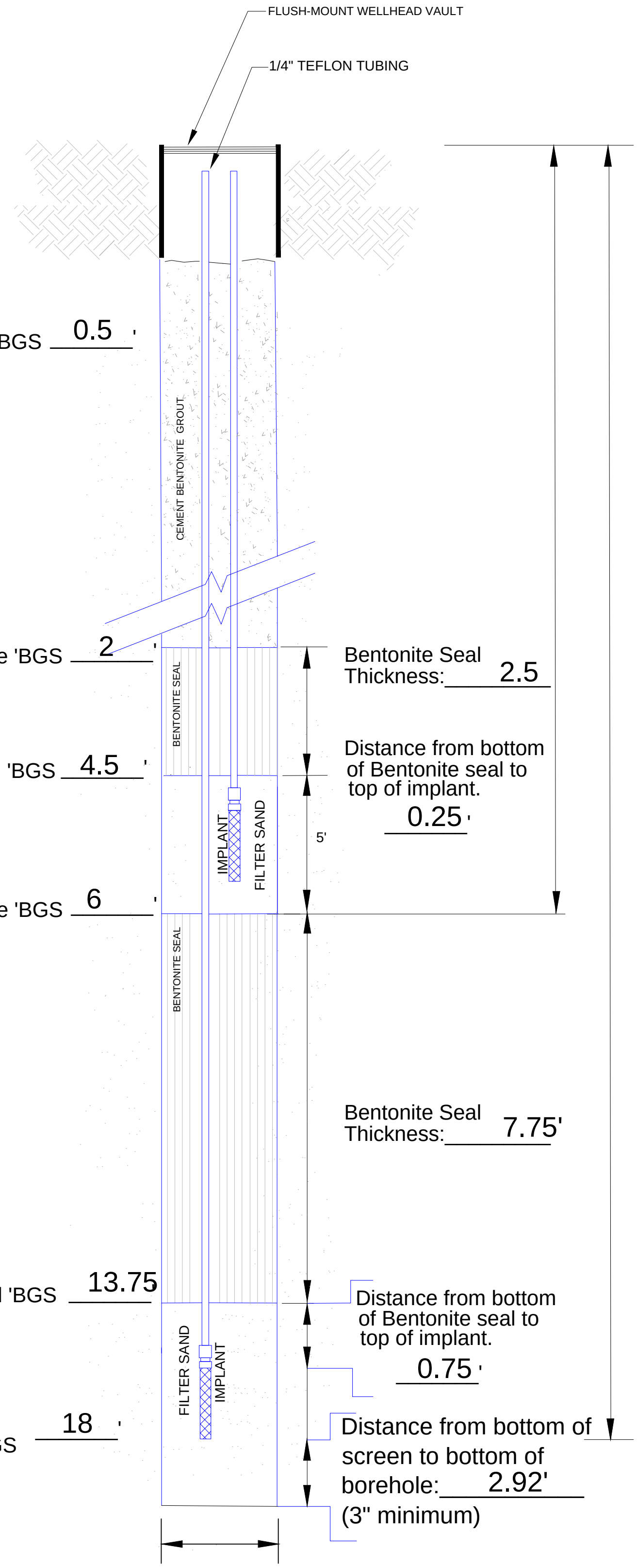
AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag

(A-DEEP, B-SHALLOW)



Depth to Top of Grout 'BGS 0.5 '

Depth to Top of Bentonite 'BGS 2 '

Bentonite Seal Thickness: 2.5

Depth to Top of Filter Sand 'BGS 4.5 '

Distance from bottom of Bentonite seal to top of implant. 0.25 '

Depth to Top of Bentonite 'BGS 6 '

Bentonite Seal Thickness: 7.75'

Depth to Top of Sand 'BGS 13.75

Distance from bottom of Bentonite seal to top of implant. 0.75 '

Total Depth 'BGS 18 '

Distance from bottom of screen to bottom of borehole: 2.92' (3" minimum)

ROD DIAMETER 2 "

VI-5

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-5

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1764 Meadowhill

LOCATION DESCRIPTION:

North side of home

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 09:00

END TIME 10:15

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 16

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.833

(B) DIAMETER: 1/4"

(B) LENGTH: 5.75

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

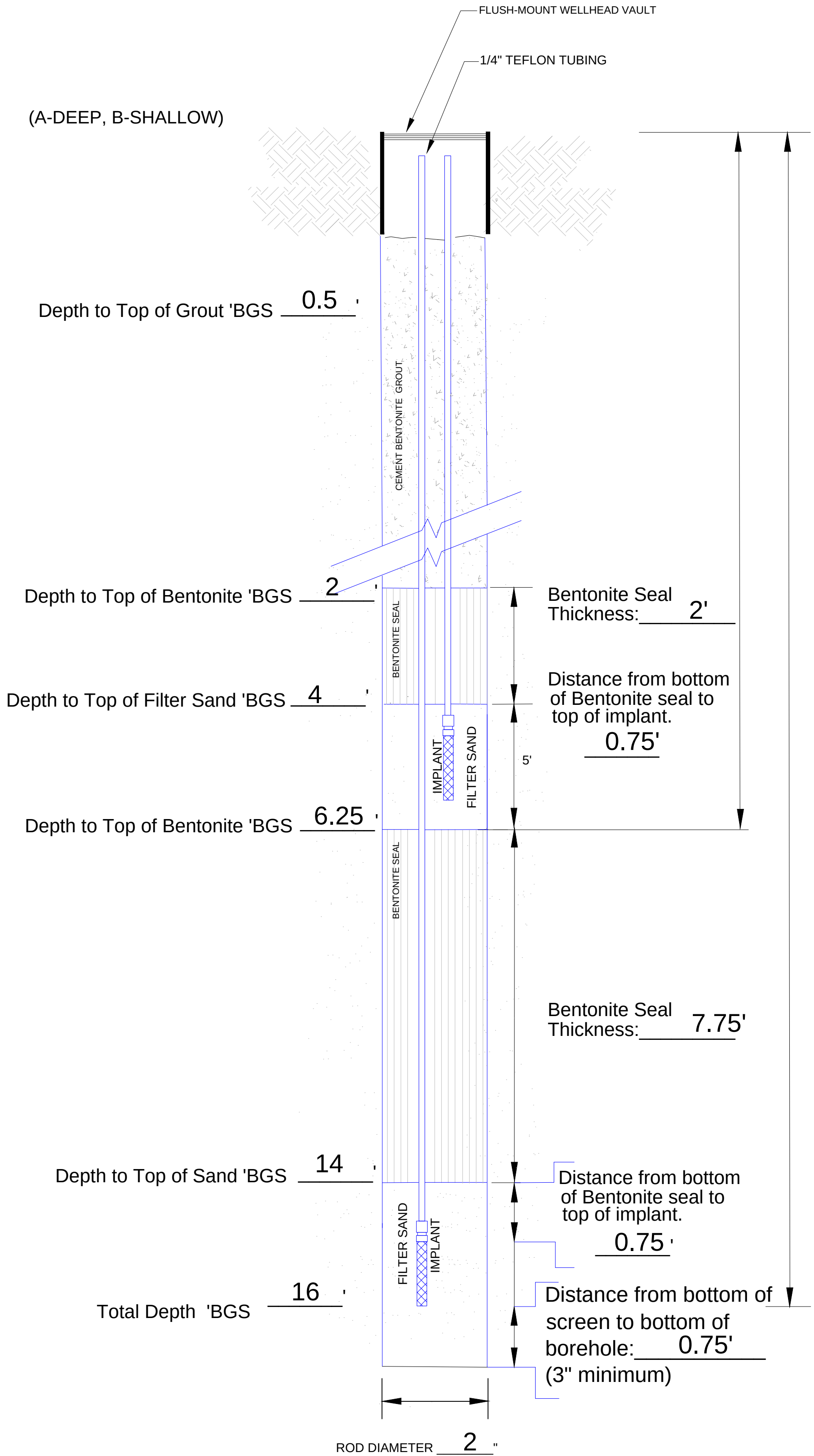
TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag



VI-6

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-6

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1739 Regan

LOCATION DESCRIPTION:

North side along fence

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 11:00

END TIME 12:40

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 18'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.875

(B) DIAMETER: 1/4"

(B) LENGTH: 5.75

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

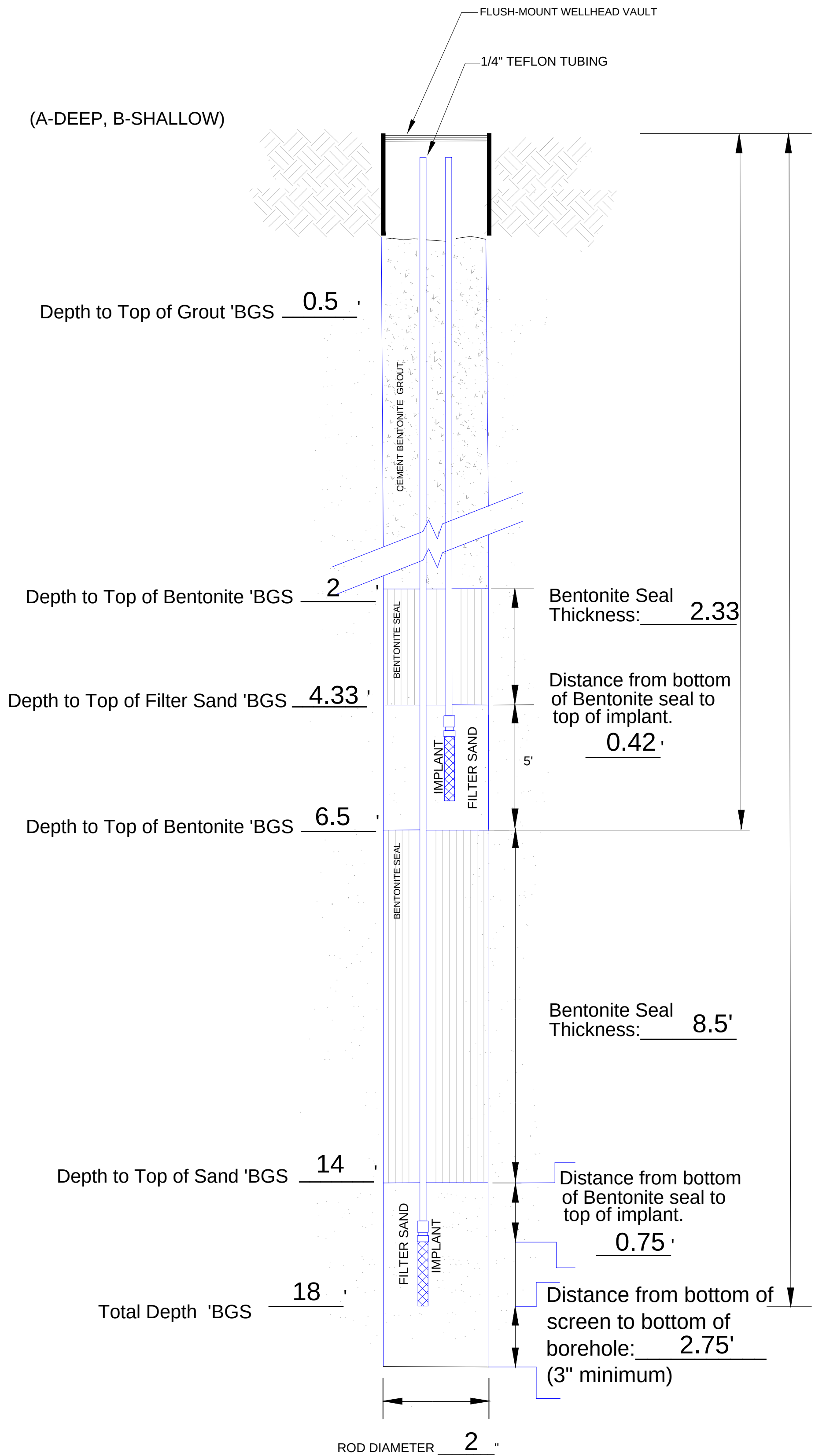
TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag



VI-7

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-7

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1739 Regan

LOCATION DESCRIPTION:

Front of home

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 13:30

END TIME 14:20

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 16'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.833

(B) DIAMETER: 1/4"

(B) LENGTH: 5.666

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

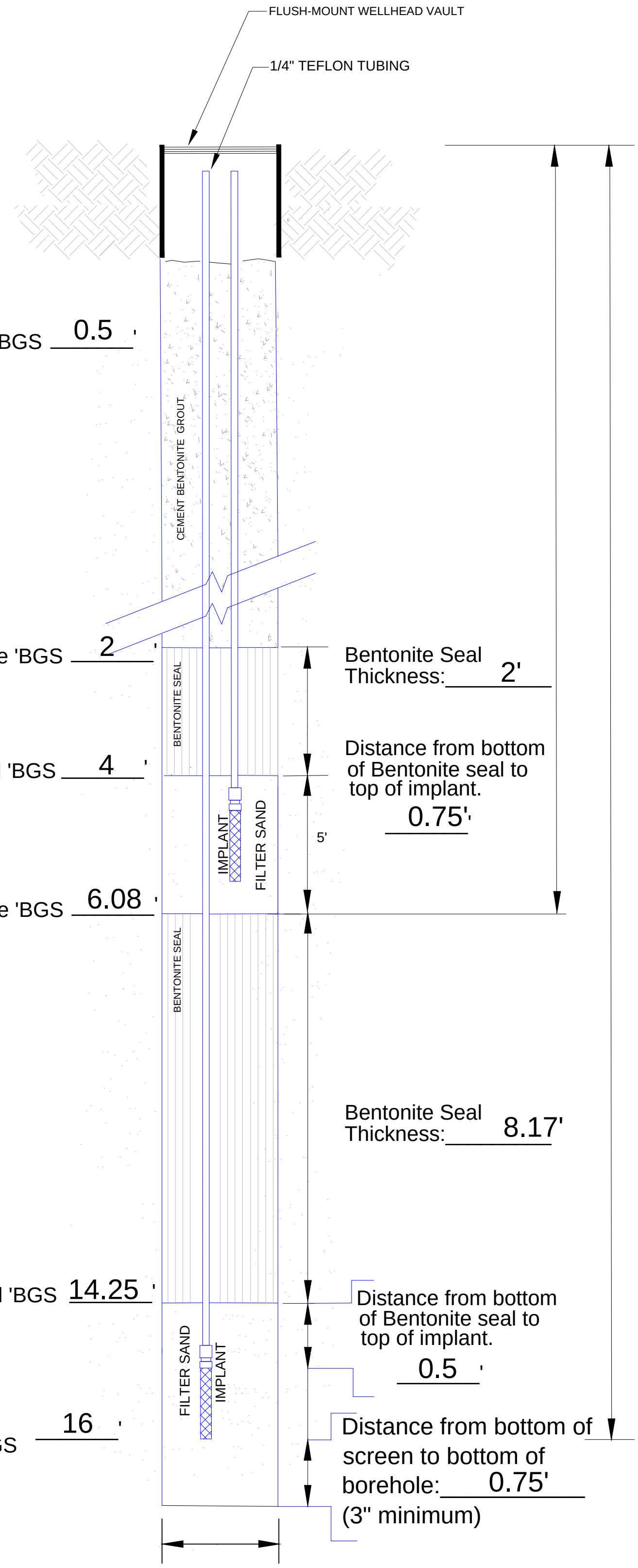
AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag

(A-DEEP, B-SHALLOW)



Depth to Top of Grout 'BGS 0.5 '

Depth to Top of Bentonite 'BGS 2 '

Bentonite Seal Thickness: 2'

Depth to Top of Filter Sand 'BGS 4 '

Distance from bottom of Bentonite seal to top of implant. 0.75'

Depth to Top of Bentonite 'BGS 6.08 '

Bentonite Seal Thickness: 8.17'

Depth to Top of Sand 'BGS 14.25 '

Distance from bottom of Bentonite seal to top of implant. 0.5 '

Total Depth 'BGS 16 '

Distance from bottom of screen to bottom of borehole: 0.75' (3" minimum)

ROD DIAMETER 2 "

VI-8

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-8

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1739 Regan

LOCATION DESCRIPTION: Rear of carport

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 14:40

END TIME 15:45

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 16'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.583

(B) DIAMETER: 1/4"

(B) LENGTH: 5.666

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

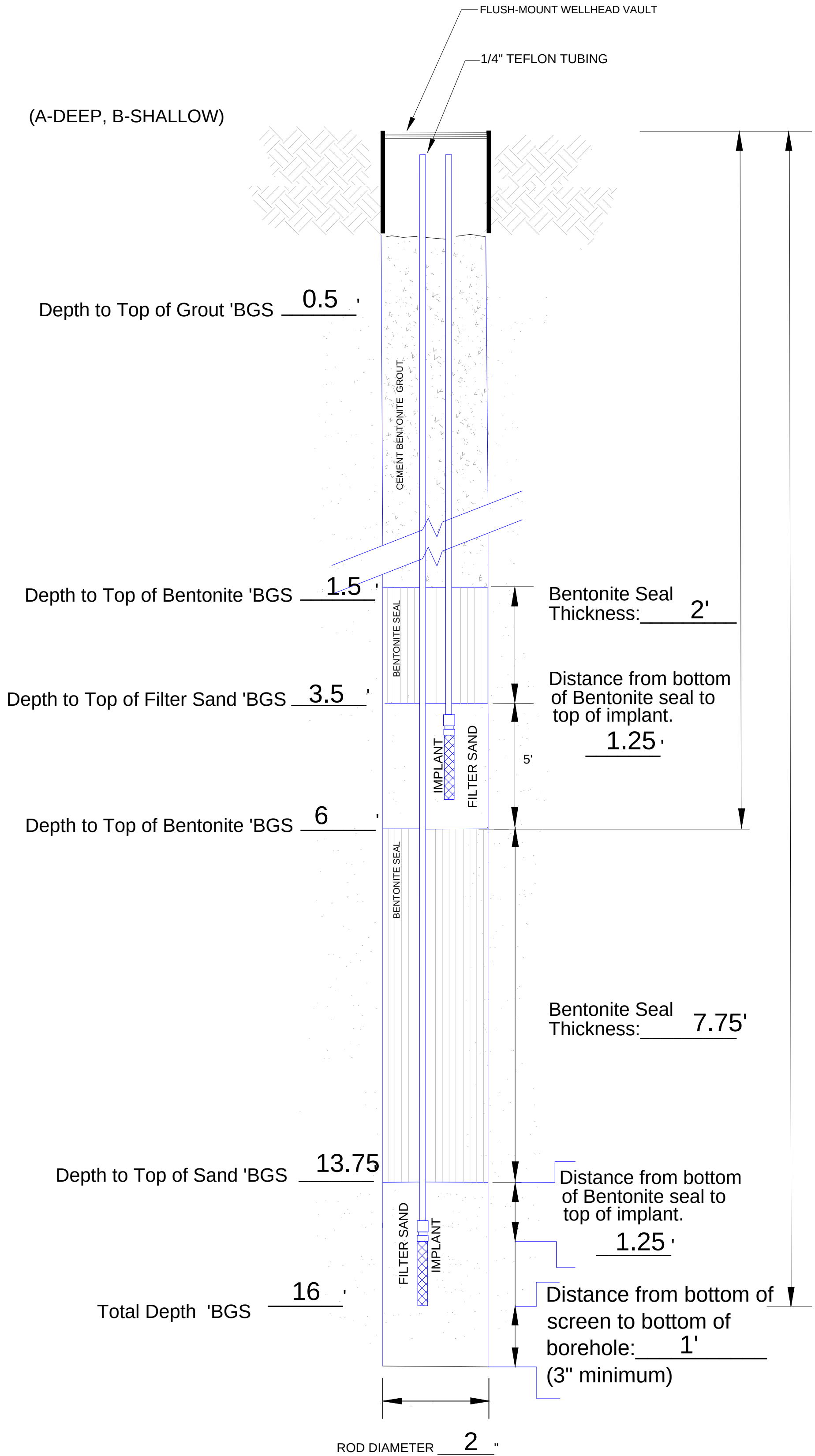
AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag

(A-DEEP, B-SHALLOW)



VI-9

VAPOR INTRUSION SAMPLING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RAWP
Defense Depot Memphis, Tennessee

WELL ID: VI-9

PROJECT: VAPOR INTRUSION

E2M FIELD REP. J. Sperry

LOCATION ADDRESS: 1733 Regan

LOCATION DESCRIPTION: Front of home

INSTALLATION DETAILS

DATE(S) 9/10/2009

START TIME 16:15

END TIME 17:15

DRILLING CONTRACTOR Boart Longyear

DRILLING TECHNIQUE DPT

SIZE AND TYPE 2"

ROD ADVANCEMENT TOOL USED 6620 DT

BOREHOLE DETAILS

TOTAL DEPTH: 16'

DIAMETER: 2"

TUBING DETAILS (A-DEEP, B-SHALLOW)

TUBING MATERIAL: Teflon

(A) DIAMETER: 1/4"

(A) LENGTH: 15.708

(B) DIAMETER: 1/4"

(B) LENGTH: 5.833

VAPOR IMPLANT DETAILS

MANUFACTURER: Geoprobe

MATERIAL: Stainless Steel

PORE DIAMETER: 0.0006

LENGTH: 6"

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Glass Beads

AMOUNT(UNITS): 3 cups

UPPER BENTONITE SEAL DETAILS

TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

LOWER BENTONITE SEAL DETAILS

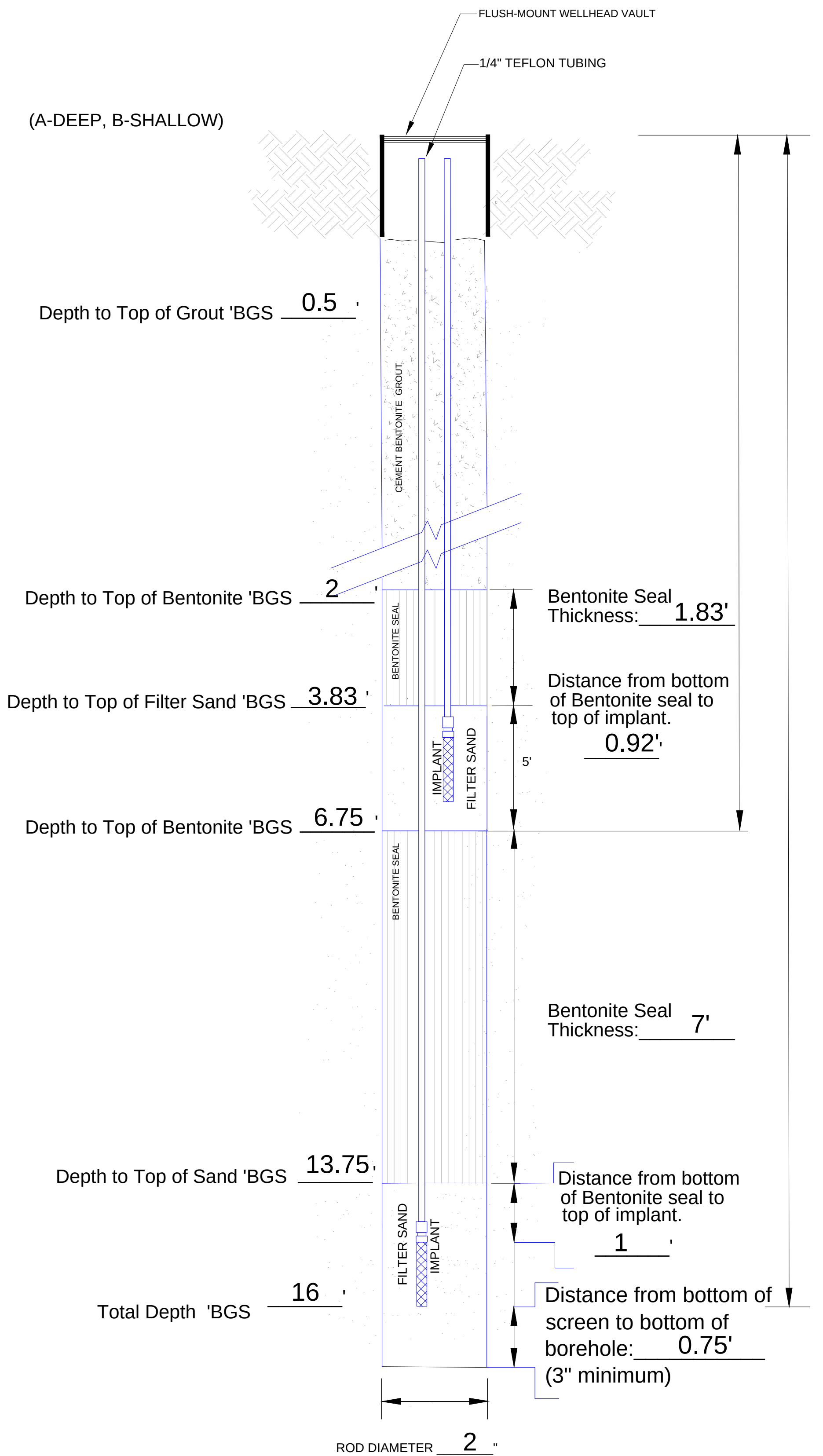
TYPE: # 16 Pellets

AMOUNT: 1/4 Bag

GROUT DETAILS

TYPE: I Portland

AMOUNT: 1/4 Bag



WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-01

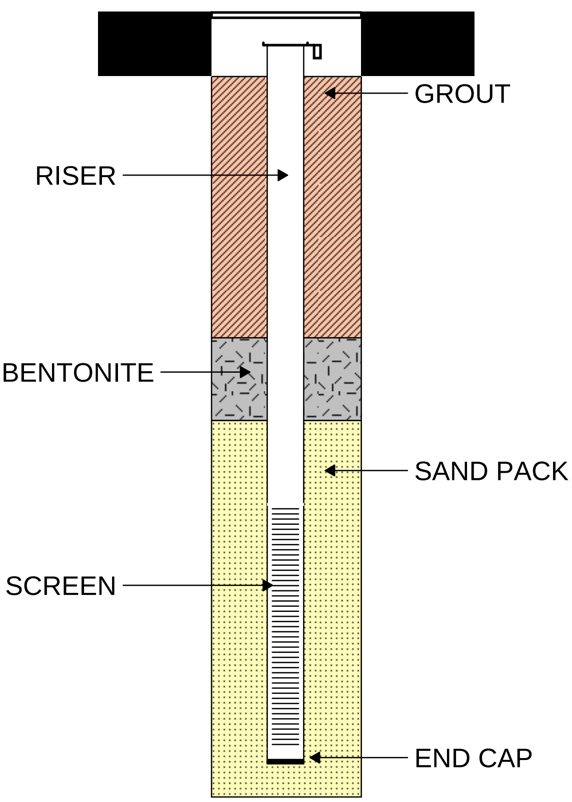
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/4/2009
WELL LOCATION: 45-ft. south of control building pad.

NORTHING: 281279.8
EASTING: 800920.76
GROUND SURFACE ELEVATION (ft, msl): 284.85

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 10/20
QUANTITY OF FILTER PACK: 13-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1.5-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	

DIMENSIONS OF CONCRETE PAD: 18- inch diameter

LENGTH OF RISER (ft): 34.5

DEPTH TO TOP OF BENTONITE (ft, bgs): 24.5

DEPTH TO TOP OF SAND PACK (ft, bgs): 29.5

LENGTH OF SCREEN (ft): 30

LENGTH OF END CAP: 2-inch

TOTAL DEPTH OF WELL (ft, bgs): 64.5

TOTAL DEPTH OF BORING (ft, bgs): 65.4

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-02

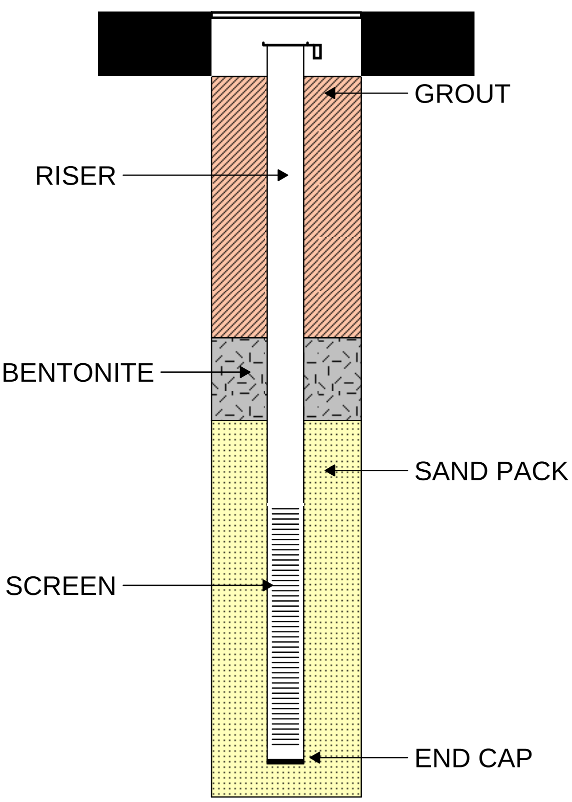
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 7/10/2009
WELL LOCATION: 15-ft. southeast of control building pad.

NORTHING: 281318.99
EASTING: 800926.44
GROUND SURFACE ELEVATION (ft, msl): 286.18

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 11-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	Well Details
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 36.2 DEPTH TO TOP OF BENTONITE (ft, bgs): 26 DEPTH TO TOP OF SAND PACK (ft, bgs): 31 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 66.2 TOTAL DEPTH OF BORING (ft, bgs): 67

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-03

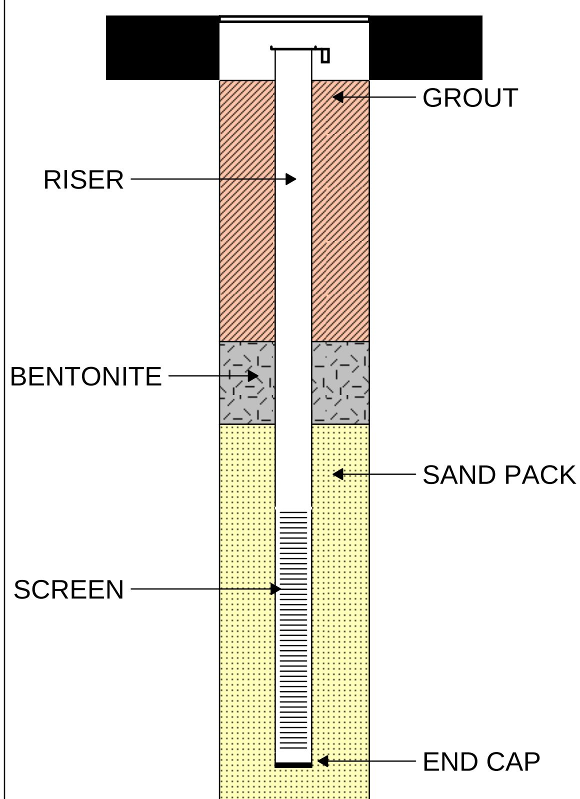
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 7/29/2009
WELL LOCATION: 35-ft. northeast of control building pad.

NORTHING: 281361.83
EASTING: 800950.39
GROUND SURFACE ELEVATION (ft, msl): 289.46

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 12-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 2-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 5-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 39.7 DEPTH TO TOP OF BENTONITE (ft, bgs): 30 DEPTH TO TOP OF SAND PACK (ft, bgs): 35 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 69.7 TOTAL DEPTH OF BORING (ft, bgs): 72.5

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-04

PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/19/2009
WELL LOCATION: 85-ft. east of control building pad.

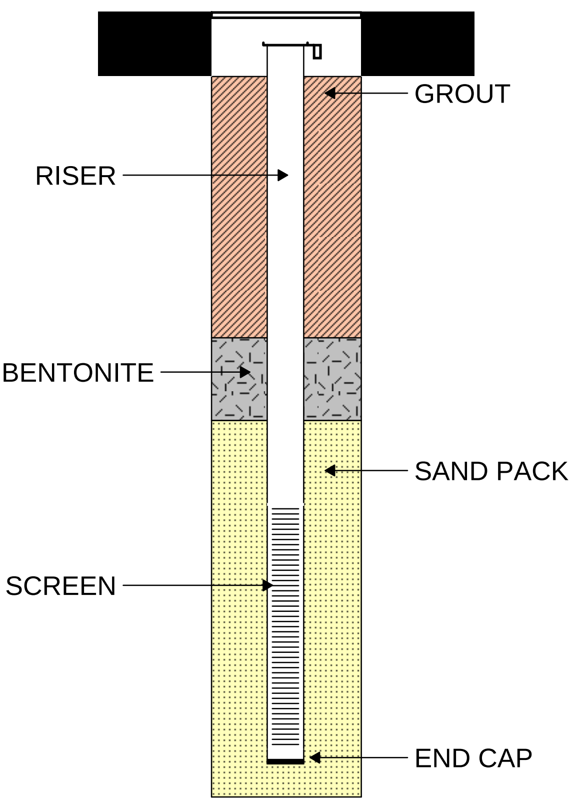
NORTHING: 281361.41
EASTING: 801001.78
GROUND SURFACE ELEVATION (ft, msl): 290.64

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 12-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 2-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)



Well Details

DIMENSIONS OF CONCRETE PAD: 18- inch diameter

LENGTH OF RISER (ft): 41.1

DEPTH TO TOP OF BENTONITE (ft, bgs): 29

DEPTH TO TOP OF SAND PACK (ft, bgs): 36

LENGTH OF SCREEN (ft): 30

LENGTH OF END CAP: 2-inch

TOTAL DEPTH OF WELL (ft, bgs): 71.1

TOTAL DEPTH OF BORING (ft, bgs): 72

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-05

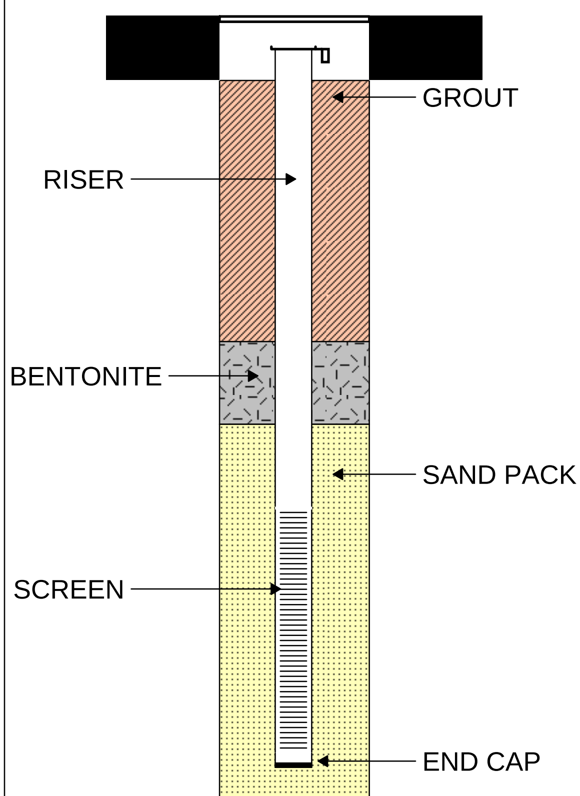
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/21/2009
WELL LOCATION: 145-ft. east of control building pad.

NORTHING: 281356.01
EASTING: 801061.37
GROUND SURFACE ELEVATION (ft, msl): 291.68

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 12.5-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 2-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 40.7 DEPTH TO TOP OF BENTONITE (ft, bgs): 31 DEPTH TO TOP OF SAND PACK (ft, bgs): 36.5 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 70.7 TOTAL DEPTH OF BORING (ft, bgs): 72

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-06

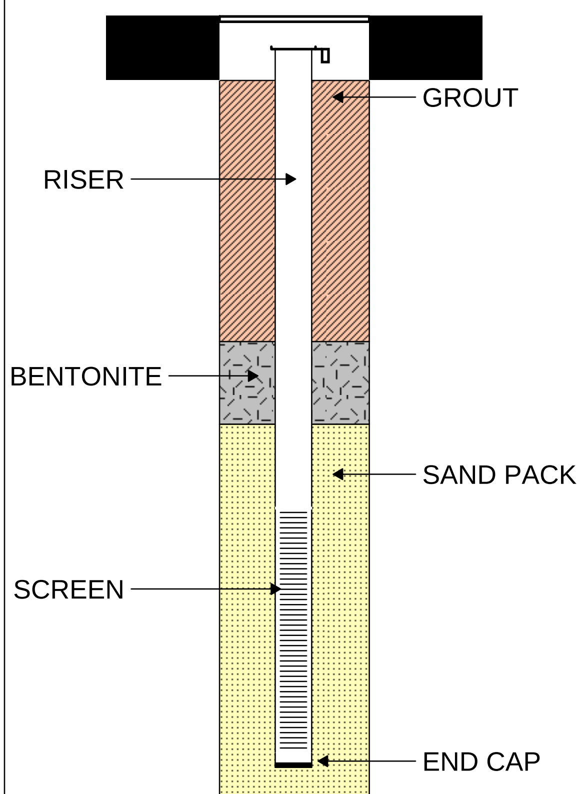
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/27/2009
WELL LOCATION: 195-ft. east of control building pad.

NORTHING: 281351.26
EASTING: 801108.21
GROUND SURFACE ELEVATION (ft, msl): 292.96

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 12-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 41.3 DEPTH TO TOP OF BENTONITE (ft, bgs): 30 DEPTH TO TOP OF SAND PACK (ft, bgs): 35.75 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 71.3 TOTAL DEPTH OF BORING (ft, bgs): 72

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-07

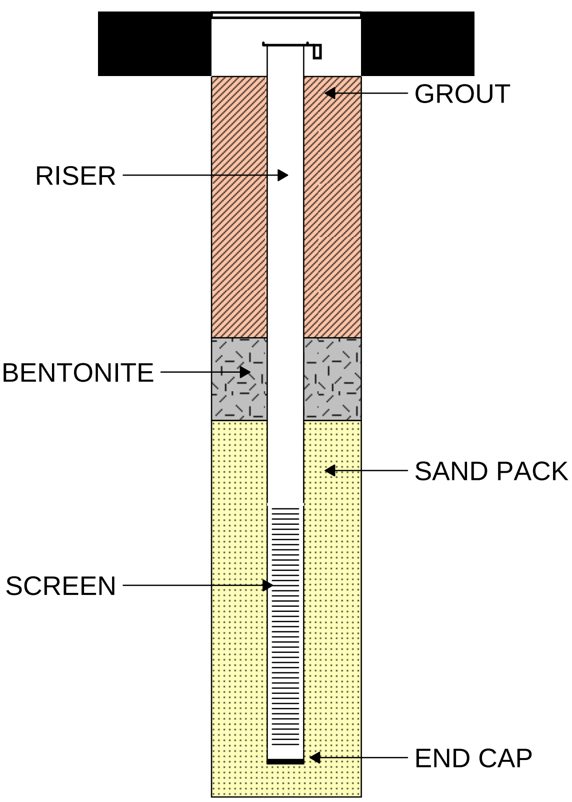
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/24/2009
WELL LOCATION: 250-ft. east of control building pad.

NORTHING: 281347.49
EASTING: 801166.74
GROUND SURFACE ELEVATION (ft, msl): 292.55

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 12-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 42 DEPTH TO TOP OF BENTONITE (ft, bgs): 33 DEPTH TO TOP OF SAND PACK (ft, bgs): 37 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 72 TOTAL DEPTH OF BORING (ft, bgs): 72.5

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-08

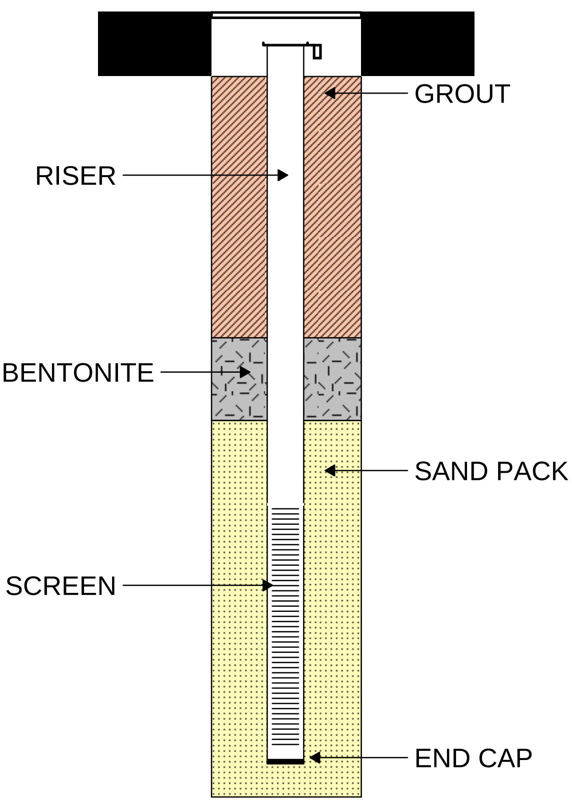
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/25/2009
WELL LOCATION: 277-ft. east of control building pad.

NORTHING: 281306.56
EASTING: 801190.2
GROUND SURFACE ELEVATION (ft, msl): 292.2

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 11.5-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 2-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 41.7 DEPTH TO TOP OF BENTONITE (ft, bgs): 28 DEPTH TO TOP OF SAND PACK (ft, bgs): 36.5 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 71.7 TOTAL DEPTH OF BORING (ft, bgs): 72

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-09

PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/28/2009
WELL LOCATION: 285-ft. east of control building pad.

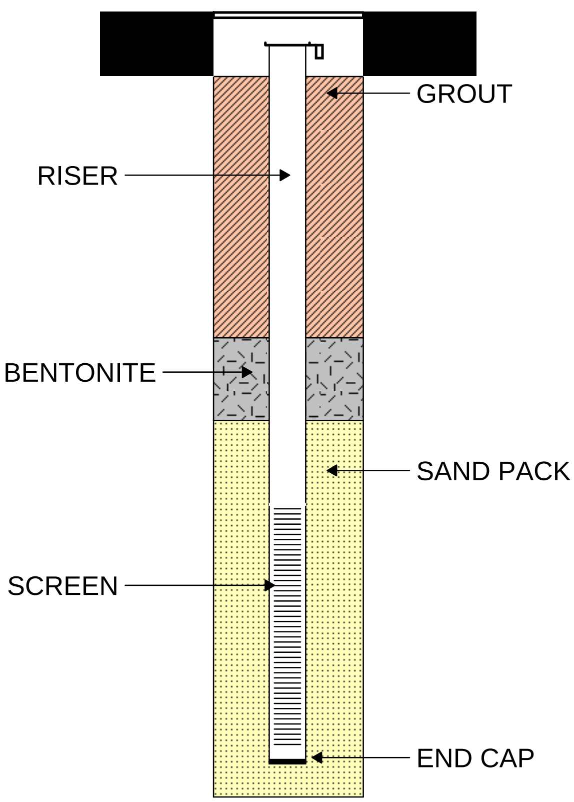
NORTHING: 281331.03
EASTING: 801202.97
GROUND SURFACE ELEVATION (ft, msl): 294.12

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 13-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 2-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**



DIMENSIONS OF CONCRETE PAD: 18- inch diameter

LENGTH OF RISER (ft): 43.5

DEPTH TO TOP OF BENTONITE (ft, bgs): 34

DEPTH TO TOP OF SAND PACK (ft, bgs): 39

LENGTH OF SCREEN (ft): 30

LENGTH OF END CAP: 2-inch

TOTAL DEPTH OF WELL (ft, bgs): 73.8

TOTAL DEPTH OF BORING (ft, bgs): 74.5

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-10

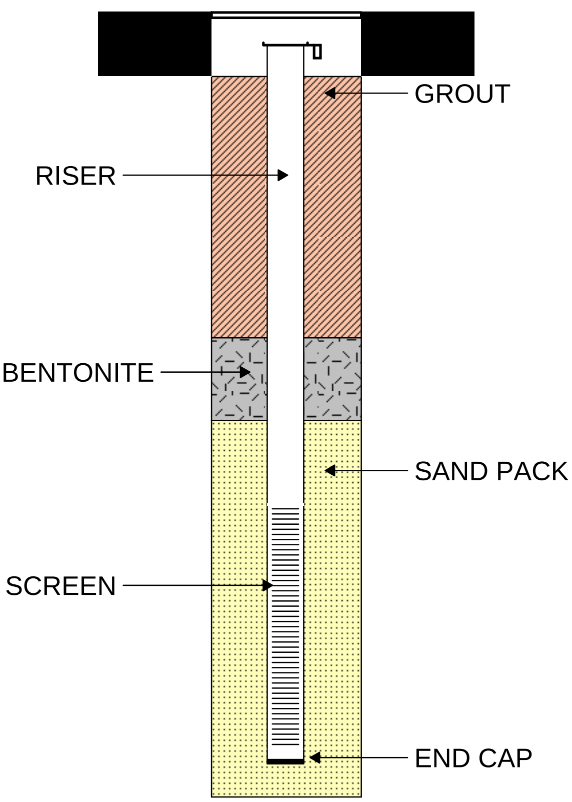
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/8/2009
WELL LOCATION: 328-ft. east of control building pad.

NORTHING: 281341.21
EASTING: 801243.83
GROUND SURFACE ELEVATION (ft, msl): 294.3

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 9-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 43.9 DEPTH TO TOP OF BENTONITE (ft, bgs): 34 DEPTH TO TOP OF SAND PACK (ft, bgs): 39 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 73.9 TOTAL DEPTH OF BORING (ft, bgs): 74

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-11

PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 7/13/2009
WELL LOCATION: 376-ft. east of control building pad.

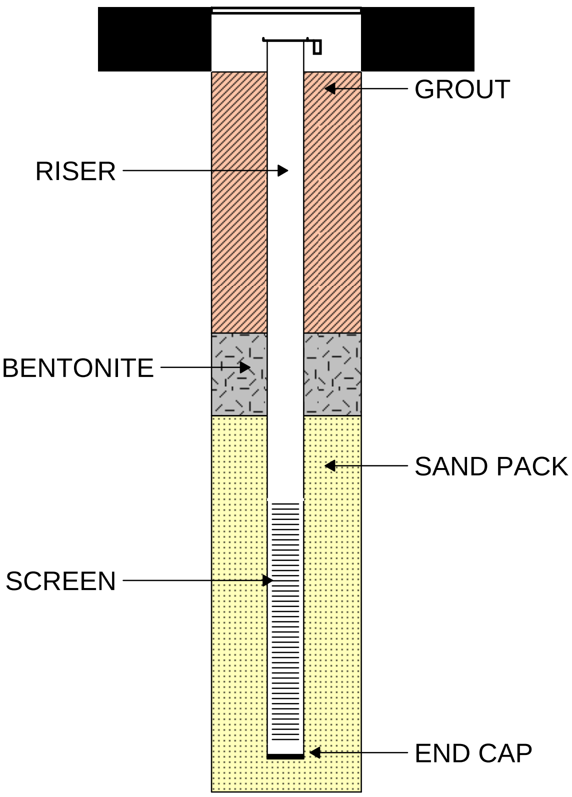
NORTHING: 281348.19
EASTING: 801294.56
GROUND SURFACE ELEVATION (ft, msl): 294.91

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 10/20
QUANTITY OF FILTER PACK: 9-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	**Well Details**



DIMENSIONS OF CONCRETE PAD: 18- inch diameter
LENGTH OF RISER (ft): 44.5
DEPTH TO TOP OF BENTONITE (ft, bgs): 34
DEPTH TO TOP OF SAND PACK (ft, bgs): 40
LENGTH OF SCREEN (ft): 30
LENGTH OF END CAP: 2-inch
TOTAL DEPTH OF WELL (ft, bgs): 74.5
TOTAL DEPTH OF BORING (ft, bgs): 76

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

WELL INSTALLATION DIAGRAM

WELL NO.: ODSVE-12

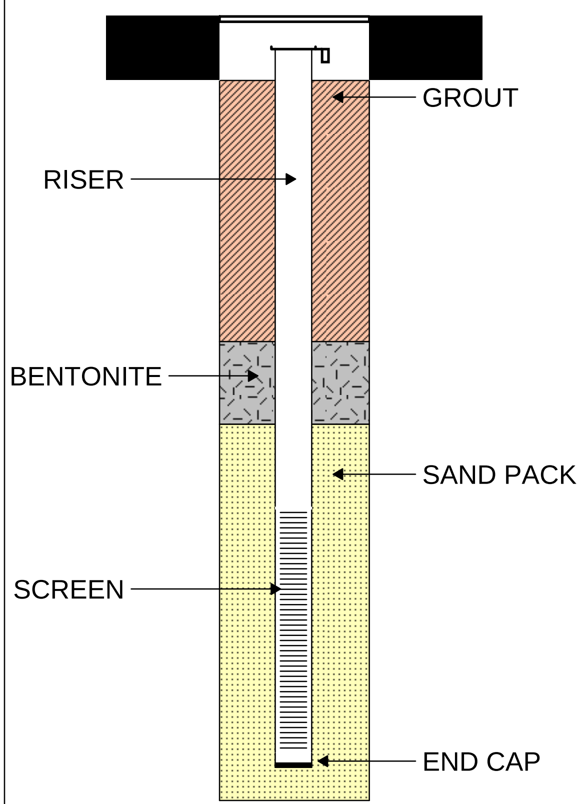
PROJECT: Off Depot RA
PROJECT NUMBER: 121716
SITE LOCATION: West of Dunn Field
e2M PROJECT MANAGER: T. Holmes
e2M FIELD STAFF: J. Sperry
DATE COMPLETED: 8/5/2009
WELL LOCATION: 453-ft. east of control building pad.

NORTHING: 281361.05
EASTING: 801371.94
GROUND SURFACE ELEVATION (ft, msl): 294.73

DRILLING CO.: WDC
DRILLING METHOD: Sonic
BOREHOLE DIAMETER (in): 6
SURFACE COMPLETION: Below Surface
BOLLARDS: No
WELL DIAMETER (in): 2
TYPE OF SCREEN/RISER MATERIAL: Sched. 40 PVC
SLOT SIZE OF SCREEN: 0.006

TYPE OF FILTER PACK: Sand
GRADATION OF FILTER PACK: 12/20
QUANTITY OF FILTER PACK: 10-50lb. Bags
TYPE OF BENTONITE IN SEAL: 3/8-inch coarse grade
QUANTITY OF BENTONITE IN SEAL: 1-50lb. Bags
TYPE OF GROUT: Portland Type 1
QUANTITY OF GROUT: 4-90lb. Bags

NOTES: SVE well completed with 2-inch PVC "tee" and transition fitting 2 feet bgs for connection to 4-inch HDPE conveyance piping. PVC riser extends from "tee" to ground surface with manhole in 2-foot square concrete pad for access.

Well Completion (Not to Scale)	Well Details
	DIMENSIONS OF CONCRETE PAD: 18- inch diameter LENGTH OF RISER (ft): 43.7 DEPTH TO TOP OF BENTONITE (ft, bgs): 25 DEPTH TO TOP OF SAND PACK (ft, bgs): 39 LENGTH OF SCREEN (ft): 30 LENGTH OF END CAP: 2-inch TOTAL DEPTH OF WELL (ft, bgs): 73.7 TOTAL DEPTH OF BORING (ft, bgs): 74

Prepared by: WTR **Date: 6/16/2010** **Checked by: JBS** **Date: 6/16/2010**

VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-1 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. J. Sperry

LOCATION DATA

NORTHING 281360.88

EASTING 801421.12

PAD ELEVATION 295.71

INSTALLATION DETAILS

DATE COMPLETED: 6 / 25 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 74 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 68 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 53 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 68-73

(B) SCREEN RANGE (ft, bgs): 53-58

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1.5-90 lb bags

LOWER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 0.5-90 lb. bags

GROUT DETAILS

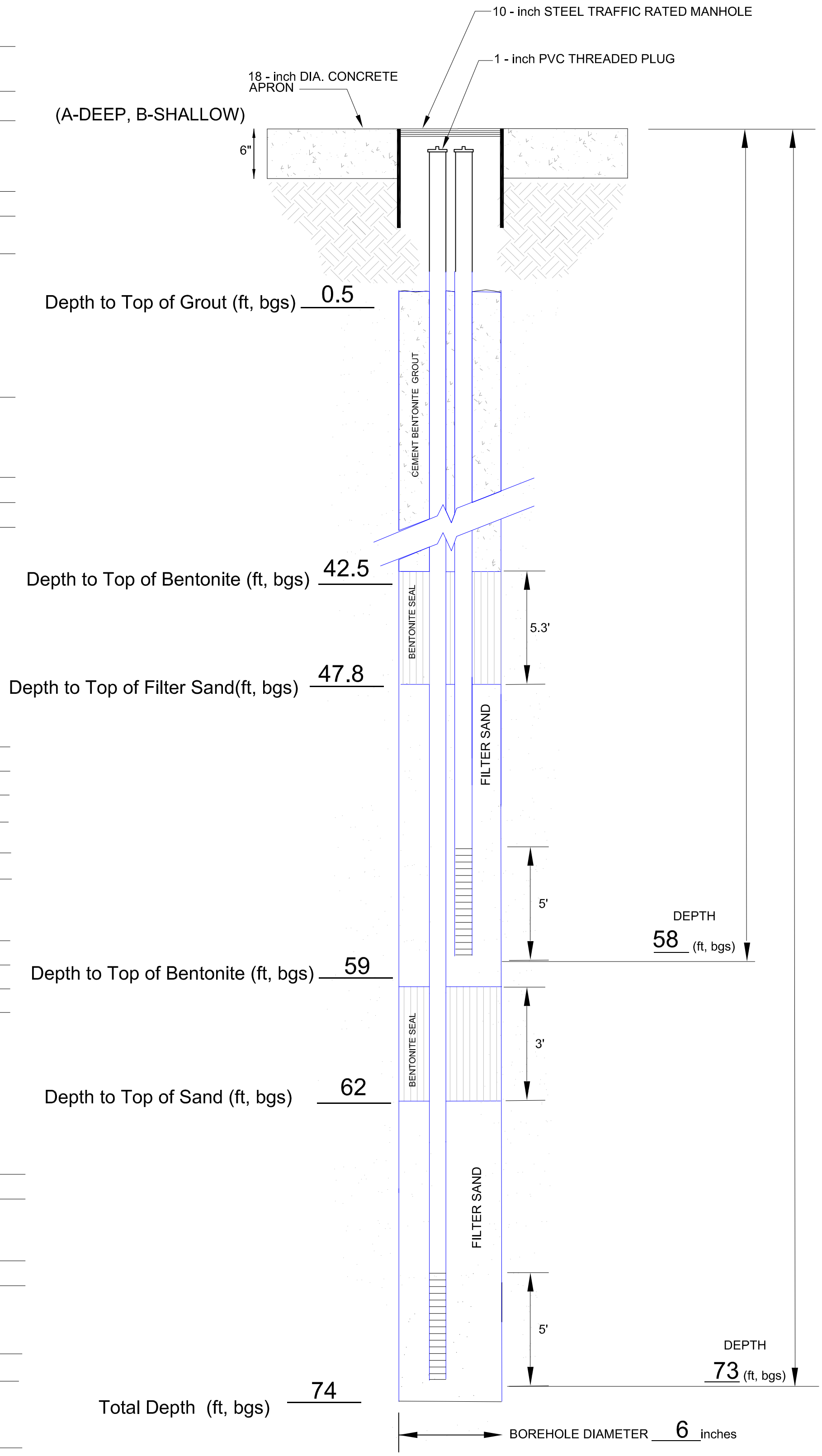
TYPE: Portland Type II Cement

AMOUNT: 6-90 lb. bags

NOTES:

TOC: Top of Casing

bgs: Below Ground Surface



VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-2 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. J. Sperry

LOCATION DATA

NORTHING 281365.95

EASTING 801274.81

PAD ELEVATION 294.15

INSTALLATION DETAILS

DATE COMPLETED: 6 / 26 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 71.6 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 65.3 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 50.4 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 65.3 - 70.3

(B) SCREEN RANGE (ft, bgs): 50.4 - 55.4

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4.5 - 50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4.5 - 50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8 inch chips

AMOUNT: 1-50 lb. bag

LOWER BENTONITE SEAL DETAILS

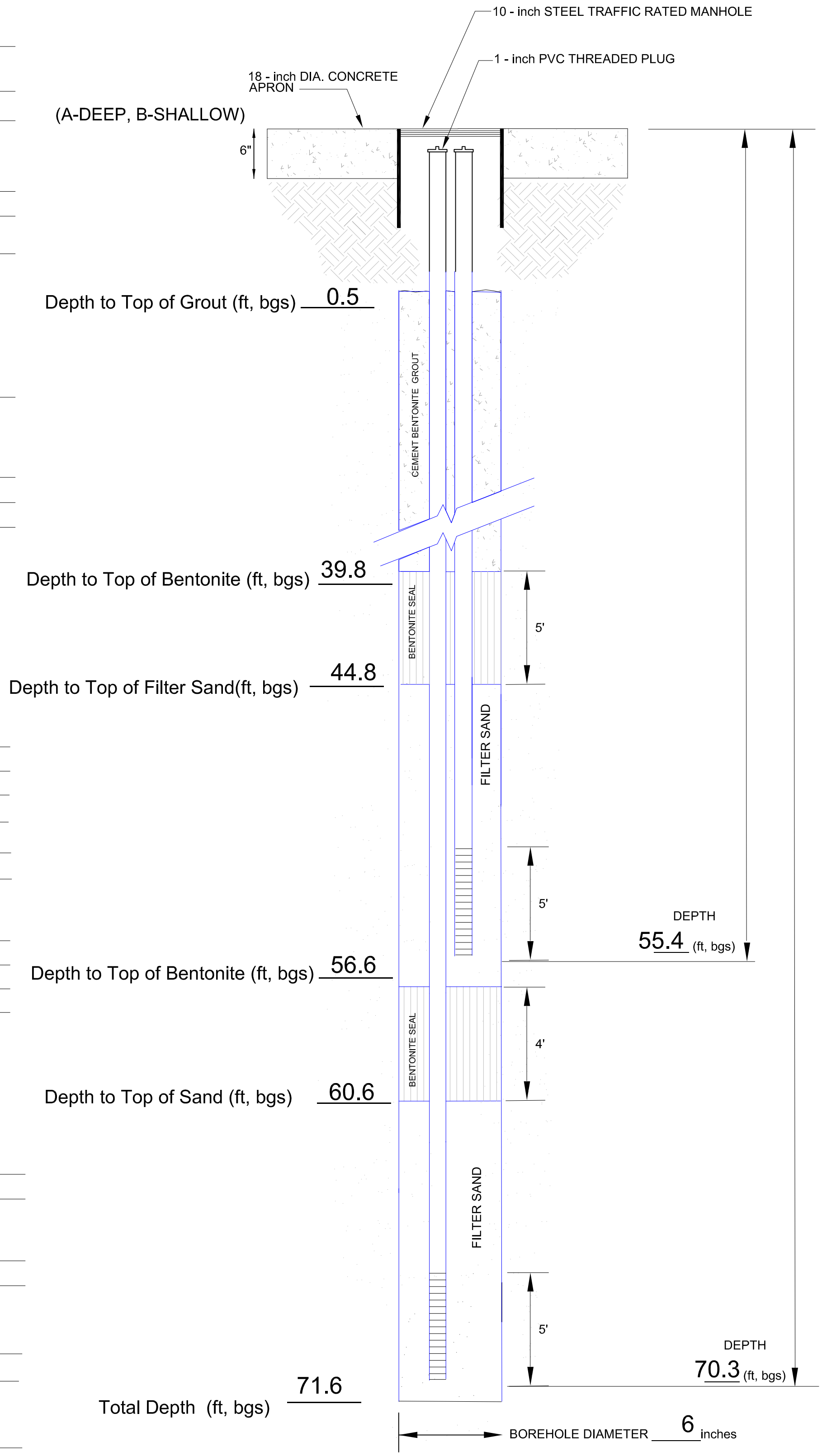
TYPE: 3/8 inch chips

AMOUNT: 1-50 lb. bag

GROUT DETAILS

TYPE: Portland Type II Cement

AMOUNT: 7 94-lb bags



NOTES:

TOC: Top of Casing

bgs: Below Ground Surface

VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-3 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. J. Sperry

LOCATION DATA

NORTHING 281275.1

EASTING 801166.21

PAD ELEVATION 290.69

INSTALLATION DETAILS

DATE COMPLETED: 6 / 21 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 70 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 64 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 49 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 64 - 69

(B) SCREEN RANGE (ft, bgs): 49 - 54

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50lb. bag

LOWER BENTONITE SEAL DETAILS

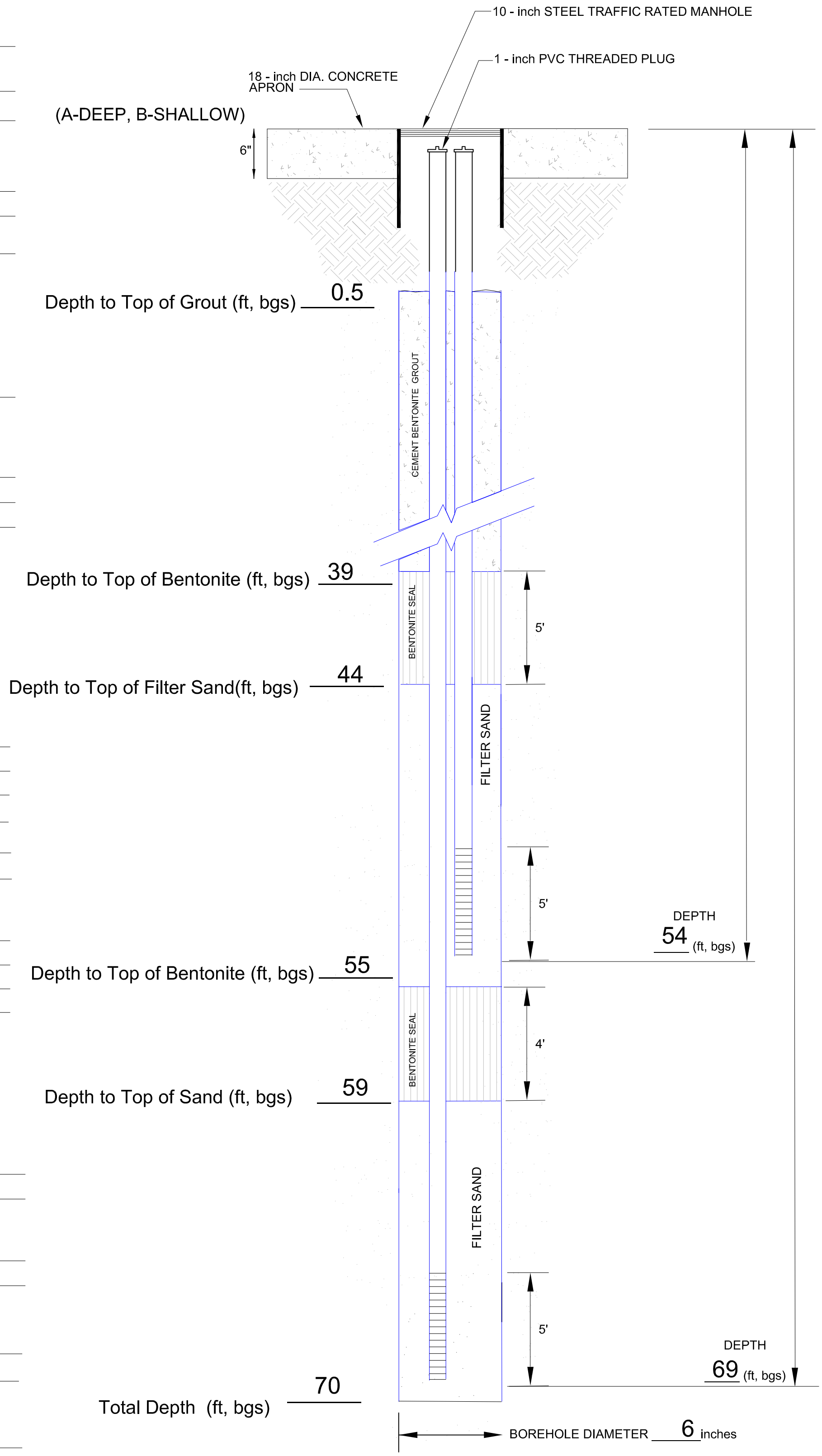
TYPE: 3/8-inch chips

AMOUNT: 1-50lb. bag

GROUT DETAILS

TYPE: Portland Type II Cement

AMOUNT: 4-94lb. bags



NOTES:

TOC: Top of Casing

bgs: Below Ground Surface

VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-4 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. S. Gillet

LOCATION DATA

NORTHING 281327.06

EASTING 801098.56

PAD ELEVATION 288.59

INSTALLATION DETAILS

DATE COMPLETED: 6 / 18 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 67.5 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 62 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 47 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 62 - 67

(B) SCREEN RANGE (ft, bgs): 47 - 52

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50lb. bag

LOWER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50lb. bag

GROUT DETAILS

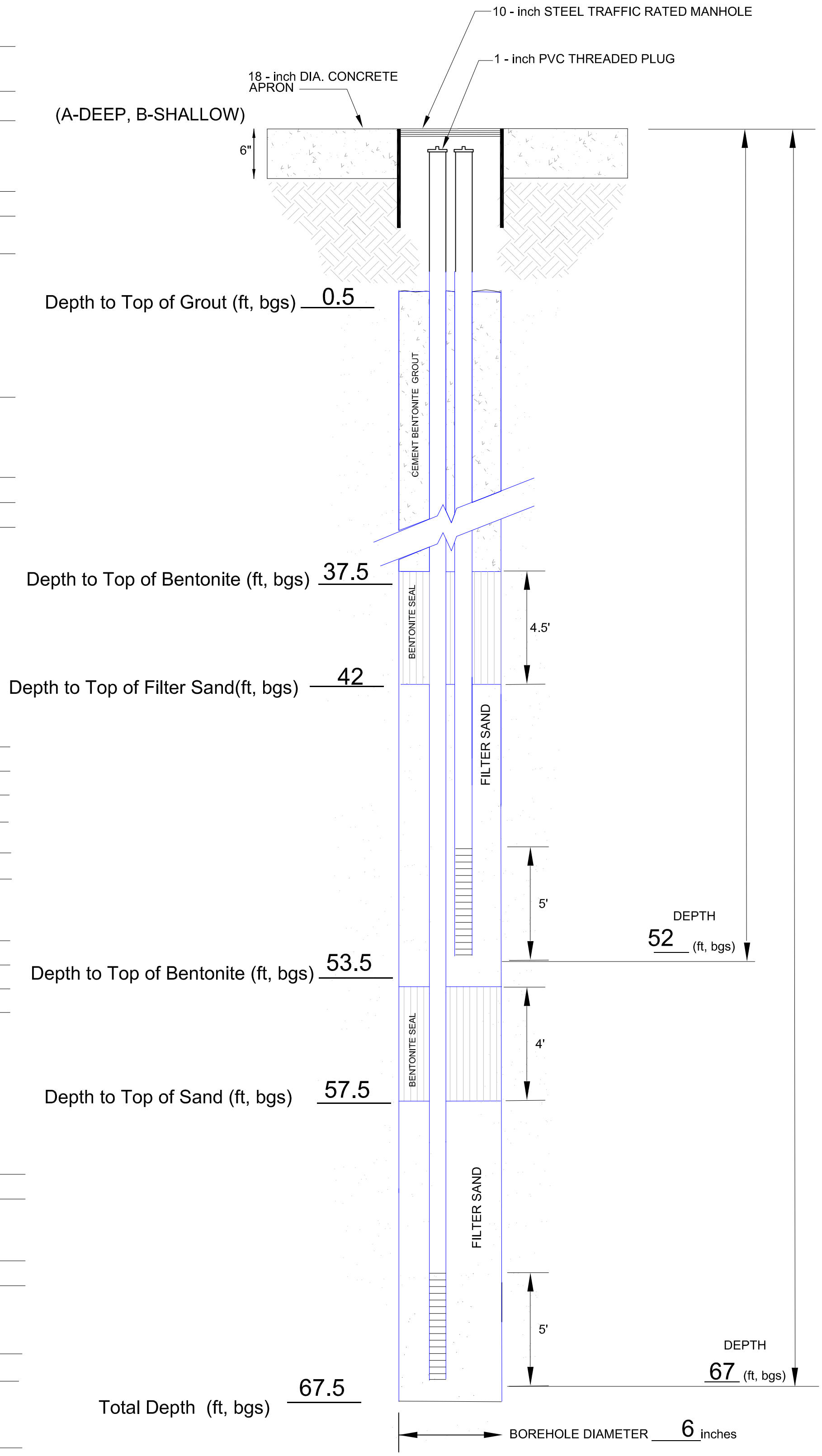
TYPE: Portland Type II Cement

AMOUNT: 4-94lb. bags

NOTES:

TOC: Top of Casing

bgs: Below Ground Surface



VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-5 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. J. Sperry

LOCATION DATA

NORTHING 281366.43

EASTING 801162.53

PAD ELEVATION 293.42

INSTALLATION DETAILS

DATE COMPLETED: 6 / 27 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 71 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 65.2 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 50 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 65.2 - 70.2

(B) SCREEN RANGE (ft, bgs): 50 - 55

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 5-50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4-50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1.5-50lb. bags

LOWER BENTONITE SEAL DETAILS

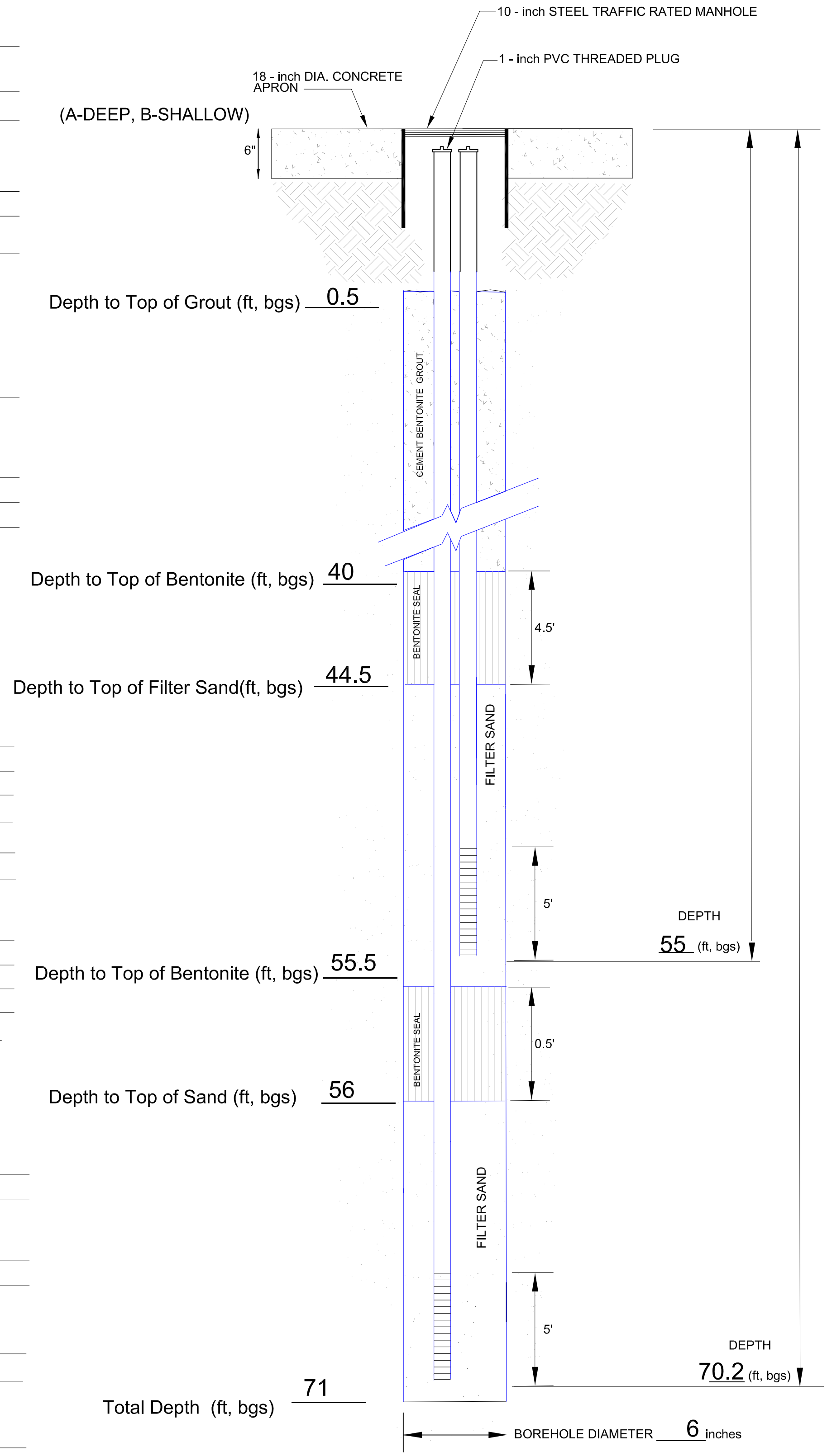
TYPE: 3/8-inch chips

AMOUNT: 0.5-50lb. bags

GROUT DETAILS

TYPE: Portland Type II Cement

AMOUNT: 3- 94lb. bags



NOTES:

TOC: Top of Casing

bgs: Below Ground Surface

Sands caved in borehole prior to installation of lower bentonite seal; only 0.5 feet of bentonite installed to avoid interference with upper VMP screen.

VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-6 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. S. Gillet

LOCATION DATA

NORTHING 281430.3

EASTING 800982.18

PAD ELEVATION 294.87

INSTALLATION DETAILS

DATE COMPLETED: 7 / 9 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 76 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 67 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 52 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 67 - 72

(B) SCREEN RANGE (ft, bgs): 52 - 57

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4-50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 7-50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50 lb. bag

LOWER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50 lb. bag

GROUT DETAILS

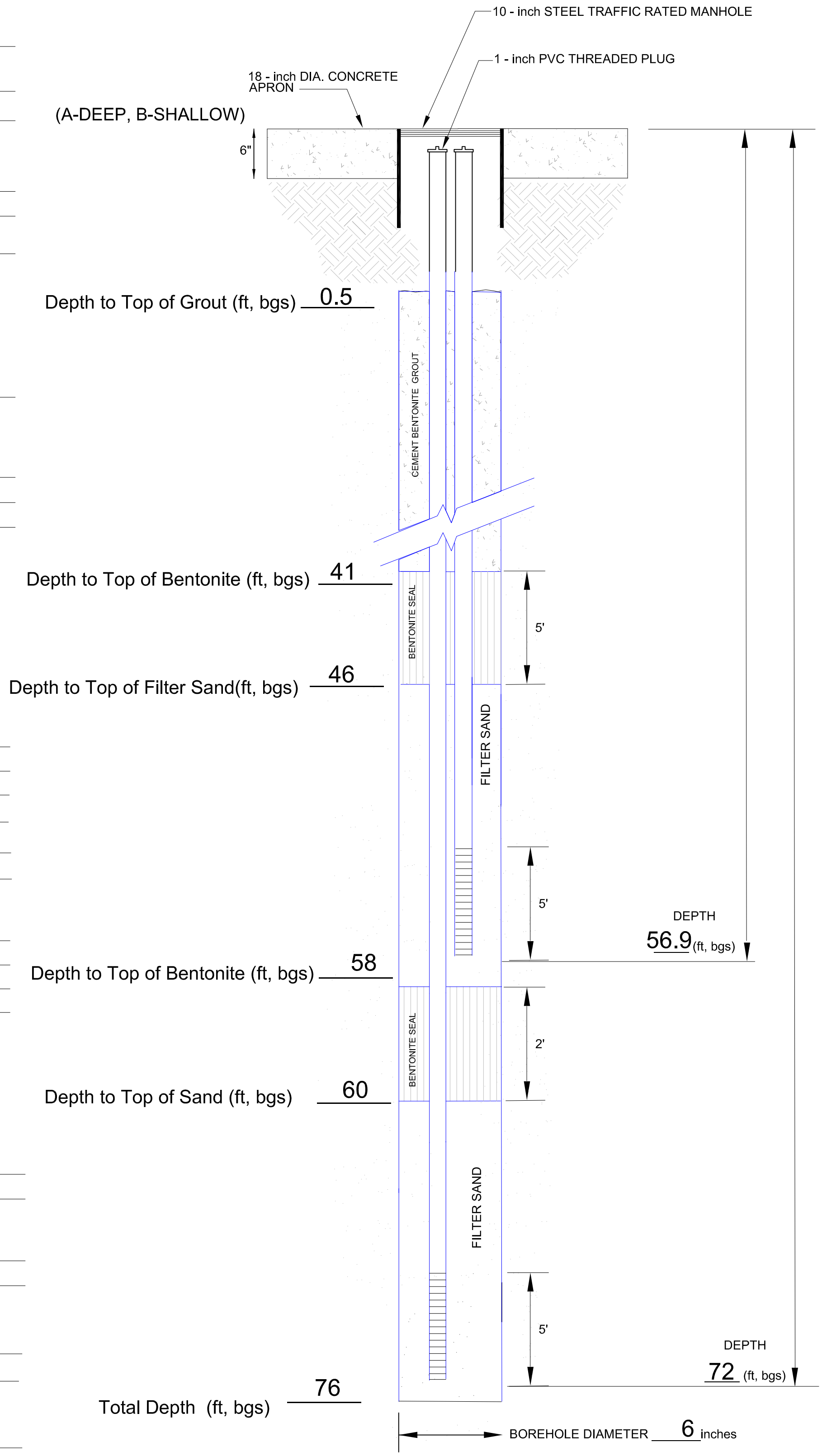
TYPE: Quickrete Portland and Gel Bentonite

AMOUNT: 70 gallons

NOTES:

TOC: Top of Casing

bgs: Below Ground Surface



VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-7 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. J. Sperry

LOCATION DATA

NORTHING 281366.09

EASTING 800896.51

PAD ELEVATION 287.55

INSTALLATION DETAILS

DATE COMPLETED: 6 / 20 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 66.5 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 60.4 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 44.8 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 60.4 - 65.4

(B) SCREEN RANGE (ft, bgs): 44.8 - 49.8

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4.5- 50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4.5- 50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50lb. bag

LOWER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50 lb. bag

GROUT DETAILS

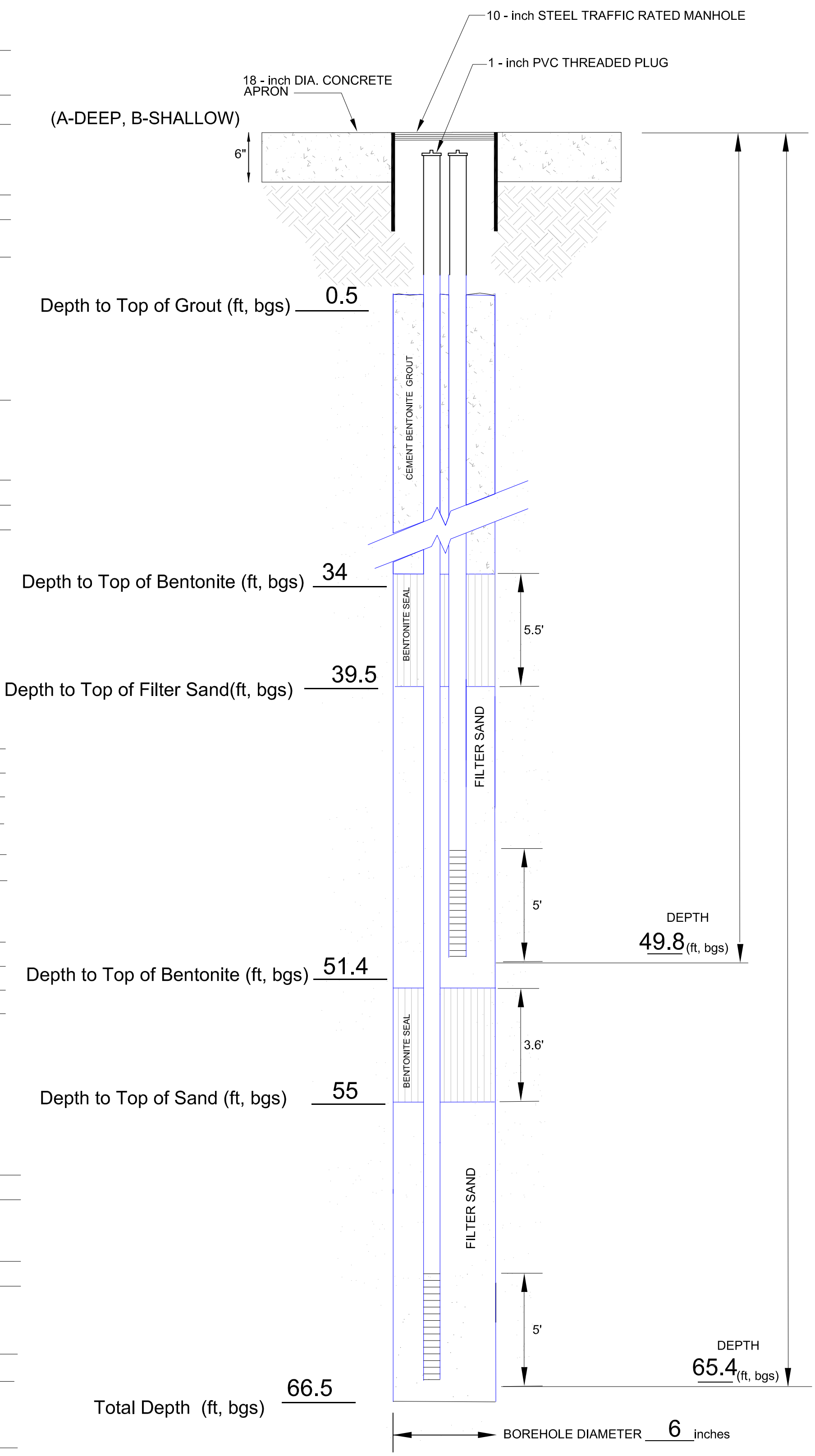
TYPE: Portland Type II Cement

AMOUNT: 7-94 lb. bags

NOTES:

TOC: Top of Casing

bgs: Below Ground Surface



VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-8 A/B

PROJECT: OFF DEPOT RA

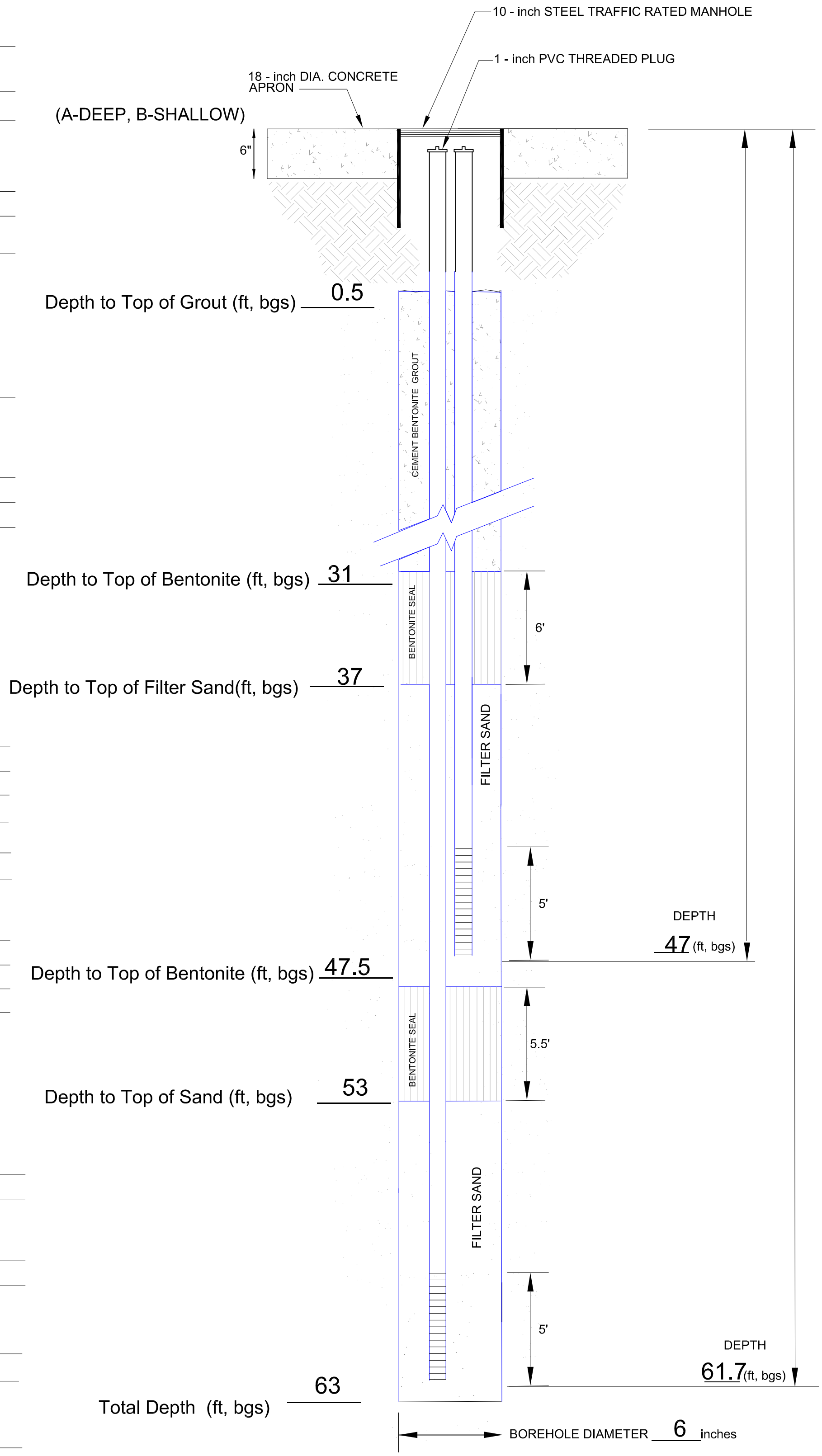
E2M FIELD REP. S. Gillet

LOCATION DATA

NORTHING 281255.49

EASTING 800988.72

PAD ELEVATION 284.27



INSTALLATION DETAILS

DATE COMPLETED: 6 / 20 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 63 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 56.7 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 42 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 56.7 - 61.7

(B) SCREEN RANGE (ft, bgs): 42 - 47

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 3.5-50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4-50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50 lb. bag

LOWER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1-50 lb. bag

GROUT DETAILS

TYPE: Portland cement Type I/II and powder bentonite

AMOUNT: 35 gallons

NOTES:

TOC: Top of Casing

bgs: Below Ground Surface

VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-9 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. S. Gillet

LOCATION DATA

NORTHING 281319.93

EASTING 801010.19

PAD ELEVATION 287.79

INSTALLATION DETAILS

DATE COMPLETED: 6 / 19 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 65.5 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 60 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 45 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 60 - 65

(B) SCREEN RANGE (ft, bgs): 45 - 50

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4-50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 4-50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1 - 50 lb. bag

LOWER BENTONITE SEAL DETAILS

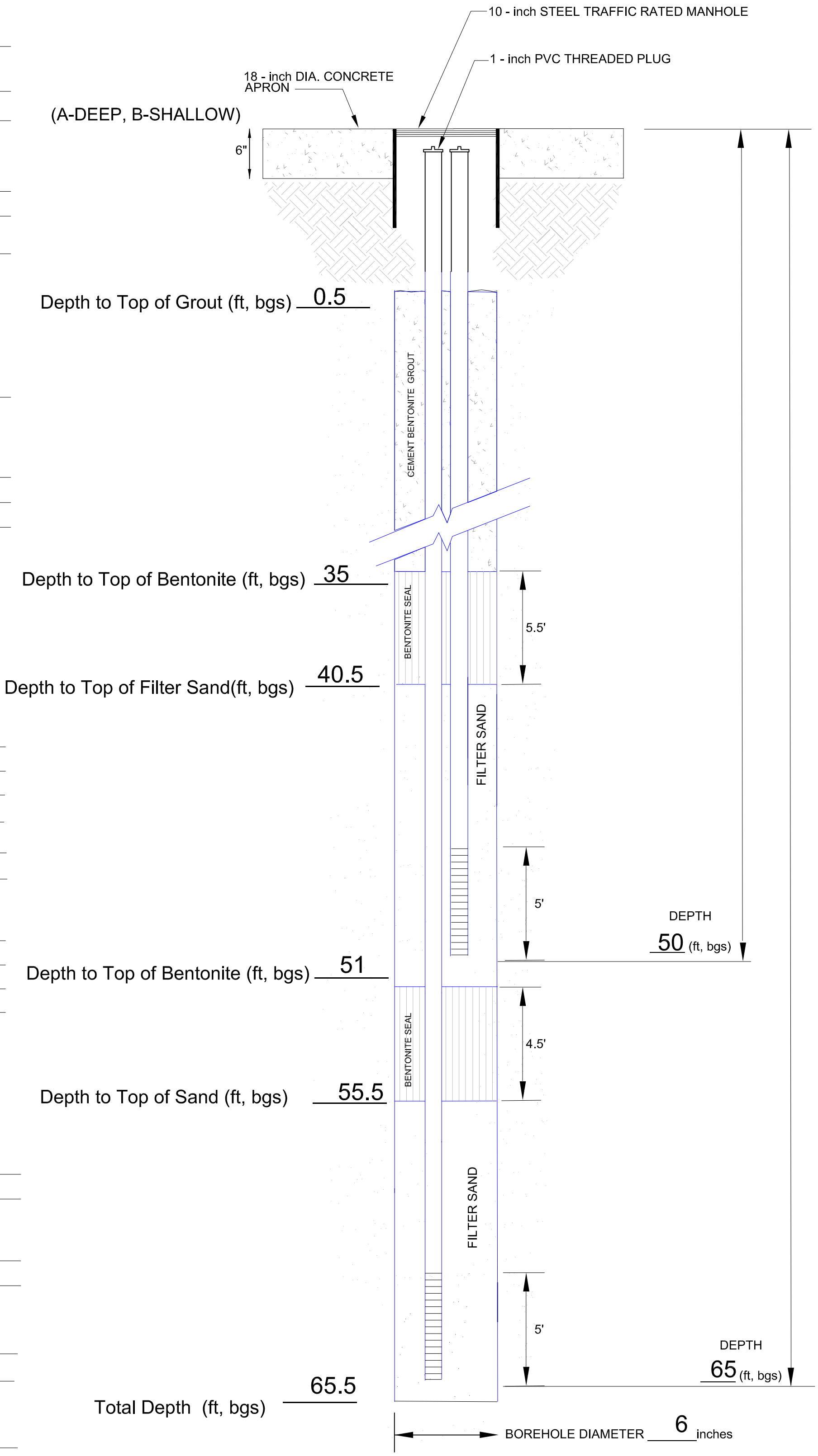
TYPE: 3/8-inch chips

AMOUNT: 1 - 50 lb. bag

GROUT DETAILS

TYPE: Portland cement Type I/II and powder bentonite

AMOUNT: 40 gallons



NOTES:

TOC: Top of Casing

bgs: Below Ground Surface

VAPOR MONITORING POINT INSTALLATION DIAGRAM
OFF DEPOT GROUNDWATER RA
Defense Depot Memphis, Tennessee

WELL ID: VMP-10 A/B

PROJECT: OFF DEPOT RA

E2M FIELD REP. J. Sperry

LOCATION DATA

NORTHING 281261.38

EASTING 800867.39

PAD ELEVATION 282.27

INSTALLATION DETAILS

DATE COMPLETED: 6 / 19 / 2009

DRILLING CONTRACTOR WDC

DRILLING TECHNIQUE SONIC

DRILL ROD SIZE AND TYPE 4-inchX6-inch

BOREHOLE DETAILS

TOTAL DEPTH: 61 feet

DIAMETER: 6 inches

RISER DETAILS (A-DEEP, B-SHALLOW)

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

(A) DIAMETER: 1 inch

(A) LENGTH: 55 feet

(B) DIAMETER: 1 inch

(B) LENGTH: 40 feet

SCREEN DETAILS

MANUFACTURER: BOART LONGYEAR

MATERIAL: PVC

SLOT SIZE: 0.010 inch

DIAMETER: 1 inch

LENGTH: 5 feet

(A) SCREEN RANGE (ft, bgs): 55 - 60

(B) SCREEN RANGE (ft, bgs): 40 - 45

UPPER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 7 - 50 lb. bags

LOWER FILTER SAND DETAILS

TYPE/GRADATION: Silica sand 10/20

AMOUNT(UNITS): 7.5 - 50 lb. bags

UPPER BENTONITE SEAL DETAILS

TYPE: 3/8-inch chips

AMOUNT: 1 - 50 lb. bag

LOWER BENTONITE SEAL DETAILS

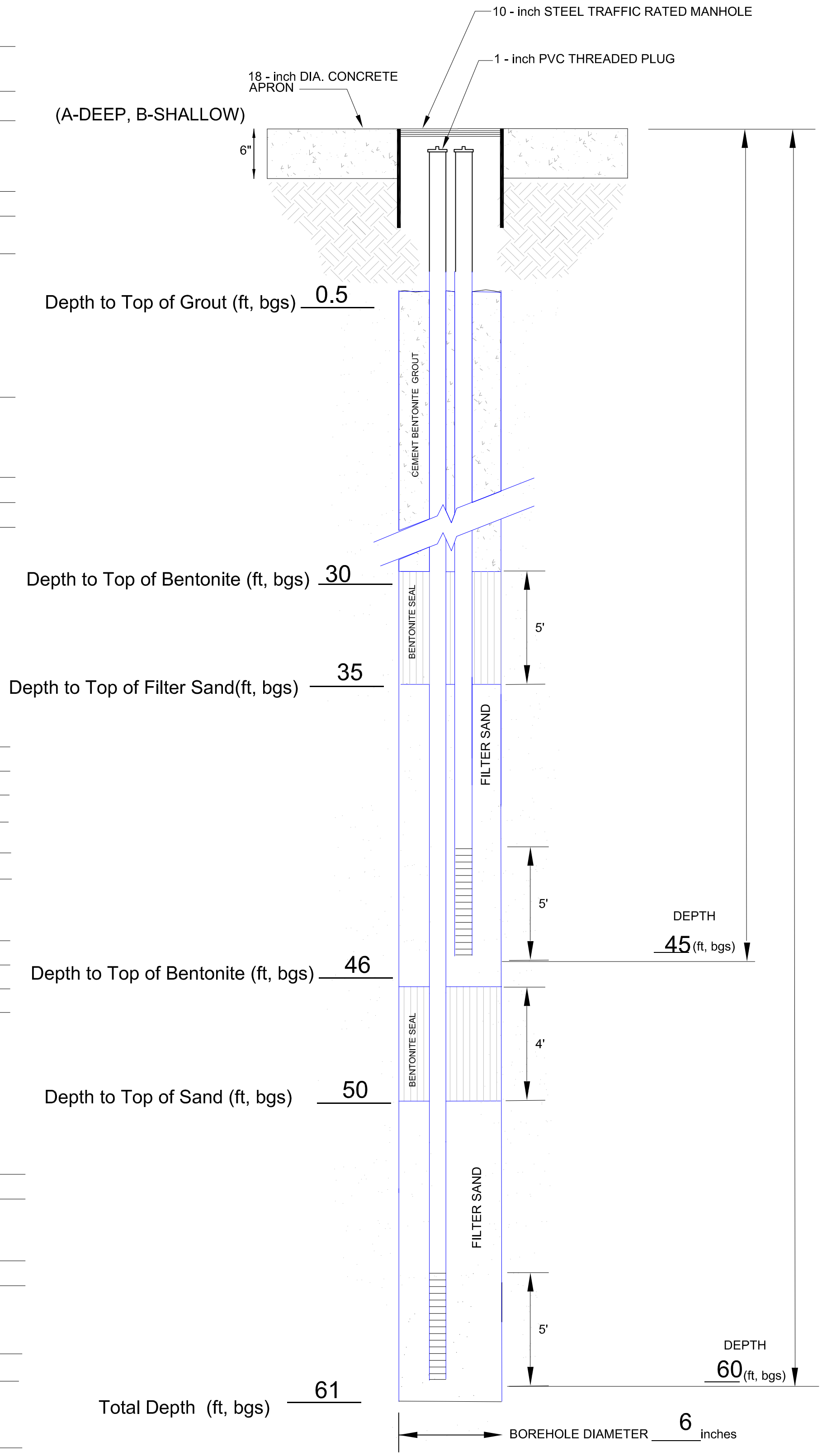
TYPE: 3/8-inch chips

AMOUNT: 1 - 50 lb. bag

GROUT DETAILS

TYPE: Portland Type II Cement

AMOUNT: 4 - 94 lb. bags



NOTES:

TOC: Top of Casing

bgs: Below Ground Surface

APPENDIX C

ANALYTICAL RESULTS

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-54	MW-70	MW-76	MW-77	MW-79
	Lab ID	L09060246-02	L09070713-01	L09070713-04	L09070713-05	L09060246-18
	Date	6/8/2009	7/30/2009	7/30/2009	7/30/2009	6/8/2009
	Units					
1,1,1,2-Tetrachloroethane	µg/L	<1	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<2	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	842	0.594	1.11	27.2	<0.5
1,1,2-Trichloroethane	µg/L	4.15	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<2	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<2	<1	<1	<1	1.17
1,1-Dichloropropene	µg/L	<2	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<2	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<2	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<2	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<2	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<4	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<2	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<2	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<1	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<2	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<2	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<2	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.8	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<1	<0.5	<0.5	<0.5	0.168 B
1-Chlorohexane	µg/L	<2	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<2	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<2	<1	<1	<1	<1
2-Hexanone	µg/L	<20	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<2	<1	<1	<1	<1
Acetone	µg/L	19.2 J	10.7 JB	14.6 B	21.4 B	18.4
Benzene	µg/L	<0.8	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<2	<1	<1	<1	<1
Bromochloromethane	µg/L	<2	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<2	<1	<1	<1	<1
Bromomethane	µg/L	<2	<1	<1	<1	<1
Carbon disulfide	µg/L	<2	<1	<1	<1	<1
Carbon tetrachloride	µg/L	0.745 J	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<2	<1	<1	<1	<1
Chloroform	µg/L	3.15	<0.3	0.146 J	0.153 J	<0.3
Chloromethane	µg/L	<2	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	25.9	<1	<1	0.52 J	<1
cis-1,3-Dichloropropene	µg/L	<1	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<1	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<2	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<2	<1	<1	<1	<1
Ethylbenzene	µg/L	<2	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1.2	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<2	<1	<1	<1	<1
m-,p-Xylene	µg/L	<4	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<20	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<10	<5	<5	<5	<5
Methylene chloride	µg/L	<2	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<20	<10	<10	<10	<10
Naphthalene	µg/L	<2	<1	<1	<1	<1
n-Butylbenzene	µg/L	<2	<1	<1	<1	<1
n-Propylbenzene	µg/L	<2	<1	<1	<1	<1
o-Xylene	µg/L	<2	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<2	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<2	<1	<1	<1	<1
Styrene	µg/L	<2	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<2	<1	<1	<1	<1
Tetrachloroethene	µg/L	5.01	0.582 J	0.444 J	0.619 J	0.536 J
Toluene	µg/L	<2	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	4.1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<2	<1	<1	<1	<1
Trichloroethene	µg/L	744	2.66	3.26	23.6	0.501 J
Trichlorofluoromethane	µg/L	<2	<1	<1	<1	<1
Vinyl acetate	µg/L	<10	<5	<5	<5	<5
Vinyl chloride	µg/L	<2	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-148	MW-149	MW-150	MW-150 DUP	MW-151
	Lab ID	L09060246-04	L09060246-06	L09060246-01	L09060246-20	L09060246-12
	Date	6/8/2009	6/8/2009	6/8/2009	6/8/2009	6/8/2009
Analyte	**Units**					
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<2.5	<2.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<5	<5	<1
1,1,2,2-Tetrachloroethane	µg/L	0.263 J	8.51	618	635	<0.5
1,1,2-Trichloroethane	µg/L	<1	0.355 J	3.21 J	3.48 J	<1
1,1-Dichloroethane	µg/L	<1	<1	<5	<5	<1
1,1-Dichloroethene	µg/L	<1	<1	<5	<5	<1
1,1-Dichloropropene	µg/L	<1	<1	<5	<5	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<5	<5	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<5	<5	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<5	<5	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<5	<5	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<10	<10	<2
1,2-Dibromoethane	µg/L	<1	<1	<5	<5	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<5	<5	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<2.5	<2.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<5	<5	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<5	<5	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<5	<5	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<2	<2	<0.4
1,4-Dichlorobenzene	µg/L	0.204 B	0.14 B	<2.5	<2.5	0.128 B
1-Chlorohexane	µg/L	<1	<1	<5	<5	<1
2,2-Dichloropropane	µg/L	<1	<1	<5	<5	<1
2-Chlorotoluene	µg/L	<1	<1	<5	<5	<1
2-Hexanone	µg/L	<10	<10	<50	<50	<10
4-Chlorotoluene	µg/L	<1	<1	<5	<5	<1
Acetone	µg/L	5.57 J	18.8	20.6 J	16.8 J	18.3
Benzene	µg/L	<0.4	<0.4	<2	<2	<0.4
Bromobenzene	µg/L	<1	<1	<5	<5	<1
Bromochloromethane	µg/L	<1	<1	<5	<5	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<2.5	<2.5	<0.5
Bromoform	µg/L	<1	<1	<5	<5	<1
Bromomethane	µg/L	<1	<1	<5	<5	<1
Carbon disulfide	µg/L	<1	<1	<5	<5	<1
Carbon tetrachloride	µg/L	<1	4.46	<5	<5	0.774 J
Chlorobenzene	µg/L	<0.5	<0.5	<2.5	<2.5	<0.5
Chloroethane	µg/L	<1	<1	<5	<5	<1
Chloroform	µg/L	0.137 J	31.7	<1.5	<1.5	1.81
Chloromethane	µg/L	<1	<1	<5	<5	<1
cis-1,2-Dichloroethene	µg/L	<1	2.24	6.26	6.16	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<2.5	<2.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<2.5	<2.5	<0.5
Dibromomethane	µg/L	<1	<1	<5	<5	<1
Dichlorodifluoromethane	µg/L	<1	<1	<5	<5	<1
Ethylbenzene	µg/L	<1	<1	<5	<5	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<3	<3	<0.6
Isopropylbenzene	µg/L	<1	<1	<5	<5	<1
m-,p-Xylene	µg/L	<2	<2	<10	<10	<2
MEK (2-Butanone)	µg/L	<10	<10	<50	<50	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<25	<25	<5
Methylene chloride	µg/L	<1	<1	<5	<5	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<50	<50	<10
Naphthalene	µg/L	<1	<1	<5	<5	<1
n-Butylbenzene	µg/L	<1	<1	<5	<5	<1
n-Propylbenzene	µg/L	<1	<1	<5	<5	<1
o-Xylene	µg/L	<1	<1	<5	<5	<1
p-Isopropyltoluene	µg/L	<1	<1	<5	<5	<1
sec-Butylbenzene	µg/L	<1	<1	<5	<5	<1
Styrene	µg/L	<1	<1	<5	<5	<1
tert-Butylbenzene	µg/L	<1	<1	<5	<5	<1
Tetrachloroethene	µg/L	0.36 J	0.776 J	3.36 J	3.38 J	<1
Toluene	µg/L	<1	<1	<5	<5	<1
trans-1,2-Dichloroethene	µg/L	<1	0.382 J	<5	<5	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<5	<5	<1
Trichloroethene	µg/L	1.78	24.9	311	307	5.1
Trichlorofluoromethane	µg/L	<1	<1	<5	<5	<1
Vinyl acetate	µg/L	<5	<5	<25	<25	<5
Vinyl chloride	µg/L	<1	<1	<5	<5	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-151 DUP / L09060246-21 / 6/8/2009	MW-152 / L09060246-17 / 6/8/2009	MW-155 / L09060246-03 / 6/8/2009	MW-157 / L09070713-06 / 7/30/2009	MW-158 / L09060246-15 / 6/8/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<1	<5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<2	<10	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	3.33	1610	5.06	5.84
1,1,2-Trichloroethane	µg/L	<1	<2	5.28 J	<1	<1
1,1-Dichloroethane	µg/L	<1	<2	<10	<1	<1
1,1-Dichloroethene	µg/L	<1	<2	<10	<1	<1
1,1-Dichloropropene	µg/L	<1	<2	<10	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<2	<10	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<2	<10	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<2	<10	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<2	<10	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<4	<20	<2	<2
1,2-Dibromoethane	µg/L	<1	<2	<10	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<2	<10	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<1	<5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<2	<10	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<2	<10	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<2	<10	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.8	<4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	0.158 B	<1	<5	0.167 B	<0.5
1-Chlorohexane	µg/L	<1	<2	<10	<1	<1
2,2-Dichloropropane	µg/L	<1	<2	<10	<1	<1
2-Chlorotoluene	µg/L	<1	<2	<10	<1	<1
2-Hexanone	µg/L	<10	<20	<100	<10	<10
4-Chlorotoluene	µg/L	<1	<2	<10	<1	<1
Acetone	µg/L	19.2	19.3 J	<100	33.9 B	17.9
Benzene	µg/L	<0.4	<0.8	<4	<0.4	<0.4
Bromobenzene	µg/L	<1	<2	<10	<1	<1
Bromochloromethane	µg/L	<1	<2	<10	<1	<1
Bromodichloromethane	µg/L	<0.5	<1	<5	<0.5	<0.5
Bromoform	µg/L	<1	<2	<10	<1	<1
Bromomethane	µg/L	<1	<2	<10	<1	<1
Carbon disulfide	µg/L	<1	<2	<10	<1	<1
Carbon tetrachloride	µg/L	0.65 J	<2	<10	3.35	<1
Chlorobenzene	µg/L	<0.5	<1	<5	<0.5	<0.5
Chloroethane	µg/L	<1	<2	<10	<1	<1
Chloroform	µg/L	1.76	2.03	<3	9.88	0.758
Chloromethane	µg/L	<1	<2	<10	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	39.9	16	12	11.6
cis-1,3-Dichloropropene	µg/L	<0.5	<1	<5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<1	<5	<0.5	<0.5
Dibromomethane	µg/L	<1	<2	<10	<1	<1
Dichlorodifluoromethane	µg/L	<1	<2	<10	<1	<1
Ethylbenzene	µg/L	<1	<2	<10	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<1.2	<6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<2	<10	<1	<1
m-,p-Xylene	µg/L	<2	<4	<20	<2	<2
MEK (2-Butanone)	µg/L	<10	<20	<100	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<10	<50	<5	<5
Methylene chloride	µg/L	<1	<2	<10	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<20	<100	<10	<10
Naphthalene	µg/L	<1	<2	<10	<1	<1
n-Butylbenzene	µg/L	<1	<2	<10	<1	<1
n-Propylbenzene	µg/L	<1	<2	<10	<1	<1
o-Xylene	µg/L	<1	<2	<10	<1	<1
p-Isopropyltoluene	µg/L	<1	<2	<10	<1	<1
sec-Butylbenzene	µg/L	<1	<2	<10	<1	<1
Styrene	µg/L	<1	<2	<10	<1	<1
tert-Butylbenzene	µg/L	<1	<2	<10	<1	<1
Tetrachloroethene	µg/L	<1	7.4	7.03 J	2.05	3.88
Toluene	µg/L	<1	<2	<10	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	13.1	<10	2.64	2.76
trans-1,3-Dichloropropene	µg/L	<1	<2	<10	<1	<1
Trichloroethene	µg/L	4.41	241	643	205	141
Trichlorofluoromethane	µg/L	<1	<2	<10	<1	<1
Vinyl acetate	µg/L	<5	<10	<50	<5	<5
Vinyl chloride	µg/L	<1	<2	<10	<1	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MW-158A L09060246-16 6/8/2009	MW-159 L09060246-11 6/8/2009	MW-160 L09060246-05 6/8/2009	MW-161 L09070713-07 7/30/2009	MW-162 L09070713-08 7/30/2009
1,1,1,2-Tetrachloroethane	µg/L	<1	<5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<2	<10	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	255	366	118	75.9	24.1
1,1,2-Trichloroethane	µg/L	5.1	92.2	0.49 J	<1	<1
1,1-Dichloroethane	µg/L	<2	<10	<1	<1	<1
1,1-Dichloroethene	µg/L	<2	<10	<1	<1	<1
1,1-Dichloropropene	µg/L	<2	<10	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<2	<10	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<2	<10	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<2	<10	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<2	<10	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<4	<20	<2	<2	<2
1,2-Dibromoethane	µg/L	<2	<10	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<2	<10	<1	<1	<1
1,2-Dichloroethane	µg/L	<1	<5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<2	<10	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<2	<10	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<2	<10	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.8	<4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<1	<5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<2	<10	<1	<1	<1
2,2-Dichloropropane	µg/L	<2	<10	<1	<1	<1
2-Chlorotoluene	µg/L	<2	<10	<1	<1	<1
2-Hexanone	µg/L	<20	<100	<10	<10	<10
4-Chlorotoluene	µg/L	<2	<10	<1	<1	<1
Acetone	µg/L	18.9 J	<100	18	20.6 B	19.8 B
Benzene	µg/L	<0.8	<4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<2	<10	<1	<1	<1
Bromochloromethane	µg/L	<2	<10	<1	<1	<1
Bromodichloromethane	µg/L	<1	<5	<0.5	<0.5	<0.5
Bromoform	µg/L	<2	<10	<1	<1	<1
Bromomethane	µg/L	<2	<10	<1	<1	<1
Carbon disulfide	µg/L	<2	<10	<1	<1	<1
Carbon tetrachloride	µg/L	<2	<10	<1	<1	<1
Chlorobenzene	µg/L	<1	<5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<2	<10	<1	<1	<1
Chloroform	µg/L	0.876	<3	0.811	0.22 J	0.142 J
Chloromethane	µg/L	<2	<10	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	64.2	248	1.23	1.34	<1
cis-1,3-Dichloropropene	µg/L	<1	<5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<1	<5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<2	<10	<1	<1	<1
Dichlorodifluoromethane	µg/L	<2	<10	<1	<1	<1
Ethylbenzene	µg/L	<2	<10	<1	<1	<1
Hexachlorobutadiene	µg/L	<1.2	<6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<2	<10	<1	<1	<1
m-,p-Xylene	µg/L	<4	<20	<2	<2	<2
MEK (2-Butanone)	µg/L	<20	<100	<10	<10	3.4 J
Methyl t-butyl ether (MTBE)	µg/L	<10	<50	<5	<5	<5
Methylene chloride	µg/L	<2	<10	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<20	<100	<10	<10	<10
Naphthalene	µg/L	<2	<10	<1	<1	<1
n-Butylbenzene	µg/L	<2	<10	<1	<1	<1
n-Propylbenzene	µg/L	<2	<10	<1	<1	<1
o-Xylene	µg/L	<2	<10	<1	<1	<1
p-Isopropyltoluene	µg/L	<2	<10	<1	<1	<1
sec-Butylbenzene	µg/L	<2	<10	<1	<1	<1
Styrene	µg/L	<2	<10	<1	<1	<1
tert-Butylbenzene	µg/L	<2	<10	<1	<1	<1
Tetrachloroethene	µg/L	2.92	6.24 J	1.34	0.984 J	0.374 J
Toluene	µg/L	<2	<10	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	3.6	17.5	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<2	<10	<1	<1	<1
Trichloroethene	µg/L	304	1280	21.8	45.3	15.4
Trichlorofluoromethane	µg/L	<2	<10	<1	<1	<1
Vinyl acetate	µg/L	<10	<50	<5	<5	<5
Vinyl chloride	µg/L	2.82	3.83 J	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MW-162 DUP L09070713-12 7/30/2009	MW-163 L09070713-09 7/30/2009	MW-164 L09070713-10 7/30/2009	MW-165 L09060246-13 6/8/2009	MW-165A L09060246-14 6/8/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	25.2	131	26.3	5.28	1.1
1,1,2-Trichloroethane	µg/L	<1	0.369 J	1.27	0.652 J	0.388 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	0.255 J	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	0.486 B	0.418 B	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1
Acetone	µg/L	20.4 B	<10	18.5 B	18	18.6
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	8.71	2.93	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	0.142 J	0.4	79.5	13.5	1.94
Chloromethane	µg/L	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	0.291 J	3.22	20.2	13.8	5.3
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	3.49 J	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	0.467 J	1.23	1.52	1.93	0.906 J
Toluene	µg/L	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	0.327 J	1.99	2.2	0.964 J
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	15.1	87.1	98.2	111	91.5
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-166 / L09060246-07 / 6/8/2009	MW-166A / L09060246-08 / 6/8/2009	MW-169 / L09060246-19 / 6/8/2009	MW-232 / L09070713-20 / 7/29/2009	MW-241 / L09070713-17 / 7/28/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	17.9	1.92	<0.5	<0.5	16.8
1,1,2-Trichloroethane	µg/L	0.729 J	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	0.147 B	0.18 B	0.526 B	0.269 B	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1
Acetone	µg/L	20.7	17.7	14.7	17.4 B	<10
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	12.3	5	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	2.32	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	95.8	16.4	<0.3	<0.3	0.227 J
Chloromethane	µg/L	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	5.57	1.85	0.4 J	0.326 J	0.262 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	2.87 J	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	0.226 B	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	2.07	0.725 J	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	1.17	0.42 J	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	63.3	22.1	<1	0.393 J	3.23
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	<1	<1	<1	1.51	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-242	MW-243	MW-244	MW-245	MW-246	MW-246 DUP
	Lab ID	L09070713-21	L09070713-18	L09070713-25	L09070713-19	L09070713-14	L09070713-16
	Date	7/29/2009	7/28/2009	7/30/2009	7/28/2009	7/27/2009	7/27/2009
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	1040	90	1620	312	1140	1140
1,1,2-Trichloroethane	µg/L	8	3.04	14.5	8.03	29.4	29.6
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	6.73	2.03	36.2	36.7
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	0.29 J	0.299 J
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	<10	<10	<10	<10	<10	<10
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.897	0.315	1.55	0.438	0.829	0.812
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	21.6	11.4	53.3	46.1	375	340
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	4.54	2.77	3.17	6.38	5.3	4.99
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	3.99	3.75	5.4	14.1	18.1	18.1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	308	146	346	473	1000	899
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	<1	<1	5.45	0.503 J	19.1	19.1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-1
GROUNDWATER ANALYTICAL RESULTS, BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	**Well ID** / **Lab ID** / **Date** / **Units**	MW-247	MW-248	MW-249	MW-250	MW-251
	Lab ID	L09070713-11	L09070713-15	L09070713-22	L09070713-23	L09070713-24
	Date	7/30/2009	7/27/2009	7/29/2009	7/29/2009	7/29/2009
Analyte	**Units**					
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	0.378 J
1,1,2,2-Tetrachloroethane	µg/L	27.3	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	1.67	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	0.47 J
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	3.33
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	0.54	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1
Acetone	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	5.85	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	193	<0.3	<0.3	<0.3	0.313
Chloromethane	µg/L	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	14.3	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5
Methylene chloride	µg/L	0.767 B	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	3.81	<1	<1	<1	0.572 J
Toluene	µg/L	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	2.38	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	134	<1	<1	<1	0.707 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.
B: Analyte detected in associated blank

TABLE C-2
VAPOR ANALYTICAL RESULTS, VI BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Sample ID Lab ID Date units	VI-1A-BASE JA28198-1 9/14/2009	VI-1B-BASE JA28198-2 9/14/2009	VI-2A-BASE JA28198-3 9/14/2009	VI-2B-BASE JA28198-4 9/14/2009	VI-3A-BASE JA28198-9 9/15/2009	VI-3B-BASE JA28198-11 9/15/2009	VMP-4A-BASE-1L JA28198-5 9/14/2009
1,1,1-Trichloroethane	μg/m³	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<49
1,1,2,2-Tetrachloroethane	μg/m³	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	1420
1,1,2-Trichloroethane	μg/m³	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<49
1,1-Dichloroethane	μg/m³	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<36
1,1-Dichloroethylene	μg/m³	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<36
1,2,4-Trichlorobenzene	μg/m³	<5.9	<5.9	<5.9	<5.9	<5.9	<5.9	<67
1,2,4-Trimethylbenzene	μg/m³	97.8	3 J	9.3	30	<3.9	<3.9	<44
1,2-Dibromoethane	μg/m³	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<69
1,2-Dichloroethane	μg/m³	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<36
1,2-Dichloropropane	μg/m³	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7	<42
1,3,5-Trimethylbenzene	μg/m³	29	<3.9	2.6 J	12	<3.9	<3.9	<44
1,3-Butadiene	μg/m³	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<20
1,4-Dioxane	μg/m³	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<32
2,2,4-Trimethylpentane	μg/m³	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7	<42
2-Chlorotoluene	μg/m³	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<47
2-Hexanone	μg/m³	6.1	<3.3	<3.3	<3.3	<3.3	<3.3	<37
3-Chloropropene	μg/m³	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<28
4-Ethyltoluene	μg/m³	13	<3.9	<3.9	3.2 J	<3.9	<3.9	<44
Acetone	μg/m³	105	42	29.2	24	15	35.4	37.1
Benzene	μg/m³	1.7 J	<2.6	<2.6	<2.6	1.6 J	4.8	<29
Benzyl Chloride	μg/m³	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<46
Bromodichloromethane	μg/m³	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<60
Bromoethene	μg/m³	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<39
Bromoform	μg/m³	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<93
Bromomethane	μg/m³	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<35
Carbon disulfide	μg/m³	6.5	3.7	5	7.2	<2.5	1.5 J	<28
Carbon tetrachloride	μg/m³	<5	<5	<5	<5	<5	<5	<57
Chlorobenzene	μg/m³	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7	<41
Chloroethane	μg/m³	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<24
Chloroform	μg/m³	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<44
Chloromethane	μg/m³	<1.7	<1.7	<1.7	1.6 J	1.8	1.9	<19
cis-1,2-Dichloroethylene	μg/m³	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	801
cis-1,3-Dichloropropene	μg/m³	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<41
Cyclohexane	μg/m³	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<31
Dibromochloromethane	μg/m³	<6.8	<6.8	<6.8	<6.8	<6.8	<6.8	<77
Dichlorodifluoromethane	μg/m³	2.8 J	2.9 J	3 J	2.6 J	3.1 J	3.7 J	<45
Ethanol	μg/m³	30.7	53.1	<3.8	23.4	12 J	123	<41
Ethyl Acetate	μg/m³	<2.9	<2.9	<2.9	<2.9	<2.9	118	<32
Ethylbenzene	μg/m³	15	<3.5	2.3 J	4	<3.5	1.7 J	<39
Freon 113	μg/m³	<6.1	<6.1	<6.1	<6.1	<6.1	9.2	<69
Freon 114	μg/m³	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6	<63
Heptane	μg/m³	6.6	<3.3	<3.3	<3.3	<3.3	<3.3	<37
Hexachlorobutadiene	μg/m³	<8.5	<8.5	<8.5	<8.5	<8.5	<8.5	<96
Hexane	μg/m³	<2.8	<2.8	<2.8	<2.8	<2.8	7.4	<32
Isopropyl Alcohol	μg/m³	<2	<2	<2	<2	72.5 J	25.6	<22
m,p-Xylene	μg/m³	59.5	3 J	12	16	<3.5	6.9	<39
m-Dichlorobenzene	μg/m³	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<54
Methyl ethyl ketone	μg/m³	11	5.9	2.7	2.6	<2.4	3.5	<27
Methyl Isobutyl Ketone	μg/m³	25	<3.3	<3.3	<3.3	<3.3	<3.3	<37
Methyl Tert Butyl Ether	μg/m³	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<32
Methylene chloride	μg/m³	4.2	7.3	2.8	2.6 J	<2.8	17	57
o-Dichlorobenzene	μg/m³	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<54
o-Xylene	μg/m³	23	<3.5	3.9	9.6	<3.5	3.5	<39
p-Dichlorobenzene	μg/m³	10	5.7	6	5.8	<4.8	<4.8	<54
Propylene	μg/m³	<3.4	3.6	2.4 J	<3.4	<3.4	4.6	19.6 J
Styrene	μg/m³	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<38
Tertiary Butyl Alcohol	μg/m³	2.5	<2.4	<2.4	2.5	<2.4	<2.4	<27
Tetrachloroethylene	μg/m³	5	2.9	3.7	3.5	<1.1	<1.1	41
Tetrahydrofuran	μg/m³	20	3.5	7.4	5.3	<2.4	<2.4	<27
Toluene	μg/m³	40.7	3.7	5.3	5.3	1.4 J	20	<34
trans-1,2-Dichloroethylene	μg/m³	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	85.2
trans-1,3-Dichloropropene	μg/m³	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<41
Trichloroethylene	μg/m³	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	6830
Trichlorofluoromethane	μg/m³	2.1 J	4.4 J	<4.5	<4.5	<4.5	15	<51
Vinyl Acetate	μg/m³	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<32
Vinyl chloride	μg/m³	<2	<2	<2	<2	<2	<2	<23
Xylenes (total)	μg/m³	82.5	3 J	16	26	<3.5	10	<39

Notes:
μg/m³: micrograms per cubic meter
<: Analyte not detected above RL

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

TABLE C-2
VAPOR ANALYTICAL RESULTS, VI BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Sample ID Lab ID Date units	VMP-4B-BASE-1L JA28198-6 9/14/2009	VMP-4A-BASE-6L JA28198-7 9/14/2009	VMP-4B-BASE-6L JA28198-8 9/14/2009	VI-4A-BASE JA28198-12 9/15/2009	VI-4B-BASE JA28198-13 9/15/2009	VI-5A-BASE JA28198-14 9/15/2009
1,1,1-Trichloroethane	µg/m³	<4.4	<55	<7.6	<4.4	<4.4	<4.4
1,1,2,2-Tetrachloroethane	µg/m³	133	2130	309	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	µg/m³	22	205	46	<4.4	<4.4	<4.4
1,1-Dichloroethane	µg/m³	<3.2	<40	<5.7	<3.2	<3.2	<3.2
1,1-Dichloroethylene	µg/m³	<3.2	<40	<5.6	<3.2	<3.2	<3.2
1,2,4-Trichlorobenzene	µg/m³	<5.9	<74	<10	<5.9	<5.9	<5.9
1,2,4-Trimethylbenzene	µg/m³	<3.9	<49	<6.9	69.3	2.4 J	285 J
1,2-Dibromoethane	µg/m³	<6.1	<77	<11	<6.1	<6.1	<6.1
1,2-Dichloroethane	µg/m³	2.6 J	<40	4.9 J	<3.2	<3.2	<3.2
1,2-Dichloropropane	µg/m³	<3.7	<46	<6.5	<3.7	<3.7	<3.7
1,3,5-Trimethylbenzene	µg/m³	<3.9	<49	<6.9	25	<3.9	89.5 J
1,3-Butadiene	µg/m³	<1.8	<22	<3.1	<1.8	<1.8	<1.8
1,4-Dioxane	µg/m³	<2.9	<36	<5	<2.9	<2.9	<2.9
2,2,4-Trimethylpentane	µg/m³	<3.7	<47	<6.5	<3.7	<3.7	<3.7
2-Chlorotoluene	µg/m³	<4.1	<52	<7.2	<4.1	<4.1	<4.1
2-Hexanone	µg/m³	<3.3	<41	<5.7	<3.3	<3.3	3 J
3-Chloropropene	µg/m³	<2.5	<31	<4.4	<2.5	<2.5	<2.5
4-Ethyltoluene	µg/m³	<3.9	<49	<6.9	12	<3.9	50.1 J
Acetone	µg/m³	21	42.3	70.8	33.7	14	72.2 J
Benzene	µg/m³	1.5 J	<32	<4.5	1.5 J	<2.6	4.2
Benzyl Chloride	µg/m³	<4.1	<52	<7.2	<4.1	<4.1	<4.1
Bromodichloromethane	µg/m³	<5.4	<67	<9.4	<5.4	<5.4	<5.4
Bromoethene	µg/m³	<3.5	<44	<6.1	<3.5	<3.5	<3.5
Bromoform	µg/m³	<8.3	<100	<14	<8.3	<8.3	<8.3
Bromomethane	µg/m³	<3.1	<39	<5.4	<3.1	<3.1	<3.1
Carbon disulfide	µg/m³	13	<31	18	6.9	2.6	18 J
Carbon tetrachloride	µg/m³	14	<63	26	<5	<5	<5
Chlorobenzene	µg/m³	<3.7	<46	<6.4	<3.7	<3.7	<3.7
Chloroethane	µg/m³	<2.1	<26	<3.7	<2.1	<2.1	<2.1
Chloroform	µg/m³	15	29 J	29	2.3 J	<3.9	<3.9
Chloromethane	µg/m³	4.1	<21	4.7	<1.7	1.3 J	1.5 J
cis-1,2-Dichloroethylene	µg/m³	186	1070	354	<3.2	<3.2	<3.2
cis-1,3-Dichloropropene	µg/m³	<3.6	<45	<6.4	<3.6	<3.6	<3.6
Cyclohexane	µg/m³	<2.8	<34	<4.8	<2.8	<2.8	<2.8
Dibromochloromethane	µg/m³	<6.8	<85	<12	<6.8	<6.8	<6.8
Dichlorodifluoromethane	µg/m³	7.9	<49	12	2.9 J	3 J	3 J
Ethanol	µg/m³	13	91.8	29.2	66.1	28.3	40.9
Ethyl Acetate	µg/m³	<2.9	<36	<5	<2.9	<2.9	<2.9
Ethylbenzene	µg/m³	<3.5	<43	<6.1	13	<3.5	48.2 J
Freon 113	µg/m³	<6.1	<77	<11	<6.1	<6.1	<6.1
Freon 114	µg/m³	<5.6	<70	<9.8	<5.6	<5.6	<5.6
Heptane	µg/m³	<3.3	<41	<5.7	<3.3	<3.3	2 J
Hexachlorobutadiene	µg/m³	<8.5	<110	<15	<8.5	<8.5	<8.5
Hexane	µg/m³	2.3 J	<35	3.5 J	<2.8	<2.8	2.2 J
Isopropyl Alcohol	µg/m³	<2	<25	16	7.4	4.2	8.4
m,p-Xylene	µg/m³	3.4 J	<43	4.2 J	50.8	3 J	215 J
m-Dichlorobenzene	µg/m³	<4.8	<60	<8.4	<4.8	<4.8	<4.8
Methyl ethyl ketone	µg/m³	<2.4	<29	6.8	4.4	<2.4	11
Methyl Isobutyl Ketone	µg/m³	<3.3	<41	<5.7	1.9 J	<3.3	7
Methyl Tert Butyl Ether	µg/m³	<2.9	<36	<5	<2.9	<2.9	<2.9
Methylene chloride	µg/m³	2.6 J	35	<4.9	9.7	3.3	<2.8
o-Dichlorobenzene	µg/m³	<4.8	<60	<8.4	<4.8	<4.8	<4.8
o-Xylene	µg/m³	<3.5	<43	<6.1	19	<3.5	71.2 J
p-Dichlorobenzene	µg/m³	<4.8	<60	<8.4	13	<4.8	2.9 J
Propylene	µg/m³	17	26.6 J	24.9	4.1	<3.4	17 J
Styrene	µg/m³	<3.4	<43	<6	<3.4	<3.4	<3.4
Tertiary Butyl Alcohol	µg/m³	4.2	<30	6.4	<2.4	<2.4	<2.4
Tetrachloroethylene	µg/m³	20	58	48	5.7	<1.1	16 J
Tetrahydrofuran	µg/m³	<2.4	<29	<4.1	7.7	<2.4	13 J
Toluene	µg/m³	8.7	<38	12	10	2 J	51.3 J
trans-1,2-Dichloroethylene	µg/m³	31	113	59.1	<3.2	<3.2	<3.2
trans-1,3-Dichloropropene	µg/m³	<3.6	<45	<6.4	<3.6	<3.6	<3.6
Trichloroethylene	µg/m³	2950	9570	6610	<0.86	<0.86	<0.86
Trichlorofluoromethane	µg/m³	5.1	<56	9	4.3 J	4 J	3.6 J
Vinyl Acetate	µg/m³	<2.8	<35	<4.9	<2.8	<2.8	<2.8
Vinyl chloride	µg/m³	<2	<26	<3.6	<2	<2	<2
Xylenes (total)	µg/m³	3.4 J	<43	4.2 J	69.9	3 J	287 J

Notes:
µg/m³: micrograms per cubic meter
<: Analyte not detected above RL

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

TABLE C-2
VAPOR ANALYTICAL RESULTS, VI BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Sample ID	VI-6A-BASE	VI-6B-BASE	VI-7A-BASE-1L	VI-7A-BASE-6L	VI-7B-BASE	VI-8A-BASE	VI-8B-BASE
	Lab ID	JA28198-16	JA28198-17	JA28198-18	JA28198-19	JA28198-20	JA28198-21	JA28198-22
	Date	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009
	units							
1,1,1-Trichloroethane	$\mu g/m^3$	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1,2,2-Tetrachloroethane	$\mu g/m^3$	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	$\mu g/m^3$	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1-Dichloroethane	$\mu g/m^3$	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,1-Dichloroethylene	$\mu g/m^3$	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2,4-Trichlorobenzene	$\mu g/m^3$	<5.9	<5.9	<5.9	<5.9	<5.9	<5.9	<5.9
1,2,4-Trimethylbenzene	$\mu g/m^3$	54.6	42	24	37	44	17	4.9
1,2-Dibromoethane	$\mu g/m^3$	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1
1,2-Dichloroethane	$\mu g/m^3$	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloropropane	$\mu g/m^3$	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7
1,3,5-Trimethylbenzene	$\mu g/m^3$	19	17	8.4	14	13	7.9	<3.9
1,3-Butadiene	$\mu g/m^3$	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
1,4-Dioxane	$\mu g/m^3$	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9
2,2,4-Trimethylpentane	$\mu g/m^3$	<3.7	<3.7	<3.7	<3.7	<3.7	3.1 J	<3.7
2-Chlorotoluene	$\mu g/m^3$	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1
2-Hexanone	$\mu g/m^3$	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
3-Chloropropene	$\mu g/m^3$	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4-Ethyltoluene	$\mu g/m^3$	3.5 J	2.7 J	3 J	4.7	4	3.2 J	<3.9
Acetone	$\mu g/m^3$	37.5	18	31.4	25.9	40.6	15	22
Benzene	$\mu g/m^3$	<2.6	<2.6	<2.6	<2.6	2.6	2.1 J	1.9 J
Benzyl Chloride	$\mu g/m^3$	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1
Bromodichloromethane	$\mu g/m^3$	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4
Bromoethene	$\mu g/m^3$	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Bromoform	$\mu g/m^3$	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3
Bromomethane	$\mu g/m^3$	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
Carbon disulfide	$\mu g/m^3$	<2.5	3.1	2.6	3.1	1.6 J	4	4.7
Carbon tetrachloride	$\mu g/m^3$	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	$\mu g/m^3$	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7
Chloroethane	$\mu g/m^3$	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1
Chloroform	$\mu g/m^3$	<3.9	3 J	<3.9	2.3 J	<3.9	<3.9	<3.9
Chloromethane	$\mu g/m^3$	<1.7	<1.7	<1.7	<1.7	2.3	<1.7	1.9
cis-1,2-Dichloroethylene	$\mu g/m^3$	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
cis-1,3-Dichloropropene	$\mu g/m^3$	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6
Cyclohexane	$\mu g/m^3$	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Dibromochloromethane	$\mu g/m^3$	<6.8	<6.8	<6.8	<6.8	<6.8	<6.8	<6.8
Dichlorodifluoromethane	$\mu g/m^3$	2.2 J	2.6 J	2.6 J	<4	2.9 J	2.4 J	3.4 J
Ethanol	$\mu g/m^3$	<3.8	22.8	20.2	<3.8	36.9	<3.8	98.2
Ethyl Acetate	$\mu g/m^3$	<2.9	<2.9	<2.9	<2.9	24	<2.9	<2.9
Ethylbenzene	$\mu g/m^3$	4.2	3.1 J	4	5.2	4.8	3.2 J	<3.5
Freon 113	$\mu g/m^3$	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1
Freon 114	$\mu g/m^3$	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6
Heptane	$\mu g/m^3$	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
Hexachlorobutadiene	$\mu g/m^3$	<8.5	<8.5	<8.5	<8.5	<8.5	<8.5	<8.5
Hexane	$\mu g/m^3$	<2.8	<2.8	<2.8	<2.8	2 J	2 J	<2.8
Isopropyl Alcohol	$\mu g/m^3$	<2	<2	<2	<2	4.2	<2	9.3
m,p-Xylene	$\mu g/m^3$	14	10	18	26	24	13	4.8
m-Dichlorobenzene	$\mu g/m^3$	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8
Methyl ethyl ketone	$\mu g/m^3$	5	<2.4	4.1	<2.4	7.1	1.9 J	<2.4
Methyl Isobutyl Ketone	$\mu g/m^3$	2.5 J	3.2 J	1.7 J	<3.3	1.7 J	<3.3	<3.3
Methyl Tert Butyl Ether	$\mu g/m^3$	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9
Methylene chloride	$\mu g/m^3$	<2.8	<2.8	<2.8	<2.8	6.6	<2.8	11
o-Dichlorobenzene	$\mu g/m^3$	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8
o-Xylene	$\mu g/m^3$	7.4	6.9	5.2	7.4	9.1	3.3 J	2.1 J
p-Dichlorobenzene	$\mu g/m^3$	<4.8	<4.8	<4.8	5.9	6.6	7.8	<4.8
Propylene	$\mu g/m^3$	<3.4	<3.4	<3.4	<3.4	1.3 J	<3.4	3.1 J
Styrene	$\mu g/m^3$	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4
Tertiary Butyl Alcohol	$\mu g/m^3$	1.4 J	3.3	<2.4	<2.4	2.7	<2.4	<2.4
Tetrachloroethylene	$\mu g/m^3$	3.5	5.9	4	5.1	2.7	2	1.2
Tetrahydrofuran	$\mu g/m^3$	4.7	8.8	2.4	<2.4	5.9	<2.4	1.7 J
Toluene	$\mu g/m^3$	3.2	3.2	6	7.2	21	4.9	5.7
trans-1,2-Dichloroethylene	$\mu g/m^3$	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
trans-1,3-Dichloropropene	$\mu g/m^3$	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6
Trichloroethylene	$\mu g/m^3$	<0.86	<0.86	<0.86	<0.86	1.4	1	3.8
Trichlorofluoromethane	$\mu g/m^3$	<4.5	<4.5	<4.5	<4.5	3.5 J	<4.5	15
Vinyl Acetate	$\mu g/m^3$	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Vinyl chloride	$\mu g/m^3$	<2	<2	<2	<2	<2	<2	<2
Xylenes (total)	$\mu g/m^3$	22	17	24	33	33	16	6.9

Notes:
$\mu g/m^3$: micrograms per cubic meter
<: Analyte not detected above RL

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

TABLE C-2
VAPOR ANALYTICAL RESULTS, VI BASELINE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Sample ID Lab ID Date units	VI-9A-BASE JA28198-23 9/15/2009	VI-9B-BASE JA28198-24 9/15/2009
1,1,1-Trichloroethane	µg/m^3	<4.4	<4.4
1,1,2,2-Tetrachloroethane	µg/m^3	<5.5	<5.5
1,1,2-Trichloroethane	µg/m^3	<4.4	<4.4
1,1-Dichloroethane	µg/m^3	<3.2	<3.2
1,1-Dichloroethylene	µg/m^3	<3.2	<3.2
1,2,4-Trichlorobenzene	µg/m^3	<5.9	<5.9
1,2,4-Trimethylbenzene	µg/m^3	116	63.4
1,2-Dibromoethane	µg/m^3	<6.1	<6.1
1,2-Dichloroethane	µg/m^3	<3.2	<3.2
1,2-Dichloropropane	µg/m^3	<3.7	<3.7
1,3,5-Trimethylbenzene	µg/m^3	31	18
1,3-Butadiene	µg/m^3	<1.8	<1.8
1,4-Dioxane	µg/m^3	<2.9	<2.9
2,2,4-Trimethylpentane	µg/m^3	<3.7	<3.7
2-Chlorotoluene	µg/m^3	<4.1	<4.1
2-Hexanone	µg/m^3	2.1 J	<3.3
3-Chloropropene	µg/m^3	<2.5	<2.5
4-Ethyltoluene	µg/m^3	11	5.4
Acetone	µg/m^3	95	17
Benzene	µg/m^3	1.4 J	0.99 J
Benzyl Chloride	µg/m^3	<4.1	<4.1
Bromodichloromethane	µg/m^3	<5.4	<5.4
Bromoethene	µg/m^3	<3.5	<3.5
Bromoform	µg/m^3	<8.3	<8.3
Bromomethane	µg/m^3	<3.1	<3.1
Carbon disulfide	µg/m^3	4.7	2.8
Carbon tetrachloride	µg/m^3	<5	<5
Chlorobenzene	µg/m^3	<3.7	<3.7
Chloroethane	µg/m^3	<2.1	<2.1
Chloroform	µg/m^3	<3.9	2 J
Chloromethane	µg/m^3	<1.7	<1.7
cis-1,2-Dichloroethylene	µg/m^3	<3.2	<3.2
cis-1,3-Dichloropropene	µg/m^3	<3.6	<3.6
Cyclohexane	µg/m^3	<2.8	<2.8
Dibromochloromethane	µg/m^3	<6.8	<6.8
Dichlorodifluoromethane	µg/m^3	<4	2.8 J
Ethanol	µg/m^3	<3.8	45.6
Ethyl Acetate	µg/m^3	<2.9	5.4
Ethylbenzene	µg/m^3	8.7	3.8
Freon 113	µg/m^3	<6.1	<6.1
Freon 114	µg/m^3	<5.6	<5.6
Heptane	µg/m^3	<3.3	<3.3
Hexachlorobutadiene	µg/m^3	<8.5	<8.5
Hexane	µg/m^3	<2.8	<2.8
Isopropyl Alcohol	µg/m^3	<2	5.7
m,p-Xylene	µg/m^3	43.9	18
m-Dichlorobenzene	µg/m^3	<4.8	<4.8
Methyl ethyl ketone	µg/m^3	17	<2.4
Methyl Isobutyl Ketone	µg/m^3	6.1	3.1 J
Methyl Tert Butyl Ether	µg/m^3	<2.9	<2.9
Methylene chloride	µg/m^3	<2.8	<2.8
o-Dichlorobenzene	µg/m^3	<4.8	<4.8
o-Xylene	µg/m^3	16	7.8
p-Dichlorobenzene	µg/m^3	7.8	3.6 J
Propylene	µg/m^3	<3.4	<3.4
Styrene	µg/m^3	<3.4	<3.4
Tertiary Butyl Alcohol	µg/m^3	<2.4	2.9
Tetrachloroethylene	µg/m^3	2.3	3.3
Tetrahydrofuran	µg/m^3	7.4	15
Toluene	µg/m^3	12	6
trans-1,2-Dichloroethylene	µg/m^3	<3.2	<3.2
trans-1,3-Dichloropropene	µg/m^3	<3.6	<3.6
Trichloroethylene	µg/m^3	2.8	4
Trichlorofluoromethane	µg/m^3	<4.5	2.4 J
Vinyl Acetate	µg/m^3	<2.8	<2.8
Vinyl chloride	µg/m^3	<2	<2
Xylenes (total)	µg/m^3	59.9	26

Notes:
µg/m^3: micrograms per cubic meter
<: Analyte not detected above RL

DQE FLAGS:
J: Analyte positively identified; quantitation estimated.

TABLE C-3
VAPOR ANALYTICAL RESULTS, AS/SVE EFFLUENT
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Sample ID Lab ID Collect Date Units	OD-SVE-BASELINE-1 JA35169-1 11-Dec-09	OD-SVE-BASELINE-2 JA38446-1 25-Jan-10	OD-SVE-BASE3-NS JA40428-1 23-Feb-10	ODSVE BASELINE 4 JA43177-1 31-Mar-10
1,1,1-Trichloroethane	ppbv	0.97	6.9	3.6	7.4
1,1,2,2-Tetrachloroethane	ppbv	113	90.9	88.7	61.4
1,1,2-Trichloroethane	ppbv	7.3	2.8	<0.8	1.5
1,1-Dichloroethane	ppbv	<0.8	2.9	2.9	2.3
1,1-Dichloroethylene	ppbv	9.7	17.5	9.8	7.8
1,2,4-Trichlorobenzene	ppbv	<0.8	<0.8	<0.8	<0.2
1,2,4-Trimethylbenzene	ppbv	<0.8	<0.8	<0.8	<0.2
1,2-Dibromoethane	ppbv	<0.8	<0.8	<0.8	<0.2
1,2-Dichloroethane	ppbv	0.64 J	<0.8	<0.8	<0.2
1,2-Dichloropropane	ppbv	<0.8	<0.8	<0.8	<0.2
1,3,5-Trimethylbenzene	ppbv	<0.8	<0.8	<0.8	<0.2
1,3-Butadiene	ppbv	<0.8	<0.8	<0.8	<0.2
1,4-Dioxane	ppbv	<0.8	<0.8	<0.8	<0.2
2,2,4-Trimethylpentane	ppbv	<0.8	3.8	7.8	2.1
2-Chlorotoluene	ppbv	<0.8	<0.8	<0.8	<0.2
2-Hexanone	ppbv	<0.8	<0.8	<0.8	<0.2
3-Chloropropene	ppbv	<0.8	<0.8	<0.8	<0.2
4-Ethyltoluene	ppbv	<0.8	<0.8	<0.8	<0.2
Acetone	ppbv	18.7	2.1	1.9	8.8
Benzene	ppbv	<0.8	<0.8	0.5 J	0.86
Benzyl Chloride	ppbv	<0.8	<0.8	<0.8	<0.2
Bromodichloromethane	ppbv	<0.8	<0.8	<0.8	<0.2
Bromoethene	ppbv	<0.8	<0.8	<0.8	<0.2
Bromoform	ppbv	<0.8	<0.8	<0.8	<0.2
Bromomethane	ppbv	<0.8	<0.8	<0.8	<0.2
Carbon disulfide	ppbv	1.3	0.69 J	<0.8	<0.2
Carbon tetrachloride	ppbv	11.5	1.1	<0.8	1
Chlorobenzene	ppbv	<0.8	<0.8	<0.8	<0.2
Chloroethane	ppbv	<0.8	<0.8	<0.8	<0.2
Chloroform	ppbv	8.5	11.5	6.7	6.4
Chloromethane	ppbv	<0.8	<0.8	<0.8	0.2
cis-1,2-Dichloroethylene	ppbv	70.8	36.3	27.7	14.7
cis-1,3-Dichloropropene	ppbv	<0.8	<0.8	<0.8	<0.2
Cyclohexane	ppbv	<0.8	1.6	1.5	1.3
Dibromochloromethane	ppbv	<0.8	<0.8	<0.8	<0.2
Dichlorodifluoromethane	ppbv	0.8	1	1.3	1.4
Ethanol	ppbv	6.6	2	<2	1.8
Ethyl Acetate	ppbv	<0.8	<0.8	<0.8	<0.2
Ethylbenzene	ppbv	<0.8	<0.8	<0.8	<0.2
Freon 113	ppbv	3.8	25.5	43.7	61.6
Freon 114	ppbv	<0.8	<0.8	<0.8	<0.2
Heptane	ppbv	<0.8	0.61 J	0.4 J	0.59
Hexachlorobutadiene	ppbv	<0.8	<0.8	<0.8	<0.2
Hexane	ppbv	0.7 J	3.6	2.1	2.1
Isopropyl Alcohol	ppbv	<0.8	<0.8	<0.8	<0.2
m,p-Xylene	ppbv	<0.8	<0.8	<0.8	0.13 J
m-Dichlorobenzene	ppbv	<0.8	<0.8	<0.8	<0.2
Methyl ethyl ketone	ppbv	2.2	<0.8	<0.8	<0.2
Methyl Isobutyl Ketone	ppbv	<0.8	<0.8	<0.8	<0.2
Methyl Tert Butyl Ether	ppbv	<0.8	<0.8	<0.8	<0.2
Methylene chloride	ppbv	<0.8	<0.8	<0.8	<0.2
o-Dichlorobenzene	ppbv	<0.8	<0.8	<0.8	<0.2
o-Xylene	ppbv	<0.8	<0.8	<0.8	<0.2
p-Dichlorobenzene	ppbv	<0.8	<0.8	<0.8	<0.2
Propylene	ppbv	<2	<2	<2	<0.5
Styrene	ppbv	<0.8	<0.8	<0.8	<0.2
Tertiary Butyl Alcohol	ppbv	<0.8	<0.8	<0.8	<0.2
Tetrachloroethylene	ppbv	134	3.4	2.8	2.4
Tetrahydrofuran	ppbv	2.8	<0.8	<0.8	<0.2
Toluene	ppbv	<0.8	<0.8	<0.8	0.33
trans-1,2-Dichloroethylene	ppbv	8.4	4.3	2.6	1.4
trans-1,3-Dichloropropene	ppbv	<0.8	<0.8	<0.8	<0.2
Trichloroethylene	ppbv	825	228	144	77
Trichlorofluoromethane	ppbv	1.3	0.61 J	0.74 J	0.8
Vinyl Acetate	ppbv	<0.8	<0.8	<0.8	<0.2
Vinyl chloride	ppbv	11.9	2	3.7	2
Xylenes (total)	ppbv	<0.8	<0.8	<0.8	0.13 J

Notes:
J: Estimated result
ppbv: parts per billion by volume

TABLE C-3
VAPOR ANALYTICAL RESULTS, AS/SVE EFFLUENT
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Sample ID	ODSVE-2Q10	ODSVE-3Q10	ODSVE-4Q10
	Lab ID	JA49630-1	JA56529-1	JA63577-1
	Collect Date	17-Jun-10	16-Sep-10	7-Dec-10
Analyte	**Units**			
1,1,1-Trichloroethane	ppbv	14.2	2.3	1.9
1,1,2,2-Tetrachloroethane	ppbv	126	16.5	6.7
1,1,2-Trichloroethane	ppbv	6.8	0.53 J	<0.8
1,1-Dichloroethane	ppbv	7.2	1.3	1.3
1,1-Dichloroethylene	ppbv	17.5	3.4	3.1
1,2,4-Trichlorobenzene	ppbv	<0.8	<0.8	<0.8
1,2,4-Trimethylbenzene	ppbv	<0.8	<0.8	<0.8
1,2-Dibromoethane	ppbv	<0.8	<0.8	<0.8
1,2-Dichloroethane	ppbv	<0.8	<0.8	<0.8
1,2-Dichloropropane	ppbv	<0.8	<0.8	<0.8
1,3,5-Trimethylbenzene	ppbv	<0.8	<0.8	<0.8
1,3-Butadiene	ppbv	<0.8	<0.8	<0.8
1,4-Dioxane	ppbv	<0.8	<0.8	<0.8
2,2,4-Trimethylpentane	ppbv	11.8	<0.8	<0.8
2-Chlorotoluene	ppbv	<0.8	<0.8	<0.8
2-Hexanone	ppbv	<0.8	<0.8	<0.8
3-Chloropropene	ppbv	<0.8	<0.8	<0.8
4-Ethyltoluene	ppbv	<0.8	<0.8	<0.8
Acetone	ppbv	25.5	7.3	<0.8
Benzene	ppbv	1.5	<0.8	<0.8
Benzyl Chloride	ppbv	<0.8	<0.8	<0.8
Bromodichloromethane	ppbv	<0.8	<0.8	<0.8
Bromoethene	ppbv	<0.8	<0.8	<0.8
Bromoform	ppbv	<0.8	<0.8	<0.8
Bromomethane	ppbv	<0.8	<0.8	<0.8
Carbon disulfide	ppbv	1.5	<0.8	<0.8
Carbon tetrachloride	ppbv	2.7	<0.8	<0.8
Chlorobenzene	ppbv	<0.8	<0.8	<0.8
Chloroethane	ppbv	<0.8	<0.8	<0.8
Chloroform	ppbv	12	1.6	1.9
Chloromethane	ppbv	0.65 J	<0.8	<0.8
cis-1,2-Dichloroethylene	ppbv	29.8	3.6	3
cis-1,3-Dichloropropene	ppbv	<0.8	<0.8	<0.8
Cyclohexane	ppbv	6	<0.8	<0.8
Dibromochloromethane	ppbv	<0.8	<0.8	<0.8
Dichlorodifluoromethane	ppbv	3.5	0.62 J	0.59 J
Ethanol	ppbv	9.7	2.1	<2
Ethyl Acetate	ppbv	2.2	<0.8	<0.8
Ethylbenzene	ppbv	<0.8	<0.8	<0.8
Freon 113	ppbv	99.7	12.6	7.3
Freon 114	ppbv	<0.8	<0.8	<0.8
Heptane	ppbv	6.1	<0.8	<0.8
Hexachlorobutadiene	ppbv	<0.8	<0.8	<0.8
Hexane	ppbv	17.4	<0.8	<0.8
Isopropyl Alcohol	ppbv	2.2	<0.8	<0.8
m,p-Xylene	ppbv	0.75 J	<0.8	0.44 J
m-Dichlorobenzene	ppbv	<0.8	<0.8	<0.8
Methyl ethyl ketone	ppbv	3.6	<0.8	<0.8
Methyl Isobutyl Ketone	ppbv	<0.8	<0.8	<0.8
Methyl Tert Butyl Ether	ppbv	<0.8	<0.8	<0.8
Methylene chloride	ppbv	3.7	<0.8	<0.8
o-Dichlorobenzene	ppbv	<0.8	<0.8	<0.8
o-Xylene	ppbv	<0.8	<0.8	<0.8
p-Dichlorobenzene	ppbv	0.45 J	<0.8	<0.8
Propylene	ppbv	54.8	<2	<2
Styrene	ppbv	<0.8	<0.8	<0.8
Tertiary Butyl Alcohol	ppbv	0.58 J	<0.8	<0.8
Tetrachloroethylene	ppbv	6.5	1.2	2.2
Tetrahydrofuran	ppbv	<0.8	<0.8	<0.8
Toluene	ppbv	5	<0.8	0.79 J
trans-1,2-Dichloroethylene	ppbv	3	<0.8	0.45 J
trans-1,3-Dichloropropene	ppbv	<0.8	<0.8	<0.8
Trichloroethylene	ppbv	134	20.7	40.1
Trichlorofluoromethane	ppbv	4.4	<0.8	<0.8
Vinyl Acetate	ppbv	9.1	<0.8	<0.8
Vinyl chloride	ppbv	5.1	0.65 J	0.97
Xylenes (total)	ppbv	0.75 J	<0.8	0.44 J

Notes:
J: Estimated result
ppbv: parts per billion by volume

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MW-54 L09100423-07 10/16/2009	MW-70 L09100412-21 10/15/2009	MW-76 L09100412-22 10/15/2009	MW-77 L09100412-23 10/15/2009	MW-77 Dup L09100412-36 10/15/2009	MW-79 L09100423-08 10/16/2009
1,1,1,2-Tetrachloroethane	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<2.5	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	384	0.971	1.38	47.5	53.2	<0.5
1,1,2-Trichloroethane	µg/L	1.49 J	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<2.5	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<2.5	<1	<1	<1	<1	3.99
1,1-Dichloropropene	µg/L	<2.5	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<2.5	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<2.5	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<2.5	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<5	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<2.5	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<2.5	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<2.5	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<2.5	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<1	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<2.5	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<2.5	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<2.5	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<25	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<2.5	<1	<1	<1	<1	<1 UJ
Acetone	µg/L	<25	3.62 J	5.76 J	5.24 J	6.23 J	3.76 J
Benzene	µg/L	<1	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<2.5	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<2.5	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<2.5	<1	<1	<1	<1	<1
Bromomethane	µg/L	<2.5	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	1.29 J	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<2.5	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<2.5	<1	<1	<1	<1	<1
Chloroform	µg/L	1.25	<0.3	<0.3	0.175 J	0.207 J	<0.3
Chloromethane	µg/L	<2.5	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	10.7	<1	<1	0.94 J	0.943 J	<1
cis-1,3-Dichloropropene	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<1.25	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<2.5	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<2.5	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<5	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<25	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<12.5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<2.5	<1	<1	<1	0.268 B	<1
MIBK (methyl isobutyl ketone)	µg/L	<25	<10	<10	<10	<10	<10
Naphthalene	µg/L	<2.5	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
o-Xylene	µg/L	<2.5	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<2.5	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
Styrene	µg/L	<2.5	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<2.5	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	2.52	0.71 J	0.35 J	0.685 J	0.751 J	1.38
Toluene	µg/L	<2.5	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	1.39 J	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<2.5	<1	<1	<1	<1	<1 UJ
Trichloroethene	µg/L	381	1.93	2.27	36.7	40.8	1.25
Trichlorofluoromethane	µg/L	<2.5	<1	<1	<1	<1	<1
Vinyl acetate	µg/L	<12.5	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	<2.5	<1 UJ	<1 UJ	<1 UJ	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-148	MW-149	MW-150	MW-151	MW-152	MW-155
	Lab ID	L09100412-24	L09100423-09	L09100423-10	L09100423-11	L09100423-14	L09100412-25
	Date	10/15/2009	10/16/2009	10/16/2009	10/16/2009	10/16/2009	10/15/2009
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<1.25	<0.5	<0.5	<1
1,1,1-Trichloroethane	µg/L	<1	<1	<2.5	<1	<1	<2
1,1,2,2-Tetrachloroethane	µg/L	0.63	9.93	406	<0.5	9.85	263
1,1,2-Trichloroethane	µg/L	<1	0.387 J	0.716 J	<1	0.336 J	<2
1,1-Dichloroethane	µg/L	<1	<1	<2.5	<1	<1	<2
1,1-Dichloroethene	µg/L	<1	<1	<2.5	<1	<1	<2
1,1-Dichloropropene	µg/L	<1	<1	<2.5	<1	<1	<2
1,2,3-Trichlorobenzene	µg/L	<1	<1	<2.5	<1	<1	<2
1,2,3-Trichloropropane	µg/L	<1	<1	<2.5	<1	<1	<2
1,2,4-Trichlorobenzene	µg/L	<1	<1	<2.5	<1	<1	<2
1,2,4-Trimethylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<5	<2	<2	<4
1,2-Dibromoethane	µg/L	<1	<1	<2.5	<1	<1	<2
1,2-Dichlorobenzene	µg/L	<1	<1	<2.5	<1	<1	<2
1,2-Dichloroethane	µg/L	<0.5	<0.5	<1.25	<0.5	<0.5	<1
1,2-Dichloropropane	µg/L	<1	<1	<2.5	<1	<1	<2
1,3,5-Trimethylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
1,3-Dichlorobenzene	µg/L	<1	<1	<2.5	<1	<1	<2
1,3-Dichloropropane	µg/L	<0.4	<0.4	<1	<0.4	<0.4	<0.8
1,4-Dichlorobenzene	µg/L	0.318 J	<0.5	<1.25	<0.5	<0.5	<1
1-Chlorohexane	µg/L	<1	<1	<2.5	<1	<1	<2
2,2-Dichloropropane	µg/L	<1	<1	<2.5	<1	<1	<2
2-Chlorotoluene	µg/L	<1	<1	<2.5	<1	<1	<2
2-Hexanone	µg/L	<10	<10	<25	<10	<10	<20
4-Chlorotoluene	µg/L	<1	<1 UJ	<2.5	<1	<1 UJ	<2
Acetone	µg/L	3.56 J	3.67 J	<25	4.93 J	6.59 J	5.33 J
Benzene	µg/L	<0.4	<0.4	<1	<0.4	<0.4	<0.8
Bromobenzene	µg/L	<1	<1	<2.5	<1	<1	<2
Bromochloromethane	µg/L	<1	<1	<2.5	<1	<1	<2
Bromodichloromethane	µg/L	<0.5	<0.5	<1.25	<0.5	<0.5	<1
Bromoform	µg/L	<1	<1	<2.5	<1	<1	<2
Bromomethane	µg/L	<1	<1	<2.5	<1	<1	<2
Carbon disulfide	µg/L	<1	<1	<2.5	<1	<1	<2
Carbon tetrachloride	µg/L	<1	6.36	<2.5	1.43	<1	<2
Chlorobenzene	µg/L	<0.5	<0.5	<1.25	<0.5	<0.5	<1
Chloroethane	µg/L	<1	<1	<2.5	<1	<1	<2
Chloroform	µg/L	<0.3	70	0.913	2.92	0.962	0.256 J
Chloromethane	µg/L	<1	<1	<2.5	<1	0.496 J	<2
cis-1,2-Dichloroethene	µg/L	<1	4.64	1.27 J	0.416 J	18.3	1.59 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<1.25	<0.5	<0.5	<1
Dibromochloromethane	µg/L	<0.5	<0.5	<1.25	<0.5	<0.5	<1
Dibromomethane	µg/L	<1	<1	<2.5	<1	<1	<2
Dichlorodifluoromethane	µg/L	<1	<1	<2.5	<1	<1	<2
Ethylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
Hexachlorobutadiene	µg/L	<0.6	<0.6	<1.5	<0.6	<0.6	<1.2
Isopropylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
m-,p-Xylene	µg/L	<2	<2	<5	<2	<2	<4
MEK (2-Butanone)	µg/L	<10	<10	<25	<10	<10	<20
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<12.5	<5	<5	<10
Methylene chloride	µg/L	<1	<1	<2.5	<1	<1	0.647 B
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<25	<10	<10	<20
Naphthalene	µg/L	<1	<1	<2.5	<1	<1	<2
n-Butylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
n-Propylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
o-Xylene	µg/L	<1	<1	<2.5	<1	<1	<2
p-Isopropyltoluene	µg/L	<1	<1	<2.5	<1	<1	<2
sec-Butylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
Styrene	µg/L	<1	<1	<2.5	<1	<1	<2
tert-Butylbenzene	µg/L	<1	<1	<2.5	<1	<1	<2
Tetrachloroethene	µg/L	<1	1.16	1.1 J	<1	2.89	1.48 J
Toluene	µg/L	<1	<1	<2.5	<1	<1	<2
trans-1,2-Dichloroethene	µg/L	<1	0.662 J	<2.5	<1	1.39	<2
trans-1,3-Dichloropropene	µg/L	<1	<1 UJ	<2.5	<1	<1 UJ	<2
Trichloroethene	µg/L	0.613 J	38.6	49.4	8.06	183	94.2
Trichlorofluoromethane	µg/L	<1	<1	<2.5	<1	<1	<2
Vinyl acetate	µg/L	<5	<5	<12.5	<5	<5	<10 UJ
Vinyl chloride	µg/L	<1 UJ	<1	<2.5	<1	<1	<2

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	**Well ID** **Lab ID** **Date** **Units**	MW-157 L09100412-26 10/15/2009	MW-158 L09100423-15 10/16/2009	MW-158A L09100423-16 10/16/2009	MW-159 L09100423-17 10/16/2009	MW-160 L09100412-27 10/15/2009	MW-160 DUP L09100412-37 10/15/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<5	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	3.88	8.22	156	483	125	144
1,1,2-Trichloroethane	µg/L	<1	<1	2.52	33.7	0.332 J	0.27 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<5	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	2.96 J	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<5	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<5	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<5	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<5	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<5	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<10	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<5	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<5	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<5	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<5	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<5	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<2	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<5	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<5	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<5	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<50	<10	<10
4-Chlorotoluene	µg/L	<1	<1 UJ	<1	<5	<1	<1
Acetone	µg/L	5.2 J	2.69 J	3.35 J	<50	3.1 J	3.37 J
Benzene	µg/L	<0.4	<0.4	<0.4	<2	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<5	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<5	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<5	<1	<1
Bromomethane	µg/L	<1	<1	<1	<5	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<5	<1	<1
Carbon tetrachloride	µg/L	4.66	<1	<1	<5	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<5	<1	<1
Chloroform	µg/L	8	0.294 J	0.67	0.923 J	0.56	0.603
Chloromethane	µg/L	<1	0.386 J	<1	<5	<1	<1
cis-1,2-Dichloroethene	µg/L	11.6	1.45	8.93	82.2	0.375 J	0.306 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<5	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<5	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<5	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<3	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<5	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<10	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<50	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<25	<5	<5
Methylene chloride	µg/L	<1	<1	<1	1.77 B	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<50	<10	<10
Naphthalene	µg/L	<1	<1	<1	<5	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<5	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<5	<1	<1
o-Xylene	µg/L	<1	<1	<1	<5	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<5	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<5	<1	<1
Styrene	µg/L	<1	<1	<1	<5	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<5	<1	<1
Tetrachloroethene	µg/L	2.1	2.66	1.96	4.11 J	0.251 J	0.254 J
Toluene	µg/L	<1	<1	<1	<5	<1	<1
trans-1,2-Dichloroethene	µg/L	2.69	<1	0.456 J	8.94	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1 UJ	<1	<5	<1	<1
Trichloroethene	µg/L	202	26.4	69.9	983	8.39	11.4
Trichlorofluoromethane	µg/L	<1	<1	<1	<5	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<25	<5	<5
Vinyl chloride	µg/L	<1	<1	1.15	<5	<1 UJ	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MW-161 L09100412-28 10/15/2009	MW-162 L09100412-29 10/15/2009	MW-163 L09100423-01 10/16/2009	MW-164 L09100412-30 10/15/2009	MW-165 L09100423-18 10/16/2009	MW-165A L09100423-19 10/16/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	17.4	8.71	143	32	3.92	12.5
1,1,2-Trichloroethane	µg/L	<1	<1	0.261 J	1.41	1.62	1.18
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	0.269 J	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	0.15 J	0.809	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	4.72 J	6.32 J	4.37 J	4.4 J	3.53 J	5.69 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	7.78	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	0.159 J	0.974	79.3	1.04	1.21
Chloromethane	µg/L	<1	<1	<1	<1	0.251 J	<1
cis-1,2-Dichloroethene	µg/L	0.309 J	<1	2.45	18.6	18.7	1.99
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	0.735 J	0.308 J	0.93 J	1.33	1.39	0.252 J
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	0.321 J	1.91	3.26	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	11.3	4.54	65.8	89.1	194	35.5
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	<1 UJ	<1 UJ	<1	<1 UJ	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab ID Date Units	MW-166 L09100423-20 10/16/2009	MW-166A L09100423-21 10/16/2009	MW-232 L09100423-22 10/16/2009	MW-232 DUP L09100423-05 10/16/2009	MW-241 L09100412-31 10/15/2009	MW-242 L09100423-23 10/16/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<1
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<2
1,1,2,2-Tetrachloroethane	µg/L	15.3	10	<0.5	<0.5	0.744	229
1,1,2-Trichloroethane	µg/L	0.525 J	0.319 J	<1	<1	<1	3.34
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<2
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<2
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<2
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<2
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<2
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<2
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<2
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<4
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<2
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<2
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<1
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<2
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<2
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<2
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.8
1,4-Dichlorobenzene	µg/L	0.282 J	0.182 J	<0.5	<0.5	<0.5	<1
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<2
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<2
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<2
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<20
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<2
Acetone	µg/L	4.58 J	5.4 J	5.36 J	6.46 J	3.94 J	5.98 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.8
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<2
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<2
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<1
Bromoform	µg/L	<1	<1	<1	<1	<1	<2
Bromomethane	µg/L	<1	<1	<1	<1	<1	<2
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<2
Carbon tetrachloride	µg/L	11.3	2.26	<1	<1	<1	<2
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<1
Chloroethane	µg/L	<1	<1	<1	<1	<1	<2
Chloroform	µg/L	80.9	24.8	<0.3	<0.3	<0.3	0.578 J
Chloromethane	µg/L	<1	<1	<1	<1	<1	<2
cis-1,2-Dichloroethene	µg/L	4.42	1.76	<1	<1	<1	15.1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<1
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<1
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<2
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<2
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<2
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<1.2
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<2
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<4
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<20
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<10
Methylene chloride	µg/L	<1	<1	<1	<1	<1	1.67 B
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<20
Naphthalene	µg/L	<1	<1	<1	<1	<1	<2
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<2
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<2
o-Xylene	µg/L	<1	<1	<1	<1	<1	<2
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<2
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<2
Styrene	µg/L	<1	<1	1.12	0.135 J	<1	<2
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<2
Tetrachloroethene	µg/L	2.03	0.367 J	<1	<1	<1	<2
Toluene	µg/L	<1	<1	<1	<1	<1	<2
trans-1,2-Dichloroethene	µg/L	0.866 J	0.266 J	<1	<1	<1	1.75 J
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<2
Trichloroethene	µg/L	48	19.1	<1	<1	2.75	26.9
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<2
Vinyl acetate	µg/L	<5	<5	<5	<5	<5	<10
Vinyl chloride	µg/L	<1	<1	0.914 J	<1	<1	<2

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-243 L09100412-32 10/15/2009	MW-244 L09100412-33 10/15/2009	MW-245 L09100423-24 10/16/2009	MW-246 L09100423-25 10/16/2009	MW-247 L09100423-26 10/16/2009	MW-248 L09100423-27 10/16/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<5	<2	<10	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	89.5	953	383	2290	18.6	0.589
1,1,2-Trichloroethane	µg/L	0.806 J	7.89	3.83	57.7	1.09	<1
1,1-Dichloroethane	µg/L	<1	<5	<2	<10	<1	<1
1,1-Dichloroethene	µg/L	<1	<5	1.85 J	18.2	<1	<1
1,1-Dichloropropene	µg/L	<1	<5	<2	<10	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<5	<2	<10	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<5	<2	<10	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<5	<2	<10	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<5	<2	<10	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<10	<4	<20	<2	<2
1,2-Dibromoethane	µg/L	<1	<5	<2	<10	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<5	<2	<10	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<5	<2	<10	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<5	<2	<10	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<5	<2	<10	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<2	<0.8	<4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<5	<2	<10	<1	<1
2,2-Dichloropropane	µg/L	<1	<5	<2	<10	<1	<1
2-Chlorotoluene	µg/L	<1	<5	<2	<10	<1	<1
2-Hexanone	µg/L	<10	<50	<20	<100	<10	<10
4-Chlorotoluene	µg/L	<1	<5	<2	<10	<1	<1
Acetone	µg/L	2.87 J	<50	<20	<100	4.92 J	4.12 J
Benzene	µg/L	<0.4	<2	<0.8	<4	<0.4	<0.4
Bromobenzene	µg/L	<1	<5	<2	<10	<1	<1
Bromochloromethane	µg/L	<1	<5	<2	<10	<1	<1
Bromodichloromethane	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
Bromoform	µg/L	<1	<5	<2	<10	<1	<1
Bromomethane	µg/L	<1	<5	<2	<10	<1	<1
Carbon disulfide	µg/L	<1	<5	<2	<10	<1	<1
Carbon tetrachloride	µg/L	<1	<5	<2	<10	3.04	<1
Chlorobenzene	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
Chloroethane	µg/L	<1	<5	<2	<10	<1	<1
Chloroform	µg/L	0.233 J	1.26 J	0.338 J	<3	120	<0.3
Chloromethane	µg/L	<1	<5	<2	<10	0.31 J	<1
cis-1,2-Dichloroethene	µg/L	10.3	17	25.8	401	15.7	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<2.5	<1	<5	<0.5	<0.5
Dibromomethane	µg/L	<1	<5	<2	<10	<1	<1
Dichlorodifluoromethane	µg/L	<1	<5	<2	<10	<1	<1
Ethylbenzene	µg/L	<1	<5	<2	<10	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<3	<1.2	<6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<5	<2	<10	<1	<1
m-,p-Xylene	µg/L	<2	<10	<4	<20	<2	<2
MEK (2-Butanone)	µg/L	<10	<50	<20	<100	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<25	<10	<50	<5	<5
Methylene chloride	µg/L	<1	<5	0.662 B	2.96 B	0.742 B	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<50	<20	<100	<10	<10
Naphthalene	µg/L	<1	<5	<2	<10	<1	<1
n-Butylbenzene	µg/L	<1	<5	<2	<10	<1	<1
n-Propylbenzene	µg/L	<1	<5	<2	<10	<1	<1
o-Xylene	µg/L	<1	<5	<2	<10	<1	<1
p-Isopropyltoluene	µg/L	<1	<5	<2	<10	<1	<1
sec-Butylbenzene	µg/L	<1	<5	<2	<10	<1	<1
Styrene	µg/L	<1	<5	<2	<10	<1	<1
tert-Butylbenzene	µg/L	<1	<5	<2	<10	<1	<1
Tetrachloroethene	µg/L	2.48	<5	4.55	5.47 J	3.38	<1
Toluene	µg/L	<1	<5	<2	<10	<1	<1
trans-1,2-Dichloroethene	µg/L	3.08	1.79 J	5.99	24.3	2.12	<1
trans-1,3-Dichloropropene	µg/L	<1	<5	<2	<10	<1	<1
Trichloroethene	µg/L	138	131	359	1800	123	<1
Trichlorofluoromethane	µg/L	<1	<5	<2	<10	<1	<1
Vinyl acetate	µg/L	<5	<25	<10	<50	<5	<5
Vinyl chloride	µg/L	<1 UJ	6.23	<2	10.3	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-4
GROUNDWATER ANALYTICAL RESULTS, OCTOBER 2009
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-249 L09100423-28 10/16/2009	MW-250 L09100423-03 10/16/2009	MW-250 DUP L09100423-06 10/16/2009	MW-251 L09100423-04 10/16/2009
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	0.294 J
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	0.49 J
1,1-Dichloroethene	µg/L	<1	<1	<1	3.8
1,1-Dichloropropene	µg/L	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1 UJ	<1
Acetone	µg/L	3.77 J	5.16 J	5.38 J	5.14 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	0.311
Chloromethane	µg/L	<1	<1	0.299 J	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	0.697 J
Toluene	µg/L	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1 UJ	<1
Trichloroethene	µg/L	<1	<1	<1	0.396 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1
Vinyl acetate	µg/L	<5	<5	<5	<5
Vinyl chloride	µg/L	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-54 L10030650-01 3/24/2010	MW-54 DUP L10030650-29 3/24/2010	MW-70 L10030693-03 3/25/2010	MW-76 L10030693-04 3/25/2010	MW-77 L10030693-05 3/25/2010	MW-79 L10030693-06 3/25/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	0.345 J
1,1,2,2-Tetrachloroethane	µg/L	168	180	<0.5	0.525	5.34	<0.5
1,1,2-Trichloroethane	µg/L	0.599 J	0.624 J	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	0.764 J
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	17.9
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.14 J	6.85 J	<10	<10	<10	2.97 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1 UJ	<1 UJ	<1 UJ	<1 UJ
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.663	0.713	<0.3	0.134 J	0.179 J	0.152 J
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	4.7	4.89	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1.77	1.87	1.04	<1	0.4 J	26.6
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	0.657 J	0.653 J	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	170	180	0.581 J	1.35	5.68	16.9
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-148	MW-149	MW-150	MW-151	MW-152	MW-155
	Lab ID	L10030650-02	L10030650-05	L10030650-06	L10030650-07	L10030693-07	L10030650-08
	Date	3/24/2010	3/24/2010	3/24/2010	3/23/2010	3/25/2010	3/24/2010
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	5.47	34.7	<0.5	77.8	16.7
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	0.492 J	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	3.71 J	3.8 J	5.54 J	4.24 J	3.87 J	5.55 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1 UJ	<1 UJ	<1	<1 UJ	<1 UJ	<1
Carbon tetrachloride	µg/L	<1	1.78	<1	0.967 J	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	12.9	0.246 J	2.93	0.711	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	4.52	0.453 J	0.369 J	4.2	0.303 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10 UJ	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	0.277 B	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10 UJ	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	0.718 J	0.711 J	<1	0.681 J	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	0.679 J	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	0.932 J	54.7	16.1	9.9	40.8	3.17
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	0.416 J	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	**Well ID** **Lab ID** **Date** **Units**	MW-157 L10030693-08 3/25/2010	MW-157 DUP L10030693-14 3/25/2010	MW-158 L10030650-09 3/24/2010	MW-158A L10030650-10 3/24/2010	MW-159 L10030650-11 3/24/2010	MW-160 L10030650-12 3/24/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<5	<1
1,1,2,2-Tetrachloroethane	µg/L	5.71	5.33	4.59	27.8	133	5.63
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	16.8	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<5	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	3.26 J	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<5	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<5	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<5	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<5	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<5	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<10	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<5	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<5	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<5	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<5	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<5	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<2	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<5	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<5	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<5	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<50	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<5	<1
Acetone	µg/L	<10	<10	3.75 J	4.08 J	<50	4.03 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<2	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<5	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<5	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<5	<1
Bromomethane	µg/L	<1	<1	<1	<1	<5	<1
Carbon disulfide	µg/L	<1 UJ	<1 UJ	1.06 UJ	<1 UJ	69 UJ	<1 UJ
Carbon tetrachloride	µg/L	4.14	3.95	<1	<1	<5	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<5	<1
Chloroform	µg/L	7.72	7.21	<0.3 J	0.155 J	<1.5	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<5	<1
cis-1,2-Dichloroethene	µg/L	9.3	8.97	1.04	0.295 J	54	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<5	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<5	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<5	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<3	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<5	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<10	<2
MEK (2-Butanone)	µg/L	<10	<10	<10 UJ	<10 UJ	<50	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<25	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<5	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10 UJ	<10 UJ	<50	<10
Naphthalene	µg/L	<1	<1	<1	<1	<5	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<5	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<5	<1
o-Xylene	µg/L	<1	<1	<1	<1	<5	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<5	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<5	<1
Styrene	µg/L	<1	<1	<1	<1	<5	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<5	<1
Tetrachloroethene	µg/L	1.81	1.66	0.697 J	<1	2.5 J	<1
Toluene	µg/L	<1	<1	<1	<1	<5	<1
trans-1,2-Dichloroethene	µg/L	2.11	1.99	0.35 J	<1	7.07	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<5	<1
Trichloroethene	µg/L	175	169	16.7	3.87	505	0.948 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<5	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	4.42 J	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-161	MW-162	MW-163	MW-164	MW-165	MW-165A
	Lab ID	L10030693-09	L10030693-10	L10030693-11	L10030693-12	L10030650-13	L10030650-32
	Date	3/25/2010	3/25/2010	3/25/2010	3/25/2010	3/24/2010	3/24/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	2.27	3.56	11.8	21.3	25.1	45.7
1,1,2-Trichloroethane	µg/L	<1	<1	<1	1.07	2.26	0.973 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	0.193 B	0.159 B	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	<10	<10	<10	<10	5.76 J	6 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1
Carbon tetrachloride	µg/L	<1	<1	<1	6.74	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.129 J	0.151 J	<0.3	56.5	2.74	1.39
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	0.303 J	15	7.7	0.421 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	0.541 J	<1	0.487 J	1.49	1.43	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	1.57	1.74	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	2.92	3.25	11.1	75.5	187	6.29
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-165A DUP L10030650-30 3/24/2010	MW-166 L10030650-14 3/23/2010	MW-166A L10030650-15 3/23/2010	MW-232 L10030650-16 3/24/2010	MW-241 L10030650-17 3/24/2010	MW-242 L10030650-18 3/24/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	44.5	10.1	6.98	<0.5	<0.5	63.3
1,1,2-Trichloroethane	µg/L	0.807 J	0.756 J	0.265 J	<1	<1	0.75 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	0.141 B	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.93 J	7.69 J	6.64 J	5.89 J	4.19 J	4.85 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1 UJ
Carbon disulfide	µg/L	<1	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ
Carbon tetrachloride	µg/L	<1	6.1	1.88	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	1.35	65	23	<0.3	<0.3	0.188 J
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	0.491 J	5.03	3.03	<1	<1	5.08
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10 UJ
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10 UJ
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	1.38	0.402 J	<1	<1	0.373 J
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	0.919 J	<1	<1	<1	1.01
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	5.95	37.8	18.4	0.308 J	1.03	24.1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	1.62	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-243	MW-244	MW-245	MW-246	MW-247	MW-248
	Lab ID	L10030650-21	L10030650-22	L10030650-23	L10030650-24	L10030650-25	L10030693-01
	Date	3/24/2010	3/24/2010	3/24/2010	3/24/2010	3/24/2010	3/26/2010
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	26.1	52.7	70.7	74.6	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	0.894 J	0.823 J	3.28	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.07 J	4.04 J	8.89 J	6.13 J	4.01 J	<10
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1 UJ	<1	<1	<1	<1 UJ	<1 UJ
Carbon tetrachloride	µg/L	<1	<1	<1	<1	0.378 J	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	<0.3	0.248 J	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	3.34	1.06	1.95	5.72	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10 UJ	<10	<10	<10	<10 UJ	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10 UJ	<10	<10	<10	<10 UJ	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	0.33 J	<1	0.41 J	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	16	4.56	21.5	14.7	0.431 J	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	2.37	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-5
GROUNDWATER ANALYTICAL RESULTS, MARCH 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab ID / Date / Units	MW-248 DUP	MW-249	MW-250	MW-251
	Lab ID	L10030693-02	L10030650-26	L10030650-27	L10030650-28
	Date	3/26/2010	3/24/2010	3/24/2010	3/24/2010
	Units				
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	5.03	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	0.445 J
1,1-Dichloroethene	µg/L	<1	<1	<1	3.15
1,1-Dichloropropene	µg/L	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1
Acetone	µg/L	5.56 J	<10 J	4.07 J	4.49 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1
Carbon disulfide	µg/L	<1 UJ	<1 UJ	<1 UJ	<1 UJ
Carbon tetrachloride	µg/L	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<0.3	0.427	<0.3	0.197 J
Chloromethane	µg/L	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10 UJ	<10 UJ	<10 UJ
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10 UJ	<10 UJ	<10 UJ
Naphthalene	µg/L	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	0.644 J
Toluene	µg/L	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	0.703 J	<1	0.34 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified, but quantitation estimated.
UJ: non-detect, estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab Id / Date / Units	MW-54 L10060784-01 6/22/2010	MW-54 DUP L10060784-29 6/22/2010	MW-70 L10060784-02 6/22/2010	MW-76 L10060784-03 6/22/2010	MW-77 L10060784-04 6/22/2010	MW-79 L10060784-05 6/22/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	0.758 J
1,1,2,2-Tetrachloroethane	µg/L	83.2	89.1	1.03	0.378 J	19.6	<0.5
1,1,2-Trichloroethane	µg/L	0.312 J	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	1.26
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	26.4
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	0.387 J
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	3.09 JB	4.21 JB	3.04 JB	<10	<10	2.9 JB
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1 UJ	<1 UJ	<1 UJ
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.366	0.364	<0.3	<0.3	0.181 J	0.228 J
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	2.5	2.37	<1	<1	0.558 J	0.438 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1.12	1.1	1.3	0.361 J	0.585 J	50.8
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	0.308 J	0.276 J	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	93.6	95.1	4.11	1.41	22.8	39
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab Id / Date / Units	MW-148 L10060784-06 6/22/2010	MW-149 L10060784-34 6/23/2010	MW-150 L10060784-09 6/22/2010	MW-151 L10060784-35 6/23/2010	MW-152 L10060784-10 6/22/2010	MW-155 L10060784-36 6/23/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	15	4.98	<0.5	63.9	24
1,1,2-Trichloroethane	µg/L	<1	0.69 J	<1	<1	0.311 J	0.498 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	<10	3.9 JB	3.7 JB	4.32 JB	4.16 JB	5.97 JB
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	2.02	<1	0.765 J	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	41.6	0.222 J	2.67	0.446	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	7.22	<1	0.309 J	1.14	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	0.651 J	0.888 J	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	0.595 J	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	35	2.44	8.21	14.5	1.57
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab Id Date Units	MW-157 L10060784-11 6/22/2010	MW-157 DUP L10060784-30 6/22/2010	MW-158 L10060784-12 6/22/2010	MW-158A L10060784-13 6/22/2010	MW-159 L10060784-37 6/23/2010	MW-160 L10060784-38 6/23/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<2	<1
1,1,2,2-Tetrachloroethane	µg/L	8.15	8.2	0.802	27.2	69.9	4.79
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	10.2	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<2	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	4.81	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<2	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<2	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<2	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<2	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<2	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<4	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<2	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<2	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<2	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<2	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<2	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.8	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<2	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<2	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<2	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<20	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<2	<1
Acetone	µg/L	4.58 JB	4.19 JB	3.31 JB	4.16 JB	<20	<10
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.8	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<2	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<2	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<2	<1
Bromomethane	µg/L	<1	<1	<1	<1	<2	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<2	<1
Carbon tetrachloride	µg/L	2.9	2.95	<1	<1	<2	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<2	<1
Chloroform	µg/L	6.41	6.62	0.156 J	<0.3	<0.6	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<2	<1
cis-1,2-Dichloroethene	µg/L	7.73	7.9	<1	0.302 J	55.4	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<1	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<2	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<2	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<2	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<1.2	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<2	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<4	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<20	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<10	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<2	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<20	<10
Naphthalene	µg/L	<1	<1	<1	<1	<2	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<2	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<2	<1
o-Xylene	µg/L	<1	<1	<1	<1	<2	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<2	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<2	<1
Styrene	µg/L	<1	<1	<1	<1	<2	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<2	<1
Tetrachloroethene	µg/L	1.34	1.29	<1	<1	1.29 J	<1
Toluene	µg/L	<1	<1	<1	<1	<2	<1
trans-1,2-Dichloroethene	µg/L	1.55	1.53	<1	<1	5.57	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<2	<1
Trichloroethene	µg/L	141	155	3.37	3.01	280	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<2	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	4.99	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab Id Date Units	MW-161 L10060784-14 6/22/2010	MW-162 L10060784-15 6/22/2010	MW-163 L10060784-16 6/22/2010	MW-164 L10060784-17 6/22/2010	MW-165 L10060784-18 6/22/2010	MW-165A L10060784-19 6/22/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	1.47	0.258 J	11.3	21	38.8	104
1,1,2-Trichloroethane	µg/L	<1	<1	<1	0.909 J	1.96	0.457 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	0.18 J	0.232 J	0.323 J	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	3.12 JB	3.8 JB	4.08 JB	4.23 JB	3.73 JB	5.18 JB
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	6.26	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.142 J	0.165 J	0.142 J	52.7	1.19	0.918
Chloromethane	µg/L	<1	<1	<1	0.594 J	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	0.272 J	13.2	3.6	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	0.696 J	<1	0.623 J	1.15	0.807 J	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	1.25	0.699 J	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	2.43	0.322 J	11.8	58.5	67.7	4.6
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab Id / Date / Units	MW-165A DUP L10060784-31 6/22/2010	MW-166 L10060784-39 6/23/2010	MW-166A L10060784-40 6/23/2010	MW-232 L10060784-41 6/23/2010	MW-241 L10060784-20 6/22/2010	MW-242 L10060784-21 6/22/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	101	8.91	4.23	<0.5	<0.5	29.8
1,1,2-Trichloroethane	µg/L	0.401 J	0.518 J	<1	<1	<1	0.328 J
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	0.16 J	<0.5	0.204 J	<0.5	0.474 J
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	4.14 JB	5.59 JB	4.58 JB	4.67 JB	<10	5.3 JB
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	2.95	0.996 J	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.906	34.7	7.54	<0.3	<0.3	0.173 J
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	6.6	3.85	<1	<1	1.94
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	1.22	0.647 J	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	1.08	0.615 J	<1	<1	0.429 J
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	3.77	59.6	53.5	<1	0.593 J	10.9
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	2.11	<1	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab Id / Date / Units	MW-243	MW-244	MW-245	MW-246	MW-247	MW-248
	Lab Id	L10060784-24	L10060784-42	L10060784-25	L10060784-26	L10060784-43	L10060784-27
	Date	6/22/2010	6/23/2010	6/22/2010	6/22/2010	6/23/2010	6/22/2010
	Units						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	15.6	13.7	27.9	24.1	11.4	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	2.91	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.16 JB	4.38 JB	4.73 JB	4.35 JB	4.85 JB	4.1 JB
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	0.875 J	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	<0.3	3.45	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	0.796 J	0.549 J	0.55 J	1.25	0.421 J	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	4.92	2.78	5.46	3.75	2.95	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	0.651 J	<1	<1	<1	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-6
GROUNDWATER ANALYTICAL RESULTS, JUNE 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-248 DUP	MW-249	MW-250	MW-251
	Lab Id	L10060784-32	L10060784-28	L10060784-44	L10060784-45
	Date	6/22/2010	6/22/2010	6/23/2010	6/23/2010
Analyte	Units				
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	0.388 J
1,1-Dichloroethene	µg/L	<1	<1	<1	2.9
1,1-Dichloropropene	µg/L	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1
Acetone	µg/L	3.49 JB	2.81 JB	4.66 JB	2.8 JB
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	0.577 J	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<0.3	0.452	<0.3	0.254 J
Chloromethane	µg/L	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	0.621 J
Toluene	µg/L	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	0.693 J	<1	0.256 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1

Notes:
µg/L: micrgrams per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, RL estimated
B: analyte found in associated blank
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab Id Date Units	MW-54 L10090659-01 9/22/2010	MW-54 DUP L10090659-25 9/22/2010	MW-70 L10090659-02 9/22/2010	MW-76 L10090659-03 9/22/2010	MW-77 L10090659-04 9/22/2010	MW-79 L10090659-28 9/23/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	0.321 J
1,1,2,2-Tetrachloroethane	µg/L	44.9 J	45.8	1.07 J	1.07	20.4	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	0.978 J
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	35.7
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	0.35 J
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10 J	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	6.67 J	5.8 J	6.02 J	6.6 J	5.63 J	9.96 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.286 J	0.276 J	<0.3	0.139 J	0.238 J	0.17 J
Chloromethane	µg/L	<1	<1 J	<1	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	2.65	1.33	<1	<1	0.592 J	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10 J	<10	<10 J	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10 J	<10	<10 J	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1.28	0.978 J	1.25	0.376 J	0.405 J	25
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	60	57.1	3.78	2.51	23.6	20.2
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-148	MW-149	MW-150	MW-151	MW-152	MW-155
	Lab Id	L10090659-05	L10090659-29	L10090659-08	L10090659-30	L10090659-31	L10090659-09
	Date	9/22/2010	9/23/2010	9/22/2010	9/23/2010	9/23/2010	9/22/2010
Analyte	Units						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	29.8	0.917	0.315 J	5.35	4.58
1,1,2-Trichloroethane	µg/L	<1	1.3	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10 J	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	4.23 J	4.61 J	4.83 J	7.08 J	5.09 J	4.1 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1 J	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	6.98	<1	0.735 J	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	92.3	0.16 J	2.36	<0.3	<0.3
Chloromethane	µg/L	<1	<1 J	<1 J	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	<1	17.7	<1	0.309 J	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1 J	<1	<1 J	<1 J	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10 J	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10 J	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	1.92	0.976 J	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	1.54	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	87.9	0.515 J	7.24	1.55	0.408 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1 J	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-157	MW-157 DUP	MW-158	MW-158A	MW-159	MW-160
	Lab Id	L10090659-10	L10090659-26	L10090659-32	L10090659-33	L10090659-11	L10090659-34
	Date	9/22/2010	9/22/2010	9/23/2010	9/23/2010	9/22/2010	9/23/2010
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	3.55	3.63	1.82	5.03	75	0.764
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	12.4	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	8.51	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	6.33 J	6.61 J	5.64 J	6.17 J	4.7 J	<10
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	2.25	2.38	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	5.85	5.83	<0.3	<0.3	0.568	<0.3
Chloromethane	µg/L	<1 J	<1 J	<1 J	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	5.44	5.41	<1	<1	62	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1 J	<1 J	<1	<1 J
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1.03	0.996 J	<1	<1	1.49	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	1.03	0.913 J	<1	<1	6.69	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	88.3	89.5	6.04	1.3	293	0.323 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	40.3	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab Id / Date / Units	MW-161	MW-162	MW-163	MW-164	MW-165	MW-165 DUP
	Lab Id	L10090659-12	L10090659-13	L10090659-14	L10090659-15	L10090659-35	L10090659-44
	Date	9/22/2010	9/22/2010	9/22/2010	9/22/2010	9/23/2010	9/23/2010
	Units						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	3.28	<0.5	5.32	11.9	34.7	33.4
1,1,2-Trichloroethane	µg/L	<1	<1	<1	0.524 J	1.93	1.72
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	0.162 J	0.165 J
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	7.18 J	5.15 J	10.2	7.96 J	5.21 J	6.23 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1 J
Carbon tetrachloride	µg/L	<1	<1	<1	4.32	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.141 J	0.135 J	0.181 J	29.5	0.927	0.896
Chloromethane	µg/L	<1 J	<1 J	<1 J	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	8.57	1.15	1.14
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1 J	<1 J
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	0.259 U
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	0.664 J	<1	0.634 J	0.962 J	0.418 J	0.331 J
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	0.703 J	0.324 J	0.284 J
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	4.78	0.278 J	6.53	39.7	35.4	33.8
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1 J

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Lab Id / Date / Units	MW-165A / L10090659-36 / 9/23/2010	MW-166 / L10090659-37 / 9/23/2010	MW-166A / L10090659-38 / 9/23/2010	MW-232 / L10090659-16 / 9/22/2010	MW-241 / L10090659-17 / 9/22/2010	MW-242 / L10090659-18 / 9/22/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	44.7	11.4	12.6	<0.5	<0.5	15.7
1,1,2-Trichloroethane	µg/L	0.28 J	0.458 J	0.503 J	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	0.217 J
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.88 J	6.69 J	6.3 J	5.31 J	4.53 J	5.39 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	6.16	2.99	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	22.8	26.5	<0.3	<0.3	0.198 J
Chloromethane	µg/L	<1 J	<1 J	<1 J	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	<1	15.4	9.91	<1	<1	0.804 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1 J	<1 J	<1 J	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	0.305 J	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	1.99	0.748 J	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	2.97	0.912 J	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	2.3	223	57.5	0.335 J	0.573 J	7.16
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	0.531 J	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	**Well ID**	MW-243	MW-244	MW-245	MW-246	MW-247	MW-248
	Lab Id	L10090659-21	L10090659-22	L10090659-23	L10090659-39	L10090659-40	L10090659-41
	Date	9/22/2010	9/22/2010	9/22/2010	9/23/2010	9/23/2010	9/23/2010
	Units						
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	12.2	2.88	10.7	11.1	20.4	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	0.936 J	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.51 J	5.65 J	6.01 J	4.19 J	4.22 J	5.43 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	0.702 J	<1 J	<1 J	<1 J
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	<0.3	0.229 J	<0.3
Chloromethane	µg/L	<1 J	<1 J	<1 J	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	0.359 J	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1 J	<1 J	<1 J
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	1.76	0.389 J	2.31	1.17	2.21	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1 J	<1 J	<1 J

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-7
GROUNDWATER ANALYTICAL RESULTS, SEPTEMBER 2010
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Lab Id Date Units	MW-248 DUP L10090659-45 9/23/2010	MW-249 L10090659-42 9/23/2010	MW-250 L10090659-43 9/23/2010	MW-251 L10090659-24 9/22/2010
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	0.473 J
1,1-Dichloroethene	µg/L	<1	<1	<1	3.77
1,1-Dichloropropene	µg/L	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1
Acetone	µg/L	6.12 J	6.7 J	4.22 J	4.02 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1
Bromomethane	µg/L	<1 J	<1	<1	<1
Carbon disulfide	µg/L	<1	<1 J	<1 J	<1
Carbon tetrachloride	µg/L	<1	0.437 J	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<0.3	0.399	<0.3	0.306
Chloromethane	µg/L	<1	<1 J	<1 J	<1 J
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1 J	<1 J	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	0.699 J
Toluene	µg/L	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	0.519 J	<1	0.366 J
Trichlorofluoromethane	µg/L	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1 J	<1 J	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-8
GROUNDWATER ANALYTICAL RESULTS, JANUARY 2011
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID / Date / Lab ID / Units	MW-54 1/26/2011 L11010698-19	MW-70 1/26/2011 L11010698-20	MW-76 1/26/2011 L11010698-21	MW-77 1/26/2011 L11010698-22	MW-79 1/25/2011 L11010698-01	MW-79 DUP 1/25/2011 L11010698-17	MW-148 1/26/2011 L11010698-23
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	0.272 J	0.279 J	<1
1,1,2,2-Tetrachloroethane	µg/L	28.5	1.05	0.853	25	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	0.881 J	0.866 J	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	28.7	32.6	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	0.27 J	0.299 J	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.83	6.8	5.94	5.37	4.32 J	6.27 J	5.74
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	0.422	<0.3	0.138 J	0.234 J	0.211 J	0.185 J	0.186 J
Chloromethane	µg/L	<1	0.511 J	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	1.11	<1	<1	0.516 J	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10 UJ	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1.31	1.21	0.322 J	0.452 J	18.1	18.1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	55.6	3.09	1.79	23.7	17.3	16.3	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: Estimated non-detect
<: Analyte not detected above RL

TABLE C-8
GROUNDWATER ANALYTICAL RESULTS, JANUARY 2011
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-149	MW-150	MW-151	MW-152	MW-155	MW-157	MW-158
	Date	1/26/2011	1/26/2011	1/25/2011	1/25/2011	1/25/2011	1/26/2011	1/25/2011
	Lab ID	L11010698-24	L11010698-25	L11010698-02	L11010698-03	L11010698-09	L11010698-27	L11010698-06
Analyte	**Units**							
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	24.8	11.4	0.846	2.01	3.75	1.29	0.677
1,1,2-Trichloroethane	µg/L	1.07	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	0.265 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4 U	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
Acetone	µg/L	6.34	5.18 J	5.02 J	6.29 J	5.76 J	6.6 J	7.18 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	7.91	<1	0.766 J	<1	<1	0.644 J	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1 U	<1	<1	<1	<1 U	<1
Chloroform	µg/L	94.3	0.178 J	4.65	<0.3	<0.3	4.43	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	13.2	<1	0.61 J	<1	<1	1.8	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6 UJ	<0.6	<0.6	<0.6	<0.6 UJ	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10 UJ	<10 U	<10 UJ	<10	<10 UJ
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	2.16	0.678 J	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	1.33	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	66.6	13.5	7.69	1.07	1.07	13.3	1.17
Trichlorofluoromethane	µg/L	<1	<1 U	<1	<1	<1	<1 U	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: Estimated non-detect
<: Analyte not detected above RL

TABLE C-8
GROUNDWATER ANALYTICAL RESULTS, JANUARY 2011
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-158A	MW-159	MW-160	MW-160 DUP	MW-161	MW-162	MW-163
	Date	1/25/2011	1/25/2011	1/26/2011	1/26/2011	1/26/2011	1/26/2011	1/26/2011
	Lab ID	L11010698-07	L11010698-08	L11010698-26	L11010698-41	L11010698-28	L11010698-29	L11010698-30
Analyte	**Units**							
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<2	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	0.771	37.8	0.254 J	<0.5	2.28	<0.5	1.78
1,1,2-Trichloroethane	µg/L	<1	6.14	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<2	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	5.86	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<4	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<2	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.8	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<2	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<2	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<2	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<20	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<2	<1	<1	<1	<1	<1
Acetone	µg/L	4.52 J	5.23 J	<10	<10 U	5.6 J	5.88 J	5.81 J
Benzene	µg/L	<0.4	<0.8	<0.4	<0.4	<0.4	<0.4	0.565
Bromobenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<2	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<2	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<2	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<2	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<2	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<2	<1 U	<1	<1 U	<1 U	<1 U
Chloroform	µg/L	<0.3	0.285 J	<0.3	<0.3	<0.3	<0.3	0.165 J
Chloromethane	µg/L	<1	<2	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	45.6	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<2	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<2	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<1.2	<0.6 UJ	<0.6	<0.6 UJ	<0.6 UJ	<0.6 UJ
Isopropylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<4	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10 UJ	<20 UJ	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<10	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<2	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<20	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<2	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<2	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<2	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<2	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<2	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	1.15 J	<1	<1	0.968 J	<1	0.553 J
Toluene	µg/L	<1	<2	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	4.82	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<2	<1	<1	<1	<1	<1
Trichloroethene	µg/L	0.426 J	200	<1	<1	3.62	<1	3.4
Trichlorofluoromethane	µg/L	<1	<2	<1 U	<1	<1 U	<1 U	<1 U
Vinyl chloride	µg/L	<1	25.7	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: Estimated non-detect
<: Analyte not detected above RL

TABLE C-8
GROUNDWATER ANALYTICAL RESULTS, JANUARY 2011
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Well ID Date Lab ID Units	MW-164 1/26/2011 L11010698-31	MW-165 1/25/2011 L11010698-10	MW-165A 1/25/2011 L11010698-11	MW-166 1/25/2011 L11010698-12	MW-166A 1/25/2011 L11010698-13	MW-241 1/26/2011 L11010698-32	MW-242 1/26/2011 L11010698-33
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	5.48	14.5	35.6	9.34	6.27	<0.5	2.83
1,1,2-Trichloroethane	µg/L	0.284 J	1.46	<1	0.435 J	0.344 J	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.79 J	4.95 J	6.81 J	4.83 J	5.93 J	4.02	5.17
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	2.53	<1	<1	6.04	2.4	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1 U	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	15.6	0.618	0.15 J	17.9	18.6	<0.3	0.165 J
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	4.74	0.456 J	<1	13.4	7.69	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6 UJ	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10 UJ	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	0.637 J	0.327 J	<1	2.03	0.973 J	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	0.381 J	<1	<1	2.06	1.05	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	23.5	19.8	3.64	154	85.9	0.741 J	3.57
Trichlorofluoromethane	µg/L	<1 U	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: Estimated non-detect
<: Analyte not detected above RL

TABLE C-8
GROUNDWATER ANALYTICAL RESULTS, JANUARY 2011
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-242 DUP	MW-243	MW-244	MW-245	MW-246	MW-247	MW-248
	Date	1/26/2011	1/26/2011	1/26/2011	1/25/2011	1/25/2011	1/25/2011	1/26/2011
	Lab ID	L11010698-42	L11010698-34	L11010698-37	L11010698-14	L11010698-15	L11010698-16	L11010698-38
Analyte	**Units**							
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	2.72	4.53	1.48	3.81	9.79	44.8	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	1.27	0.272 J	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
Acetone	µg/L	5.06	6.25 J	4.34	7.26 J	6.59 J	8.28 J	4.38
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	0.544 J	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1 U	<1	<1	<1	<1	<1
Chloroform	µg/L	0.151 J	<0.3	<0.3	<0.3	<0.3	2.39	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	1.52	0.826 J	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	0.269 B	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	3.25	1.89	0.753 J	1.59	1.75	12.1	<1
Trichlorofluoromethane	µg/L	<1	<1 U	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1 U	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: Estimated non-detect
<: Analyte not detected above RL

TABLE C-8
GROUNDWATER ANALYTICAL RESULTS, JANUARY 2011
OFF DEPOT INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Well ID	MW-249	MW-249 DUP
	Date	1/26/2011	1/26/2011
	Lab ID	L11010698-39	L11010698-43
Analyte	**Units**		
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1
1,1-Dichloroethane	µg/L	<1	<1
1,1-Dichloroethene	µg/L	<1	<1
1,1-Dichloropropene	µg/L	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2
1,2-Dibromoethane	µg/L	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1
2,2-Dichloropropane	µg/L	<1	<1
2-Chlorotoluene	µg/L	<1	<1
2-Hexanone	µg/L	<10	<10
4-Chlorotoluene	µg/L	<1	<1
Acetone	µg/L	4.48	6.28
Benzene	µg/L	<0.4	<0.4
Bromobenzene	µg/L	<1	<1
Bromochloromethane	µg/L	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5
Bromoform	µg/L	<1	<1
Bromomethane	µg/L	<1	<1
Carbon disulfide	µg/L	<1	<1
Carbon tetrachloride	µg/L	1.19	1.15
Chlorobenzene	µg/L	<0.5	<0.5
Chloroethane	µg/L	<1	<1
Chloroform	µg/L	2.23	2.26
Chloromethane	µg/L	<1	<1
cis-1,2-Dichloroethene	µg/L	0.263 J	0.252 J
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5
Dibromomethane	µg/L	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1
m-,p-Xylene	µg/L	<2	<2
MEK (2-Butanone)	µg/L	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5
Methylene chloride	µg/L	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10
Naphthalene	µg/L	<1	<1
n-Butylbenzene	µg/L	<1	<1
n-Propylbenzene	µg/L	<1	<1
o-Xylene	µg/L	<1	<1
p-Isopropyltoluene	µg/L	<1	<1
sec-Butylbenzene	µg/L	<1	<1
Styrene	µg/L	<1	<1
tert-Butylbenzene	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	<1
Toluene	µg/L	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1
Trichloroethene	µg/L	1.88	1.77
Trichlorofluoromethane	µg/L	<1	<1
Vinyl chloride	µg/L	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: Estimated non-detect
<: Analyte not detected above RL

TABLE C-9
VAPOR ANALYTICAL RESULTS, VI MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Location	VI-1A	VI-1B	VI-2A	VI-2B	VI-4B	VI-5B	VI-6A	VI-6A	VI-6B	VI-7A
	Lab Sample ID	JA41416-1	JA41416-2	JA41416-3	JA41416-19	JA41416-7	JA41416-9	JA41416-10	JA41417-1	JA41416-11	JA41416-12
	Date	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/9/2010	3/9/2010	3/8/2010	3/8/2010	3/9/2010	3/8/2010
	Field Sample ID	VI-1A-1Q10	VI-1B-1Q10	VI-2A-1Q10	VI-2B-1Q10	VI-4B-1Q10	VI-5B-1Q10	VI-6A-1Q10	DUP-1	VI-6B-1Q10	VI-7A-1Q10
Analyte	**Units**										
1,1,2,2-Tetrachloroethane	μg/m^3	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	μg/m^3	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1-Dichloroethylene	μg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloroethane	μg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Carbon tetrachloride	μg/m^3	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	μg/m^3	2.6 J	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
cis-1,2-Dichloroethylene	μg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Methylene chloride	μg/m^3	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	4.2
Tetrachloroethylene	μg/m^3	4.7	1.2	<1.1	8.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.8
trans-1,2-Dichloroethylene	μg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Trichloroethylene	μg/m^3	<0.86	<0.86	<0.86	0.75 J	<0.86	8.6	<0.86	<0.86	<0.86	<0.86
Vinyl chloride	μg/m^3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

Notes:
μg/m^3: micrograms per cubic metter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-9
VAPOR ANALYTICAL RESULTS, VI MARCH 2010
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Location	VI-8A	VI-9A	VI-9B	VMP-4A	VMP-4A	VMP-4B
	Lab Sample ID	JA41416-14	JA41416-16	JA41416-20	JA41416-17	JA41417-2	JA41416-18
	Date	3/8/2010	3/8/2010	3/9/2010	3/8/2010	3/8/2010	3/8/2010
	Field Sample ID	VI-8A-1Q10	VI-9A-1Q10	VI-9B-1Q10	VMP-4A-1Q10	DUP-2	VMP-4B-1Q10
Analyte	**Units**						
1,1,2,2-Tetrachloroethane	µg/m^3	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	µg/m^3	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,1-Dichloroethylene	µg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloroethane	µg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Carbon tetrachloride	µg/m^3	<5	<5	<5	<5	<5	<5
Chloroform	µg/m^3	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
cis-1,2-Dichloroethylene	µg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	1.9 J
Methylene chloride	µg/m^3	<2.8	<2.8	<2.8	<2.8	<2.8	10
Tetrachloroethylene	µg/m^3	<1.1	<1.1	1 J	<1.1	<1.1	2.5
trans-1,2-Dichloroethylene	µg/m^3	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Trichloroethylene	µg/m^3	<0.86	5.9	<0.86	11	1.6	28
Vinyl chloride	µg/m^3	<2	<2	<2	<2	<2	<2

Notes:
µg/m^3: micrograms per cubic metter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
<: Analyte not detected above RL

TABLE C-10
QC ANALYTICAL RESULTS,
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Sample ID / Lab ID / Date / units	TB-072809 / L09070713-26 / 7/30/2009 / Trip Blank	TB06082009 / L09060246-22 / 6/8/2009 / Trip Blank	RB1 / L09070713-13 / 7/30/2009 / Rinsate Blank	TB-101509 / L09100412-38 / 10/15/2009 / Trip Blank	TB-101609 / L09100423-02 / 10/16/2009 / Trip Blank	TB-31910-ODPM-3 / L10030650-31 / 3/24/2010 / Trip Blank
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	0.281 J	0.174 J	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	<10	<10	4.44 J	<10	<10	<10
Benzene	µg/L	<0.4	<0.4	0.142 J	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1	<1	<1 UJ
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chloromethane	µg/L	<1	<1	<1	0.461 J	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	0.456 J	<1	<1	0.531 J	0.596 J	0.395 J
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	0.128 J	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1	<1
Toluene	µg/L	<1	0.298 J	0.39 J	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated

TABLE C-10
QC ANALYTICAL RESULTS,
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

	Sample ID	ODPM-4-RB	TB-31810-ODPM-3	TB-062510	ODPM-4-RB	TB-062410	TB-31910
	Lab ID	L10030693-13	L10030693-15	L10060784-33	L10060784-46	L10060784-47	L10090659-27
	Date	3/25/2010	3/25/2010	6/22/2010	6/23/2010	6/23/2010	9/22/2010
Analyte	**units**	Rinsate Blank	Trip Blank	Trip Blank	Rinsate Blank	Trip Blank	Trip Blank
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	0.986	<0.5	<0.5	<0.5	<0.5	<0.5
1-Chlorohexane	µg/L	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1	<1	<1
Acetone	µg/L	<10	<10	<10	4.7 J	<10	<10
Benzene	µg/L	0.145 J	<0.4	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	<1	<1	0.579 J	<1	<1	<1
Carbon disulfide	µg/L	<1 UJ	<1 UJ	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1 J
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5	<5	<5
Methylene chloride	µg/L	<1	<1	<1	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1	<1
Toluene	µg/L	0.481 J	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated

TABLE C-10
QC ANALYTICAL RESULTS,
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

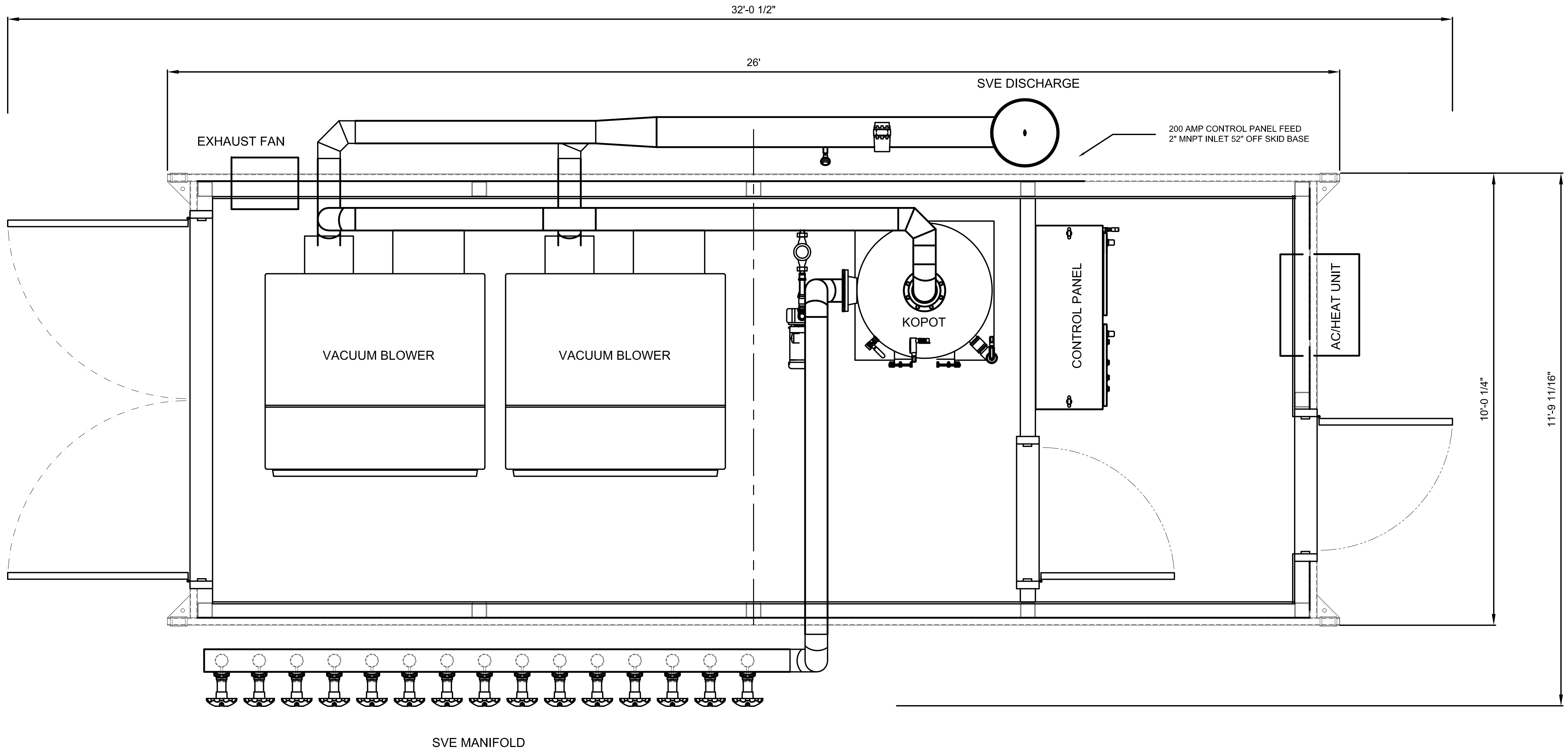
	Sample ID	TB-31810	TB-012411-ODPM-7	TB-012511-ODPM-7	ODPM-7-RB
	Lab ID	L10090659-46	L11010698-18	L11010698-44	L11010698-40
	Date	9/23/2010	1/25/2011	1/26/2011	1/26/2011
Analyte	**units**	Trip Blank	Trip Blank	Trip Blank	Rinsate Blank
1,1,1,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	<1	<1	<1	<1
1,1-Dichloroethene	µg/L	<1	<1	<1	<1
1,1-Dichloropropene	µg/L	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/L	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/L	<2	<2	<2	<2
1,2-Dibromoethane	µg/L	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-Dichloroethane	µg/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/L	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1
1,3-Dichloropropane	µg/L	<0.4	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	<0.5	<0.5	<0.5	1.03
1-Chlorohexane	µg/L	<1	<1	<1	<1
2,2-Dichloropropane	µg/L	<1	<1	<1	<1
2-Chlorotoluene	µg/L	<1	<1	<1	<1
2-Hexanone	µg/L	<10	<10	<10	<10
4-Chlorotoluene	µg/L	<1	<1	<1	<1
Acetone	µg/L	<10	<10	<10	4.22 J
Benzene	µg/L	<0.4	<0.4	<0.4	<0.4
Bromobenzene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	<1	<1	<1	<1
Bromomethane	µg/L	<1 J	<1	<1	<1
Carbon disulfide	µg/L	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1
Chlorobenzene	µg/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<0.3	<0.3	<0.3	<0.3
Chloromethane	µg/L	0.769 J	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	<1	<1	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<0.6	<0.6	<0.6	<0.6
Isopropylbenzene	µg/L	<1	<1	<1	<1
m-,p-Xylene	µg/L	<2	<2	<2	<2
MEK (2-Butanone)	µg/L	<10	<10	<10	<10
Methyl t-butyl ether (MTBE)	µg/L	<5	<5	<5	<5
Methylene chloride	µg/L	0.309 J	<1	<1	<1
MIBK (methyl isobutyl ketone)	µg/L	<10	<10	<10	<10
Naphthalene	µg/L	<1	<1	<1	<1
n-Butylbenzene	µg/L	<1	<1	<1	<1
n-Propylbenzene	µg/L	<1	<1	<1	<1
o-Xylene	µg/L	<1	<1	<1	<1
p-Isopropyltoluene	µg/L	<1	<1	<1	<1
sec-Butylbenzene	µg/L	<1	<1	<1	<1
Styrene	µg/L	<1	<1	<1	<1
tert-Butylbenzene	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	0.303 J
trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1
Trichlorofluoromethane	µg/L	<1	<1	<1	<1
Vinyl chloride	µg/L	<1	<1	<1	<1

Notes:
µg/L: micrograms per liter

DQE Flags:
J: Analyte positively identified; quantitation estimated.
UJ: non-detect, estimated

APPENDIX D

AS/SVE SYSTEM AS-BUILT DRAWINGS



PLAN VIEW

SYSTEM WEIGHT DRY IS 12,750 LBS

SYSTEM WEIGHT WET IS 14,680 LBS

PROPERTY OF

OEC

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CUSTOMER	PROJECT
E2M	MEMPHIS DEPOT – DUNN FIELD

FINAL EQUIPMENT LAYOUT

FOR

SOIL VAPOR EXTRACTION SYSTEM

DWN BY	CHK'D BY	APP'D BY	DATE	SCALE	JOB No.	DRAWING No.	REV
DB (TF)	TB (TF)	EP (TF)	SEP 21/09	NTS	09-16A	M-2	0

MASTER BILL OF MATERIAL

ITEM	QTY	DESCRIPTION
100	2	VACUUM BLOWER, KAESER MODEL EB420CVAC/53P, 40 HP 3PH 230/460V 6" 150# INLET, 6" SOKET TUBE OUTLET
101	1	TRANSFER PUMP, AMT MODEL 285P-95, 3/4 HP TEFC - 3PH - 1-1/4" FNPT SUCTION/DISCHARGE
104	1	AIR WATER SEPARATOR, TETRASOLV FILTRATION MODEL MS36-6-S, 160 GAL, 6" ANSI FLNG INLET/OUTLET
201	1	SILENCER, 18 GAL
202	1	SILENCER, 8" INLINE

ITEM	QTY	DESCRIPTION
400	1	BALL VALVE, FULL PORT, BRONZE, TFE, 1" FNPT
401	15	DIAPHRAGM VALVE, GIE MODEL WFDX223N30, 3" ANSI FLNG
402	16	BALL VALVE, FULL PORT, BRONZE, TFE, 1/4" FNPT
403	1	BALL VALVE, FULL PORT, BRONZE, TFE, 1-1/4" FNPT
404	1	CHECK VALVE, STRATA FLO NO. 400, 1" BRONZE
406	2	BUTTERFLY VALVE 150# LEVER HANDLE, 6" LUG
801	16	VACUUM GAUGE, 0-30" Hg, 1/4" NPT LB, 2 1/2" DIAL
802	1	PRESSURE GAUGE, 0-60 PSI, 1/4" NPT LB, 2-1/2" DIAL, LIQUID FILLED 304 SS BODY
803	1	PITOT TUBE, DWYER DS-300-8"

ITEM	QTY	DESCRIPTION
900	1	LEVEL SWITCH, FLOW PLUS, 316 SS FLOATS (1513 SDT), LEVELS {L3(R)=10", L2(Y)=18", L3(B)=41"} OAL=44"
901	15	FLOW METER, ERDCO MODEL 3211-12F5, 3" ANSI FLNG
902	1	FLOW METER, NEPTUNE T-10 FLOW AND TOTALIZER, 3/4" FNPT, BRONZE
903	1	FLOW METER, SIERRA MODEL 640S-NAA-L09-M1-EN2-P2-V4-NR-0-640S
904	1	TEMPERATURE TRANSMITER, MCMASTER-CARR P/N 40705K3, 0-300 F, 1/2" NPT
905	1	VACUUM TRANSMITER, DWYER MODEL 628-00-GH-P1-E1-S1, 0-30" Hg, 1/4" NPT

SYSTEM INTERLOCKS

ALARM	ACTION
AWS HI/HI	SYSTEM SHUTDOWN
LOW VAC SVE	SYSTEM SHUTDOWN
HIGH TEMP SVE	SYSTEM SHUTDOWN
HIGH DIFF FILTER	SYSTEM ALERT

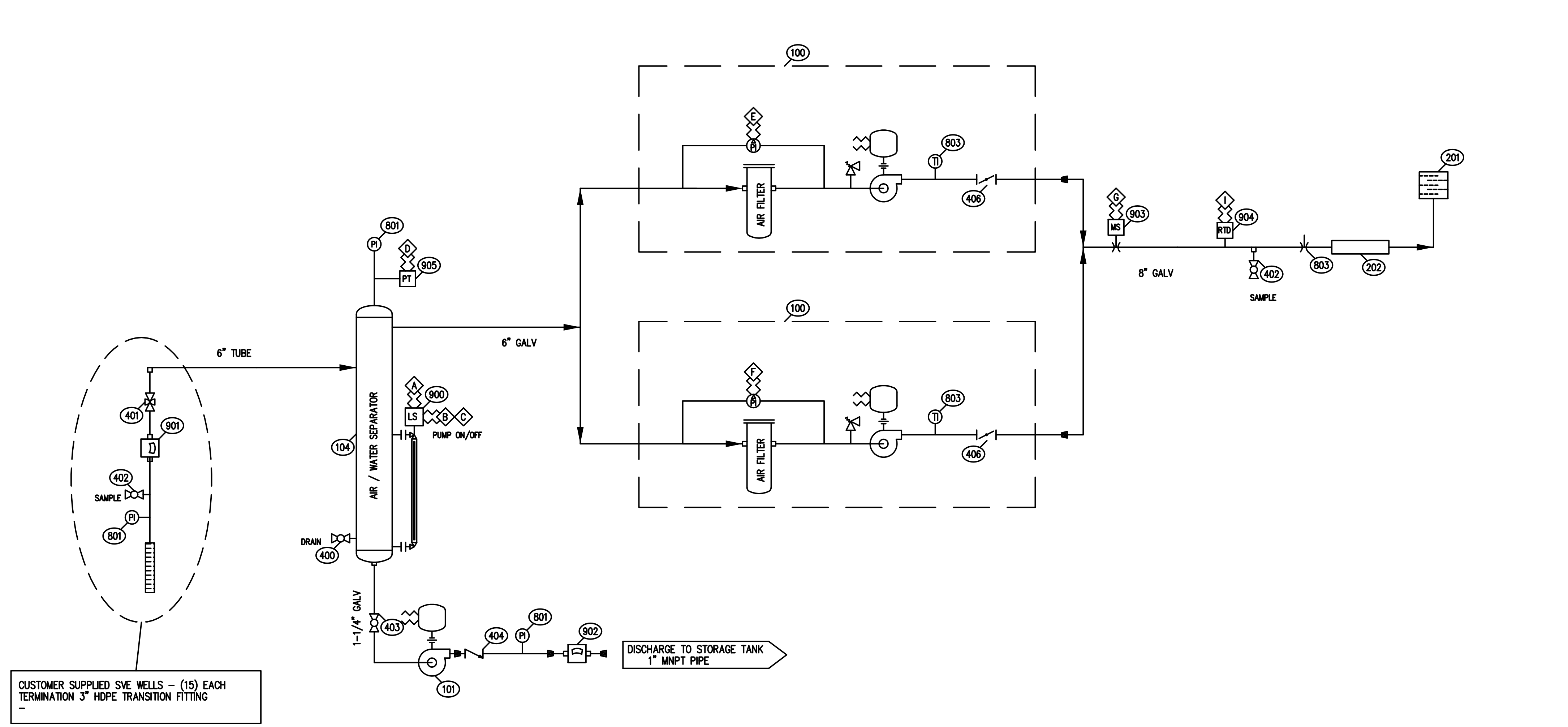
NOTES

1. ALL QUICK CONNECT FITTINGS ALUMINUM WITH BUNA-N GASKETS
2. ALL HOSE GOODYEAR PLICORD HOSE / SYNTHETIC RUBBER
3. PRIMARY SYSTEM VOLTAGE 480V 3 PHASE 60 HZ
4. DESIGN FLOW RATE 25 GPM

BILL OF MATERIAL TAG LEGEND

1XX - SPECIALIZED PROCESS EQUIPMENT	6XX - HEATING AND VENTILATION
2XX - STANDARD PROCESS EQUIPMENT	7XX - NOT USED
3XX - CONTROL PANELS	8XX - INSTRUMENTATION
4XX - VALVES	9XX - OTHER
5XX - LIGHTING	0XX - NOT USED

PROCESS



ELECTRICAL TERMINATIONS

- A HIGH LIQUID LEVEL SHUTDOWN AWS - NO
- B TRANSFER PUMP ON LIQUID LEVEL AWS - NO
- C TRANSFER PUMP OFF LIQUID LEVEL AWS - NO
- D SVE VACUUM LEVEL - 4-20 mA Output
- E FILTER DIFFERENTIAL PRESSURE
- F FILTER DIFFERENTIAL PRESSURE
- G PROCESS FLOW MEASURMENT- 4-20 mA Output
- H
- I HEAT EXCHANGER TEMP DISCHARGE - 4-20 mA Output
- J
- K
- L
- M
- N
- O
- P
- Q EMERGENCY STOP - NO (NOT SHOWN)

PNEUMATIC TERMINATIONS

- 0

LEGEND

BILL OF MAT'L TAG	SWING CHECK VALVE	LS LIQUID LEVEL SWITCH
PNEUMATIC TAG	PISTON CHECK VALVE	LS H LEVEL SENSOR - HIGH
ELECTRICAL TAG	DIAPHRAGM VALVE	LS L LEVEL SENSOR - LOW
PI PRESSURE GAUGE	BUTTERFLY VALVE	PS D PRESSURE SENSOR - DIFFERENTIAL
Δ DIFF. PRESS. GAUGE	CONTROL VALVE	PS L PRESSURE SENSOR - LOW
TI THERMOMETER	REGULATOR VALVE	MS MASS FLOW SENSOR
GAUGE IN PANEL	REGULATOR/RELIEF VALVE	TS TEMPERATURE SENSOR
CAM FITTING OR UNION	IN LINE FILTER	RTD RESISTANT TEMPERATURE DETECTOR
GATE VALVE	"Y" - STRAINER	MAIN PROCESS PIPING
BALL VALVE	FLOW METER	UTILITY PIPING
GLOBE VALVE	ORIFICE PITOT TUBE SENSOR	FUTURE PIPING / PIPING BY OTHERS
BUTTERFLY BALL VALVE	PT PRESSURE/VACUUM TRANSDUCER	INST. TUBING AIR, GAS, or OIL
RELIEF VALVE	FS FLOW SWITCH	PROCESS HOSE

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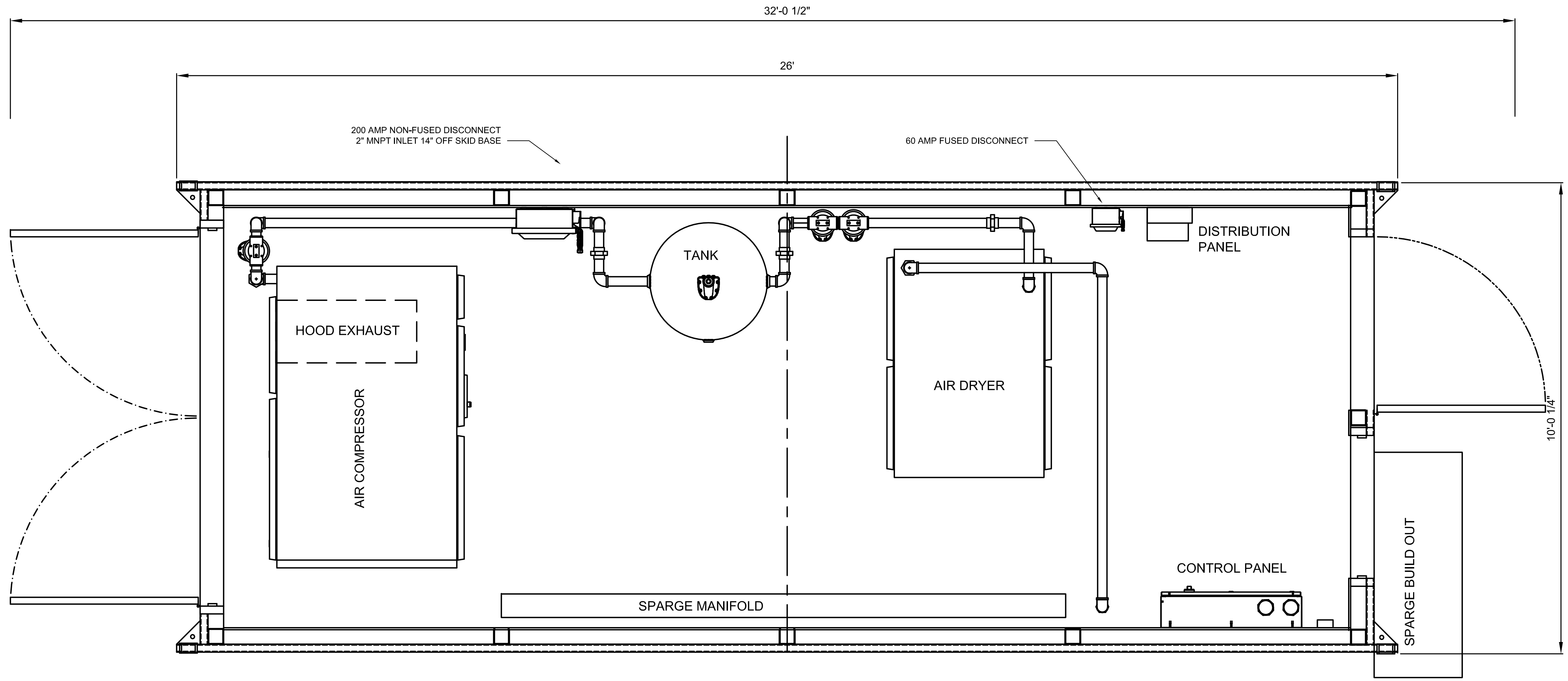
CUSTOMER: E2M

PROJECT: MEMPHIS DEPOT - DUNN FIELD

PROCESS AND INSTRUMENTATION FLOW DIAGRAM
FOR
SOIL VAPOR EXTRACTION SYSTEM

DWN BY	CHK'D BY	APP'D BY	DATE	SCALE	JOB No.	DRAWING No.	REV
DB (TF)	TB (TF)	EP (TF)	SEP 21/09	NTS	09-16A	P-2	0



PLAN VIEW

SYSTEM WEIGHT DRY IS 13,250 LBS

SYSTEM WEIGHT WET IS 14,280 LBS

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CUSTOMER	PROJECT
E2M	MEMPHIS DEPOT – DUNN FIELD

FINAL EQUIPMENT LAYOUT
FOR
AIR SPARGE SYSTEM

3/3

DWN BY	CHK'D BY	APP'D BY	DATE	SCALE	JOB No.	DRAWING No.	REV
DB (TF)	TB (TF)	EP (TF)	SEP 21/09	NTS	09-16A	M-1	0

MASTER BILL OF MATERIAL

ITEM	QTY	DESCRIPTION
100	1	COMPRESSOR PACKAGE – MODEL CSD-100, 100 HP – 3PH 460V – W/ENCLOSURE
101	1	COMPRESSOR PACKAGE – KAESER MODEL TE-141- 3PH 460V
200	1	LIQUID SEPARATOR – KAESER KFS485, 2" FNPT
201	1	PREFILTER – KAESER KPF485, 2" FNPT
202	1	OIL REMOVAL FILTER, KAESER KOR485, 2" FNPT
203	1	CONDENSATE TREATMENT SYSTEM, KAESER MODEL KCF-100
204	1	AUTO DRAIN – KAESER MODEL AMD-6550, 1/2" FNPT
205	1	COMPRESSED AIR STORAGE TANK, STEEL 30" DIAMETER, 400 GAL
206	3	AUTO DRAIN – KAESER MODEL AMD-1550, 1/2" FNPT

ITEM	QTY	DESCRIPTION
401	100	REGULATOR VALVE, METAL WORK RFL R U 8-8, 5/16" TUBExTUBE
402	100	CHECK VALVE, METAL WORK VNR L 8-8, 5/16" TUBExTUBE
403	100	REGULATOR, METAL WORK MR BIT 1/4 0-120 W/ 1" REG GAUGE (0-170 PSI), 1/4" FNPT
404	2	150# BALL VALVE, BRASS BODY, TEFLON SEAT, SS BALL – 2" FNPT
405	10	SOLENOID VALVE MANIFOLD, METAL WORK MULTIMACH M51-3-8-I8 (10 VALVES EACH)
406	1	150# BALL VALVE, BRASS BODY, TEFLON SEAT, SS BALL – 1/2" FNPT
801	1	FLOW METER, MBLT MODEL LZT-10A24G, 2.4-24 SCFM, 3/8" FNPT
802	1	FLOW METER, CDI MODEL 5200-20S, 2-200 SCFM, 2" FNPT
805	2	PRESSURE GAUGE, 0-300 PSIG, 1/4" NPT LB, 4" DIAL
806	1	TEMPERATURE GAUGE, 0-240F

ITEM	QTY	DESCRIPTION

NOTES

1. ALL TUBE FITTINGS NORGREN SERIES 12
2. ALL HOSE GOODYEAR PLICORD HOSE / SYNTHETIC RUBBER
3. PRIMARY SYSTEM VOLTAGE 480V 3 PHASE 60 HZ

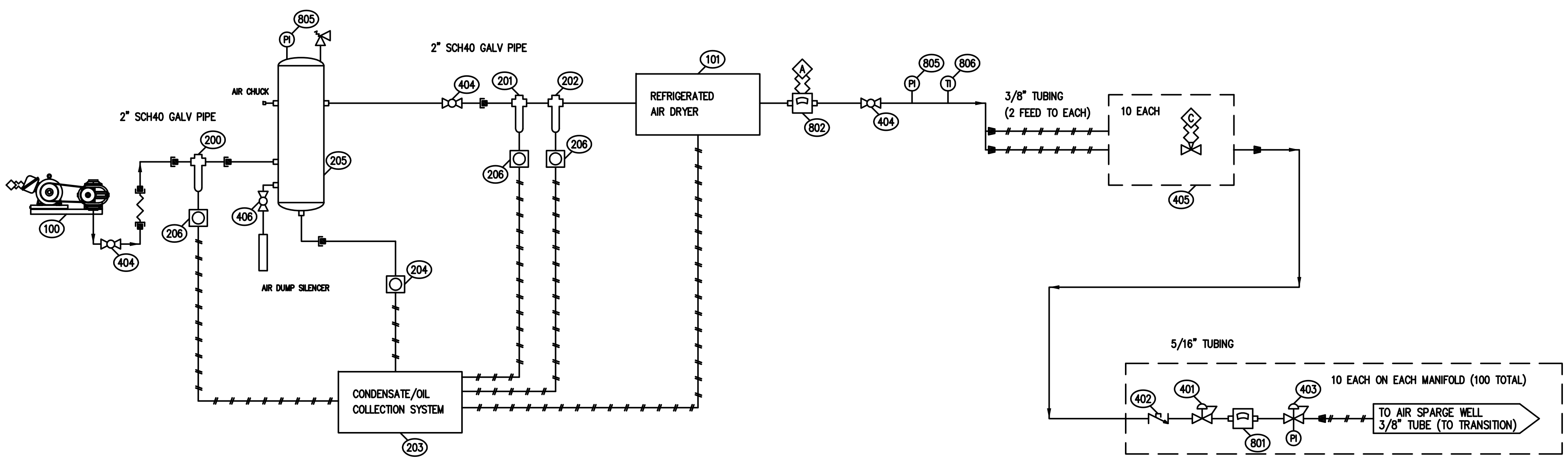
SYSTEM INTERLOCKS

ALARM	ACTION
COMPRESSOR ON	SIGNAL ONLY TO SENSAPHONE
LOW PRESSURE	SIGNAL ONLY TO SENSAPHONE

BILL OF MATERIAL TAG LEGEND

1XX – SPECIALIZED PROCESS EQUIPMENT	6XX – HEATING AND VENTILATION
2XX – STANDARD PROCESS EQUIPMENT	7XX – NOT USED
3XX – CONTROL PANELS	8XX – INSTRUMENTATION
4XX – VALVES	9XX – OTHER
5XX – LIGHTING	0XX – NOT USED

PROCESS



ELECTRICAL TERMINATIONS

A – FLOW MEASUREMENT – 24VDC IN – 4-20MA OUT
B
C – SOLENOID – 120 VAC – N.C. (QUAN 100)
D
E
F
G
H
I
J
K
L
M
N
O
P
Q

PNEUMATIC TERMINATIONS

0 –

LEGEND

BILL OF MAT'L TAG	SWING CHECK VALVE	LS LIQUID LEVEL SWITCH
PNEUMATIC TAG	PISTON CHECK VALVE	LS H LEVEL SENSOR – HIGH
ELECTRICAL TAG	IN-LINE CHECK VALVE	LS L LEVEL SENSOR – LOW
PI PRESSURE GAUGE	BUTTERFLY CHECK VALVE	PS D PRESSURE SENSOR – DIFFERENTIAL
DIFF. PRESS. GAUGE	DIAPHRAGM VALVE	PS L PRESSURE SENSOR – LOW
TI THERMOMETER	REGULATOR VALVE	PS H PRESSURE SENSOR – HIGH
GAUGE IN PANEL	REGULATOR/RELIEF VALVE	TS H TEMPERATURE SENSOR – HIGH
CAM FITTING OR UNION	IN LINE FILTER	RTD RESISTANT TEMPERATURE DETECTOR
GATE VALVE	"Y" – STRAINER	MAIN PROCESS PIPING
BALL VALVE	FLOW METER	UTILITY PIPING
GLOBE VALVE	ORIFICE PITOT TUBE SENSOR	FUTURE PIPING / PIPING BY OTHERS
SOLENOID VALVE	PT PRESSURE/VACUUM TRANSDUCER	INST. TUBING AIR, GAS, or OIL
RELIEF VALVE	FS FLOW SWITCH	PROCESS HOSE

OEC
ONION EQUIPMENT COMPANY
WWW.ONIONENTERPRISES.COM
7385 STONEGATE DRIVE
NAPLES, FLORIDA 34109
Ph: (877) 566-7007
Fx: (239) 596-3768

CUSTOMER: E2M

PROJECT: OFF DEPOT – DUNN FIELD

PROCESS AND INSTRUMENTATION FLOW DIAGRAM

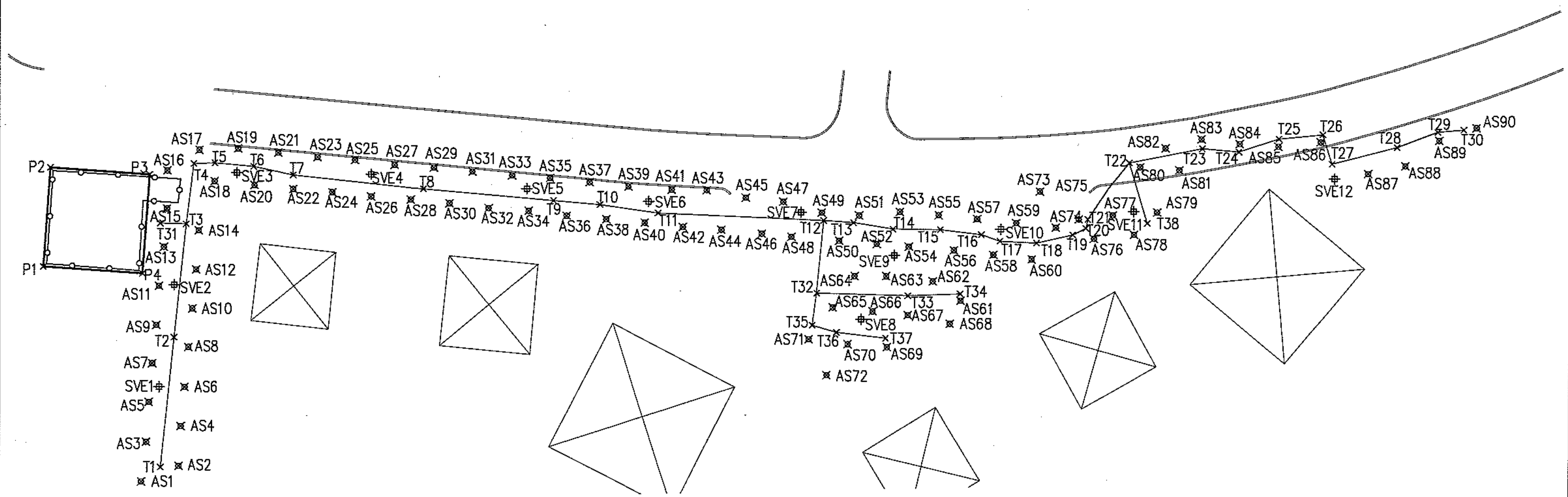
FOR

AIR SPARGING SYSTEM

DWN BY	CHK'D BY	APP'D BY	DATE	SCALE	JOB No.	DRAWING No.	REV
DB (TF)	TB (TF)	EP (TF)	SEP 13/09	NTS	09-16A	M-1	0

APPENDIX E

SURVEY PLOTS



	NORTH	EAST	ELEV
AS 1	281243.53	800914.09	283.76
AS 2	281249.49	800928.23	283.72
AS 3	281258.68	800915.97	284.34
AS 4	281264.74	800929.01	283.96
AS 5	281273.97	800916.98	284.76
AS 6	281279.78	800930.42	284.58
AS 7	281288.85	800918.20	285.24
AS 8	281295.10	800931.88	284.59
AS 9	281303.48	800919.69	285.69
AS 10	281309.83	800933.33	285.78
AS 11	281318.51	800920.65	286.25
AS 12	281324.76	800934.74	286.77
AS 13	281333.39	800922.52	286.27
AS 14	281339.73	800935.75	287.15
AS 15	281348.08	800923.65	286.14
AS 16	281362.59	800923.79	287.24
AS 17	281370.56	800935.95	287.92
AS 18	281358.54	800941.97	288.82
AS 19	281371.09	800950.88	288.72
AS 20	281357.09	800957.19	289.51
AS 21	281369.48	800966.24	289.13
AS 22	281355.60	800972.08	289.59
AS 23	281367.90	800981.34	289.59
AS 24	281354.39	800987.06	290.10
AS 25	281366.77	800995.62	289.92
AS 26	281352.79	801001.79	290.50
AS 27	281364.98	801010.77	290.35
AS 28	281351.70	801017.04	290.69
AS 29	281363.97	801025.79	290.70
AS 30	281350.29	801031.76	290.72
AS 31	281362.49	801040.60	291.12
AS 32	281348.50	801046.90	291.02
AS 33	281361.05	801055.79	291.43
AS 34	281347.49	801062.12	291.02
AS 35	281360.16	801070.29	291.76
AS 36	281345.70	801076.63	291.15
AS 37	281358.58	801085.35	292.11

	NORTH	EAST	ELEV
AS 38	281344.35	801091.78	291.76
AS 39	281356.97	801100.32	292.33
AS 40	281343.17	801106.72	291.89
AS 41	281355.85	801117.00	292.72
AS 42	281341.59	801121.39	292.15
AS 43	281355.75	801130.62	292.98
AS 44	281340.56	801136.27	292.45
AS 45	281352.89	801145.45	292.75
AS 46	281339.09	801151.58	292.27
AS 47	281351.37	801159.94	292.65
AS 48	281337.97	801163.11	292.23
AS 49	281347.29	801174.80	292.67
AS 50	281336.53	801181.51	292.40
AS 51	281346.28	801189.21	292.56
AS 52	281335.38	801196.14	292.93
AS 53	281347.73	801205.08	293.29
AS 54	281334.36	801208.50	294.35
AS 55	281346.48	801219.98	293.89
AS 56	281333.03	801225.99	294.99
AS 57	281345.09	801234.82	294.08
AS 58	281331.35	801241.02	295.29
AS 59	281343.57	801249.76	294.27
AS 60	281329.74	801255.71	295.29
AS 61	281313.77	801228.70	295.79
AS 62	281321.16	801217.83	295.13
AS 63	281323.04	801199.96	293.89
AS 64	281323.04	801187.58	292.09
AS 65	281310.98	801179.17	291.52
AS 66	281309.54	801194.68	293.08
AS 67	281308.20	801208.29	295.09
AS 68	281304.86	801224.57	295.78
AS 69	281295.86	801200.37	294.59
AS 70	281296.97	801185.01	291.50
AS 71	281298.83	801169.95	291.01
AS 72	281285.05	801176.93	291.05
AS 73	281355.72	801258.68	293.66
AS 74	281341.92	801264.74	294.70

	NORTH	EAST	ELEV
AS 75	281345.11	801273.58	294.53
AS 76	281337.72	801279.44	295.40
AS 77	281346.76	801286.55	294.73
AS 78	281339.31	801294.80	295.43
AS 79	281347.90	801303.73	295.26
AS 80	281365.15	801297.11	293.97
AS 81	281364.01	801312.27	293.74
AS 82	281372.46	801306.80	293.99
AS 83	281375.94	801320.85	293.84
AS 84	281374.24	801335.66	293.75
AS 85	281373.27	801350.52	293.54
AS 86	281375.02	801366.62	293.12
AS 87	281363.05	801384.88	295.03
AS 88	281366.05	801398.99	294.78
AS 89	281375.82	801412.04	294.28
AS 90	281380.82	801426.28	294.17

	NORTH	EAST	ELEV
SVE 1	281279.80	800920.76	284.85
SVE 2	281318.99	800926.44	286.18
SVE 3	281361.83	800950.39	289.46
SVE 4	281361.41	801001.78	290.64
SVE 5	281356.01	801061.37	291.68
SVE 6	281351.26	801108.21	292.96
SVE 7	281347.49	801166.74	292.55
SVE 8	281306.56	801190.20	292.20
SVE 9	281331.03	801202.97	294.12
SVE 10	281341.21	801243.83	294.30
SVE 11	281348.19	801294.56	294.91
SVE 12	281361.05	801371.94	294.73

	NORTH	EAST	ELEV
P1	281325.78	800876.62	287.52
P2	281363.71	800879.28	287.52
P3	281361.09	800917.13	287.51
P4	281323.20	800914.43	287.50

	NORTH	EAST	ELEV
T1	281249.03	800921.37	283.8
T2	281298.77	800926.46	285.0
T3	281342.18	800930.90	286.9
T4	281365.23	800933.80	288.1
T5	281365.54	800942.06	288.8
T6	281364.20	800956.85	289.3
T7	281360.99	800972.10	289.6
T8	281355.79	801021.83	290.7
T9	281351.52	801071.64	291.5
T10	281349.99	801089.36	282.2
T11	281346.91	801111.83	292.4
T12	281344.29	801175.50	292.6
T13	281343.52	801187.07	292.6
T14	281341.09	801202.47	293.2
T15	281340.91	801220.72	294.1
T16	281339.04	801236.41	294.5
T17	281336.59	801243.57	294.8
T18	281335.94	801257.47	294.9
T19	281339.15	801271.26	295.0
T20	281341.67	801276.31	294.9
T21	281345.10	801277.07	294.6
T22	281366.83	801292.85	294.1
T23	281372.38	801321.21	293.9
T24	281371.17	801335.38	293.7
T25	281376.23	801350.77	293.6
T26	281377.91	801367.36	293.3
T27	281366.68	801370.87	294.4
T28	281373.17	801395.75	294.0
T29	281379.09	801411.45	293.7
T30	281380.06	801421.43	293.8
T31	281342.45	800921.18	286.5
T32	281316.48	801172.95	291.2
T33	281315.61	801208.27	294.9
T34	281316.33	801228.48	295.6
T35	281304.14	801171.29	291.2
T36	281301.45	801180.70	291.3
T37	281299.32	801199.82	294.3
T38	281343.73	801299.94	295.4

GRID NORTH (NAD27)

SCALE : 1" = 50'

0' 25' 50' 100'

FINAL WELL, TRENCH AND PAD LOCATIONS

OFF DEPOT GROUNDWATER REMEDIAL ACTION PLAN

DUNN FIELD DEFENSE DEOT MEMPHIS, TENNESSEE

OCTOBER 22, 2009

FINAL LOCATIONS LOCATED BY BWSC ON OCTOBER 20, 2009

KENNETH E. FRANCIS, JR. REGISTERED LAND SURVEYOR XVI AGRICULTURE COMMERCE TENNESSEE NO 1567

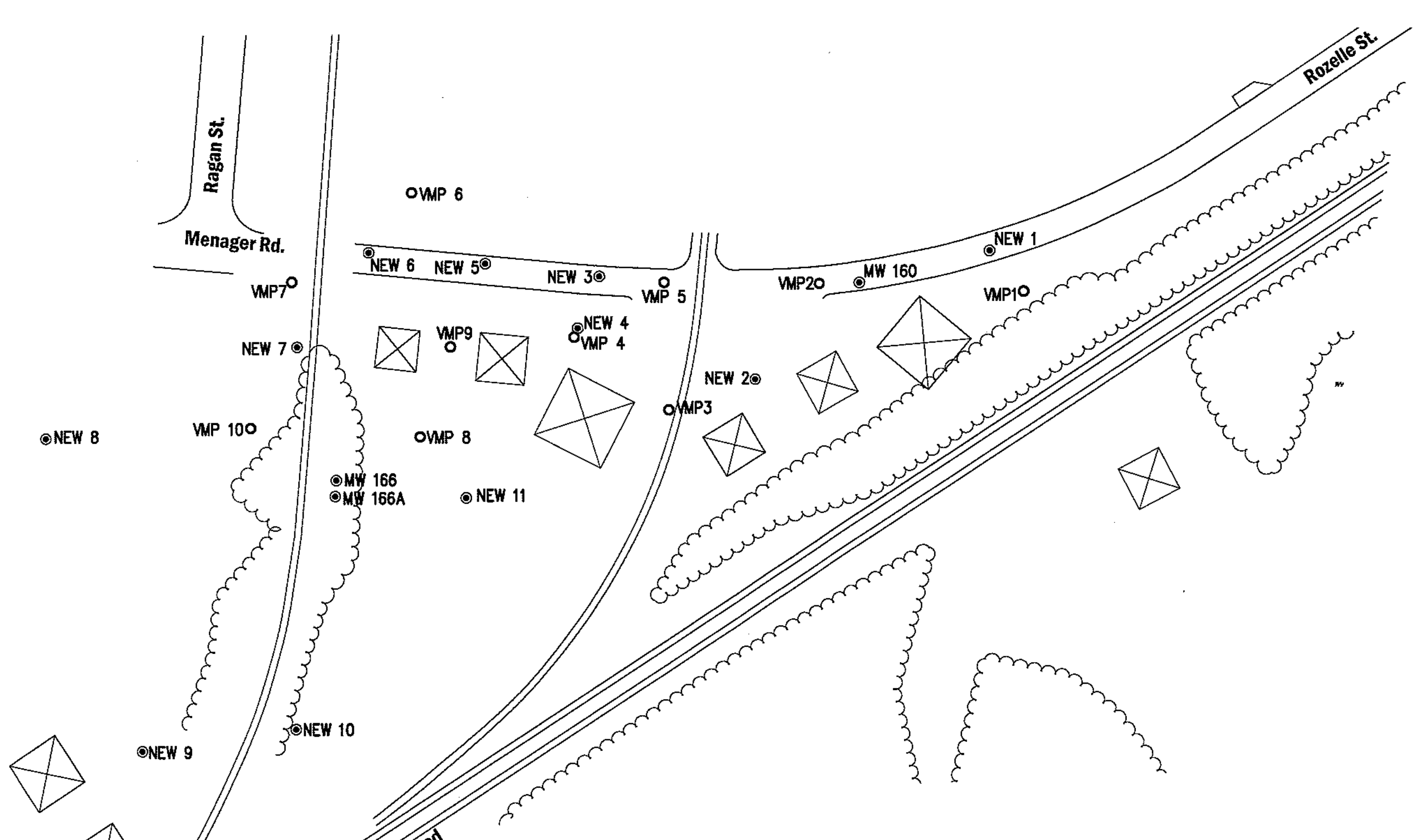
Kenneth E. Francis, Jr

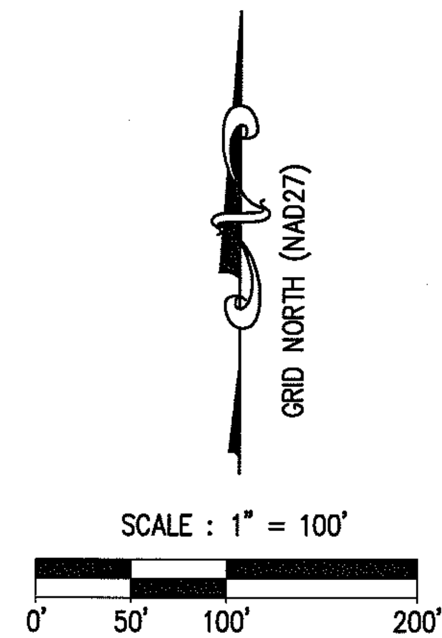
10.22.09

BWSC | BARGE WAGGONER SUMNER & CANNON, INC.

ENGINEERS ARCHITECTS PLANNERS SURVEYORS

60 Germantown Court, Suite 100 Memphis, Tennessee 38138
Phone (901)755-7166 Fax (901)755-7844





	NORTH	EAST	TOP	BRASS
NEW 1	281389.92	801396.74	292.82	293.00
NEW 2	281297.31	801228.65	295.40	295.94
NEW 3	281370.62	801116.45	292.26	292.53
NEW 4	281333.49	801101.07	288.72	289.45
NEW 5	281379.56	801035.07	290.13	290.55
NEW 6	281387.26	800951.62	288.17	288.49
NEW 7	281319.67	800900.12	285.70	286.16
NEW 8	281253.66	800720.22	275.45	275.93
NEW 9	281029.63	800789.83	285.53	285.89
NEW 10	281045.53	800900.38	289.66	290.19
NEW 11	281211.70	801021.75	285.83	286.16
MW 160	281366.76	801304.17	293.69	293.91
MW 166	281225.00	800927.99	282.72	283.29
MW 166A	281213.39	800927.27	282.90	283.36

WELL COORDINATES WERE TAKEN ON THE NORTH EDGE OF THE WELL RISER.

	NORTH	EAST	ELEV
VMP 1	281360.88	801421.12	295.71
VMP 2	281365.95	801274.81	294.15
VMP 3	281275.10	801166.21	290.69
VMP 4	281327.06	801098.56	288.59
VMP 5	281366.43	801162.53	293.42
VMP 6	281430.30	800982.18	294.87
VMP 7	281366.09	800896.51	287.55
VMP 8	281255.49	800988.72	284.27
VMP 9	281319.93	801010.19	287.79
VMP 10	281261.38	800867.39	282.27

FINAL WELL LOCATIONS

OFF DEPOT GROUNDWATER REMEDIAL ACTION PLAN

DUNN FIELD DEFENSE DEOT MEMPHIS, TENNESSEE

FINAL LOCATIONS OF WELLS LOCATED BY BWSC ON JULY 14, 2009

REVISED AUGUST 11, 2009 TO SHOW NEW COORDINATES FOR NEW 7

REVISED OCTOBER 22, 2009 TO SHOW FINAL LOCATIONS OF VMP AND BRASS ON NEW 1 TAKEN BY BWSC ON OCTOBER 20, 2009

KENNETH E. FRANCIS, JR. REGISTERED LAND SURVEYOR XVI AGRICULTURE COMMERCE TENNESSEE NO 1567

Kenneth E Francis Jr

10-22-09

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS ARCHITECTS PLANNERS SURVEYORS
60 Germantown Court, Suite 100 Memphis, Tennessee 38138
Phone (901)755-7166 Fax (901)755-7844

APPENDIX F

CONSTRUCTION INSPECTION CHECKLISTS

Table C-1
SVE/AS System Pre-Shipment Inspection
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Recommended Action/Comments
SVE Header/Manifold				
1	Manifold piping size/material installed per specification (15 legs)		X	Manifold located on exterior of building, per approval by SLH. See notes.
2	Pressure gauge installed per specification (15 total)		X	Not installed when inspected. To be installed prior to shipment. See notes.
3	Flow indicator installed as required (15 total)	X		
4	Diaphragm valve installed per specification (15 total)	X		
5	Sample port installed per specification (15 total)	X		
Air/Water Separator				
6	Correct size vessel installed (with mist eliminator) per specification	X		
7	Vacuum relief valve installed per specification	X		
8	Bleed valve and manual drain valve installed per specification	X		
9	Site glass installed with level switch per specification	X		
10	Float system installed per specification	X		
Condensate Transfer				
11	Transfer pump installed per specification	X		
12	Transfer piping size/material installed per specification	X		
13	Check valve installed per specification	X		
14	Pressure gauge installed per specification		X	Not installed when inspected. To be installed prior to shipment. See note #6.
15	Flow meter installed per specification		X	Not installed when inspected. To be installed prior to shipment. See note #6.
16	535 gallon stand tank installed per specification		X	To be shipped to site as separate delivery. Spec sheet sent prior to shipment and approved by SLH. See note #7.
SVE Blowers and Other Major Equipment				
17	Blowers installed with VFD per specification (two blowers total)	X		
18	Piping size/material installed per specification	X		
19	Pressure transmitter installed per specification	X		
20	Vacuum gauge installed per specification (3 total)	X		
21	Temperature gauge installed per specification (2 total)	X		Gauge not installed. Temperature indicator internal to blowers.
22	Check valve installed downstream of blowers per specification	X		Not installed. Blowers designed not to free spin. Approval by SLH.
23	Pressure gauge installed downstream of blowers per specification	X		
24	Temperature gauge installed downstream of blowers per specification	X		Gauge not installed. Temperature indicator internal to blowers.
Discharge Piping				
25	Piping size/material installed per specification	X		
26	Thermal mass flow sensor transmitter installed per specification		X	Not installed to prevent damage during shipment. Will be installed after building arrival to site. See note #8.
27	Pressure transmitter installed per specification		X	Not installed to prevent damage during shipment. Will be installed after building arrival to site. See note #8.
28	Pressure gauge installed per specification		X	Not installed to prevent damage during shipment. Will be installed after building arrival to site. See note #8.

No.	Checklist Item	MR	AN	Recommended Action/Comments
29	Temperature gauge installed per specification		X	Temperature transmitter to be installed per approval by SLH.
30	Sample port installed per specification		X	Not installed to prevent damage during shipment. Will be installed after building arrival to site. See note #8.
31	Ensure stack is adequate height per specification	X		
SVE Building/Office				
32	SVE building proper size per specification		X	4' x 4' enclosure not constructed due to structural issues. TetraSolv to construct exterior cabinet/cover following system delivery. See note #9.
33	SVE building framing material as specified	X		
34	Door separating office and equipment room provided per specification	X		
35	Floor covering as specified	X		
36	Interior wall/ceiling covering as specified	X		
37	Interior wall/ceiling covering as specified	X		
38	Aluminum wall louvers w/ air filter installed per specification	X		Air filter internal to SVE blowers. No air filter required. Approval by SLH.
39	Rain guard hood installed per specification	X		Rain guard not required per approval from SLH (left over from FSVE design drawings).
40	HVAC/lighting installed per specification	X		
41	Desk installed per specification		X	Not installed when inspected. To be installed following system arrival. See note #10.
42	Desktop computer provided per specification	X		
43	Electrical outlets installed per specification	X		
44	Phone jacks installed per specification	X		Phone service not required. Item not installed per approval from SLH.
45	Fire extinguisher installed per specification	X		
46	Exterior electrical outlet installed per specification	X		
System Control Panel/Controls				
47	Control panel installed per specification	X		
48	Control panel equipped for telemetric monitoring and control via modem and internet connection	X		
49	Panel controls installed per specification and subcontractor submittal	X		
50	Preliminary testing of system controls (Note: a complete test of PLC and system alarms will be completed during system startup)	X		SVE blowers were started briefly prior to system shipment. Blowers function adequately.
AS Header/Manifold				
51	Manifold piping size/material installed per specification (100 legs)	X		
52	Tubing from compressor correct size (5/16") per specification	X		3/8" tubing used from compressor to solenoid. 5/16" tubing used from solenoid banks to manifold. 3/8" tubing from manifold to conveyance pipeline transition. Changes approved by SLH.
53	Speed control valve installed per specification (100 total)	X		Metal Work Pneumatic brand substituted per approval by SLH.
54	Pressure regulator installed as required (100 total)	X		Metal Work Pneumatic brand substituted per approval by SLH.
55	Rotameter installed per specification (100 total)	X		

Table C-1
SVE/AS System Pre-Shipment Inspection
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Recommended Action/Comments
56	Pressure gauge installed per specification (100 total)	X		Mounted with pressure regulator.
57	Name plate installed per specification (100 total)	X		
58	Tubing to solenoid valves correct size (1/2") per specification	X		3/8" tubing used per approval by SLH.
59	Piping in steel painted raceway	X		Tubing located in open rack as approved by SLH.
Air Sparge Compressor and Other Major Equipment				
60	AS Compressor provided and installed per specification (with particulate filter and inlet silencer)	X		
61	Receiving tank provided and installed per specification	X		
62	Receiving tank provided with vacuum relief valve, pressure gauge, and manual drain valves per specification	X		
63	Refrigerated air dryer provided and installed per specification	X		
64	Filtered separator provided and installed per specification	X		
65	Oil removal filter provided and installed per specification	X		
66	Vapor adsorber provided and installed per specification	X		
67	Automatic magnetic drain provided and installed per specification	X		
68	Condensate management system provided and installed per specification		X	To be installed following shipment. See note # 11.
69	Interior piping provided installed per specification	X		
Solenoid Master Panel				
70	Solenoid valves provided and installed per specification (100 total)	X		Metal Work brand solenoid valve bank substituted (5 total, 20 valves each). Change approved by SLH.
71	Solenoid manifold provided and installed per specification (100 total)	X		
AS Equipment Enclosure				
72	All piping installed per specification (100 total)	X		
73	Cabinet doors installed per specification	X		Cabinet not installed due to space constraints. Change approved by SLH.
Air Sparge Building				
74	AS building proper size per specification	X		
75	Building doors installed in correct places per specification	X		
76	Aluminum wall louvers installed per specification	X		
77	Rain guard hood installed per specification	X		
78	HVAC/lighting installed per specification	X		
79	Electrical outlets installed per specification	X		
80	Phone jacks installed per specification	X		Phone service not required. Item not installed per approval from SLH.
81	Fire extinguisher installed per specification	X		
82	Exterior electrical outlet installed per specification	X		

Table C-1
SVE/AS System Pre-Shipment Inspection
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Recommended Action/Comments

MR = meets requirement
AR = action required
Inspection Completed by: __Steven Herrera, HDR|e^{2}M_
Inspector Project Role: __Project Engineer
Date of Inspection: ___10/13/09 Place of Inspection: TetraSolv Filtration, Anderson, Indiana
Additional notes/deficiencies on attached sheets.

Other notes/deficiencies noted by inspector (attach additional sheets as required):

1. Due to spacing constraints, SVE manifold moved to exterior of building and layout of equipment inside building was adjusted. All changes approved by SLH. TetraSolv to construct and install shield/cover over manifold. Cover will ship separately and be installed by TetraSolv by 11/20/09.

2. AS building not constructed with 4' x 4' equipment enclosure. TetraSolv to construct exterior cabinet following system delivery.

3. Solenoid valve and AS manifold components supplied by Metal Works Pneumatic per approval by SLH. Change made per consultation with manufacturer's rep and Mark Strong (CH2M HILL).

4 Other changes deviations from RAWP are minimal and noted on previous sheets.

5. Various hardware not installed at time of inspection (as noted on previous sheets) and to be installed prior to shipment.

Additional Notes added on 10/30/09 following system shipment:

6. SVE manifold pressure gauges and flow meters installed following system delivery on 10/27/09.

7. Condensate tank delivered on 10/23/09. Piping connected on 10/28/09.

8. Pressure gauge, pressure transducer/transmitter, mass flow meter, temperature gauge, and sample port installed on SVE exterior piping on 10/27/09.

9. Exterior AS piping enclosure to be installed prior to 11/20/09.

10. SVE office desk to be installed prior to 11/20/09.

11. AS condensate piping connected on 10/28/09.

Table C-2
SVE/AS System Pre-Startup Inspection Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
AS/SVE Wells					
1	AS wells installed per specification	X		10/27/2009	Slight deviations from planned locations due to underground utilities.
2	SVE well installed per specification	X		10/27/2009	Slight deviations from planned locations due to underground utilities.
3	VMPs installed per specification	X			
4	AS/SVE/VMP construction information noted in field log books	X		10/23/2009	
5	All wells labeled at well head	X		10/23/2009	
6	All wells have traffic rated cover and concrete apron per specification	X		10/23/2009	
7	Wells/VMPs surveyed	X		10/19/2009	
Trenching/Piping					
8	Piping/trenching completed per design/specification	X		10/23/2009	
9	Pressure test complete (except for joints that require testing while system is in operation)	X		N/A	Pressure test of lines unable to be completed.
Equipment Compound					
10	Concrete pad constructed per specification	X		10/23/2009	
11	Chain Link fencing (w/ barbed wire) installed per specification	X		10/23/2009	
12	Fence gates installed per specification	X		10/23/2009	
13	Exterior lighting installed per specification.	X		10/23/2009	
SVE/AS System Delivery					
14	SVE system delivered to site with all components and w/o damage	X		10/29/2009	All components installed as specified.
15	AS system delivered to site with all components and w/o damage	X		10/29/2009	All components installed as specified.
16	Condensate holding tank	X		10/23/2009	
17	Building placed on equipment pad per design	X		10/21/2009	
18	Buildings anchored per specification		X		To be completed by contractor during week of 11/2/09.
Permits/Notifications					
19	Operational permits obtained (if applicable)	X		N/A	Permit not required. Not applicable.
20	MSCHD notified of planned startup (if applicable)	X		N/A	Permit not required. Not applicable.
21	Trailer tank registered with local DMV.	X		N/A	DMV tags not required for trailer.
Electrical and Communication Hookup (Pre Start-up)					
22	Transformers installed by contractor per specifications	X		10/28/2009	
23	Electrical service brought to AS/SVE unit disconnect	X		10/28/2009	
24	Communication lines between AS and SVE buildings installed and functional	X		10/29/2009	
25	Protective covers on terminal boxes and panels in place	X		10/28/2009	Inspected by City of Memphis code enforcement.
26	Grounding installed/checked	X		10/28/2009	Per conversations with MLGW on 10/28/09.
27	Wiring integrity between components and supply (no damage or deterioration)	X		10/28/2009	
28	Major equipment functional	X		10/29/2009	
29	Lighting/HVAC functional	X		10/29/2009	
30	AC outlets functional	X		10/29/2009	
31	MLGW/City of Memphis inspection completed	X		10/23/2009	

Table C-2
SVE/AS System Pre-Startup Inspection Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
32	Phone line/internet connection established	X		10/29/2009	
	SVE Equipment Major Equipment Check				
33	Blower pump rotation verified	X		10/28/2009	
34	Valves/piping/hardware installed per specification and subcontractor submittals	X		10/27/2009	
35	SVE stack installed	X		10/27/2009	
	Piping Connections				
36	SVE well conveyance piping connected to system	X		10/26/2009	
37	SVE header/sample ports clearly labeled/identified	X		10/30/2009	
38	AS conveyance piping connection to system.	X		10/27/2009	
39	AS header clearly labeled/identified	X		10/23/2009	
40	Exterior piping connections intact (visual inspection only)	X		10/27/2009	
41	Interior piping connections intact (visual inspection only)	X		10/24/2009	
42	Connect transfer piping to 595-gallon holding tank	X		10/28/2009	
	Ancillary Equipment				
43	Field monitoring instruments available (PID, vacuum gauges, etc.)	X		10/27/2009	
44	Field monitoring forms available	X		10/30/2009	

MR = meets requirement   N/A = not applicable
AR = action required
Inspection Completed by:__Steven Herrera, HDR|e2M____
Inspector Project Role: __Project Engineer____

Additional notes/deficiencies on attached sheets.

Other notes/deficiencies noted by inspection (attach additional sheets as required):

None noted.

Table C-3
SVE/AS Startup and Function Performance Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
	SVE Air/Water Separator (Post Start-up)				
1	Ensure AWS vessel is not leaking		X		To be inspected once sufficient condensate is generated.
2	Ensure all valves are functional	X		10/30/2009	
3	Condensate drainage is unobstructed		X		To be inspected once sufficient condensate is generated. See note #1.
4	Condensate transfer pump functional		X		To be inspected once sufficient condensate is generated. See note #1.
5	Condensate flow meter functional		X		To be inspected once sufficient condensate is generated. See note #1.
6	Pressure gauge functional		X		To be inspected once sufficient condensate is generated. See note #1.
7	Valves/piping/ labeled as necessary	X		10/30/2009	
8	535-gallon holding tank free of leaks		X		505 gallon tank installed. To be inspected once sufficient condensate generated. No visual leaks detected.
	SVE System Major Components				
9	Blowers functioning as designed (including VFDs)	X		10/30/2009	
10	Interior pipe connections inspected/tested (no leaks)	X		10/30/2009	
11	Exterior pipe connections inspected/tested (no leaks)		X	10/30/2009	Small leak at weld at exterior manifold piping. See note #2.
12	Manifold piping gauges/valves functioning	X		10/30/2009	
13	All other flow meters/gauges functioning	X		10/30/2009	
	Air Sparge System Major Components				
14	AS Compressor functioning as designed		X	10/30/2009	Compressor not providing sufficient flow rate per specification. Contractor notified. See note #3.
15	Receiving tank functioning as designed	X		10/30/2009	
16	Receiving tank vacuum relief valve, pressure gauge, and manual drain functioning as designed	X		10/30/2009	
17	Refrigerated air dryer functioning as designed	X		10/30/2009	
18	Filtered separator functioning as designed	X		10/30/2009	
19	Oil removal filter functioning as designed	X		10/30/2009	
20	Vapor adsorber functioning as designed	X		10/30/2009	
21	Automatic magnetic drain functioning as designed	X		10/30/2009	
22	Condensate management system functioning as designed	X		10/30/2009	
23	Manifold piping inspected (free of leaks)	X		10/30/2009	
24	Manifold speed control valves functioning as designed (100 total)	X		10/30/2009	Speed control valves installed upside down; error corrected.
25	Manifold pressure regulator functioning as designed (100 total)	X		10/30/2009	
26	Manifold rotameter functioning as designed (100 total)		X	10/30/2009	Rotameter may not be providing accurate flow rate. Contractor to address issue. See note #4.

Table C-3
SVE/AS Startup and Function Performance Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
27	Solenoid valves functioning as designed (100 total)		X	10/30/2009	Issues with push connects holding tubing (exiting soleniod bank) at #'s 24, 82, 84, 89 and 90. Contractor notified. See note #5.
28	Solenoid manifold functioning as designed (100 total)	X		10/30/2009	
29	Other gauges/valves functioning as designed	X		10/30/2009	
	Control Panel and System Controls				
30	Main control panel installed and functioning per specification	X		10/30/2009	
31	Main control panel disconnect switch functioning	X		10/30/2009	
32	Control panel emergency STOP button functioning	X		10/30/2009	
	Control Panel and System Controls (continued)				
33	HOA switches functioning	X			
34	Vacuum transmitter functioning/relaying data (at blower influent)		X	10/30/2009	Not functioning. Contractor notified. See note #6.
35	Pressure transmitter functioning/relaying data (at blower effluent)		X	10/30/2009	Not functioning. Contractor notified. See note #6.
36	Air/Mass Meter transmitter functioning/relaying data		X	10/30/2009	
37	All system alarms functioning per specification/contractor submittal:			N/A	N/A
38	AWS high/high alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
39	SVE low vacuum alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
40	SVE system high vacuum alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
41	SVE/AS manifold high vacuum alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
42	SVE/AS Manifold Low vacuum alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
43	UPS low battery alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
44	AS/SVE high discharge pressure alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
45	Blower/compressor equipment start failure alarm		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
46	Other alarms		X	10/30/2009	To be inspected following completion of PLC programming. See note # 7.
47	Ability to adjust pulsing frequencies of solenoid valves	X		10/30/2009	
	Building Piping Connections				
48	AS polyurethane tubing connection to HDPE piping inspected (free of leaks)	X		10/30/2009	
49	SVE piping connections to HDPE conveyance piping inspected (free of leaks)	X		10/30/2009	

Table C-3
SVE/AS Startup and Function Performance Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
50	HDPE piping connections at SVE well heads inspected (free of leaks)	X			Visual inspection during drilling activities.
51	HDPE piping connections at AS well heads inspected (free of leaks)	X			Visual inspection during drilling activities.
	SVE/AS Buildings				
50	AS Building free of weather related leaks		X	10/30/2009	Issues with rain coming in under doors and interior walls. Door sweeps, interior siding, and if necessary, insulation to be installed. See note #8.
51	SVE building free of weather related leaks		X	10/30/2009	Issues with rain coming in under doors. Door sweeps to be installed. See note #8.
52	Door locks functioning	X		10/23/2009	
53	AS Building meets noise requirements per specification		X		To be completed on 11/5/09.
54	SVE Building meets noise requirements per specification		X		To be completed on 11/5/09.

MR = meets requirement
AR = action required
Inspection Completed by:__Steven Herrera, HDR|e2M_____________________________________
Inspector Project Role: __Project Engineer_____________________________

Additional notes/deficiencies on attached sheets.

Other notes/deficiencies noted by inspection (attach additional sheets as required):

1. Condensate collection system to be inspected once sufficient condensate has been collected.

2. Weld to be repaired by 11/20/09.

3. Contractor to evaluate issue with compressor, mass flow meter and rotameter vendors. Solution to be developed by 11/4/09.

4. Rotameters are believed to be reading low. Contractor to evaluate issue with vendor and provide solution by 11/4/09.

5. Contractor to verify issues with vendor and provide solution by 11/6/09. Replacement of components (if necessary) to be completed by 11/20/09.

6. Contractor to evaluate and provide solution by 11/6/09. Replacement of components (if necessary) to be completed by 11/20/09.

7. Alarms not able to be tested during initial startup. Alarms to be tested during week of 11/2/09 (following completion of programming).

8. All building weather related issues/repairs (i.e., leaks) to occur prior to 11/20/09.

9. Exterior receptacles to be installed on both buildings by 11/20/09.

Other Notes:

10. Whistle sound coming from SVE stack. e2M to measure sound level and report to Contractor to determine solution by 11/6/09.

DDMT Off Depot SVE/AS System Post Startup List of Action Items
DDMT Off Depot Remedial Action

No.	Description of Task/Action Items to be Completed a DDMT Off Depot AS/SVE System	System Operations Adversely Affected (Y/N)	Expected Completion Date	Completed By	Verified By	Notes
	System Construction Related Issues					
1	Investigate low air flow readings at AS manifold.	Y	See notes			AS flow meters are reading low. Contractor to contact vendor and investigate issue. Suspected that flow meters are designed for free air flow, not compressed (high pressure) air flow. Contractor to provide correction factor by 11/4/09 and provide solution (most likely replacement of flow meters) by 11/6/09. Contractor will come onsite to replace if necessary. All work to be completed by 11/20/09.
2	Install cover over SVE manifold.	N	11/20/2009			Contractor to construct new cover and install by 11/20/09.
3	Install cover over AS tubing/HDPE connections.	N	11/20/2009			Contractor to construct new cover and install by 11/20/09.
4	Shorten AS tubing (outside of building).	N	11/6/2009			e^2M to shorten AS tubing (at HDPE connection) to further minimize pressure losses.
5	Install new door at AS building.	N	12/18/2009			Contractor to installed new door (east side of bldg.) at AS building.
6	Address weather related issues on building (water leaks).	N	11/20/2009			
7	Install exterior receptacles on SVE and AS building.	N	11/20/2009			To be installed by contractor.
8	Ensure condensate collection system (poly tank, tubing) is free of leaks.	N	See notes			To be completed once sufficient condensate has been generated.
9	Remove and re-secure AS well caps.	Y	11/4/2009			Compressed air escaping at AS well caps (threaded). e2M to remove all caps, clean threads, and re-secure with teflon tape.
10	Complete programming of PLC.	Y	11/4/2009			Contractor to complete final programming of PLC.
11	Address issues with solenoid quick connects.	Y	11/6/2020			Contractor to contact vendor to develop solution.
12	Address issues with low flow rates from compressor.	Y	11/6/2009			Contractor to develop solution based on discussions with manufacturer and outcome of evaluation from Item #1 (see above).
13	Confirm functionality of PLC alarms.	Y	11/6/2009			Testing to be completed following PLC programming.
14	Troubleshoot non-functioning mass flow meter and pressure transducer (SVE manifold)	Y	11/6/2009			
15	Address whistle noise from SVE stack.	Y	11/6/2009			Contractor to address loud sound from stack.
	System Effectiveness Tasks					
16	Verify air flow at AS locations.	Y	11/6/2009			e2M to visually verify air flow at several AS wells.
	Additional Action Items					
17	Obtain sound level meter to ensure noise requirements are met.	Y	11/4/2009			To be performed by e2M.
18	Submittal of as-built drawings and system maintenance requirements	N	11/13/2009			To be completed by Contractor.

Table C-3
SVE/AS Startup and Function Performance Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
SVE Air/Water Separator (Post Start-up)					
1	Ensure AWS vessel is not leaking	X		12/17/2009	
2	Ensure all valves are functional	X		10/30/2009	
3	Condensate drainage is unobstructed	X		12/17/2009	
4	Condensate transfer pump functional	X		12/17/2009	
5	Condensate flow meter functional	X		12/17/2009	
6	Pressure gauge functional	X		12/17/2009	
7	Valves/piping/ labeled as necessary	X		10/30/2009	
8	535-gallong holding tank free of leaks	X		12/17/2009	
SVE System Major Components					
9	Blowers functioning as designed (including VFDs)	X		10/30/2009	
10	Interior pipe connections inspected/tested (no leaks)	X		10/30/2009	
11	Exterior pipe connections inspected/tested (no leaks)	X		12/17/2009	
12	Manifold piping gauges/valves functioning	X		10/30/2009	
13	All other flow meters/gauges functioning	X		10/30/2009	
Air Sparge System Major Components					
14	AS Compressor functioning as designed	X		12/17/2009	
15	Receiving tank functioning as designed	X		10/30/2009	
16	Receiving tank vacuum relief valve, pressure gauge, and manual drain functioning as designed	X		10/30/2009	
17	Refrigerated air dryer functioning as designed	X		10/30/2009	
18	Filtered separator functioning as designed	X		10/30/2009	
19	Oil removal filter functioning as designed	X		10/30/2009	
20	Vapor adsorber functioning as designed	X		10/30/2009	
21	Automatic magnetic drain functioning as designed	X		10/30/2009	
22	Condensate management system functioning as designed	X		10/30/2009	
23	Manifold piping inspected (free of leaks)	X		10/30/2009	
24	Manifold speed control valves functioning as designed (100 total)	X		10/30/2009	
25	Manifold pressure regulator functioning as designed (100 total)	X		10/30/2009	
26	Manifold rotameter functioning as designed (100 total)	X		12/17/2009	
27	Solenoid valves functioning as designed (100 total)	X		12/16/2009	
28	Solenoid manifold functioning as designed (100 total)	X		10/30/2009	
29	Other gauges/valves functioning as designed	X		10/30/2009	
Control Panel and System Controls					
30	Main control panel installed and functioning per specification	X		10/30/2009	
31	Main control panel disconnect switch functioning	X		10/30/2009	
32	Control panel emergency STOP button functioning	X		10/30/2009	

Table C-3
SVE/AS Startup and Function Performance Checklist
DDMT Off Depot Remedial Action
Construction Quality Assurance Plan

No.	Checklist Item	MR	AN	Date Inspected	Recommended Action/Comments
	Control Panel and System Controls (continued)				
33	HOA switches functioning	X		10/28/2009	
34	Vacuum transmitter functioning/relaying data (at blower influent)	X		12/17/2009	
35	Pressure transmitter functioning/relaying data (at blower effluent)	X		12/17/2009	
36	Air/Mass Meter transmitter functioning/relaying data		X	12/17/2009	See note #1.
37	All system alarms functioning per specification/contractor submittal:			N/A	
38	AWS high/high alarm	X		12/17/2009	
39	SVE low vacuum alarm	X		12/17/2009	
40	SVE system high vacuum alarm	X		12/17/2009	
41	SVE/AS manifold high vacuum alarm	X		12/17/2009	
42	SVE/AS Manifold Low vacuum alarm	X		12/17/2009	
43	UPS low battery alarm	X		12/17/2009	
44	AS/SVE high discharge pressure alarm	X		12/17/2009	
45	Blower/compressor equipment start failure alarm	X		12/17/2009	
46	Other alarms	X		12/17/2009	
47	Ability to adjust pulsing frequencies of solenoid valves	X		10/30/2009	
	Building Piping Connections				
48	AS polyurethane tubing connection to HDPE piping inspected (free of leaks)	X		10/30/2009	
49	SVE piping connections to HDPE conveyance piping inspected (free of leaks)	X		10/30/2009	
50	HDPE piping connections at SVE well heads inspected (free of leaks)	X		12/17/2009	
51	HDPE piping connections at AS well heads inspected (free of leaks)	X		12/17/2009	
	SVE/AS Buildings				
52	AS Building free of weather related leaks		X	10/30/2009	Initial weather issues addressed. Contractor to revisit issue and inspect insulation for damage. See note #2.
53	SVE building free of weather related leaks		X	10/30/2009	Initial weather issues addressed. Contractor to revisit issue and inspect insulation for damage. See note #2.
54	Door locks functioning	X		10/23/2009	
55	AS Building meets noise requirements per specification	X		12/16/2009	
56	SVE Building meets noise requirements per specification	X		12/16/2009	

MR = meets requirement
AR = action required
Inspection Completed by: __Steven Herrera, HDR|e2M__
Inspector Project Role: __Project Engineer__

Additional notes/deficiencies on attached sheets.

Other notes/deficiencies noted by inspection (attach additional sheets as required):

1. SVE air mass meter could not be calibrated as installed and was removed. New meter to be installed in early February 2010. In the interim, a pitot tube was installed and is used to measure SVE system flow rates.

2. Contractor applied additional sealant/chalking at building exterior. Once it is determined that leaks have been addressed, Contractor will return to inspect building insulation and replace/repair if damaged.

APPENDIX G

DATA QUALITY EVALUATION

DATA QUALITY EVALUATION

The Off Depot Remedial Action included sampling and analysis of soil vapor from shallow vapor intrusion probes and effluent from the air sparging and soil vapor extraction (AS/SVE) system; and groundwater from performance monitoring wells. Samples were collected during two vapor intrusion sampling events in September 2009 and March 2010; four baseline AS/SVE effluent sampling events in December 2009, January 2010, February 2010 and March 2010; quarterly AS/SVE effluent sampling events in June 2010, September 2010 and December 2010; and six groundwater performance monitoring sampling events in June and July 2009, October 2009, March 2010, June 2010, September 2010 and January 2011. Sampling locations were based on the *Dunn Field Off Depot Groundwater Remedial Action Work Plan, Revision 2* (Off Depot RAWP) (HDR, 2009). The field and laboratory procedures were performed in accordance with past practice and the *Remedial Action Sampling and Analysis Plan* (RA SAP) (MACTEC, 2005).

Air samples were submitted to Accutest Laboratories in Dayton, New Jersey for analysis. Groundwater samples were submitted to Microbac Laboratories in Marietta, Ohio for analysis. The analytical laboratories have been audited under the National Environmental Laboratory Accreditation Program. Microbac was audited by the American Association for Laboratory Accreditation and is an accredited Department of Defense Environmental Laboratory Accreditation Program laboratory with certificate valid thru 12/31/11. Accutest was audited by New Jersey Department of Environmental Protection and is a Nationally Accredited Environmental Laboratory with certificate valid thru 6/30/11. Copies of the certificates are attached.

The data quality evaluation (DQE) process involves assessment of all field and laboratory procedures, including data validation in accordance with the RA SAP completed by Diane Short and Associates, Inc (DSA). The data validation reports are included in this appendix. (One DQE report includes SDG L10030780 that was not associated with this project. Due to a large sampling effort for several projects, each SDG includes samples that were received in one cooler, which may have included samples from more than one project.) This assessment is designed to evaluate problems with the quality assurance (QA)/quality control (QC) associated with the laboratory data and potential impact to the data quality objectives (DQOs). The DQE findings are summarized in the following sections.

FIELD ACTIVITIES AND FIELD QUALITY CONTROL

The field effort included the collection of air samples from designated locations and groundwater samples from designated wells during two vapor intrusion events in September 2009 and March 2010, four monthly baseline AS/SVE effluent events in December 2009 through March 2010, three quarterly AS/SVE effluent events in June, September and December 2010, and six quarterly performance monitoring events in June-July and October 2009, March, June and September 2010 and January 2011. The vapor intrusion probe locations are shown on Figure 12 of the report. The AS/SVE effluent location is shown on Figure 3 of the report. The groundwater performance monitoring well locations are shown on Figure 4 of the report. Field QC samples were collected at selected vapor locations and wells to evaluate sampling technique and decontamination procedures. These samples included field duplicates, trip blanks, and field equipment (rinsate) blanks. Additional samples were collected at selected locations for matrix spike/matrix spike duplicate (MS/MSD) analyses in the laboratory. Sample bottles met U.S. Environmental Protection Agency (USEPA) requirements for environmentally clean containers. Sample labels were pre-printed to facilitate sample tracking from the field through the laboratory. Documentation of the sampling was performed in the field to ensure that the samples collected, sample labels, chain-of-custody (COC) records, which were generated electronically using a personal digital assistant (PDA) supplied by the laboratory, and request for analysis were consistent. Where necessary, COC forms were filled out manually. Custody seals were placed on each sample cooler prior to shipment by common carrier.

ANALYTICAL METHODS

The air samples were analyzed for volatile organic compounds (VOCs) by Toxic Organics (TO) Method TO-15. The groundwater samples were analyzed for Target Compound List (TCL) VOCs by method SW 8260B.

LABORATORY QUALITY CONTROL

The laboratory QC program, including sample handling, laboratory control, and reporting, is documented in the RA SAP. Sample handling includes documentation of sample receipt, placement in storage, lab personnel using the sample, and disposal. The laboratory control consists of instrument calibration and maintenance, laboratory control samples (LCS), method blanks and matrix spikes. Reporting of the laboratory control data was planned prior to the collection of the data, allowing the laboratory to place the appropriate information into the data package so that the DQE could be performed in a timely manner.

DQE SUMMARY

The objective of the DQE was to provide a review of the chemical data reports submitted by the laboratory and to assess the data in relation to the data quality objectives stated in the RA SAP. The DQE consisted of review of laboratory QC data and field QC parameters, and flagging of the data as usable, usable with qualification, or unusable in accordance with the DQE standard operating procedures (SOPs) using the criteria stated in the RA SAP for each analytical method performed. The following information was reviewed:

- Sample Integrity (Deliverables)
- Sample Completeness
- Sample Holding Times
- Laboratory Methods for Extraction and Analysis (Calibration, Internal Standards)
- Method Accuracy (bias) and Precision (Surrogates, Matrix Spike/Matrix Spike Duplicates (MS/MSD), LCS Recoveries)
- Laboratory Performance Criteria (Blanks, Instrument Performance Check)

Field QC parameters were evaluated through field duplicates, rinsate blanks, field documentation, and shipping criteria.

The DQE was summarized by use of flags that indicate to the reviewer that the data being considered has been qualified using the established criteria. Sample delivery group (SDG) narratives detailing the evaluation of the laboratory data by DSA are included as attachments in this Appendix. The SDGs and associated air and groundwater samples are listed on Table G-1.

The following sections provide summary discussions of the required data qualifications for each sampling event. A Level III DQE was performed and the data quality indicators (DQIs), expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity, were assessed. This included the evaluation of sample integrity, holding times, trip blanks, rinsate blanks, method blanks, internal standards, surrogate recoveries, matrix spike/matrix spike duplicate (MS/MSD) recoveries, LCSs, and field duplicate precision. The results of the DQI assessment are provided below.

Precision

Field duplicates were collected to assess sampling precision. They consisted of replicate grab samples collected concurrently with the associated field samples. Precision is best expressed in terms of relative percent difference (RPD). Field precision goals were met for the duplicate sample pairs collected during the groundwater sampling events. Field precision goals were generally met for the duplicate sample pairs collected during the vapor intrusion sampling events. Laboratory precision is discussed in more detail in the attached narratives.

Accuracy

Accuracy or bias was measured through the analyses of LCSs and MS/MSDs. Sample specific accuracy is measured through surrogate recovery. Accuracy is expressed as percent recovery (%R).

Although there were a number of high and low LCS recoveries observed, all associated data are qualified "J" or "UJ" and as such are valid. Accuracy goals based upon LCS were met. Further discussion of the LCS and MS/MSD recoveries is provided in the attached DQE narratives.

Representativeness

Representativeness refers to the degree sample data accurately and precisely describes the population of samples at a sampling point or under certain environmental conditions. Samples that are not properly preserved or are analyzed beyond holding times may not be considered representative. Review of sampling procedures, laboratory preparation, analysis holding times, trip blank and rinsate blank analysis help in providing this assessment.

Sampling procedures followed the RA SAP and were considered representative of the matrices collected. Laboratory preparation and analysis followed method guidelines.

Comparability

The selection of standardized methods and consistent laboratory practices facilitates the comparison of data between events. Past data are comparable to recent events. Consistent methodology has been maintained throughout the sampling events.

Completeness

Completeness is determined for both field and analytical objectives. Field completeness is calculated from the number of samples proposed versus the actual number of samples collected. Analytical completeness is expressed in terms of usable data. The project completeness goal for DDMT is 90 percent as stated in the RA SAP.

Field completeness for the baseline vapor intrusion events was 95 percent; vapor samples could be collected from only 19 of the 20 locations. Field completeness for the March 2010 vapor intrusion event was 70 percent; vapor samples could be collected from only 14 of the 20 sample locations. Field completeness for AS/SVE effluent events and for groundwater events was 100 percent. Analytical completeness was 100% for all events as all samples collected were analyzed by the appropriate method and with usable results.

Sensitivity

Analytical sensitivity is the concentration at which the measurement system can quantitate target analytes in the environmental matrices of concern. Analytical sensitivity is expressed in terms of the reporting limit (RL), which is provided by the respective laboratories as their reasonable and defensible quantitation limit for environmental samples above the method detection limit (MDL), which is established by each laboratory using pure water or clean matrix. The analytical method RLs and MDLs were compared to groundwater protection standards and vapor screening levels in the Off Depot RAWP and were determined to meet the overall project objectives. (The groundwater MDLs for six VOCs [1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2-dichloroethane, bromodichloromethane, carbon tetrachloride, and Dibromochloromethane] were above the standards; however, as noted in the RA SAP ("… MDLs for these VOC … compounds are higher than their corresponding screening levels because current VOC … analytical method technology can not achieve MDLs lower than those listed.")

The following sections discuss only those deficiencies encountered during the evaluation that resulted in qualified and/or unusable data.

Vapor Intrusion Event – September 2009

A total of 24 air samples including 22 field samples and two QA/QC samples (duplicates) were collected from 19 locations in September 2009. The samples were analyzed for VOCs. The data are usable with qualifications as described below:

- Isopropanol and ethanol were qualified as estimated J in one sample (VI-3A-BASE) and 13 analytes (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-ethyltoluene, acetone, carbon disulfide, ethylbenzene, m/p-xylenes, o-xylene, total xylenes, propylene, tetrachloroethene, tetrahydrofuran and toluene) were qualified as estimated J in one sample (VI-5A-BASE) due to high relative percent difference (RPD) values between the samples and their field duplicates.
- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

Vapor Intrusion Event – March 2010

A total of 22 air samples including 20 field samples and two QA/QC samples (field duplicates) were collected from 20 locations in March 2010. The samples were analyzed for VOCs. Six samples were not analyzed due to the pressures in the Summa canisters upon receipt at the laboratory. The data are usable with qualifications as described below:

- The validator noted apparent gaps in the relinquishment dates and the sampling dates on the chains of custody. This issue was satisfactorily explained by the laboratory to the project chemist.
- Trichloroethene was qualified as estimated J in one sample (VMP-4A-1Q10) due to a high RPD value between the sample and its field duplicate.
- The samples were reported down to the MDL but the method blanks were reported down to the RL. Analytes reported in the samples between the MDL and RL may be false positives. These results were: chloroform in VI-1A-1Q10, cis-1,2-dichloroethene in VMP-4B-1Q10, trichloroethene in VI-2B-1Q10 and tetrachloroethene in VI-9B-1Q10.
- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

AS/SVE Effluent Baseline Sampling Events – December 2009, January 2010, February 2010 and March 2010

A total of four air samples including one field sample and no QA/QC samples were collected from one effluent location in each of four consecutive months (December 2009 through March 2010). The samples were analyzed for VOCs. The data are usable with qualifications as described below:

- The validator noted apparent gaps in the relinquishment dates and the sampling dates on the chains of custody. This issue was satisfactorily explained by the laboratory to the project chemist.
- When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the analyte is detected, the result is qualified as "J" and data could be biased high proportional to the LCS %R. All results associated with low recoveries are qualified. Carbon tetrachloride in one sample (OD-SVE-BASELINE-1) was qualified "J" based on a slightly high LCS recovery.
- The samples were reported down to the MDL but the method blanks were reported down to the RL. Analytes reported in the samples between the MDL and RL may be false positives. These results were: 1,2-dichloroethane and hexane in OD-SVE-BASELINE-1; carbon tetrachloride, heptane and trichlorofluoromethane in OD-SVE-BASELINE-2; benzene, heptane and trichlorofluoromethane in OD-SVE-BASE3-NS; and m/p-xylene and total xylenes in ODSVE BASELINE 4.
- Any result reported below the RL but above the MDL was flagged "J" and considered an estimated result.

AS/SVE Effluent Quarterly Sampling Event – June 2010

A total of one air sample including one field sample and no QA/QC samples was collected from one effluent location. The sample was analyzed for VOCs. The data are usable with qualifications as described below:

- Any result reported below the RL but above the MDL was flagged "J" and considered an estimated result.

AS/SVE Effluent Quarterly Sampling Event – September 2010

A total of one air sample including one field sample and no QA/QC samples was collected from one effluent location. The sample was analyzed for VOCs. The data are usable with qualifications as described below:

- Any result reported below the RL but above the MDL was flagged "J" and considered an estimated result.

AS/SVE Effluent Quarterly Sampling Event – December 2010

A total of one air sample including one field sample and no QA/QC samples was collected from one effluent location. The sample was analyzed for VOCs. The data are usable with qualifications as described below:

- The validator noted apparent gaps in the relinquishment dates and the sampling dates on the chains of custody. This issue was satisfactorily explained by the laboratory to the project chemist.
- Any result reported below the RL but above the MDL was flagged "J" and considered an estimated result.

Groundwater Performance Monitoring – June 2009

A total of 22 groundwater samples including 17 field samples and five QA/QC samples (field duplicates, MS/MSD and trip blank) were collected from 17 locations in June 2009. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:

- Toluene and 1,4-dichlorobenzene were detected between the MDL and RL in the trip blank. Toluene was not detected in associated samples and was not qualified. 1,4-Dichlorobenzene was detected at less than five times the blank concentration in several samples (MW-148-86.35-B1, MW-149-92.15-B1, MW-166-92.1-B1, MW-166A-78.17-B1, MW-151-87.75-B1, MW-165-96.88-B1, MW-79-93.05-B1 and MW-169-87.06-B1) and was qualified "B". (The data validator qualified these results as not detected U at the trip blank concentration, but the QAPP does not list this as an option, instead stating that results should be B-qualified.)
- Any result reported below the RL but above the MDL was flagged "J" and considered an estimated result.

Groundwater Performance Monitoring – July 2009

A total of 26 groundwater samples including 20 field samples and six QA/QC samples (field duplicates, MS/MSD, rinsate blank and trip blanks) were collected from 20 locations in July 2009. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:

- Acetone in one sample (MW-70-87.67-B-2) was qualified as estimated "J" due to low recoveries of the MS and MSD.

- Methylene chloride was detected between the MDL and RL in the method blanks. Methylene chloride was also detected at less than five times the blank concentration in one sample (MW-247-B-2) and the trip blank and was qualified "B".

- Styrene was detected in the trip blank, and acetone, benzene, toluene and 1,4-dichlorobenzene were detected between the MDL and RL in the rinsate blank. Benzene and toluene were not detected in associated samples and were not qualified. 1,4-Dichlorobenzene and acetone were detected at less than five times the blank concentration in several samples (MW-70-87.67-B-2, MW-76-90.75-B-2, MW-77-85.55-B-2, MW-157-75.95-B-2, MW-161-82-B-2, MW-162-86.08-B-2, MW-164-74.59-B-2 and MW-232-B-2) and were qualified "B".

- Any result reported below the RL but above the MDL was flagged "J" and considered an estimated result.

Groundwater Performance Monitoring – October 2009

A total of 46 groundwater samples including 36 field samples and ten QA/QC samples (field duplicates, MS/MSD and trip blanks) were collected from 36 locations in October 2009. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:

- Vinyl acetate in one sample (MW-155-ODPM-3) and 4-chlorotoluene in two samples (MW-79-ODPM-3 and MW-149-ODPM-3) were non-detect and qualified as non-detect estimated "UJ" due to low continuing calibration verification (CCV) results.

- Vinyl chloride in nine samples (MW-70-ODPM-3, MW-76-ODPM-3, MW-77-ODPM-3, MW-148-ODPM-3, MW-160-ODPM-3, MW-161-ODPM-3, MW-162-ODPM-3, MW-164-ODPM-3 and MW-243-ODPM-3), 4-chlorotoluene in two samples (MW-152-ODPM-3 and MW-158-ODPM-3) and trans-1,3-dichloropropene in four samples (MW-79-ODPM-3, MW-149-ODPM-3, MW-152-ODPM-3 and MW-158-ODPM-3) were non-detect and qualified as non-detect estimated "UJ" due to low LCS recoveries.

- Methylene chloride was detected between the MDL and RL in the method blanks. Methylene chloride was also detected at less than five times the blank concentration in six samples (MW-155-ODPM-3, MW-159-ODPM-3, MW-242-ODPM-3, MW-245-ODPM-3, MW-246-ODPM-3 and MW-247-ODPM-3) and was qualified "B".

- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

Groundwater Performance Monitoring – March 2010

A total of 46 groundwater samples including 36 field samples and ten QA/QC samples (field duplicates, MS/MSD and trip blanks) were collected from 36 locations in March 2010. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:

- Carbon disulfide in 29 samples, acetone in nine samples, 2-butanone (MEK) in nine samples and 4-methyl-2-pentanone (MIBK) in nine samples were qualified as estimated “J” or non-detect estimated “UJ” due to low LCS recoveries.
- Methylene chloride and 1,4-dichlorobenzene were detected between the MDL and RL in the trip blanks and rinsate blanks. These analytes were also detected at less than five times the blank concentration in four samples (methylene chloride in MW-150-ODPM-4 and 1,4-dichlorobenzene in MW-164-ODPM-4, MW-165-ODPM-4 and MW-166-ODPM-4) and these results were qualified “B”.
- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

Groundwater Performance Monitoring – June 2010

A total of 47 groundwater samples including 36 field samples and 11 QA/QC samples (field duplicates, MS/MSD, trip blanks and rinsate blanks) were collected from 36 locations in June 2010. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:

- Carbon tetrachloride in three samples (MW-76-ODPM-5, MW-77-ODPM-5 and MW-79-ODPM-5) was non-detect and qualified as non-detect estimated “UJ” due to a high initial calibration relative standard deviation (RSD).
- Acetone was detected between the MDL and RL in the rinsate blank. Acetone was also detected at less than five times the blank concentration in 30 samples and these results were qualified “B”.
- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

Groundwater Performance Monitoring – September 2010

A total of 46 groundwater samples including 36 field samples and ten QA/QC samples (field duplicates, MS/MSD and trip blanks) were collected from 36 locations in September 2010. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:

- Acetone was qualified as estimated “J” in MW-148-ODPM-6 due to high MS/MSD recoveries. Chloromethane was non-detect and qualified as non-detect estimated “UJ” in MW-242-ODPM-6 due to low MS/MSD recoveries.
- Chloromethane in 32 samples, acetone in 18 samples, dichlorodifluoromethane in 15 samples, carbon disulfide in seven samples, vinyl chloride in six samples, 2-butanone (MEK) and 4-methyl-2-pentanone (MIBK) in three samples, 2-hexanone and 1,1,2,2-tetrachloroethane in two samples, and bromomethane in one sample were qualified as estimated “J” or non-detect estimated “UJ” due to high or low LCS results.
- Chloromethane and methylene chloride were detected between the MDL and RL in one trip blank. Chloromethane was not detected in any field samples and has not been qualified. Methylene chloride was detected in one field duplicate sample and qualified “B”.
- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

Groundwater Performance Monitoring – January 2011

A total of 44 groundwater samples including 33 field samples and 11 QA/QC samples (field duplicates, MS/MSD, trip blanks and rinse blanks) were collected from 33 locations in January 2011. The samples were analyzed for TCL VOCs. The data are usable with qualifications as described below:.

- Acetone, 2-butanone and hexachlorobutadiene in seven samples and chloromethane in one sample were qualified as estimated “J” or non-detect estimated “UJ” due to high or low LCS results.
- Methylene chloride was detected between the MDL and RL in one method blank; it was also detected in one field sample, MW-243-ODPM-7, and qualified “B”.
- Acetone, toluene and 1,4-dichlorobenzene were detected at trace or low levels in the rinse blank, which was associated with sample MW-160-ODPM-7, the only sample that was collected using non-

dedicated equipment. These analytes were non-detect in the sample and no qualification was required.

- Any result reported below the RL but above the MDL was flagged “J” and considered an estimated result.

SUMMARY

The sample data from the vapor intrusion, AS/SVE effluent, and groundwater performance monitoring events met the data quality objectives and are of sufficient quality to support the evaluation of remedial actions.

TABLE G-1
SDG SUMMARY TABLE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

SDG	Field Samples			Quality Control Samples
Vapor Intrusion Event - September 2009				
JA28198	VI-1A-BASE	VI-4B-BASE	VI-8A-BASE	DUP-1-VI-3A-BASE
	VI-1B-BASE	VI-5A-BASE	VI-8B-BASE	DUP-2-VI-5A-BASE
	VI-2A-BASE	VI-6A-BASE	VI-9A-BASE	
	VI-2B-BASE	VI-6B-BASE	VI-9B-BASE	
	VI-3A-BASE	VI-7A-BASE-1L	VMP-4A-BASE-1L	
	VI-3B-BASE	VI-7A-BASE-6L	VMP-4B-BASE-1L	
	VI-4A-BASE	VI-7B-BASE	VMP-4A-BASE-6L	
			VMP-4B-BASE-6L	
Vapor Intrusion Event - March 2010				
JA41416	VI-1A-1Q10	VI-5B-1Q10	VI-9A-1Q10	
	VI-1B-1Q10	VI-6A-1Q10	VI-9B-1Q10	
	VI-2A-1Q10	VI-6B-1Q10	VMP-4A-1Q10	
	VI-2B-1Q10	VI-7A-1Q10	VMP-4B-1Q10	
	VI-4B-1Q10	VI-8A-1Q10		
JA41417				DUP-1-VI-6A-1Q10
				DUP-2-VMP-4A-1Q10
AS/SVE Effluent Baseline Event - December 2009				
JA35169	OD-SVE-BASELINE-1			
AS/SVE Effluent Baseline Event - January 2010				
JA38446	OD-SVE-BASELINE-2			
AS/SVE Effluent Baseline Event - February 2010				
JA40428	OD-SVE-BASE3-NS			
AS/SVE Effluent Baseline Event - March 2010				
JA43177	ODSVE BASELINE 4			
AS/SVE Effluent Quarterly Event - June 2010				
JA49630	ODSVE-2Q10			
AS/SVE Effluent Quarterly Event - September 2010				
JA56529	ODSVE-3Q10			
AS/SVE Effluent Quarterly Event - December 2010				
JA63577	ODSVE-4Q10			

TABLE G-1
SDG SUMMARY TABLE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

SDG	Field Samples			Quality Control Samples
Groundwater Performance Monitoring Baseline Event 1 - June 2009				
L09060246	MW-54-90.25-B1	MW-152-101.75-B1	MW-165-96.88-B1	DUP-1-B1-MW-150-88.51-B1
	MW-79-93.05-B1	MW-155-88.94-B1	MW-165A-81.65-B1	DUP-2-B1-MW-151-87.75-B1
	MW-148-86.35-B1	MW-158-99.25-B1	MW-166-92.1-B1	MW-166A-78.17-B1-MS
	MW-149-92.15-B1	MW-158A-88.25-B1	MW-166A-78.17-B1	MW-166A-78.17-B1-MSD
	MW-150-88.51-B1	MW-159-81.85-B1	MW-169-87.06-B1	TB06082009
	MW-151-87.75-B1	MW-160-84.35-B1		
Groundwater Performance Monitoring Baseline Event 2 - July 2009				
L09070713	MW-70-87.67-B-2	MW-164-74.59-B-2	MW-246-B-2	DUP-1-B-1-MW-162-86.08-B-2
	MW-76-90.75-B-2	MW-232-B-2	MW-247-B-2	DUP-2-B-2-MW-246-B-2
	MW-77-85.55-B-2	MW-241-B-2	MW-248-B-2	MW-70-87.67-B-2-MS
	MW-157-75.95-B-2	MW-242-B-2	MW-249-B-2	MW-70-87.67-B-2-MSD
	MW-161-82-B-2	MW-243-B-2	MW-250-B-2	RB1
	MW-162-86.08-B-2	MW-244-B-2	MW-251-B-2	TB-072809
	MW-163-77.03-B-2	MW-245-B-2		
Groundwater Performance Monitoring Event - October 2009				
L09100412	MW-70-ODPM-3	MW-155-ODPM-3	MW-162-ODPM-3	DUP-1-ODPM-3-MW-77-ODPM-3
	MW-76-ODPM-3	MW-157-ODPM-3	MW-164-ODPM-3	DUP-2-ODPM-3-MW-160-ODPM-3
	MW-77-ODPM-3	MW-160-ODPM-3	MW-241-ODPM-3	MW-244-ODPM-3-MS
	MW-148-ODPM-3	MW-161-ODPM-3	MW-243-ODPM-3	MW-244-ODPM-3-MSD
			MW-244-ODPM-3	TB-101509-ODPM-3
L09100423	MW-54-ODPM-3	MW-159-ODPM-3	MW-245-ODPM-3	DUP-3-ODPM-3-MW-232-ODPM-3
	MW-79-ODPM-3	MW-163-ODPM-3	MW-246-ODPM-3	DUP-4-ODPM-3-MW-250-ODPM-3
	MW-149-ODPM-3	MW-165-ODPM-3	MW-247-ODPM-3	MW-151-ODPM-3-MS
	MW-150-ODPM-3	MW-165A-ODPM-3	MW-248-ODPM-3	MW-151-ODPM-3-MSD
	MW-151-ODPM-3	MW-166-ODPM-3	MW-249-ODPM-3	TB-101609-ODPM-3
	MW-152-ODPM-3	MW-166A-ODPM-3	MW-250-ODPM-3	
	MW-158-ODPM-3	MW-232-ODPM-3	MW-251-ODPM-3	
	MW-158A-ODPM-3	MW-242-ODPM-3		
Groundwater Performance Monitoring Event - March 2010				
L10030650	MW-54-ODPM-4	MW-159-ODPM-4	MW-242-ODPM-4	DUP-1-ODPM-4-MW-54-ODPM-4
	MW-148-ODPM-4	MW-160-ODPM-4	MW-243-ODPM-4	DUP-3-ODPM-4-MW-165A-ODPM-4
	MW-149-ODPM-4	MW-165-ODPM-4	MW-244-ODPM-4	MW-148-ODPM-4-MS
	MW-150-ODPM-4	MW-165A	MW-245-ODPM-4	MW-148-ODPM-4-MSD
	MW-151-ODPM-4	MW-166-ODPM-4	MW-246-ODPM-4	MW-242-ODPM-4-MS
	MW-155-ODPM-4	MW-166A-ODPM-4	MW-247-ODPM-4	MW-242-ODPM-4-MSD
	MW-158-ODPM-4	MW-232-ODPM-4	MW-249-ODPM-4	TB-31910-ODPM-3

TABLE G-1
SDG SUMMARY TABLE
OFF DEPOT GROUNDWATER INTERIM REMEDIAL ACTION COMPLETION REPORT
Dunn Field - Defense Depot Memphis, Tennessee

SDG	Field Samples			Quality Control Samples
	MW-158A-ODPM-4	MW-241-ODPM-4	MW-250-ODPM-4	
			MW-251-ODPM-4	
L10030693	MW-70-ODPM-4	MW-152-ODPM-4	MW-163-ODPM-4	DUP-2-ODPM-4-MW-157-ODPM-4
	MW-76-ODPM-4	MW-157-ODPM-4	MW-164-ODPM-4	DUP-4-ODPM-4-MW-248-ODPM-4
	MW-77-ODPM-4	MW-161-ODPM-4	MW-248-ODPM-4	TB-31810-ODPM-3
	MW-79-ODPM-4	MW-162-ODPM-4		ODPM-4-RB

Groundwater Performance Monitoring Event - June 2010

SDG	Field Samples			Quality Control Samples
L10060784	MW-54-ODPM-5	MW-158-ODPM-5	MW-232-ODPM-5	DUP-1-ODPM-5-MW-54-ODPM-5
	MW-70-ODPM-5	MW-158A-ODPM-5	MW-241-ODPM-5	DUP-2-ODPM-5-MW-157-ODPM-5
	MW-76-ODPM-5	MW-159-ODPM-5	MW-242-ODPM-5	DUP-3-ODPM-5-MW-165A-ODPM-5
	MW-77-ODPM-5	MW-160-ODPM-5	MW-243-ODPM-5	DUP-4-ODPM-5-MW-248-ODPM-5
	MW-79-ODPM-5	MW-161-ODPM-5	MW-244-ODPM-5	MW-148-ODPM-5-MS
	MW-148-ODPM-5	MW-162-ODPM-5	MW-245-ODPM-5	MW-148-ODPM-5-MSD
	MW-149-ODPM-5	MW-163-ODPM-5	MW-246-ODPM-5	MW-242-ODPM-5-MS
	MW-150-ODPM-5	MW-164-ODPM-5	MW-247-ODPM-5	MW-242-ODPM-5-MSD
	MW-151-ODPM-5	MW-165-ODPM-5	MW-248-ODPM-5	TB-062410-ODPM-5
	MW-152-ODPM-5	MW-165A-ODPM-5	MW-249-ODPM-5	TB-062510-ODPM-5
	MW-155-ODPM-5	MW-166-ODPM-5	MW-250-ODPM-5	ODPM-5-RB
	MW-157-ODPM-5	MW-166A-ODPM-5	MW-251-ODPM-5	

Groundwater Performance Monitoring Event - September 2010

SDG	Field Samples			Quality Control Samples
L10090659	MW-54-ODPM-6	MW-158-ODPM-6	MW-232-ODPM-6	DUP-1-ODPM-6-MW-54-ODPM-6
	MW-70-ODPM-6	MW-158A-ODPM-6	MW-241-ODPM-6	DUP-2-ODPM-6-MW-157-ODPM-6
	MW-76-ODPM-6	MW-159-ODPM-6	MW-242-ODPM-6	DUP-3-ODPM-6-MW-165A-ODPM-6
	MW-77-ODPM-6	MW-160-ODPM-6	MW-243-ODPM-6	DUP-4-ODPM-6-MW-248-ODPM-6
	MW-79-ODPM-6	MW-161-ODPM-6	MW-244-ODPM-6	MW-148-ODPM-6-MS
	MW-148-ODPM-6	MW-162-ODPM-6	MW-245-ODPM-6	MW-148-ODPM-6-MS
	MW-149-ODPM-6	MW-163-ODPM-6	MW-246-ODPM-6	MW-242-ODPM-6-MS
	MW-150-ODPM-6	MW-164-ODPM-6	MW-247-ODPM-6	MW-242-ODPM-6-MSD
	MW-151-ODPM-6	MW-165-ODPM-6	MW-248-ODPM-6	TB-31810-ODPM-6
	MW-152-ODPM-6	MW-165A-ODPM-6	MW-249-ODPM-6	TB-31910-ODPM-6
	MW-155-ODPM-6	MW-166-ODPM-6	MW-250-ODPM-6	
	MW-157-ODPM-6	MW-166A-ODPM-6	MW-251-ODPM-6	

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: JA28198

PROJECT: Memphis Defense Depot Vapor Intrusion for e2m, Texas

LABORATORY: Accutest Laboratories, Dayton New Jersey

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): September, 2009

NUMBER OF SAMPLES: 24 Air Samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: DUP-1, DUP-2, VI-1A-BASE, VI-1B-BASE, VI-2A-BASE, VI-2B-BASE, VI-3A-BASE, VI-3B-BASE, VI-4A-BASE, VI-4B-BASE, VI-5A-BASE, VI-6A-BASE, VI-6B-BASE, VI-7A-BASE-1L, VI-7A-BASE-6L, VI-7B-BASE, VI-8A-BASE, VI-8B-BASE, VI-9A-BASE, VI-9B-BASE, VMP-4A-BASE-1L, VMP-4A-BASE-6L, VMP-4B-BASE-1L, VMP-4B-BASE-6L

DATA REVIEWER: John and Sammy Huntington

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __________

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The project QAPP, the EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES

All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.

Yes _X__ No ____

The EDD did not contain usable QC information, and lacked numerous important data such as analysis date, batch number, etc. This does not allow the reviewer to compare EDD results with hardcopy results and assure that the correct results have been qualified at this level of review.

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.

Yes __X__ No___

B. Holding Times

The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.

Yes ___X__ No____

C. Chains of Custody

Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.

Yes __X___ No ____

D. Canister Pressure

Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.

Yes _______ No ______ NA ___X_____

Not part of this review level.

All readings met the limits or exceptions were noted and pressure corrected

Yes _____ No ____ NA __X__

Not part of this review level.

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS

1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria of 0.01 for the poor responders and 0.05 for all other compounds.

Yes __X__ No____ NA____

Minimum response factors are not defined by the method nor are air methods specifically addressed in the project QAPP. Criteria from the SW-846 Method 8260B/C have been applied as appropriate from the QAPP and project management specifications for all calibration evaluation. This method does not involve purging water samples. Consequently, all targets, including the typically poor-purging compounds, normally have response factors that are acceptable per the 2001validation criteria for volatiles.

The relative standard deviation (RSD) for the five-point calibration was within the 30% (40% for the poor responders) limit.

Yes __X__ No ___

B. Continuing Calibration – GC/MS

1. The RRF standard was analyzed for each analysis at the required frequency and the QC criteria were met

Yes __X__ No____ NA____

Minimum response factors are not defined by the method, but met 2001 validation guidance as have been applied to the SW-846 Method 8260 validation for this project.

2. The percent difference (%D) limits of 30% were met.
Yes __X__ No ____

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the $\pm$ 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____

And met the recovery limits defined in the current contract of 70- 130%
Yes __ X _ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes __X__ No ____NA _____
Spikes are not amenable to canister analysis and are not required. Laboratory duplicates are required and are provided by the laboratory. 2 duplicates are present, on lab sample 2 (VI-1B-BASE) and lab sample 14 (VI-5A-BASE).

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes _X_ No ____ NA____
For validation purposes, only results > 5x PQL are qualified for RPD outliers. For results < 5x PQL, results are qualified if the absolute difference is greater than 2x PQL. The qualifier added is JD#, where # is the RPD or the absolute difference observed, as appropriate. No qualifiers are added for duplicate outliers in this project.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_ No ___
The laboratory does analyze laboratory control samples (LCS), but does not analyze laboratory control sample duplicates (LCSD). Neither are required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes __X__ No ___

C. And Relative Percent Differences were within lab limits.
Yes _X__ No____ NA____
The laboratory RPD limit is 30%. All are well below that limit.

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___ No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.
Yes __X___ No __X___

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes ____ No____ NA ____X___
Not part of this review level.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___ No __X__ NA___
Qualifiers are not added for field duplicate differences as they are evaluated for the overall project by the project manager. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.

2 field duplicates were identified, as shown in the table below. Isopropanol was present at very high levels in DUP-1 but at much lower levels in the parent. The result is flagged by the laboratory as exceeding calibration range, and has been qualified as JE in DUP-1.

Field Duplicate	Parent Sample	Observations
DUP-1	VI-3A-BASE	Isopropanol 7100E ug/m3 in DUP-1, 72.5 ug/m3 in parent (RPD=196%); Ethanol RPD is 132%; also detected in DUP-1 below 5x RL are methylene chloride, TCE, and trichlorofluoromethane, not detected in parent. Criteria are met for these (difference < 2xPQL)
DUP-2	VI-5A-BASE	See tables below

For DUP -2, there are a number of outliers above 5x PQL. These are shown in the table below. There is a fairly consistent difference between the DUP-2 and parent sample results. The results shown are in ug/m3. The laboratory reports both in ug/m3 and ppmv. Results that are < 5x PQL in this case are associated with parent results below the PQL, and thus fall within the acceptance windows. However they are also significantly different from the DUP-2 values.

Sample ID	Analyte	Result	DUP-2 Res	RL ug/m3	RPD	Difference
VI-5A-BASE	1,2,4-Trimethylbenzene	285	100	3.9	96	
VI-5A-BASE	1,3,5-Trimethylbenzene	89.5	37.4	3.9	82	
VI-5A-BASE	4-Ethyltoluene	50.1	21.4	3.9	80	

Sample ID	Analyte	Result	DUP-2 Res	RL ug/m3	RPD	Difference
VI-5A-BASE	Acetone	72.2	28.6	1.9	87	
VI-5A-BASE	Carbon disulfide	18	8.6	2.5	71	9.4
VI-5A-BASE	Ethylbenzene	48.2	22.6	3.5	72	
VI-5A-BASE	m,p-Xylene	215	95.7	3.5	77	
VI-5A-BASE	o-Xylene	71.2	29.7	3.5	82	
VI-5A-BASE	Propylene	17	5.4	3.4	104	11.6
VI-5A-BASE	Tetrachloroethylene	16	4	1.1	120	12
VI-5A-BASE	Tetrahydrofuran	13	3.8	2.4	110	9.2
VI-5A-BASE	Toluene	51.3	24.3	3	71	
VI-5A-BASE	Xylenes (total)	287	125	3.5	79	

XII. SYSTEM PERFORMANCE
The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems
Yes ___ No ____NA__X___
Not part of this review level.

XIII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
For this project, ten percent of the data are fully review for chromatograms and spectra.
Yes ___ No____ NA__X_
Not part of this review level.

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level.

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of qualifiers. Points of significance are summarized below:

<u>Field Duplicates:</u>
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.

2 field duplicates were identified, as shown in the table within the body of the report. There were significant outliers in both field duplicates, with DUP-2 being the more severely impacted.

Isopropanol was present at very high levels in DUP-1 but at much lower levels in the parent. The result is flagged by the laboratory as exceeding calibration range, and has been qualified as JE in DUP-1.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: JA: 41416, 41417

PROJECT: Memphis Defense Depot , Off Depot vapor intrusion for HDR Inc. (formerly e2m)

LABORATORY: Accutest Laboratories, New Jersey

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): March, 2010

NUMBER OF SAMPLES: 16 air samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: _See attached result forms

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __________

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note a project list of 12 volatile compounds was reported. Full raw data packages were submitted. Level III validation was performed for holding times, chain of custody, calibrations and QC.

II. ANALYTICAL REPORT FORMS
A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes __X__ No___

B. Holding Times
The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.
Yes ___X__ No____

C. Chains of Custody
Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.
Yes _____ No ___X_
The project manager is informed of the following and the project record is being updated.
The chains of custody have 2 relinquishment and 2 received entries including FedEx courier notations (but no signatures or dates). It is not clear if the signatures are from FedEx or the lab. There are gaps from relinquishment to sample receipt and no dates on some signoffs. There is no airbill number reported for JA41417.
JA41416: The relinquishment date is 3/1/10. The sampling date is 3/8-9/10. The date needs to be corrected. Air bill numbers are present as required.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes ___X____ No ______ NA ________
Pressures were reported for the initial and final pressure

All readings met the limits or exceptions were noted and pressure corrected
Yes _____ No __X__ NA ____
Not part of this review level, but is performed to ensure sample integrity. The following samples in JA41416 were unacceptable (in the range of -28 to -30) and these samples were accurately cancelled by the client.
VI*-1Q10, where * = 3A, 3B, 4A, 5A, 7B, 8B

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS
1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria.
Yes __X__ No____ NA____
Minimum response factors are not defined by the method but meet routine Method 8260 limits. This method does not involve purging water samples. Consequently, all targets, including the typically poor-purging compounds, normally have response factors that are acceptable per validation criteria for volatiles.
The laboratory runs the samples on 2 instruments, MS3W and MSW. Sometimes the QC is run on one instrument and the sample on another. It would significantly enhance precision and comparability, reduce paperwork and validation time if all analyses were run on one instrument and QC were in the same calibration as the samples. There are over 13 days of analyses (calibrations and QC) submitted including the initial calibrations.

The relative standard deviation (RSD) for the five-point calibration was within the 30% limit.
Yes __X__ No ___
Calibrations for the client samples for the project compounds are all within limits.
JA41416: There are 3 full compound list ICALs reported for instrument MSW and 2 for MSW3.
SDG JA41417: One of the ICALs has a date of 3/1/10 but it appears that is the report date, not the actual run date, which correlates to the 2/13/10 data and ICV. The 3/11/10 ICAL is more current for this instrument and was used for qualification, although both calibrations were acceptable.

B. Continuing Calibration – GC/MS
1. The RRF standard was analyzed for each analysis at the required frequency and the QC criteria were met
Yes __X__ No____ NA____
Minimum response factors are not defined by the method, but met validation guidance.

2. The percent difference (%D) limits of 30% were met.
Yes ____ No __X__
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met for project compounds.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____
The BFB was acceptable for the tunes.

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the $\pm$ 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____
Note that only one surrogate is used 4-bromofluorobenzene. Method 8260 requires 3 surrogates, but one is acceptable for TO-15.

And met the recovery limits defined in the current contract
Yes __ X _ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes____ No ____NA ___X__
Spikes are not amenable to canister analysis and are not required. Laboratory duplicates are required and are provided by the laboratory. Five duplicates are present with one being a client sample, VI-8A-1Q10 being used for QC. This meets the project frequency.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes __X__ No ____ NA____

For validation purposes, only results > 5x PQL are qualified for RPD outliers. For results < 5x PQL, results are qualified if the absolute difference is greater than 2x PQL. The qualifier added is JD#, where # is the RPD or the absolute difference observed, as appropriate.
The duplicates were acceptable.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_   No ___
The laboratory does analyze laboratory control samples (LCS) and laboratory control sample duplicates (LCSD). Neither are required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes ____ No _X___
There are numerous LCS and LCSD samples submitted. The LCS for MSW on 2/9 (VW1030) reported carbon tetrachloride at 134/ 134% and 1,2-dichloroethane at 139/ 141%. These compounds are not detected in any client sample and there was a subsequent ICAL and associated QC that were acceptable in March. No qualification is required.

C. And Relative Percent Differences were within lab limits.
Yes _X__   No____ NA____

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___   No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.
Yes __X___   No _____
The laboratory reports the method blank to the RL (reporting limit). Data are reported to the MDL (method detection limit). Low level ‘J’ data could be false positives as there is no laboratory, nor field blank.

C. If Field Blanks were identified, they were free of contamination.
Yes _____   No ____   NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes __X__   No____   NA _______
Reporting units include both ppbv and ug/m3.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___   No _X___ NA___
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.
There are 2 field duplicates:
DUP 1 and VI-6A acceptable precision

DUP 2 and VMP 4A , trichloroethylene is reported at 1.6 ug/m^3 (0.3 ppbv) in Dup 2 and 11 ug/m^3 (2.0 ppbv) in VMP 4a. The reporting limit is 0.86 ug/m^3 (0.074 ppbv). Difference is 9.4 ug/m^3 (1.7 ppbv). Precision is actually not clearly defined in the QAPP for air canisters. These are co-located samples , collected at the same time from the same location. A difference of 100% is not uncommon for canisters.

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
Yes ___ No____ NA__X_

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level.

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of qualifiers or comments. Points of significance are summarized below and no data have been qualified:

Chain of Custody:
The project manager is informed of the following and the project record is being updated.
The chains of custody have 2 relinquishment and 2 received entries including FedEx courier notations (but no signatures or dates). It is not clear if the signatures are from FedEx or the lab. There are gaps from relinquishment to sample receipt and no dates on some signoffs. There is no airbill number reported for JA41417.
JA41416: The relinquishment date is 3/1/10. The sampling date is 3/8-9/10. The date needs to be corrected. Air bill numbers are present as required.

Sample Integrity
Pressures were reported for the initial and final pressure. The following samples in JA41416 were unacceptable (in the range of -28 to -30) and these samples were accurately cancelled by the client.
VI*-1Q10, where * = 3A, 3B, 4A, 5A, 7B, 8B

Initial and Continuing Calibration:
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met.
The laboratory runs the samples on 2 instruments, MS3W and MSW. Sometimes the QC is run on one instrument and the sample on another. It would significantly enhance precision and comparability, reduce paperwork and validation time if all analyses were run on one instrument and QC were in the same calibration as the samples. There are over 13 days of analyses (calibrations and QC) submitted including the initial calibrations.
JA41416: There are 3 full compound list ICALs reported for instrument MSW and 2 for MSW3.
SDG JA41417: One of the ICALs has a date of 3/1/10 but it appears that is the report date, not the actual run date, which correlates to the 2/13/10 data and ICV. The 3/11/10 ICAL is more current for this instrument and was used for qualification, although both calibrations were acceptable.

Method Blanks:
The laboratory reports the method blank to the RL (reporting limit). Data are reported to the MDL (method detection limit). Low level ‘J’ data could be false positives as there is no laboratory, nor field blank.

Laboratory duplicates
The duplicates were acceptable. A client sample IV-8A-1Q10 was used .

Laboratory Control Samples

There are numerous LCS and LCSD samples submitted. The LCS for MSW on 2/9 (VW1030) reported carbon tetrachloride at 134/ 134% and 1,2-dichloroethane at 139/ 141%. These compounds are not detected in any client sample and there was a subsequent ICAL and associated QC that were acceptable in March. No qualification is required.

Field Duplicates:

There are 2 field duplicates:

DUP 1 and VI-6A acceptable precision

DUP 2 and VMP 4A , trichloroethylene is reported at 1.6 ug/m^3 (0.3 ppbv) in Dup 2 and 11 ug/m^3 (2.0 ppbv) in VMP 4a. The reporting limit is 0.86 ug/m^3 (0.074 ppbv). Difference is 9.4 ug/m^3 (1.7 ppbv). Precision is actually not clearly defined in the QAPP for air canisters. These are co-located samples , collected at the same time from the same location. A difference of 100% is not uncommon for canisters.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: JA: 35169, 38446, 40428, 43177

PROJECT: Memphis Defense Depot Off Depot Baseline for HDR Inc. (formerly e2m)

LABORATORY: Accutest Laboratories, New Jersey

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): October, 2009, December 2009, January 2010

NUMBER OF SAMPLES: 3 air samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: OD-SVE-Baseline: 1, 2, 3, 4

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __________

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note an extended list of volatile compounds was reported. Full raw data packages were submitted. Level III validation was performed for holding times, chain of custody, calibrations and QC.

II. ANALYTICAL REPORT FORMS
A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes __X__ No___

B. Holding Times
The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.
Yes ___X__ No____

C. Chains of Custody
Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.
Yes ___X__ No ___
The project manager is informed of the following and the project record is being updated.
JA38446 and 40428: The chain of custody has 2 relinquishment and 2 received entries including FedEx courier notations (but no signatures or dates). There are gaps from relinquishment to sample receipt and no dates on some signoffs. There is no airbill number reported.
JA35169: The relinquishment date is 10/22/09. The sampling date is 12/11/09. The date needs to be corrected. Air bill numbers are present as required.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes ___X____ No ______ NA ________
Pressures were reported and were acceptable for the initial and final pressures.

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____
Not part of this review level, but is performed to ensure sample integrity.

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS
1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria.
Yes __X__ No____ NA____
Minimum response factors are not defined by the method but meet routine Method 8260 limits. This method does not involve purging water samples. Consequently, all targets, including the typically poor-purging compounds, normally have response factors that are acceptable per validation criteria for volatiles.
The laboratory sometimes runs the samples on 2 instruments, MS3W and MSW. Sometimes the QC is run on one instrument and the sample on another. In some cases, the dilution is run on one instrument and the original on another. It would significantly enhance precision and comparability, reduce paperwork and validation time if all analyses were run on one instrument and QC were in the same calibration as the samples.

The relative standard deviation (RSD) for the five-point calibration was within the 30% limit.
Yes ____ No __X_

Calibrations for the client samples are noted below although all calibrations (6 for the 3 samples) were reviewed. No data are qualified as outlier compounds had acceptable response factors and the non-detect is verified at the reporting limit.

SDG	Date	Compound	RSD	Qualification
JA38446	ICAL 1/14/10, MSW3	1,2,4 trichlorobenzene	38.35%	No qualification as result ND
	ICAL 2/5/10 MSW3	Hexachlorobutadiene	36.4	No qualification as result ND
JA40428	ICAL 3/5/10 MSW	Hexachlorobutadiene	36.4	No qualification as result ND

B. Continuing Calibration – GC/MS
1. The RRF standard was analyzed for each analysis at the required frequency and the QC criteria were met
Yes __X__ No____ NA____
Minimum response factors are not defined by the method, but met validation guidance.

2. The percent difference (%D) limits of 30% were met.
Yes ____ No __X__
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met with the following exceptions No data were qualified when data were non-detect. The response factor was acceptable to verify the non-detect. Detected data are not qualified as they meet the TO-15 %D and the QAPP does not specifically address air limits. There could be a slight high bias to the data as the response increases for these compounds.

SDG	Date, instrument	Compound	% D	Qualification
JA35169	CCAL 1/4/10	Trichlorofluoromethane	26.5%	Meet TO-15 limits
	MSW	Carbon tetrachloride	26.9	Meet TO-15 limits
JA40428	CCAL 3/4/10,MSW	Hexachlorobutadiene	30.6	No qualification as result ND
JA43177	CCAL 4/9/10	hexane	28.1	Meet TO-15 limits
	MSW	Ethyl acetate	26.5	Meet TO-15 limits
		Cyclohexane	25.7	Meet TO-15 limits
		1,2 dichloropropane	26.1	Meet TO-15 limits

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____
The BFB was acceptable for the tunes.

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the $\pm$ 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____
Note that only one surrogate is used 4-bromofluorobenzene. Method 8260 requires 3 surrogates, but one is acceptable for TO-15.

And met the recovery limits defined in the current contract
Yes __ X _ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes____ No ____NA ___X__
Spikes are not amenable to canister analysis and are not required. Laboratory duplicates are required and are provided by the laboratory. Three duplicates are present.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes ____ No __X__ NA____
For validation purposes, only results > 5x PQL are qualified for RPD outliers. For results < 5x PQL, results are qualified if the absolute difference is greater than 2x PQL. The qualifier added is JD#, where # is the RPD or the absolute difference observed, as appropriate.
The duplicates were acceptable with the exception of several medium chain hydrocarbons in SDG JA43177, which did not meet lab limits but all except isopropyl alcohol (38%) met the QAPP limits. A client sample was not used for any of the duplicates as none was designated on the chains and data are not qualified for non-client samples.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_ No ___
The laboratory does analyze laboratory control samples (LCS) and laboratory control sample duplicates (LCSD). Neither are required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes ____ No _X___
SDG JA35169 with carbontetrachloride at 131/ 126% (limit 130%). Data are qualified JL131 to indicate a potential slight high bias.
SDG JA40428 with trichlorofluoromethane at 134%. No data are reported as detected and no qualifier is applied for high recovery.

C. And Relative Percent Differences were within lab limits.
Yes _X__ No____ NA____

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___ No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.

Yes __X___ No _____
The laboratory reports the method blank to the MRL (method reporting limit). Data are reported to the MDL (method detection limit). Low level 'J' data could be false positives as there is no laboratory, nor field blank.

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes __X__ No____ NA _______
Reporting units include both ppbv and ug/m3.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___ No ____ NA__X_
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.
There are no field duplicates.

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
Yes ___ No____ NA__X_

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level. It is noted that several compounds were diluted to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution.

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of comments. No qualifiers have been applied. Points of significance are summarized below:

<u>Chain of Custody:</u>
The project manager is informed of the following and the project record is being updated.
JA38446 and 40428: The chain of custody has 2 relinquishment and 2 received entries including FedEx courier notations (but no signatures or dates). There are gaps from relinquishment to sample receipt and no dates on some signoffs. There is no airbill number reported.
JA35169: The relinquishment date is 10/22/09. The sampling date is 12/11/09. The date needs to be corrected. Air bill numbers are present as required.

<u>Initial and Continuing Calibration:</u>
Initial calibrations for the client samples are noted in the report although all calibrations were reviewed. No data are qualified as outlier compounds had acceptable response factors and the non-detect is verified at the reporting limit.

The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met with the following exceptions No data were qualified when data were non-detect. The response factor was acceptable to verify the non-detect. Detected data are not qualified as they meet the TO-15 %D and the QAPP does not specifically address air limits. There could be a slight high bias to the data as the response increases for these compounds.

Method Blanks:
The laboratory reports the method blank to the RL (reporting limit). Data are reported to the MDL (method detection limit). Low level 'J' data could be false positives as there is no laboratory, nor field blank.

Laboratory duplicates
The duplicates were acceptable with the exception of several medium chain hydrocarbons in SDG JA43177, which did not meet lab limits but all except isopropyl alcohol (38%) met the QAPP limits. A client sample was not used for any of the duplicates as none was designated on the chains and data are not qualified for non-client samples.

Laboratory Control Samples
SDG JA35169 with carbontetrachloride at 131/ 126% (limit 130%). Data are qualified JL131 to indicate a potential slight high bias.
SDG JA40428 with trichlorofluoromethane at 134%. No data are reported as detected and no qualifier is applied for high recovery.

Field Duplicates:
No field duplicate was identified.

Compound Detection Limits:
It is noted that several compounds were diluted to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution. The dilution is sometimes run on a different instrument.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: JA: 49630____

PROJECT: Memphis Defense Depot Off Depot soil vapor extraction for HDR Inc. (formerly e2m)____

LABORATORY: Accutest Laboratories, New Jersey_______________________________________

SAMPLE MATRIX: Air____

SAMPLING DATE (Month/Year): May 2010____

NUMBER OF SAMPLES: 1 air sample____

ANALYSES REQUESTED: Summa Canister VOA TO-15_________________________________

SAMPLE NO.: OD-SVE-2Q10_______ ____

DATA REVIEWER: Diane Short____

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __________

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note an extended list of volatile compounds was reported. Full raw data packages were submitted. Level III validation was performed for holding times, chain of custody, calibrations and QC.

II. ANALYTICAL REPORT FORMS
A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes __X__ No___

B. Holding Times
The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.
Yes ___X__ No____

C. Chains of Custody
Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.
Yes ___X__ No ___
The project manager is informed of the following and the project record is being updated.
The chain of custody has FedEx courier notations but there is no airbill (tracking) number reported on the chain or the log in form.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes ___X____ No ______ NA ________
Pressures were reported and were acceptable for the initial and final pressures.

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____
Not part of this review level, but is performed to ensure sample integrity.

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS
1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria.
Yes __X__ No____ NA____
Minimum response factors are not defined by the method but meet routine Method 8260 limits. This method does not involve purging water samples. Consequently, all targets, including the typically poor-purging compounds, normally have response factors that are acceptable per validation criteria for volatiles.

The relative standard deviation (RSD) for the five-point calibration was within the 30% limit.
Yes ____ No __X_
Calibrations for the client samples only are noted below although all calibrations (2 for the 1 sample) were reviewed. No data are qualified as outlier compounds had acceptable response factors and the non-detect is verified at the reporting limit. Only client compounds are noted.

SDG	Date	Compound	RSD	Qualification
JA49630	ICAL 6/17/10, MS2W	1,2,4 trichlorobenzene	31.21%	No qualification as result ND

B. Continuing Calibration – GC/MS
1. The RRF standard was analyzed for each analysis at the required frequency and the QC criteria were met
Yes __X__ No____ NA____
Minimum response factors are not defined by the method, but met validation guidance.

2. The percent difference (%D) limits of 30% were met.
Yes ____ No __X__
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met with the following exceptions No data were qualified when data were non-detect. The response factor was acceptable to verify the non-detect. Detected data are not qualified as they meet the TO-15 %D and the QAPP does not specifically address air limits. There could be a slight high bias to the data as the response increases for these compounds.

SDG	Date, instrument	Compound	% D	Qualification
JA49603	CCAL 6/17/10, MS2W	Hexachlorobutadiene	25.3	Meet TO-15 limits
	CCAL 6/25/10	All client ok		

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____
The BFB was acceptable for the tunes.

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the $\pm$ 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____
Note that only one surrogate is used 4-bromofluorobenzene. Method 8260 requires 3 surrogates, but one is acceptable for TO-15.

And met the recovery limits defined in the current contract
Yes __ X _ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes____ No ____NA ___X__
Spikes are not amenable to canister analysis and are not required. Laboratory duplicates are required and are provided by the laboratory. Three duplicates are present.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes __X__ No ____ NA____

For validation purposes, only results > 5x PQL are qualified for RPD outliers. For results < 5x PQL, results are qualified if the absolute difference is greater than 2x PQL. The qualifier added is JD#, where # is the RPD or the absolute difference observed, as appropriate.
The duplicate was not a Memphis sample, but it was acceptable for low level results differences. A client sample was not used for any of the duplicates as none was designated on the chains and data are not qualified for non-client samples. These samples are collected on a regular basis and field precision is monitored over time.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_ No ___
The laboratory does analyze laboratory control samples (LCS) and laboratory control sample duplicates (LCSD). Neither are required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes __X__ No ____

C. And Relative Percent Differences were within lab limits.
Yes _X__ No____ NA____

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___ No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.
Yes __X___ No _____

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes __X__ No____ NA _______
Reporting units include both ppbv and ug/m3.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___ No ____ NA__X_
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.
There are no field duplicates.

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
Yes ___ No____ NA__X_

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level. It is noted that several compounds were diluted to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution.

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of comments. No qualifiers have been applied. Points of significance are summarized below:

Chain of Custody:
The project manager is informed of the following and the project record is being updated.
There is no airbill (tracking) number reported on the chain or the log-in form.

Initial and Continuing Calibration:
Initial calibrations for the client samples are noted in the report although all calibrations were reviewed. No data are qualified as outlier compounds had acceptable response factors and the non-detect is verified at the reporting limit.

Laboratory Duplicate:
A client sample was not used for any of the duplicates as none was designated on the chains and data are not qualified for non-client samples. These samples are collected on a regular basis and field precision is monitored over time.

Field Duplicates:
No field duplicate was identified.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: JA56529

PROJECT: Memphis Defense Depot Soil Vapor Extraction for e2m, Denver

LABORATORY: Accutest Laboratories, Dayton New Jersey

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): September, 2010

NUMBER OF SAMPLES: 1

YSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: ODSVE-3Q10

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc.   INITIALS/DATE: __________

Telephone Logs included   Yes____ No __X__

Contractual Violations   Yes____ No __X_

The project QAPP, the EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
The initial package was for the vapor intrusion short list. The accurate Soil vapor extraction (SVE) full list was processed and reported as requested.

II. ANALYTICAL REPORT FORMS
A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes __X__ No___

B. Holding Times
The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.
Yes ___X__ No____

C. Chains of Custody
Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.
Yes __X___ No ____
The project manager is informed of the following and the chains are updated for the project record. The FedEX receipt time is 12:30 and the sample relinquishment is 13:00.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes ___X____ No ______ NA ________
Not part of this review level, but pressures were recorded and were checked for the field, final field and laboratory receipt.

All readings met the limits or exceptions were noted and pressure corrected
Yes __X___ No ____ NA ____
Not part of this review level, but checked as noted and acceptable.

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS
1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria of 0.01 for the poor responders and 0.05 for all other compounds.
Yes __X__ No____ NA____
Minimum response factors are not defined by the method nor are air methods specifically addressed in the project QAPP. Criteria from the SW-846 Method 8260B/C have been applied as appropriate from the QAPP and project management specifications for all calibration evaluation. This method does not involve purging water samples. Consequently, all targets, including the typically poor-purging compounds, normally have response factors that are acceptable per the 2001validation criteria for volatiles. Two calibrations were submitted. Only the one applicable to the client sample was used for validation.

The relative standard deviation (RSD) for the five-point calibration was within the 30% (40% for the poor responders) limit.
Yes ____ No __X_
The calibration on 9/1/10 reported vinyl acetate at 39.9 %RSD and methyl ethyl ketone at 33.4%. Neither of these compounds is reported as detected and the response factors are sufficient to verify the non-detect. The ICV reported vinyl acetate at 26.7 % with a high bias which would also verify the non-detect. No qualification is required.

B. Continuing Calibration – GC/MS
1. The RRF standard was analyzed for each analysis at the required frequency and the QC criteria were met
Yes __X__ No____ NA____
Minimum response factors are not defined by the method, but met 2001 validation guidance as have been applied to the SW-846 Method 8260 validation for this project.

2. The percent difference (%D) limits of 25% were met.
Yes __X__ No ____

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the $\pm$ 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____

And met the recovery limits defined in the current contract of 70- 130%
Yes __ X _ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes __X__ No ____NA _____
Spikes are not amenable to canister analysis and are not required. Laboratory duplicates are required and are provided by the laboratory. One duplicate is present to meet the method criteria. It is not a Memphis sample.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes __ No _X___ NA____
Several compounds are out of limits. As the sample is not a client sample, the matrix is not comparable to the client matrix and no qualification is applied.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_ No ___
The laboratory does analyze laboratory control samples (LCS) and laboratory control sample duplicates (LCSD). Neither is required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes __X__ No ___

C. And Relative Percent Differences were within lab limits.
Yes _X__ No____ NA____
The laboratory RPD limit is 30%. All are well below that limit.

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___ No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.
Yes __X___ No __X___

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes ____ No____ NA ____X___
Not part of this review level.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___ No __X__ NA___
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.

There is no field duplicate in this set.

XII. SYSTEM PERFORMANCE
The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems
Yes ___ No ____NA__X___
Not part of this review level.

XIII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
For this project, ten percent of the data are fully review for chromatograms and spectra.
Yes __X_ No____ NA___
Not part of this review level, but data were reviewed as raw data needed to be accessed to find the calibration associations.

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level.

OVERALL ASSESSMENT
Data are considered to be usable for project purposes and no qualifiers are applied. Points of significance are summarized below:

Deliverables
The initial package was for the vapor intrusion short list. The accurate Soil vapor extraction (SVE) full list was processed and reported as requested.

Chain of Custody
The project manager is informed of the following and the chains are updated for the project record.
The FedEX receipt time is 12:30 and the sample relinquishment is 13:00.

Canister Pressure
Not part of this review level, but pressures were recorded and were checked for the field, final field and laboratory receipt.

Initial Calibration
The calibration on 9/1/10 reported vinyl acetate at 39.9 %RSD and methyl ethyl ketone at 33.4%. Neither of these compounds is reported as detected and the response factors are sufficient to verify the non-detect. The ICV reported vinyl acetate at 26.7 % with a high bias which would also verify the non-detect. No qualification is required.

Laboratory Duplicate
Several compounds are out of limits. As the sample is not a client sample, the matrix is not comparable to the client matrix and no qualification is applied.

Compound Identification
Not part of this review level, but data were reviewed as raw data needed to be accessed to find the calibration associations.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: JA: 63577

PROJECT: Memphis Defense Depot , Off Depot soil vapor for HDR Inc. (formerly e2m)

LABORATORY: Accutest Laboratories, New Jersey

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): December, 2010

NUMBER OF SAMPLES: 1 air samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: ODSVE-4QTR10

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __________

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note a full list of volatile compounds was reported. Level III validation was performed for holding times, chain of custody, calibrations and QC.

II. ANALYTICAL REPORT FORMS
A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes __X__ No___

B. Holding Times
The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.
Yes ___X__ No____

C. Chains of Custody
Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.
Yes _____ No _X___
The project manager is informed of the following and the project record is being updated.
The chains of custody have no airbill number reported on the chain or on the log in form. The sampling date is 12/7/10, the relinquishment date is 11/22/10, that is well before the samples are taken. There are 2 FedEx 'hand-offs' and the reason for the 2 relinquishments and receipts is not clear. The forms do not have a field for receipt date for the courier and so no date is present. The forms should be updated to contain all required authentication data.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes ___X____ No ______ NA ________
Pressures were reported for the initial and final pressure

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____
Not part of this review level, but is performed to ensure sample integrity.

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS
1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria.
Yes __X__ No____ NA____
Minimum response factors are not defined by the method but meet routine Method 8260 limits. This method does not involve purging water samples. Consequently, all targets, including the typically poor-purging compounds, normally have response factors that are acceptable per validation criteria for volatiles.
There are 2 ICALs reported although only one date of sample analysis. It appears one ICAL is associated with some of the QC samples and the ICAL on 12/6/10 is associated with the client sample. Both were checked as required.

The relative standard deviation (RSD) for the five-point calibration was within the 30% limit.
Yes __X__ No ___

Calibrations for the client samples for the project compounds are all within limits except for n-butylbenzene at 30.91 %RSD. No data are detected and no qualification is required as the response factor is sufficient to verify the non-detect.

B. Continuing Calibration – GC/MS
1. The RRF standard was analyzed for each analysis at the required frequency and the QC criteria were met
Yes __X__ No____ NA____
Minimum response factors are not defined by the method, but met validation guidance.

2. The percent difference (%D) limits of 30% were met.
Yes ____ No __X__
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met for project compounds with the following notations.
In the ICV/LCS for 11/10/10, 1,2,4-trichlorobenzene was reported high at 125 and 141%. For the CCAL on 12/13/10, nonane was reported high at 26.2% which meets and TO-15 limits. No data are reported and no qualifiers are added for high recovery.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____
The BFB was acceptable for the tunes.

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the ± 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____
Note that only one surrogate is used 4-bromofluorobenzene. Method 8260 requires 3 surrogates, but one is acceptable for TO-15.

And met the recovery limits defined in the current contract
Yes __ X _ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes____ No ____NA ___X__
Spikes are not amenable to canister analysis and are not required. Laboratory duplicates are required and are provided by the laboratory. The client sample was run in duplicate (a second run from the same canister). This meets the project frequency.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes __X__ No ____ NA____

For validation purposes, only results > 5x PQL are qualified for RPD outliers. For results < 5x PQL, results are qualified if the absolute difference is greater than 2x PQL. The qualifier added is JD#, where # is the RPD or the absolute difference observed, as appropriate.
The duplicates were acceptable.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_ No ___
The laboratory does analyze laboratory control samples (LCS), but no laboratory control sample duplicates (LCSD). Neither are required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes __X__ No ____

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___ No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.
Yes __X___ No _____

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes __X__ No____ NA _______
Reporting units include both ppbv and ug/m3.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___ No ____ NA__X_
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.
There are no field duplicates . This is an ongoing monitoring project and samples are collected on a regular basis.

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
Yes ___ No____ NA__X_

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level.

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of qualifiers or comments. Points of significance are summarized below and no data have been qualified:

<u>Chain of Custody:</u>
The project manager is informed of the following and the project record is being updated.
The chains of custody have no airbill number reported on the chain or on the log in form. The sampling date is 12/7/10, the relinquishment date is 11/22/10, that is well before the samples are taken. There are 2 FedEx ‘hand-offs’ and the reason for the 2 relinquishments and receipts is not clear. The same chain may be used for issuing the canisters as well as return of the canisters, but then there would need to be a receipt by the field team for the canisters, which is not present. The forms do not have a field for receipt date for the courier and so no date is present. The forms should be updated to contain all required authentication data.

<u>Initial and Continuing Calibration:</u>
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met for project compounds with the following notations.
In the ICV/LCS for 11/10/10, 1,2,4-trichlorobenzene was reported high at 125 and 141%. For the CCAL on 12/13/10, nonane was reported high at 26.2% which meets and TO-15 limits. No data are reported and no qualifiers are added for high recovery.

<u>Field Duplicates:</u>
There are no field duplicates. This is an ongoing monitoring project and samples are collected on a regular basis.

ORGANIC DATA QUALITY REVIEW REPORT
VOLATILE ORGANICS SW-846 METHOD 8260B

SDG: L09060246 , L09070713

PROJECT: Memphis Defense Depot, Off Depot for e2m, Texas, project 3200-064-01-06

LABORATORY: Microbac Laboratories, Inc., Marietta, OH

SAMPLE MATRIX: Water

SAMPLING DATE (Month/Year): June, July 2009

NO. OF SAMPLES: 8260B: 20 aqueous samples; including 1 trip blank; 24 aqueous samples; including 1 trip blank and 1 rinse blank

ANALYSES REQUESTED: SW-846 8260B

SAMPLE NO.: See attached result forms and associated EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short and Associates Inc. INITIALS/DATE: ___________

Telephone Logs included Yes____ No _X__

Contractual Violations Yes____ No _X___

The project QAPP (11/05), the EPA Contract Laboratory Program National Functional Guidelines for Organic Review, 1999 and 2001, and the SW-846 Method 8260B have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the Project Manager. Per the Scope of Work, the review of these samples includes Level III validation of all chains of custody, calibrations and QC forms referencing the QC limits in the above documents.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW), SW-846, or in the project contract.

Yes __X_ No _____

This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.

B. Chain of Custody Documentation was complete and accurate.

Yes ___X___ No ___

The chains are complete with associated airbills and custody documentation for L09060246.

For L09070713, the project manager is informed of the following and the documentation is being completed for the project record. Historic Kemron chains have been provided for these samples. There is a gap from sample relinquishment to sample receipt. Each of the 4 chains has the date of collection (7/27 – 7/30/09) as date of relinquishment. There is only one date of receipt which is 7/31/09. The custody of samples from 7/27 – 7/31 is recorded in the project record along with associated airbills and custody documentation.

C. Samples were received at the required temperature, preservation and intact with no bubbles.

Yes ___X___ No ____

EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

8260B samples cannot be checked for pH on receipt. pH is checked for 8260B samples at run time. There is a completed log in check sheet for bubbles, temperature and integrity.

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.

Yes _X_ No ____

B. Holding Times

1. The contract holding times were met for all analyses (Time of sample receipt to time of analysis).

Yes __X___ No______

2. The Clean Water Act (40 CFR 136) or method holding times were met for all analyses (14 days from time of sample collection to analysis or extraction).

Yes _X__ No ____

III. INSTRUMENT CALIBRATION – GC/MS

A. Initial Calibration

1. The Response (RF) and Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the contract criteria of >0.01 for volatiles and 0.05 for semi-volatiles.

Yes __X__ No ____ NA____

Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common "poor responders". The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory does provide its 10 point calibration data and there are 3 to 4 low level standard data points which are excluded for the poor responders and for which the reporting limits (RL) are appropriately elevated. This is acceptable per the method. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified and all responses are greater than 0.05.

Most of the low-responding compounds are highly water-soluble and capable of hydrogen bonding with water. This decreases their purge efficiency and results in the relatively low response. The implication of this low purge efficiency is that a relatively low absolute recovery of such compounds is achieved in the purge step of the analysis. If this recovery is consistent, reasonable accuracy and precision can be achieved in a given matrix, which is indicated for the lab matrix by acceptable recoveries in LCS and calibration checks. However, this causes these targets to be more sensitive to matrix variations that impact purge efficiency (such as ionic strength or the presence of varying levels of soluble non-target organic material) than are the more hydrophobic compounds typically analyzed by this method, and as a result they are more likely to exhibit matrix bias.

2a.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for the CCCs.
Yes _X__ No____ NA____
This is a method requirement and indicates that the analytical system is in control.

2b.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for all other compounds, the average %RSD was <15%, or a linear curve was used.
Yes _____ No __X__ NA____
For L09060246, the % RSD for instrument HPMS8, ICAL 6/11/09 reported methylene chloride at 42%. Linear or quadratic curves have been generated as required. Methylene chloride data are not qualified as all are non-detect for results associated with this ICAL.
For L09070713, the % RSD for instrument HPMS11, ICAL 6/23/09 reported vinyl chloride at 28.7% and methylene chloride at 55.5%. Linear or quadratic curves have been generated as required. Vinyl chloride and Methylene chloride data are not qualified as all are non-detect for results associated with the HPMS11.

3. The 12 hour system Performance Check was performed as required in SW-846.
Yes __X__ No_____ NA____
For L09060246, An ICV is also reported. The recovery for bromomethane was 123%, project limit is 120%. No detects are reported and no qualifiers are required.
For L09070713, an ICV is also reported. The recovery for dichlordifluoromethane was 159%, project limit is 120%. As data are qualified for this compound for the LCS, no further qualifier has been added. The high bias is verified. No detects are reported and no qualifiers are required.

B. Continuing Calibrations
1. The midpoint standard was analyzed for each analysis at the required frequency and the QC criteria of > 0.05 (.01 for CLP 2001 VOA) were met.
Yes __X___ No ____ NA____

2. The percent difference (%D) limits of $\pm$ 25% were met. The 2001 NFG also allow for 40% D for the poor responders (pr). For other compounds the QAPP notes rejection of detected compounds with %D > 40%.
Yes __X___ No ____ NA___
The table below shows the outliers observed in CCVs for this method. Vinyl acetate is not listed in the 2001 NFG as a poor responder as it is not part of the CLP list of compounds. Its chemical behavior is that of a poor responder and the Intent of the NFG has been applied in qualifying for this compound.

SDG	BATCH	Analysis Date	Analyte	%D	Qualifier
L09070713	WG309199-02	08/07/09	Vinyl Acetate	25.1	None, ND and pr

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
The BFB (VOA) performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No ____ NA____

V. INTERNAL STANDARDS
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes _X__ No ____ NA____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X__ No ____

And met the recovery limits defined in the QAPP of 70 – 130% for VOA and 45-135% for SVOA base/neutral fraction or 35-140% for the acid fraction. For SVOA, one surrogate per fraction is allowed to be at 15 – 150%.
Yes __X___ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes __X___ No _____
For L09060246, there is one MS/MSD, sample MW-166A-78.17-B-1. When trip blank is taken out of the count, the 1/20 field samples is met.
For L09070713, there is one MS/MSD, sample MW-70-87.67-B-2. When field blanks and field duplicates are taken out of the count, the 1/20 field samples is met.

B. The MS and MSD percent recoveries were within the limits defined in the QAPP of VOA at 70 – 130% with 5 compounds allowed to be within 60 – 140%;
Yes _____ No __X__NA___
The full target list has been spiked. All data having recovery outliers out of QAPP limits have been qualified and the project manager will make the decision regarding which qualifiers can be removed per the 5 compound allowances. Data would be qualified JMS#, where # is the %R. Non-detects are not qualified for high spikes and no qualifiers are required.
Only the parent sample is qualified.

Parent	Analyte	%Rec	MSD Rec	%RPD	Qualifiers
L09070713-01	Dichlorodifluoromethane	135	134	<1	None, ND
	Acetone	72.8	68.6	6%	JMS69
L09060246-08	Dichlorodifluoromethane	132	121	8.5	None, ND

C. The MSD relative percent differences (RPD) were within the defined contract limits for VOA of 30% water, 40 soil, with 5 compounds allowed to be < 40%.RPD.
Yes __X__ No ____NA____
Qualifiers are added only when the MS or MSD recovery is also out of limits. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. No precision outliers were reported.

D. The MS/MSD were client samples.
Yes _X__ No ____NA____

VIII. LABORATORY CONTROL SAMPLE
A. Laboratory Control Samples (LCS) was analyzed for every analysis performed and for every 20 samples.
Yes __X__ No ____

B. The LCS percent recoveries were within the limits defined in the QAPP for VOA of 80-120% for water and 75 – 125% for soil. Five compounds are allowed to be 60 – 140%. If an LCS and LCSD are analyzed, both samples must have the same compounds out for data to be qualified.
Yes ______ No __X____
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high proportional to the LCS %R. All results associated with low recoveries are qualified.

8260B: The table below shows the outliers and the limits applied per the QAPP. The limits are specified per matrix. When an LCS and LCSD are reported, both values are listed. Outliers associated with the contingency limits indicated (60-140) are also shown. No data have been qualified. Note that the laboratory limits are not the QAPP limits.

BATCH	Analyte	Recovery	Bias	Qualifiers Required
WG304711	Dichlorodifluoromethane	128/ 120	High	None, ND
WG308715	Dichlorodifluoromethane	139	High	None, ND
308837	Dichlorodifluoromethane	143/ 145	high	None, ND
309200	Dichlorodifluoromethane	156/ 153	high	None, ND
308954	Dichlorodifluoromethane	154/ 145	high	None, ND

IX. BLANKS

A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X__ No____

B. No blank contamination was found in the Method Blank.
Yes__X__ No ____
All 4 method blanks were clean.

C. If Field Blanks were identified, no blank contamination was found.
Yes____ No __X__
For L09060246, there is 1 trip blank. There are detections observed below the reporting limit in the field blanks.
For L09070713, there are 1 trip blank and 1 rinse blank for 8260. There are detections observed below the reporting limit in the field blanks. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and UFB for the rinse blank, where # is the associated blank value. Qualifiers added are shown in the table below. Results so qualified are usable as non-detects.

Sample ID	Sample Date	Analyte	Result	Qualifier
TB-072809	7/30/2009	Styrene	0.12F	UTB.12 detects < 5x
		Methylene chloride	0.456F	UB from method blank
RB1	7/30/09	1,4 dichlorobenzene	0.174F	UFB.174 detects < 5x
		Acetone	4.4F	UFB4.4 detects <10x
		Benzene	0.142F	None, ND
		Toluene	0.39F	None, ND
TB-06082009	6/28/2009	1,4 dichlorobenzene	0.28F	UTB.28 detects < 5x
		Toluene	0.298F	None, ND

X. FIELD QC

If Field duplicates were identified, they met guidance for VOA of RPD of < 35% for water or < 50% for soils. For values reported at < 5 x the reporting limit (RL), a difference of 2 x RL is used as guidance (4 x RL for soils). Data are not qualified for field duplicates as these are evaluated for the total project by the client.
Yes _X__ No ___ NA____
For L09060246, there are 2 identified field duplicates, all in control.
For L09070713, there are 2 identified field duplicates, all in control.

Field Dup	Parent Sample	Observations
DUP-1-B-1	MW-150-88.51-B-1	OK
DUP-2-B-2	MW-151-87.75-B-1	OK
DUP-1-B-2	MW-162-86.08-B-2	OK
DUP-2-B-2	MW-246-B-2	OK

XI. SYSTEM PERFORMANCE
A. The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems.
Yes ____ No____ NA__X__
Not part of this review level

B. The suggested EQLs for the sample matrices in this set were met.
Yes __X__ No____ NA____
For L09060246, a couple of samples are diluted to bring compounds such as TCE and 1,1,2,2-tetrachloroethene into linear range. Other compounds are reported at the lowest dilution and reporting limits are maintained. Some samples are diluted from 2 to 10x with no explanation of the reason for dilution and all compound RLs are elevated.
For L09070713, A number of samples are diluted to bring compounds such as TCE and 1,1,2,2-tetrachloroethene into linear range. Other compounds are reported at the lowest dilution and reporting limits are maintained.

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds.
Yes ____ No____ NA__X__
Not part of this review level

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standards quantitation set.
Yes ____ No____ NA__X__
Not part of this review level

XIII. TENTATIVELY IDENTIFIED COMPOUNDS
TICs were properly identified and met the library identification criteria.
Yes ____ No____ NA__X__
Not part of this review level

XIV. OVERALL ASSESSMENT OF THE CASE
The laboratory has complied with the requested method. Data are fully usable after consideration of qualifiers.
The following is noted:

Chain of Custody:
The chains are complete with associated airbills and custody documentation for L09060246.

For L09070713, the project manager is informed of the following and the documentation is being completed for the project record. Historic Kemron chains have been provided for these samples. There is a gap from sample relinquishment to sample receipt. Each of the 4 chains has the date of collection (7/27 – 7/30/09) as date of relinquishment. There is only one date of receipt which is 7/31/09. The custody of samples from 7/27 – 7/31 is recorded in the project record along with associated airbills and custody documentation.

Calibration:

Method 8260 Outliers: The table in the text shows the outliers observed in calibrations for this method. Vinyl acetate is not listed in the 2001 NFG as a poor responder as it is not part of the CLP list of compounds. Its chemical behavior is that of a poor responder and the Intent of the NFG has been applied in qualifying for this compound.

For L09060246, the % RSD for instrument HPMS8, ICAL 6/11/09 reported methylene chloride at 42%. Linear or quadratic curves have been generated as required. Methylene chloride data are not qualified as all are non-detect for results associated with this ICAL.

For L09070713, the % RSD for instrument HPMS11, ICAL 6/23/09 reported vinyl chloride at 28.7% and methylene chloride at 55.5%. Linear or quadratic curves have been generated as required. Vinyl chloride and Methylene chloride data are not qualified as all are non-detect for results associated with the HPMS11.

For L09060246, An ICV is also reported. The recovery for bromomethane was 123%, project limit is 120%. No detects are reported and no qualifiers are required.

For L09070713, an ICV is also reported. The recovery for dichlordifluoromethane was 159%, project limit is 120%. As data are qualified for this compound for the LCS, no further qualifier has been added. The high bias is verified. No detects are reported and no qualifiers are required.

The table below shows the outliers observed in CCVs for this method. Vinyl acetate is not listed in the 2001 NFG as a poor responder as it is not part of the CLP list of compounds. Its chemical behavior is that of a poor responder and the Intent of the NFG has been applied in qualifying for this compound.

SDG	BATCH	Analysis Date	Analyte	%D	Qualifier
L09070713	WG309199-02	08/07/09	Vinyl Acetate	25.1	None, ND and pr

Matrix Spikes:

The full target list has been spiked. All data having recovery outliers out of QAPP limits have been qualified and the project manager will make the decision regarding which qualifiers can be removed per the 5 compound allowances. Data would be qualified JMS#, where # is the %R. Non-detects are not qualified for high spikes and no qualifiers are required.

Only the parent sample is qualified.

Parent	Analyte	%Rec	MSD Rec	%RPD	Qualifiers
L09070713-01	Dichlorodifluoromethane	135	134	<1	None, ND
	Acetone	72.8	68.6	6%	JMS69
L09060246-08	Dichlorodifluoromethane	132	121	8.5	None, ND

Laboratory Control Sample:

The table in the text shows the outliers and the limits applied per the QAPP. The limits are specified per matrix. When an LCS and LCSD are reported, both values are listed. Outliers associated with the contingency limits indicated (60-140) are also shown. No data have been qualified as the dichlorodifluoromethane results are non-detect. Note that the laboratory limits are not the QAPP limits.

Field Blanks:
For L09060246, there is 1 trip blank. There are detections observed below the reporting limit in the field blanks.
For L09070713, there are 1 trip blank and 1 rinse blank for 8260. There are detections observed below the reporting limit in the field blanks. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and UFB for the rinse blank, where # is the associated blank value. Qualifiers added are shown in the table below. Results so qualified are usable as non-detects.

Sample ID	Sample Date	Analyte	Result	Qualifier
TB-072809	7/30/2009	Styrene	0.12F	UTB.12 detects < 5x
		Methylene chloride	0.456F	UB from method blank
RB1	7/30/09	1,4 dichlorobenzene	0.174F	UFB.174 detects < 5x
		Acetone	4.4F	UFB4.4 detects <10x
		Benzene	0.142F	None, ND
		Toluene	0.39F	None, ND
TB-06082009	6/28/2009	1,4 dichlorobenzene	0.28F	UTB.28 detects < 5x
		Toluene	0.298F	None, ND

Field QC:
For L09060246, there are 2 identified field duplicates, all in control.
For L09070713, there are 2 identified field duplicates, all in control.

Reporting Limits:
For L09060246, a couple of samples are diluted to bring compounds such as TCE and 1,1,2,2-tetrachloroethene into linear range. Other compounds are reported at the lowest dilution and reporting limits are maintained. Some samples are diluted from 2 to 10x with no explanation of the reason for dilution and all compound RLs are elevated.
For L09070713, A number of samples are diluted to bring compounds such as TCE and 1,1,2,2-tetrachloroethene into linear range. Other compounds are reported at the lowest dilution and reporting limits are maintained.

Qualified Data

Lab ID	client ID	compound	Result ug/l	Qualifier
L09060246-04	MW-148-86.35-B1	1,4-Dichlorobenzene	0.204	UTB.28
L09060246-06	MW-149-92.15-B1	1,4-Dichlorobenzene	0.14	UTB.28
L09060246-07	MW-166-92.1-B1	1,4-Dichlorobenzene	0.147	UTB.28
L09060246-08	MW-166A-78.17-B1	1,4-Dichlorobenzene	0.18	UTB.28
L09060246-12	MW-151-87.75-B1	1,4-Dichlorobenzene	0.128	UTB.28
L09060246-13	MW-165-96.88-B1	1,4-Dichlorobenzene	0.418	UTB.28
L09060246-18	MW-79-93.05-B1	1,4-Dichlorobenzene	0.168	UTB.28
L09060246-19	MW-169-87.06-B1	1,4-Dichlorobenzene	0.526	UTB.28
L09060246-21	DUP-2-B1	1,4-Dichlorobenzene	0.158	UTB.28
L09070713-01	MW-70-87.67-B-2	Acetone	10.7	JMS69
L09070713-04	MW-76-90.75-B-2	Acetone	14.6	UFB4.4
L09070713-05	MW-77-85.55-B-2	Acetone	21.4	UFB4.4

L09070713-06	MW-157-75.95-B-2	1,4-Dichlorobenzene	0.167F	UFB.174
L09070713-06	MW-157-75.95-B-2	Acetone	33.9	UFB4.4
L09070713-07	MW-161-82-B-2	Acetone	20.6	UFB4.4
L09070713-08	MW-162-86.08-B-2	Acetone	19.8	UFB4.4
L09070713-10	MW-164-74.59-B-2	1,4-Dichlorobenzene	0.486F	UFB.174
L09070713-10	MW-164-74.59-B-2	Acetone	18.5	UFB4.4
L09070713-11	MW-247-B-2	Methylene chloride	0.767F	UMB.422
L09070713-12	DUP-1-B-2	Acetone	20.4	UFB4.4
L09070713-20	MW-232-B-2	1,4-Dichlorobenzene	0.269F	UFB.174
L09070713-20	MW-232-B-2	Acetone	17.4	UFB4.4
L09070713-20	MW-232-B-2	Styrene	0.226F	UTB.128
L09070713-26	TB-072809	Methylene chloride	0.456F	UMB.422

ORGANIC DATA QUALITY REVIEW REPORT
VOLATILE ORGANICS SW-846 METHOD 8260B
8260B/5030B

SDG: L09100412, L09100423

PROJECT: Memphis Defense Depot, Off-Depot for e2m, Texas (ODPM-3)

LABORATORY: Microbac Laboratories, Inc., Marietta, OH

SAMPLE MATRIX: Water

SAMPLING DATE (Month/Year): October 2009

NO. OF SAMPLES: 8260B: 42 aqueous samples; including 2 trip blanks, 4 field duplicates

ANALYSES REQUESTED: SW-846 8260B

SAMPLE NO.: See attached result forms and associated EDD

DATA REVIEWER: Sammy Huntington and John Huntington

QA REVIEWER: Diane Short and Associates Inc. INITIALS/DATE: ___________

Telephone Logs included Yes____ No _X__

Contractual Violations Yes____ No _X___

The project QAPP (11/05), the EPA Contract Laboratory Program National Functional Guidelines for Organic Review, 1999 and 2001, and the SW-846 Method 8260B and 8270C have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the Project Manager. Per the Scope of Work, the review of these samples includes Level III validation of all chains of custody, calibrations and QC forms referencing the QC limits in the above documents.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW), SW-846, or in the project contract.

Yes __X_   No _____

This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.

Note: In the pdf version of the report for SDG L09100412, method blank results and initial calibration summaries were missing. These were present in the hard copy version.

B. Chain of Custody Documentation was complete and accurate.

Yes __X__   No ___

No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

For both the projects, only the first page of the chain of custody documents were signed and dated by the laboratory. These are electronically-generated chain of custody documents, and there may be electronic signatures for these which we are not able to review. In addition, there are sample receipt acknowledgements from the laboratory. However, the hardcopy documents should be properly signed and dated by the laboratory on each page.

C. Samples were received at the required temperature, preservation and intact with no bubbles.

Yes ___X___   No ____

EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

In SDG L09100412 the following sample receiving discrepancy was noted by the laboratory: "COC# 90001; MW-70-ODPM-3, 1 vial rec'd broken. Other 2 ok." No qualifiers are required, since there were sufficient containers intact to conduct the analysis.

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.

Yes _X_   No ____

B. Holding Times

1. The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis).

Yes __X___   No______

2. The Clean Water Act (40 CFR 136) or method holding times were met for all analyses (14 days from time of sample collection to analysis or extraction).

Yes _X__   No ____

III. INSTRUMENT CALIBRATION – GC/MS

A. Initial Calibration

1. The Response (RF) and Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the contract criteria of >0.01 for volatiles and 0.05 for semi-volatiles.

Yes __X__   No ____ NA____

Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common "poor responders". Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.

Most of the low-responding compounds are highly water-soluble and capable of hydrogen bonding with water. This decreases their purge efficiency and results in the relatively low response. The implication of this low purge efficiency is that a relatively low absolute recovery of such compounds is achieved in the purge step of the analysis. If this recovery is consistent, reasonable accuracy and precision can be achieved in a given matrix, which is indicated for the lab matrix by acceptable recoveries in LCS and calibration checks. However, this causes these targets to be more sensitive to matrix variations that impact purge efficiency (such as ionic strength or the presence of varying levels of soluble non-target organic material) than are the more hydrophobic compounds typically analyzed by this method, and as a result they are more likely to exhibit matrix bias.

2a.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for the CCCs.
Yes _X__ No____ NA____
This is a method requirement and indicates that the analytical system is in control.

2b.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for all other compounds, the average %RSD was <15%, or a linear curve was used.
Yes __X___ No ____ NA____

3. The 12 hour system Performance Check was performed as required in SW-846.
Yes __X__ No_____ NA____

B. Continuing Calibrations
1. The midpoint standard was analyzed for each analysis at the required frequency and the QC criteria of > 0.05 (.01 for CLP 2001 VOA) were met.
Yes __X___ No ____ NA____

2. The percent difference (%D) limits of ± 25% were met. The 2001 NFG also allow for 40% D for the poor responders (pr). For other compounds the QAPP notes rejection of detected compounds with %D > 40%.
Yes _____ No __X__ NA___
See the tables below. When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.

The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection. Note that in the cases below where %Ds are above 40%, the bias of the CCV is high. Professional judgment is that high bias CCVs with a %D above 40% should not be rejected for non-detects.

[Final validation note, per Project Chemist: Non-detect vinyl acetate results will be rejected when the %D is greater than 40%. Non-detect results for other analytes will be qualified as undetected estimated (UJ) when the %D is between 20% and 40% and the CCV is biased low. Detected results will be qualified as estimated (J) when the %D is between 20% and 40%. Non-detect results will not be qualified when the %D is between 20% and 40% and the CCV is biased high, as the greater sensitivity suggests a low likelihood of false negatives.]

Method 8260 Outliers: The table below shows the outliers observed in CCVs for this method. No qualifiers have been required as response factors are acceptable to verify the non-detects.

SDG	Batch	Analyte	%D	Bias	Qualifiers	Final Qualifier per Project Chemist
L09100412	WG315097	Vinyl Acetate	41.8	high	OK, ND	R
L09100412	WG315391	Dichlorodifluoromethane	23.3	high	OK, ND	NONE
L09100412	WG315404	Vinyl Acetate	20.7	Low	OK, ND	UJ
L09100423	WG315210	4-Chlorotoluene	20.9	Low	OK, ND	UJ
L09100423	WG315238	Vinyl Acetate	31.8	high	OK, ND	NONE
L09100423	WG315391	Dichlorodifluoromethane	23.3	high	OK, ND	NONE

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
The BFB (VOA) and DFTPP (SVOA) performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No ____ NA____

V. INTERNAL STANDARDS
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes _X__ No ____ NA____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X__ No ____

And met the recovery limits defined in the QAPP of 70 – 130% for VOA and 45-135% for SVOA base/neutral fraction or 35-140% for the acid fraction. For SVOA, one surrogate per fraction is allowed to be at 15 – 150%.
Yes __X___ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes __X___ No _____
There are 2 MS/MSDs. This is a sufficient frequency for the number of field samples.

SDG	Client Sample ID	Lab Sample ID
L09100412	MW-244-ODPM-3-MS	L09100412-33
L09100423	MW-151-ODPM-3-MS	L09100423-11

B. The MS and MSD percent recoveries were within the limits defined in the QAPP of VOA at 70 – 130% with 5 compounds allowed to be within 60 – 140%; SVOA at 45- 135%, 5 compounds allowed to be at 15 – 150%. Reject non-detects at < 15% for SVOA.
Yes _____ No __X__NA___
The full target list has been spiked. Outliers observed per the QAPP limits for Method 8260 MS/MSD runs are shown in the table below. For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method;

hence recoveries for such cases are not meaningful. In this case, no qualifiers are required for matrix spike outliers.

SDG	Sample ID	Analyte	Sample	%MS	%MSD	MS bias	MSD Bias	Qualifiers
L09100423	MW-151-ODPM-3	Vinyl acetate	U	152	152	HIGH	HIGH	OK, ND
L09100412	MW-244-ODPM-3	1,1,2,2-Tetrachloroethane	953	42.8	53.8	LOW	LOW	None, sample > 4x spike
L09100412		Acetone	U	130	134		HIGH	OK, ND
L09100412		Vinyl acetate	U	155	159	HIGH	HIGH	OK, ND

C. The MSD relative percent differences (RPD) were within the defined contract limits for VOA of 30% water, 40 soil, with 5 compounds allowed to be < 40%.RPD; for SVOA of 50% for water and 60% for soil and 5 compounds allowed to be > 60% RPD.
Yes __X__ No ____NA____
Qualifiers are added only when the MS or MSD recovery is also out of limits. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. No qualifications are required for this set of samples.

D. The MS/MSD were client samples.
Yes _X__ No ____NA____

VIII. LABORATORY CONTROL SAMPLE
A. Laboratory Control Samples (LCS) was analyzed for every analysis performed and for every 20 samples.
Yes __X__ No ____

B. The LCS percent recoveries were within the limits defined in the QAPP for VOA of 80-120% for water and 75 – 125% for soil. Five compounds are allowed to be 60 – 140%. For SVOA 60 -120 for PAH and phthalates, 20 – 150% for phenols and amines. All other compounds 45 – 135% with 5 compounds allowed to be 15 – 150%. No soil limits are defined in the QAPP and laboratory limits will be applied. If an LCS and LCSD are analyzed, both samples must have the same compounds out for data to be qualified.
Yes ______ No __X____
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high proportional to the LCS %R. All results associated with low recoveries are qualified.

The table below shows the outliers and the limits applied per the QAPP. The limits are specified per matrix. Only two recoveries are outside of the marginal exceedance limits (60-140). Qualifiers are added for all outliers as described here but the project manager may consider reversing some of these when the limits fall within the marginal exceedance limits. Please see the project EDD for a detailed list of qualifiers added.

8260B LCS Outliers:

SDG	Batch	Analytes	% Rec	Bias	Qualifiers
L09100412	WG315111	Vinyl acetate	130	HIGH	OK, ND
L09100412	WG315111	Vinyl chloride	79.1	LOW	JL79
L09100412	WG315212	Vinyl acetate	148	HIGH	OK, ND
L09100423	WG315212	Vinyl acetate	148	HIGH	OK, ND
L09100423	WG315210	4-Chlorotoluene	78.3	LOW	JL78

L09100423	WG315210	trans-1,3-Dichloropropene	77.4	LOW	JL77
L09100423	WG315210	Vinyl acetate	146	HIGH	OK, ND

In some cases, the laboratory analyzed both an LCS and an LCSD. In such cases, per the QAPP only results in which both recoveries are out of limits are qualified. Outliers are shown in the table below for LCS/LCSDs. Two pairs of recoveries are outside the marginal exceedance limits (60-140). Again, see the project EDD for detailed lists of qualifiers added.

8260B LCSD Outliers:

SDG	Batch	Analytes	% REC	% REC	LCS Bias	LCSD Bias	Qualifiers
L09100412	WG315097	Carbon disulfide	85.3	76.4		LOW	OK, one out
L09100412	WG315097	Vinyl acetate	122	123	HIGH	HIGH	OK, ND
L09100412	WG315391	Vinyl acetate	136	139	HIGH	HIGH	OK, ND
L09100412	WG315391	Vinyl chloride	79.0	81.0	LOW		OK, one out
L09100423	WG315295	Vinyl acetate	148	148	HIGH	HIGH	OK, ND
L09100423	WG315391	Vinyl acetate	136	139	HIGH	HIGH	OK, ND
L09100423	WG315391	Vinyl chloride	79.0	81.0	LOW		OK, one out
L09100423	WG315238	Vinyl acetate	162	158	HIGH	HIGH	OK, ND
L09100423	WG315248	4-Chlorotoluene	78.2	75.4	LOW	LOW	JL75
L09100423	WG315248	trans-1,3-Dichloropropene	77.7	79.3	LOW	LOW	JL78
L09100423	WG315248	Vinyl acetate	151	152	HIGH	HIGH	OK, ND
L09100423	L09100423	1,2,4-Trichlorobenzene	84.8	78.1		LOW	OK, one out
L09100423	L09100423	2-Hexanone	111	123		HIGH	OK, one out
L09100423	L09100423	Vinyl acetate	133	130	HIGH	HIGH	OK, ND
L09100423	L09100423	Vinyl chloride	86.2	78.8		LOW	OK, one out

IX. BLANKS

A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X__ No____

B. No blank contamination was found in the Method Blank.
Yes____ No _X___

Methylene chloride was detected in some method blanks. Whenever methylene chloride, acetone, 2-butanone or phthalate esters are detected in associated samples at a level less than 10x the method blank (corrected for dilution), the result is qualified as UMB#, where # is the corrected method blank level. Such results are usable as nondetects. For other targets, the factor used is 5x.

Method 8260 Method Blank Detections:

SDG	Batch	Analytes	Conc	Qualifier
L09100412	WG315404	Methylene chloride	0.316 F	UMB.32 detect
L09100412	WG315111	Methylene chloride	0.287 F	OK, ND
L09100412	WG315212	Methylene chloride	0.351 F	OK, ND
L09100412	WG315391	Methylene chloride	0.29 F	OK, ND
L09100423	WG315212	Methylene chloride	0.351 F	UMB.35 detect
L09100423	WG315295	Methylene chloride	0.370 F	UMB.74 detect (DF=2)

SDG	Batch	Analytes	Conc	Qualifier
L09100423	WG315391	Methylene chloride	0.290 F	UMB.29
L09100423	WG315238	Methylene chloride	0.450 F	UMB4.5 (DF=10) detect

C. If Field Blanks were identified, no blank contamination was found.
Yes____ No __X__
There are 2 trip blanks for 8260. There are detections observed below the reporting limit in the trip blanks. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and UFB# for rinse blanks, where # is the associated blank value. Qualifiers added are shown in the table below. Results so qualified are usable as non-detects.

SDG	Field Blank	Analyte	Result	Qualifiers
L09100412	TB-101509-ODPM-3	Chloromethane	0.461F	OK, ND
		Methylene chloride	0.531F	UTB.53 detect
L09100423	TB-101609-ODPM-3	Methylene chloride	0.596F	OK, qualified from MB

X. FIELD QC
If Field duplicates were identified, they met guidance for VOA of RPD of < 35% for water or < 50% for soils. For SVOA < 50% RPD for water, no soils RPD is defined in the QAPP. For values reported at < 5 x the reporting limit (RL), a difference of 2 x RL is used as guidance (4 x RL for soils). Data are not qualified for field duplicates as these are evaluated for the total project by the client.
Yes ___ No ___ NA____
There are 4 identified field duplicates, in control.

SDG	Parent Sample	Field Dup	Observations
L09100412	MW-77-ODPM-3	DUP-1	OK
L09100412	MW-160-ODPM-3	DUP-2	OK
L09100423	MW-232-ODPM-3	DUP-3	OK
L09100423	MW-250-ODPM-3	DUP-4	OK

XI. SYSTEM PERFORMANCE
A. The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems.
Yes ____ No____ NA__X__
Not part of this review level

B. The suggested EQLs for the sample matrices in this set were met.
Yes __X__ No____ NA____

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds.
Yes ____ No____ NA__X__
Not part of this review level

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standards quantitation set.
Yes ____ No____ NA__X__

Not part of this review level

XIII. TENTATIVELY IDENTIFIED COMPOUNDS
TICs were properly identified and met the library identification criteria.
Yes ____ No____ NA__X__
Not part of this review level

XIV. OVERALL ASSESSMENT OF THE CASE
The laboratory has complied with the requested method. Data are fully usable after consideration of qualifiers. The following is noted:

Chain of Custody:
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

For both the projects, only the first page of the chain of custody documents were signed and dated by the laboratory. These are electronically-generated chain of custody documents, and there may be electronic signatures for these which we are not able to review. In addition, there are sample receipt acknowledgements from the laboratory. However, the hardcopy documents should be properly signed and dated by the laboratory..

Sample Condition:
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

In SDG L09100412 the following sample receiving discrepancy was noted by the laboratory: “COC# 90001; MW-70-ODPM-3, 1 vial rec'd broken. Other 2 ok.” No qualifiers are required, since there were sufficient containers intact to conduct the analysis.

Continuing Calibrations:
There are a few %D outliers, but none have required qualifiers to be added to the data.

Matrix Spikes:
There are 2 MS/MSDs. This is a sufficient frequency for the number of field samples. No qualifiers are required and the MS/MSDs meet criteria.

Method Blanks:
Methylene chloride was detected in some method blanks. Whenever methylene chloride, acetone, 2-butanone or phthalate esters are detected in associated samples at a level less than 10x the method blank (corrected for dilution), the result is qualified as UMB#, where # is the corrected method blank level. Such results are usable as nondetects. For other targets, the factor used is 5x.

Field Blanks:
There are 2 trip blanks for 8260. There are detections observed below the reporting limit in the trip blanks. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and UFB# for rinse blanks, where # is the associated blank value. Qualifiers added are shown in the table within the body of this report. Results so qualified are usable as non-detects.

LCS Recoveries:
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as

JL#, where # is the elevated recovery. Data could be biased high proportional to the LCS %R. All results associated with low recoveries are qualified.

The table within the body of this report shows the outliers and the limits applied per the QAPP. The limits are specified per matrix. Only two recoveries are outside of the marginal exceedance limits (60-140). Qualifiers are added for all outliers as described here but the project manager may consider reversing some of these when the limits fall within the marginal exceedance limits. Please see the project EDD for a detailed list of qualifiers added.

In some cases, the laboratory analyzed both an LCS and an LCSD. In such cases, per the QAPP only results in which both recoveries are out of limits are qualified. Outliers are shown in the table within the body of this report for LCS/LCSDs. Two pairs of recoveries are outside the marginal exceedance limits (60-140). Again, see the project EDD for detailed lists of qualifiers added.

<u>Field QC:</u>
There are 4 identified field duplicates, in control.

ORGANIC DATA QUALITY REVIEW REPORT
VOLATILE ORGANICS SW-846 METHOD 8260B
8260B/5030B

SDG: L10030650, 10030693, 10030780

PROJECT: Memphis Defense Depot, Off Depot groundwater and LTM for e2m, Texas

LABORATORY: Microbac Laboratories, Inc., Marietta, OH

SAMPLE MATRIX: Water

SAMPLING DATE (Month/Year): March 2010

NO. OF SAMPLES: 104 aqueous samples; including 5 trip blanks, 2 rinse blanks, 7 field duplicates

ANALYSES REQUESTED: SW-846 8260B

SAMPLE NO.: See attached result forms and associated EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short and Associates Inc. INITIALS/DATE: ___________

Telephone Logs included Yes____ No _X__

Contractual Violations Yes____ No _X___

The project QAPP (11/05), the EPA Contract Laboratory Program National Functional Guidelines for Organic Review, 1999 and 2001, and the SW-846 Method 8260B have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the Project Manager. Per the Scope of Work, the review of these samples includes Level III validation of all chains of custody, calibrations and QC forms referencing the QC limits in the above documents.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW), SW-846, or in the project contract.
Yes __X_ No _____
This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.
Although the samples are collected and delivered together, the laboratory splits the samples into numerous analytical batches which are run on up to 3 different instruments. This compounds the validation work, the data tracking and paperwork. The reviewer iterates the request to minimize the environmental impact of the paperwork by analyzing client samples in the minimum number of analytical batches and on the same instrument. The variability in response of instruments to client compounds can add a precision variability to the data results.

B. Chain of Custody Documentation was complete and accurate.
Yes __X__ No ___
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

Only the first page of the chain of custody documents were signed and dated by the laboratory. These are electronically-generated chain of custody documents, and there may be electronic signatures for these which we are not able to review. However, the hardcopy documents should be properly signed and dated by the sampler and the laboratory on each page. There is also no tracking to identify the gap in time from relinquishment to laboratory receipt.

C. Samples were received at the required temperature, preservation and intact with no bubbles.
Yes ___X___ No ____
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.
There is no formal log-in verification for bubbles and sample integrity. The project manager, to date, has approved of the laboratory narrative to discuss any integrity outliers

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes _X_ No ____

B. Holding Times
1. The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis).
Yes __X___ No______

2. The Clean Water Act (40 CFR 136) or method holding times were met for all analyses (14 days from time of sample collection to analysis or extraction).
Yes _X__ No ____

III. INSTRUMENT CALIBRATION – GC/MS

A. Initial Calibration
1. The Response (RF) and Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the contract criteria of >0.01 for volatiles and 0.05 for semi-volatiles.
Yes __X__ No ____ NA____
Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common “poor responders”. Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any

calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.

Most of the low-responding compounds are highly water-soluble and capable of hydrogen bonding with water. This decreases their purge efficiency and results in the relatively low response. The implication of this low purge efficiency is that a relatively low absolute recovery of such compounds is achieved in the purge step of the analysis. If this recovery is consistent, reasonable accuracy and precision can be achieved in a given matrix, which is indicated for the lab matrix by acceptable recoveries in LCS and calibration checks. However, this causes these targets to be more sensitive to matrix variations that impact purge efficiency (such as ionic strength or the presence of varying levels of soluble non-target organic material) than are the more hydrophobic compounds typically analyzed by this method, and as a result they are more likely to exhibit matrix bias.

2a.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for the CCCs.
Yes _X__ No____ NA____
This is a method requirement and indicates that the analytical system is in control.

2b.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for all other compounds, the average %RSD was <15%, or a linear curve was used.
Yes __X___ No ____ NA____

3. The 12 hour system Performance Check was performed as required in SW-846.
Yes __X__ No_____ NA____
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

B. Continuing Calibrations
1. The midpoint standard was analyzed for each analysis at the required frequency and the QC criteria of > 0.05 (.01 for CLP 2001 VOA) were met.
Yes __X___ No ____ NA____

2. The percent difference (%D) limits of $\pm$ 25% were met. The 2001 NFG also allow for 40% D for the poor responders (pr). For other compounds the QAPP notes rejection of detected compounds with %D > 40%.
Yes __X___ No ____ NA___
When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.
The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection. No data have been outside the noted criteria and no qualifiers are applied.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
The BFB (VOA) performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No ____ NA____

V. INTERNAL STANDARDS
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.

Yes _X__   No ____   NA____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X__   No ____

And met the recovery limits defined in the QAPP of 70 – 130% for VOA and 45-135% for SVOA base/neutral fraction or 35-140% for the acid fraction. For SVOA, one surrogate per fraction is allowed to be at 15 – 150%.
Yes __X___   No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes __X___   No _____
There are 5 MS/MSD pair designated or analyzed by the laboratory for 94 client samples. This is a sufficient frequency for the number of field samples.

B. The MS and MSD percent recoveries were within the limits defined in the QAPP of VOA at 70 – 130% with 5 compounds allowed to be within 60 – 140%; SVOA at 45- 135%, 5 compounds allowed to be at 15 – 150%. Reject non-detects at < 15% for SVOA.
Yes _____   No __X__NA___
The full target list has been spiked. Outliers observed per the QAPP limits for Method 8260 MS/MSD runs are shown in the table below. For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. Data are qualified JMS#, where # is the %R. Data could be biased slightly low in proportion to the recovery. As carbon disulfide is low in all the LCS's, the low recovery appears to be laboratory related, not matrix related.

Lab ID	**Client ID**	**Compound**	**Conc. ug/l**	**flag**	**RL**	**Qualifier**
L10030780-11	MW85-LS-11	Acetone	12.5	M	10	JMS69D31
L10030780-11	MW85-LS-11	Carbon disulfide		U	1	JL77MS64
L10030780-11	MW85-LS-11	Carbon tetrachloride	116	M	1	JMS63
L10030650-02	MW-148-ODPM-4	Carbon disulfide		U	1	JL74MS68
L10030650-18	MW-242-ODPM-4	Bromomethane		U	1	JMS63
L10030650-18	MW-242-ODPM-4	MEK (2-Butanone)		U	10	JL78MS66
L10030693-21	MW-057-ODLA-1	Chloroform	50.7	M	0.3	JMS43

C. The MSD relative percent differences (RPD) were within the defined contract limits for VOA of 30% water, 40 soil, with 5 compounds allowed to be < 40%.RPD; for SVOA of 50% for water and 60% for soil and 5 compounds allowed to be > 60% RPD.
Yes ____   No __X__NA____
Qualifiers are added only when the MS or MSD recovery is also out of limits. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. One qualifications was required for this set of samples.

D. The MS/MSD were client samples.
Yes _X__   No ____NA____

VIII. LABORATORY CONTROL SAMPLE

A. Laboratory Control Samples (LCS) was analyzed for every analysis performed and for every 20 samples.
Yes __X__ No ____

B. The LCS percent recoveries were within the limits defined in the QAPP for VOA of 80-120% for water and 75 – 125% for soil. Five compounds are allowed to be 60 – 140%. No soil limits are defined in the QAPP and laboratory limits will be applied. If an LCS and LCSD are analyzed, both samples must have the same compounds out for data to be qualified.
Yes ______ No __X____
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All results associated with low recoveries are qualified. Dichlorodifluoromethane, and sometimes vinyl chloride, are consistently high in the ICV and the LCS standards. The compounds are not been detected and data are not qualified for high recovery with one exception for vinyl chloride.

The table below shows the outliers and the limits applied per the QAPP. The limits are specified per matrix. Only two recoveries are outside of the marginal exceedance limits (60-140). Qualifiers are added for all outliers as described here but the project manager may consider reversing some of these when the limits fall within the marginal exceedance limits. Please see the project EDD for a detailed list of qualifiers added.

Lab ID	Client ID	Compound	Conc ug/l	Flag	RL	MDL	Qualifier
L10030780-01	MW-78-ODLA-1	Bromomethane		U	1	0.5	JL76
L10030780-01	MW-78-ODLA-1	Carbon disulfide		U	1	0.5	JL74
L10030780-02	MW-132-ODLA-1	Bromomethane		U	1	0.5	JL76
L10030780-02	MW-132-ODLA-1	Carbon disulfide		U	1	0.5	JL74
L10030780-03	MW-172-ODLA-1	Bromomethane		U	1	0.5	JL76
L10030780-03	MW-172-ODLA-1	Carbon disulfide		U	1	0.5	JL74
L10030780-04	MW-228-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030780-05	RB-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030780-06	TB-031610-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030780-07	MW64-LS-11	Carbon disulfide		U	1	0.5	JL77
L10030780-08	MW94-LS-11	Carbon disulfide		U	1	0.5	JL77
L10030780-09	MW-200-LS-11	Carbon disulfide		U	1	0.5	JL77
L10030780-10	MW21-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-11	MW85-LS-11	Carbon disulfide		U	1	0.5	JL77MS64
L10030780-14	MW88-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-15	MW100B-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-15	MW100B-LS-11	Vinyl chloride	131		5	1.25	JL134
L10030780-16	MW113-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-17	DR1-5-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-18	DR1-5A-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-19	DR2-1-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-20	PMW21-03-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030780-21	TB-041210-LS-11	Carbon disulfide		U	1	0.5	JL68
L10030693-01	MW-248-ODPM-4	Carbon disulfide		U	1	0.5	JL76

L10030693-02	DUP-4-ODPM-4	Carbon disulfide		U	1	0.5	JL77
L10030693-03	MW-70-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-04	MW-76-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-05	MW-77-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-06	MW-79-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-07	MW-152-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-08	MW-157-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-09	MW-161-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-10	MW-162-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-11	MW-163-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-12	MW-164-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-13	ODPM-4-RB	Carbon disulfide		U	1	0.5	JL74
L10030693-14	DUP-2-ODPM-4	Carbon disulfide		U	1	0.5	JL74
L10030693-15	TB-31810-ODPM-3	Carbon disulfide		U	1	0.5	JL76
L10030693-16	MW-006-ODLA-1	Carbon disulfide		U	1	0.5	JL76
L10030693-17	MW-015-ODLA-1	Carbon disulfide		U	1	0.5	JL76
L10030693-18	MW-031-ODLA-1	Carbon disulfide		U	1	0.5	JL76
L10030693-19	MW-032-ODLA-1	Carbon disulfide		U	1	0.5	JL76
L10030693-20	MW-044-ODLA-1	Carbon disulfide		U	1	0.5	JL74
L10030693-21	MW-057-ODLA-1	Carbon disulfide		U	1	0.5	JL76
L10030693-24	MW-069-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-25	MW-071-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-26	MW-074-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-27	MW-075-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-28	MW-087-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-29	MW-144-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-30	MW-145-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-31	MW-147-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-32	MW-174-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-33	MW-176-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-34	MW-178-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-35	MW-179-ODLA-1	Carbon disulfide		U	1	0.5	JL77
L10030693-36	MW-180-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-37	MW-187-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-38	MW-190-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-39	MW-221-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-40	MW-222-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-44	MW-224-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-45	MW-225-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-46	MW-226-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-47	MW-227-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-48	DUP-1-ODLA-1	Carbon disulfide		U	1	0.5	JL78

L10030693-49	DUP-2-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030693-50	DUP-3-ODLA-1	Bromomethane		U	1	0.5	JL77
L10030693-50	DUP-3-ODLA-1	Carbon disulfide		U	1	0.5	JL70
L10030693-51	TB-31510-ODLA-1	Carbon disulfide		U	1	0.5	JL78
L10030650-02	MW-148-ODPM-4	Carbon disulfide		U	1	0.5	JL74MS68
L10030650-05	MW-149-ODPM-4	Acetone	3.8	F	10	2.5	JL78
L10030650-05	MW-149-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-05	MW-149-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-05	MW-149-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-07	MW-151-ODPM-4	Carbon disulfide		U	1	0.5	JL66
L10030650-09	MW-158-ODPM-4	Acetone	3.75	F	10	2.5	JL78
L10030650-09	MW-158-ODPM-4	Carbon disulfide	1.06		1	0.5	JL73
L10030650-09	MW-158-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-09	MW-158-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-10	MW-158A-ODPM-4	Acetone	4.08	F	10	2.5	JL78
L10030650-10	MW-158A-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-10	MW-158A-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-10	MW-158A-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-11	MW-159-ODPM-4	Carbon disulfide	69		5	2.5	JL73
L10030650-12	MW-160-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-13	MW-165-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-14	MW-166-ODPM-4	Carbon disulfide		U	1	0.5	JL72
L10030650-15	MW-166A-ODPM-4	Carbon disulfide		U	1	0.5	JL72
L10030650-16	MW-232-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-17	MW-241-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-18	MW-242-ODPM-4	Acetone	4.85	F	10	2.5	JL78
L10030650-18	MW-242-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-18	MW-242-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78MS66
L10030650-18	MW-242-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-21	MW-243-ODPM-4	Acetone	5.07	F	10	2.5	JL78
L10030650-21	MW-243-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-21	MW-243-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-21	MW-243-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-25	MW-247-ODPM-4	Acetone	4.01	F	10	2.5	JL78
L10030650-25	MW-247-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-25	MW-247-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-25	MW-247-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-26	MW-249-ODPM-4	Acetone		F	10	2.5	JL78
L10030650-26	MW-249-ODPM-4	Carbon disulfide		U	1	0.5	JL73

L10030650-26	MW-249-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-26	MW-249-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-27	MW-250-ODPM-4	Acetone	4.07	F	10	2.5	JL78
L10030650-27	MW-250-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-27	MW-250-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-27	MW-250-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-28	MW-251-ODPM-4	Acetone	4.49	F	10	2.5	JL78
L10030650-28	MW-251-ODPM-4	Carbon disulfide		U	1	0.5	JL73
L10030650-28	MW-251-ODPM-4	MEK (2-Butanone)		U	10	2.5	JL78
L10030650-28	MW-251-ODPM-4	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL78
L10030650-31	TB-31910-ODPM-3	Carbon disulfide		U	1	0.5	JL74

In some cases, the laboratory analyzed both an LCS and an LCSD as there was no MS/MSD. In such cases, per the QAPP only results in which both recoveries are out of limits are qualified. An LCS/LCSD was performed for SDG L10030693, WG 327234; SDG L10030650 WG 326987, 326997 and 326996. In WG 327114, a compound (bromomethane, Methyl ethyl ketone, Methyl isobutyl ketone) was slightly low in the LCS or LCSD, but within range in the other QC pair. No qualifier has been applied.

IX. BLANKS

A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X__ No____

B. No blank contamination was found in the Method Blank.
Yes__X__ No ____
Method blanks are undetected for client compounds. Whenever methylene chloride, acetone, 2-butanone or phthalate esters are detected in associated samples at a level less than 10x the method blank (corrected for dilution), the result is qualified as UMB#, where # is the corrected method blank level. Such results are usable as nondetects. For other targets, the factor used is 5x.

C. If Field Blanks were identified, no blank contamination was found.
Yes____ No __X__
There are 5 trip blanks (TB in the client ID) and 2 rinse blanks (RB in the client ID) for 8260. There are detections observed below the reporting limit in the trip blanks. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and URB# for rinse blanks, where # is the associated blank value. Qualifiers added are shown in the table below. Results so qualified are usable as non-detects.

Laboratory ID	**Client ID**	**Compound**	**Result ug/l**	**Flag**	**RL**	**MDL**	**Qualifier**
L10030780-01	MW-78-ODLA-1	1,4-Dichlorobenzene	0.198	F	0.5	0.125	URB1.04
L10030650-06	MW-150-ODPM-4	Methylene chloride	0.277	F	1	0.25	UTB.395
L10030650-13	MW-165-ODPM-4	1,4-Dichlorobenzene	0.159	F	0.5	0.125	URB1
L10030650-14	MW-166-ODPM-4	1,4-Dichlorobenzene	0.141	F	0.5	0.125	URB1
L10030693-12	MW-164-ODPM-4	1,4-Dichlorobenzene	0.193	F	0.5	0.125	URB.99

X. FIELD QC

If Field duplicates were identified, they met guidance for VOA of RPD of < 35% for water or < 50% for soils. For SVOA < 50% RPD for water, no soils RPD is defined in the QAPP. For values reported at < 5 x the reporting limit (RL), a difference of 2 x RL is used as guidance (4 x RL for soils). Data are not qualified for field duplicates as these are evaluated for the total project by the client.

Yes ___ No ___ NA____

There are 7 identified field duplicates, in control. There are a few discrepancies between acetone and chloroform results, but they are well within the 2x RL limit and these are both common laboratory or field outliers.

SDG	Parent	Dup	Comment
L10030650	MW-54-ODPM-4	DUP-1-ODPM-4	OK
L10030650	MW-165A-ODPM-4	DUP-3-ODPM-4	OK
L10030693	MW248-ODPM-4	DUP-4-ODPM-4	OK
L10030693	MW-157-ODPM-4	DUP-2-ODPM-4	OK
L10030693	MW-006-ODLA-1	DUP-1-ODLA-1	OK
L10030693	MW-144-ODLA-1	DUP-2-ODLA-1	OK
L10030693	MW-187-ODLA-1	DUP-3-ODLA-1	OK

XI. SYSTEM PERFORMANCE

A. The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems.

Yes ____ No____ NA__X__

Not part of this review level

B. The suggested EQLs for the sample matrices in this set were met.

Yes __X__ No____ NA____

XII. TCL COMPOUNDS

A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds.

Yes ____ No____ NA__X__

Not part of this review level

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standards quantitation set.

Yes ____ No____ NA__X__

Not part of this review level

XIII. TENTATIVELY IDENTIFIED COMPOUNDS

TICs were properly identified and met the library identification criteria.

Yes ____ No____ NA__X__

Not part of this review level

XIV. OVERALL ASSESSMENT OF THE CASE

The laboratory has complied with the requested method. Data are fully usable after consideration of qualifiers. The following is noted:

<u>General Deliverables and Data Packages</u>

This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.
Although the samples are collected and delivered together, the laboratory splits the samples into numerous analytical batches which are run on up to 3 different instruments. This compounds the validation work, the data tracking and paperwork. The reviewer iterates the request to minimize the environmental impact of the paperwork by analyzing client samples in the minimum number of analytical batches and on the same instrument. The variability in response of instruments to client compounds can add a precision variability to the data results.

Chain of Custody:
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

Only the first page of the chain of custody documents were signed and dated by the laboratory. These are electronically-generated chain of custody documents, and there may be electronic signatures for these which we are not able to review. However, the hardcopy documents should be properly signed and dated by the sampler and the laboratory on each page. There is also no tracking to identify the gap in time from relinquishment to laboratory receipt.

Sample Condition:
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.
There is no formal log-in verification for bubbles and sample integrity. The project manager, to date, has approved of the laboratory narrative to discuss any integrity outliers

Calibration:
Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common "poor responders". Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

Matrix Spikes:
There are 5 MS/MSD pairs designated or analyzed by the laboratory for 94 samples. This is a sufficient frequency for the number of field samples.
The full target list has been spiked. Outliers observed per the QAPP limits for Method 8260 MS/MSD runs are shown in the table in the text. For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. Data are qualified JMS#, where # is the %R. Data could be biased slightly low in proportion to the recovery. As carbon disulfide is low in all the LCS's, the low recovery appears to be laboratory related, not matrix related.
Qualifiers are added for the MS or MSD precision. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. One qualifications was required for this set of samples.

Field Blanks:

There are 5 trip blanks (TB in the client ID) and 2 rinse blanks (RB in the client ID) for 8260. There are detections observed below the reporting limit in the trip blanks and rinse blanks. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and URB# for rinse blanks, where # is the associated blank value. Qualifiers added are shown in the table in the text. Results so qualified are usable as non-detects.

LCS Recoveries:
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All results associated with low recoveries are qualified and one detect for slightly high acetone. Dichlorodifluoromethane, and sometimes vinyl chloride, are consistently high in the ICV and the LCS standards. The compounds are not been detected and data are not qualified for high recovery with one exception for vinyl chloride.

The table in the text shows the outliers and the limits applied per the QAPP. The limits are specified per matrix. Only two recoveries are outside of the marginal exceedance limits (60-140). Qualifiers are added for all outliers as described here but the project manager may consider reversing some of these when the limits fall within the marginal exceedance limits. Please see the project EDD for a detailed list of qualifiers added.
In some cases, the laboratory analyzed both an LCS and an LCSD as there was no MS/MSD. In such cases, per the QAPP only results in which both recoveries are out of limits are qualified. An LCS/LCSD was performed for SDG L10030693, WG 327234; SDG L10030650 WG 326987, 326997 and 326996. In WG 327114, a compound (bromomethane, Methyl ethyl ketone, Methyl isobutyl ketone) was slightly low in the LCS or LCSD, but within range in the other QC pair. No qualifier has been applied.

Field QC:
There are 7 identified field duplicates, in control. There are a few discrepancies between acetone and chloroform results, but they are well within the 2x RL limit and these are both common laboratory or field outliers.

ORGANIC DATA QUALITY REVIEW REPORT
VOLATILE ORGANICS SW-846 METHOD 8260B
8260B/5030B

SDG: L10060784

PROJECT: Memphis Defense Depot, Off Depot groundwater and LTM for e2m, Texas

LABORATORY: Microbac Laboratories, Inc., Marietta, OH

SAMPLE MATRIX: Water

SAMPLING DATE (Month/Year): June 2010

NO. OF SAMPLES: 47 aqueous samples; including 2 trip blanks, 1 rinse blank, 4 field duplicates

ANALYSES REQUESTED: SW-846 8260B

SAMPLE NO.: See attached result forms and associated EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short and Associates Inc. INITIALS/DATE: ___________

Telephone Logs included Yes____ No _X__

Contractual Violations Yes____ No _X___

The project QAPP (11/05), the EPA Contract Laboratory Program National Functional Guidelines for Organic Review, 1999 and 2001, and the SW-846 Method 8260B have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the Project Manager. Per the Scope of Work, the review of these samples includes Level III validation of all chains of custody, calibrations and QC forms referencing the QC limits in the above documents.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW), SW-846, or in the project contract.

Yes __X_ No _____

This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.

Although the samples are collected and delivered together, the laboratory splits the samples into numerous analytical batches which are run on 4 different instruments and 6 distinct QC sets (days of analysis per instrument). This compounds the validation work, the data tracking and paperwork. The reviewer iterates the request to minimize the environmental impact of the paperwork by analyzing client samples in the minimum number of analytical batches and on the same instrument. The variability in response of instruments to client compounds can add a precision variability to the data results.

B. Chain of Custody Documentation was complete and accurate.

Yes __X__ No ___

No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

Only the first page of the chain of custody documents were signed and dated by the laboratory. Page 2 and 4 have no signatures, page 3 and 5 have a computer generated sampler signature and date, These are electronically-generated chain of custody documents, and there may be electronic signatures for these which we are not able to review. However, the hardcopy documents should be properly signed and dated by the sampler and the laboratory on each page. There is a tracking number , and the courier is identified as FedEx on the cooler inspection form to account for the gap in time from relinquishment to laboratory receipt.

C. Samples were received at the required temperature, preservation and intact with no bubbles.

Yes ___X___ No ____

EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

There is no formal log-in verification for bubbles and sample integrity. The project manager, to date, has approved of the laboratory narrative to discuss any integrity outliers

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.

Yes _X_ No ____

B. Holding Times

1. The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis).

Yes __X___ No______

2. The Clean Water Act (40 CFR 136) or method holding times were met for all analyses (14 days from time of sample collection to analysis or extraction).

Yes _X__ No ____

III. INSTRUMENT CALIBRATION – GC/MS

A. Initial Calibration

1. The Response (RF) and Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the contract criteria of >0.01 for volatiles and 0.05 for semi-volatiles.

Yes __X__ No ____ NA____

Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common "poor responders". Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.

Most of the low-responding compounds are highly water-soluble and capable of hydrogen bonding with water. This decreases their purge efficiency and results in the relatively low response. The implication of this low purge efficiency is that a relatively low absolute recovery of such compounds is achieved in the purge step of the analysis. If this recovery is consistent, reasonable accuracy and precision can be achieved in a given matrix, which is indicated for the lab matrix by acceptable recoveries in LCS and calibration checks. However, this causes these targets to be more sensitive to matrix variations that impact purge efficiency (such as ionic strength or the presence of varying levels of soluble non-target organic material) than are the more hydrophobic compounds typically analyzed by this method, and as a result they are more likely to exhibit matrix bias.

2a.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for the CCCs.
Yes _X__ No____ NA____
This is a method requirement and indicates that the analytical system is in control.

2b.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for all other compounds, the average %RSD was <15%, or a linear curve was used.
Yes _____ No __X__ NA____
For Instrument HPMS6, ICAL 6/14/10, carbon tetrachloride reported a % RSD of 31%. The linear coefficient was within limits. Data for the 3 samples run on this instrument are qualified JC31 to indicate variability to the instrument response.

3. The 12 hour system Performance Check was performed as required in SW-846.
Yes __X__ No_____ NA____
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

B. Continuing Calibrations
1. The midpoint standard was analyzed for each analysis at the required frequency and the QC criteria of > 0.05 (.01 for CLP 2001 VOA) were met.
Yes __X___ No ____ NA____

2. The percent difference (%D) limits of $\pm$ 25% were met. The 2001 NFG also allow for 40% D for the poor responders (pr). For other compounds the QAPP notes rejection of detected compounds with %D > 40%.
Yes __X___ No ____ NA___
When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.
The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection. No data have been outside the noted criteria and no qualifiers are applied.
One carbon disulfide CCAL for Instrument HPMS11, 6/28/10 reported a %D of 22.8%. This is out of the laboratory limit, but within the QAPP limits, which are the NFG.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK

The BFB (VOA) performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No ____ NA____

V. INTERNAL STANDARDS
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes _X__ No ____ NA____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X__ No ____

And met the recovery limits defined in the QAPP of 70 – 130% for VOA and 45-135% for SVOA base/neutral fraction or 35-140% for the acid fraction. For SVOA, one surrogate per fraction is allowed to be at 15 – 150%.
Yes __X___ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes __X___ No _____
There are 2 MS/MSD pair analyzed by the laboratory. This is a sufficient frequency for the number of field samples.

B. The MS and MSD percent recoveries were within the limits defined in the QAPP of VOA at 70 – 130% with 5 compounds allowed to be within 60 – 140%; SVOA at 45- 135%, 5 compounds allowed to be at 15 – 150%. Reject non-detects at < 15% for SVOA.
Yes ___X__ No ____NA___
The full target list has been spiked. There were no outliers observed per the QAPP limits for Method 8260. There were 3 outliers per the laboratory limits, which have been noted for the record.
For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. There is no case of high results. Data are qualified JMS#, where # is the %R, but no data have required this qualification per the QAPP.

Work Group	**Client ID**	**Compound**	**%R**	**Qualifier**
335667	MW-148-ODPM-4	Acetone	123/ 120	None, ND data
335682	MW-242-ODPM-4	Bromomethane	72.3/ 83.9	OK, per QAPP
	MW-242-ODPM-4	Hexachloropentadiene	78.6/ 81.9	OK per QAPP
	MW-242-ODPM-4	Isopropylbenzene	78.9/ 84	OK Per QAPP

C. The MSD relative percent differences (RPD) were within the defined contract limits for VOA of 30% water, 40 soil, with 5 compounds allowed to be < 40%.RPD; for SVOA of 50% for water and 60% for soil and 5 compounds allowed to be > 60% RPD.
Yes __X__ No ____NA____
Qualifiers are added only when the MS or MSD recovery is also out of limits. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. No qualifications was required for this set of samples.

D. The MS/MSD were client samples.
Yes _X__ No ____NA____
Sufficient MS/MSD samples were reported from client samples. For remaining Work Groups (QC sets), and LCS/LCS pair were appropriately reported.

VIII. LABORATORY CONTROL SAMPLE
A. Laboratory Control Samples (LCS) was analyzed for every analysis performed and for every 20 samples.
Yes __X__ No ____
As noted and LCS Duplicate (LCSD) was reported for some work groups when a client sample was not included in the QC set (Work group).

B. The LCS percent recoveries were within the limits defined in the QAPP for VOA of 80-120% for water and 75 – 125% for soil. Five compounds are allowed to be 60 – 140%. No soil limits are defined in the QAPP and laboratory limits will be applied. If an LCS and LCSD are analyzed, both samples must have the same compounds out for data to be qualified.
Yes ______ No __X____
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All results associated with low recoveries are qualified.

The table below shows the outliers and the limits applied per the QAPP. No recoveries are outside of the marginal exceedence limits (60-140 %). No qualifiers are added as all associated compounds are non-detect (ND) and the recoveries are high.

Work Group (Instrument)	**Compound**	**%R**	**Qualifier**
35552 (11)	Carbon disulfide	135%	None, ND data
355516 (6)	Carbon disulfide	131%	None, ND data
335789 (8)	Carbon disulfide	135/ 113 %	None, ND data
335667 (10)	Vinyl chloride	126%	None, ND data

In some cases, the laboratory analyzed both an LCS and an LCSD as there was no MS/MSD. In such cases, per the QAPP only results in which both recoveries are out of limits are qualified. An LCS/LCSD was performed for Work Groups 335834 and 335789.

IX. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X__ No____

B. No blank contamination was found in the Method Blank.
Yes__X__ No ____
Method blanks are undetected for client compounds. Whenever methylene chloride, acetone, 2-butanone or phthalate esters are detected in associated samples at a level less than 10x the method blank (corrected for dilution), the result is qualified as UMB#, where # is the corrected method blank level. Such results are usable as nondetects. For other targets, the factor used is 5x.

C. If Field Blanks were identified, no blank contamination was found.
Yes____ No __X__

There are 2 trip blanks (TB in the client ID) and 1 rinse blank (RB in the client ID). There are detections observed below the reporting limit in trip blank TB-062510-ODPM-4 (bromomethane at 0.58). The compound is not detected in client samples associated with that trip blank and no qualification is applied.
Acetone is reported in the rinse blank at 4.7 ug/l. All samples have been assumed to be associated with this blank. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and URB# for rinse blanks, where # is the associated blank value. Qualifiers added are shown in the table below. Results so qualified are usable as non-detects.

Client ID	Compound	Conc. ug/l	Qualifier
MW-54-ODPM-4	Acetone	3.09	URB4.7
MW-70-ODPM-4	Acetone	3.04	URB4.7
MW-79-ODPM-4	Acetone	2.9	URB4.7
MW-150-ODPM-4	Acetone	3.7	URB4.7
MW-152-ODPM-4	Acetone	4.16	URB4.7
MW-157-ODPM-4	Acetone	4.58	URB4.7
MW-158-ODPM-4	Acetone	3.31	URB4.7
MW-158A-ODPM-4	Acetone	4.16	URB4.7
MW-161-ODPM-4	Acetone	3.12	URB4.7
MW-162-ODPM-4	Acetone	3.8	URB4.7
MW-163-ODPM-4	Acetone	4.08	URB4.7
MW-164-ODPM-4	Acetone	4.23	URB4.7
MW-165-ODPM-4	Acetone	3.73	URB4.7
MW-165A-ODPM-4	Acetone	5.18	URB4.7
MW-242-ODPM-4	Acetone	5.3	URB4.7
MW-243-ODPM-4	Acetone	5.16	URB4.7
MW-245-ODPM-4	Acetone	4.73	URB4.7
MW-246-ODPM-4	Acetone	4.35	URB4.7
MW-248-ODPM-4	Acetone	4.1	URB4.7
MW-249-ODPM-4	Acetone	2.81	URB4.7
DUP-1-ODPM-4	Acetone	4.21	URB4.7
DUP-2-ODPM-4	Acetone	4.19	URB4.7
DUP-3-ODPM-4	Acetone	4.14	URB4.7
DUP-4-ODPM-4	Acetone	3.49	URB4.7
MW-149-ODPM-4	Acetone	3.9	URB4.7
MW-151-ODPM-4	Acetone	4.32	URB4.7
MW-155-ODPM-4	Acetone	5.97	URB4.7
MW-166-ODPM-4	Acetone	5.59	URB4.7
MW-166A-ODPM-4	Acetone	4.58	URB4.7
MW-232-ODPM-4	Acetone	4.67	URB4.7
MW-244-ODPM-4	Acetone	4.38	URB4.7
MW-247-ODPM-4	Acetone	4.85	URB4.7
MW-250-ODPM-4	Acetone	4.66	URB4.7
MW-251-ODPM-4	Acetone	2.8	URB4.7

X. FIELD QC
If Field duplicates were identified, they met guidance for VOA of RPD of < 35% for water or < 50% for soils. For SVOA < 50% RPD for water, no soils RPD is defined in the QAPP. For values reported at < 5 x the reporting limit (RL), a difference of 2 x RL is used as guidance (4 x RL for soils). Data are not qualified for field duplicates as these are evaluated for the total project by the client.
Yes ___ No ___ NA____
There are 4 identified field duplicates, all in control.

Parent	Dup	Comment
MW-54-ODPM-4	DUP-1-ODPM-4	OK
MW-165A-ODPM-4	DUP-3-ODPM-4	OK
MW248-ODPM-4	DUP-4-ODPM-4	OK
MW-157-ODPM-4	DUP-2-ODPM-4	OK

XI. SYSTEM PERFORMANCE
A. The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems.
Yes ____ No____ NA__X__
Not part of this review level

B. The suggested EQLs for the sample matrices in this set were met.
Yes __X__ No____ NA____

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds.
Yes ____ No____ NA__X__
Not part of this review level

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standards quantitation set.
Yes ____ No____ NA__X__
Not part of this review level

XIII. TENTATIVELY IDENTIFIED COMPOUNDS
TICs were properly identified and met the library identification criteria.
Yes ____ No____ NA__X__
Not part of this review level

XIV. OVERALL ASSESSMENT OF THE CASE
The laboratory has complied with the requested method. Data are fully usable after consideration of qualifiers. The following is noted:

General Deliverables and Data Packages
This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.

Chain of Custody:
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

Only the first page of the chain of custody documents were signed and dated by the laboratory. Page 2 and 4 have no signatures, page 3 and 5 have a computer generated sampler signature and date, These are electronically-generated chain of custody documents, and there may be electronic signatures for these which we are not able to review. However, the hardcopy documents should be properly signed and dated by the sampler and the laboratory on each page. There is a tracking number, and the courier is identified as FedEx on the cooler inspection form to account for the gap in time from relinquishment to laboratory receipt.

Sample Condition:
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.
There is no formal log-in verification for bubbles and sample integrity. The project manager, to date, has approved of the laboratory narrative to discuss any integrity outliers

Calibration:
Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common "poor responders". Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

For Instrument HPMS6, ICAL 6/14/10, carbon tetrachloride reported a % RSD of 31%. The linear coefficient was within limits. Data for the 3 samples run on this instrument are qualified JC31 to indicate variability to the instrument response.

One carbon disulfide CCAL for Instrument HPMS11, 6/28/10 reported a %D of 22.8%. This is out of the laboratory limit, but within the QAPP limits, which are the NFG.

Matrix Spikes:
The full target list has been spiked. There were no outliers observed per the QAPP limits for Method 8260. There were 3 outliers per the laboratory limits, which have been noted for the record.
For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. There is no case of high results. Data are qualified JMS#, where # is the %R, but no data have required this qualification per the QAPP.

Work Group	**Client ID**	**Compound**	**%R**	**Qualifier**
335667	MW-148-ODPM-4	Acetone	123/ 120	None, ND data
335682	MW-242-ODPM-4	Bromomethane	72.3/ 83.9	OK, per QAPP
	MW-242-ODPM-4	Hexachloropentadiene	78.6/ 81.9	OK per QAPP
	MW-242-ODPM-4	Isopropylbenzene	78.9/ 84	OK Per QAPP

Laboratory Control Samples:
The table in the text shows the outliers and the limits applied per the QAPP. No recoveries are outside of the marginal exceedence limits (60-140 %). No qualifiers are added as all associated compounds are non-

detect (ND) and the recoveries are high. In some cases, the laboratory analyzed both an LCS and an LCSD as there was no MS/MSD. In such cases, per the QAPP only results in which both recoveries are out of limits are qualified. An LCS/LCSD was performed for Work Groups 335834 and 335789.

<u>Field Blanks:</u>
There are 2 trip blanks (TB in the client ID) and 1 rinse blank (RB in the client ID). There are detections observed below the reporting limit in trip blank TB-062510-ODPM-4 (bromomethane at 0.58). The compound is not detected in client samples associated with that trip blank and no qualification is applied.
Acetone is reported in the rinse blank at 4.7 ug/l. All samples have been assumed to be associated with this blank. When analytes are present in both the field blank and the associated samples, the results in the samples are qualified in the same manner as for method blanks. For clarity, the qualifiers used in this case are UTB# for trip blanks and URB# for rinse blanks, where # is the associated blank value. Qualifiers added are shown in the table below. Results so qualified are usable as non-detects.

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MW-158-ODPM-4	Acetone	3.31	URB4.7
MW-158A-ODPM-4	Acetone	4.16	URB4.7
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MW-243-ODPM-4	Acetone	5.16	URB4.7
MW-245-ODPM-4	Acetone	4.73	URB4.7
MW-246-ODPM-4	Acetone	4.35	URB4.7
MW-248-ODPM-4	Acetone	4.1	URB4.7
MW-249-ODPM-4	Acetone	2.81	URB4.7
DUP-1-ODPM-4	Acetone	4.21	URB4.7
DUP-2-ODPM-4	Acetone	4.19	URB4.7
DUP-3-ODPM-4	Acetone	4.14	URB4.7
DUP-4-ODPM-4	Acetone	3.49	URB4.7
MW-149-ODPM-4	Acetone	3.9	URB4.7
MW-151-ODPM-4	Acetone	4.32	URB4.7
MW-155-ODPM-4	Acetone	5.97	URB4.7
MW-166-ODPM-4	Acetone	5.59	URB4.7
MW-166A-ODPM-4	Acetone	4.58	URB4.7

MW-232-ODPM-4	Acetone	4.67	URB4.7
MW-244-ODPM-4	Acetone	4.38	URB4.7
MW-247-ODPM-4	Acetone	4.85	URB4.7
MW-250-ODPM-4	Acetone	4.66	URB4.7
MW-251-ODPM-4	Acetone	2.8	URB4.7

Field QC:
There are 4 identified field duplicates, all in control.

Parent	Dup	Comment
MW-54-ODPM-4	DUP-1-ODPM-4	OK
MW-165A-ODPM-4	DUP-3-ODPM-4	OK
MW248-ODPM-4	DUP-4-ODPM-4	OK
MW-157-ODPM-4	DUP-2-ODPM-4	OK

ORGANIC DATA QUALITY REVIEW REPORT
VOLATILE ORGANICS SW-846 METHOD 8260B
8260B/5030B

SDG: L10090659

PROJECT: Memphis Defense Depot, Off Depot groundwater and LTM for e2m, Texas

LABORATORY: Microbac Laboratories, Inc., Marietta, OH

SAMPLE MATRIX: Water

SAMPLING DATE (Month/Year): September 2010

NO. OF SAMPLES: 47 aqueous samples; including 2 trip blanks, 2 field duplicates

ANALYSES REQUESTED: SW-846 8260B

SAMPLE NO.: See attached result forms and associated EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short and Associates Inc. INITIALS/DATE: ___________

Telephone Logs included Yes____ No _X__

Contractual Violations Yes____ No _X___

The project QAPP (11/05), the EPA Contract Laboratory Program National Functional Guidelines for Organic Review, 1999 and 2001, and the SW-846 Method 8260B have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the Project Manager. Per the Scope of Work, the review of these samples includes Level III validation of all chains of custody, calibrations and QC forms referencing the QC limits in the above documents.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW), SW-846, or in the project contract.

Yes ___ No __X___

B. Chain of Custody Documentation was complete and accurate.

Yes ____ No _X__

No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

There is one standard chain with one sample and full receipt and relinquishment data. For all the other samples, there is a sampler signature on several pages, but not on all and no dates or times of relinquishment and receipt on any of the chains. There is no courier identified, but there is a tracking number on the laboratory log-in form.

C. Samples were received at the required temperature, preservation and intact with no bubbles.

Yes ___X___ No ____

EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.

Yes _X_ No ____

B. Holding Times

1. The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis).

Yes __X___ No______

2. The Clean Water Act (40 CFR 136) or method holding times were met for all analyses (14 days from time of sample collection to analysis or extraction).

Yes _X__ No ____

III. INSTRUMENT CALIBRATION – GC/MS

A. Initial Calibration

1. The Response (RF) and Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the contract criteria of >0.01 for volatiles and 0.05 for semi-volatiles.

Yes __X__ No ____ NA____

Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common “poor responders”. Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.

Most of the low-responding compounds are highly water-soluble and capable of hydrogen bonding with water. This decreases their purge efficiency and results in the relatively low response. The implication of this low purge efficiency is that a relatively low absolute recovery of such compounds is achieved in the purge step of the analysis. If this recovery is consistent, reasonable accuracy and precision can be achieved in a given matrix, which is indicated for the lab matrix by acceptable recoveries in LCS and calibration checks. However, this causes these targets to be more sensitive to matrix variations that impact purge efficiency (such as ionic strength or the presence of varying levels of soluble non-target organic material) than are the more hydrophobic compounds typically analyzed by this method, and as a result they are more likely to exhibit matrix bias.

For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the individual and average response factors and the % RSDs. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record. The response factors could be derived from the associated continuing calibration and were acceptable.

2a.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for the CCCs.
Yes __X_   No_ ___ NA____
This is a method requirement and indicates that the analytical system is in control.
2b.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for all other compounds, the average %RSD was <15%, or a linear curve was used.
Yes _____   No __X__ NA____
Review of the calibration data notes that naphthalene is 31.3% for instrument HPMS11, the 8/26/10 calibration. As no naphthalene data are reported as detected and the response factor is sufficient to verify the non-detect, no qualification is required.

3. The 12 hour system Performance Check was performed as required in SW-846.
Yes __X__ No_____ NA____
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

B. Continuing Calibrations
1. The midpoint standard was analyzed for each analysis at the required frequency and the QC criteria of > 0.05 (.01 for CLP 2001 VOA) were met.
Yes __X___   No ____ NA____

2. The percent difference (%D) limits of ± 25% were met. The 2001 NFG also allow for 40% D for the poor responders (pr). For other compounds the QAPP notes rejection of detected compounds with %D > 40%.
Yes _____   No __X__   NA___
When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.
The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection.
For HPMS11 chloromethane was out of limits for almost every calibration, but within the 40% allowance for poor responders. No qualification has been applied.
For HPMS6 bromomethane was out of limits for almost every calibration, but within the 40% allowance for poor responders. No qualification has been applied.
For HPMS8, 2-butanone was at 38.2%, 4-methyl-2-pentanone was at 27.1%. These and other outliers were within the CLP 25% limit or the 40% poor responder limit. No qualification has been applied.
The difference in the calibration outliers verified the distinct difference in response of the instruments used for the analysis of the client samples.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK

The BFB (VOA) performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___   No ____ NA____

V. INTERNAL STANDARDS
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes _X__ No ____ NA____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X__ No ____

And met the recovery limits defined in the QAPP of 70 – 130% for VOA and 45-135% for SVOA base/neutral fraction or 35-140% for the acid fraction. For SVOA, one surrogate per fraction is allowed to be at 15 – 150%.
Yes __X___ No ____

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes _____ No __X___
There are 2 MS/MSD pairs analyzed by the laboratory. This is a sufficient frequency for the number of field samples (when field duplicates and blanks are excluded), but not to meet the method criteria of 1 per work group (preparation and analysis set).

B. The MS and MSD percent recoveries were within the limits defined in the QAPP of VOA at 70 – 130% with 5 compounds allowed to be within 60 – 140%; SVOA at 45- 135%, 5 compounds allowed to be at 15 – 150%. Reject non-detects at < 15% for SVOA.
Yes ___X__ No ____NA___
The full target list has been spiked. There were outliers observed per the QAPP limits for Method 8260. There were outliers per the laboratory limits, but not the QAPP and for which no qualification is applied. They have been noted for the record.
For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. Undetected data are not qualified for high results. Data are qualified JMS#, where # is the %R. Results could be biased proportional to the spike recovery. Only the client sample is qualified.

Work Group (instrument)	**Client ID**	**Compound**	**%R**	**Qualifier**
344011 (8)	MW-148-ODPM-6	Acetone	142/ 144	JMS144
		Bromodichloromethane	123/122	OK, per QAPP
		2-butanone	144/ 144	None, ND
		Carbon disulfide	147/ 130	None, ND
344094 (11)	MW-242- ODPM-6	Carbon disulfide	187/ 182	None, ND
		Chloromethane	59.1/ 59.7	JMS59.1

C. The MSD relative percent differences (RPD) were within the defined contract limits for VOA of 30% water, 40 soil, with 5 compounds allowed to be < 40%.RPD; for SVOA of 50% for water and 60% for soil and 5 compounds allowed to be > 60% RPD.
Yes __X__ No ____NA____
Qualifiers are added only when the MS or MSD recovery is also out of limits. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. No qualifications was required for this set of samples.

D. The MS/MSD were client samples.
Yes _X__ No ____NA____
Sufficient MS/MSD samples were reported from client samples when the trip blank and duplicates were taken out of the count. Client samples are noted in the table above.

VIII. LABORATORY CONTROL SAMPLE
A. Laboratory Control Samples (LCS) was analyzed for every analysis performed and for every 20 samples.
Yes __X__ No ____

B. The LCS percent recoveries were within the limits defined in the QAPP for VOA of 80-120% for water and 75 – 125% for soil. Five compounds are allowed to be 60 – 140%. No soil limits are defined in the QAPP and laboratory limits will be applied. If an LCS and LCSD are analyzed, both samples must have the same compounds out for data to be qualified.
Yes ______ No __X____
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All results associated with low recoveries are qualified.

The table below shows the outliers and the limits applied per the QAPP. Four applicable recoveries are outside of the marginal exceedence limits (60-140 %). No qualifiers are added when associated compounds are non-detect (ND) and the recoveries are high. The specific samples qualified are contained in the table at the end of the report. Data could be biased high or low proportional to the spike recovery due to laboratory accuracy for the noted compound.

Work Group (Instrument)	Compound	%R	Qualifier
344006 (11)	Chloromethane Acetone	69.8 121	JL69.8 JL121
344094(11)	Chloromethane	63.7	JL63.7
344443 (11)	Outliers, but this is for TCE only		TCE only
3344505 (11)	Chloromethane	34.9	None, cal for TCE only
344503 (6)	Carbon disulfide Chloromethane Dichlorodifluoromethane Vinyl chloride	66.1 59 34.4 71.3	JL66 JL59 JL34 JL71
334525 (6)	bromodichloromethane Bromomethane Dichlorodifluoromethane Vinyl chloride	122 78.8 154 123	None, ND JL78.8 None, ND None, ND
344011 (8)	1,1,2,2-tetrachloroethane 1,2 dichloroethane 2-hexanone Acetone Bromodichloromethane Chloroethane Dichlorodifluoromethane, 2-butanone MIBK Trichlorofluoromethane Vinyl chloride	122 124 121 139 123 124 121 147 129 132 121	JL122 None ND JL121 JL139 None, ND None ND None ND JL147 JL129 None, ND None, ND

No LCS and LCSD pair was reported when there was no MS/MSD.

IX. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X__ No____

B. No blank contamination was found in the Method Blank.
Yes__X__ No ____
Method blanks are undetected for client compounds. Whenever methylene chloride, acetone, 2-butanone or phthalate esters are detected in associated samples at a level less than 10x the method blank (corrected for dilution), the result is qualified as UMB#, where # is the corrected method blank level. Such results are usable as nondetects. For other targets, the factor used is 5x.

C. If Field Blanks were identified, no blank contamination was found.
Yes____ No __X__
There are 2 trip blanks (TB in the client ID) and no rinse blanks (RB in the client ID). TB-31910 has no reported detections. There are detections observed below the reporting limit in trip blank TB-31810-ODPM-6 (chloromethane at 0.77 and methylene chloride at 0.309 ug/l). The qualifiers used in this case are UTB# for trip blanks, where # is the associated blank value. Qualifiers added are shown in the table at the end of the report. Results so qualified are usable as non-detects.
Acetone has been consistently reported in past rinse blanks. As there is no rinse blank, the presence of acetone cannot be confirmed, but data at low levels for acetone could be suspect.

X. FIELD QC
If Field duplicates were identified, they met guidance for VOA of RPD of < 35% for water or < 50% for soils. For SVOA < 50% RPD for water, no soils RPD is defined in the QAPP. For values reported at < 5 x the reporting limit (RL), a difference of 2 x RL is used as guidance (4 x RL for soils). Data are not qualified for field duplicates as these are evaluated for the total project by the client.
Yes ___ No ___ NA____
There are 2 identified field duplicates, all in control. These are consistent field duplicate pairs on this project to date.

Parent	Dup	Comment
MW-54-ODPM-6	DUP-1-ODPM-6	OK
MW-157-ODPM-6	DUP-2-ODPM-6	OK

XI. SYSTEM PERFORMANCE
A. The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems.
Yes ____ No____ NA__X__
Not part of this review level

B. The suggested EQLs for the sample matrices in this set were met.
Yes __X__ No____ NA____

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds.
Yes ____ No____ NA__X__
Not part of this review level

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standards quantitation set.
Yes ____ No____ NA__X__
Not part of this review level

XIII. TENTATIVELY IDENTIFIED COMPOUNDS
TICs were properly identified and met the library identification criteria.
Yes ____ No____ NA__X__
Not part of this review level

XIV. OVERALL ASSESSMENT OF THE CASE
The laboratory has complied with the requested method. Data are fully usable after consideration of qualifiers. The following is noted:

General Deliverables and Data Packages
This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.
Although the samples are collected and delivered together, the laboratory splits the samples into numerous analytical batches which are run on 3 different instruments and 8 distinct QC sets (days of analysis per instrument). Two of these are for diluted TCE only. This compounds the validation work, the data tracking and paperwork. The reviewer iterates the request to minimize the environmental impact of the paperwork by analyzing client samples in the minimum number of analytical batches and on the same instrument. The variability in response of instruments to client compounds adds a precision variability to the data results.
For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the individual and average response factors and the % RSDs. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record.

Chain of Custody:
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

Sample Condition:
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

Initial Calibration:
Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common “poor responders”. Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.
For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the individual and average response factors and the % RSDs. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record. The response factors could be derived from the associated continuing calibration and were acceptable.

Review of the calibration data notes that naphthalene is 31.3% RSD for instrument HPMS11, the 8/26/10 initial calibration. As no naphthalene data are reported as detected and the response factor is sufficient to verify the non-detect, no qualification is required.
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

Continuing Calibration:
When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.
The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection.
For HPMS11 chloromethane was out of limits for almost every calibration, but within the 40% allowance for poor responders. No qualification has been applied.
For HPMS6 bromomethane was out of limits for almost every calibration, but within the 40% allowance for poor responders. No qualification has been applied.
For HPMS8, 2-butanone was at 38.2%, 4-methyl-2-pentanone was at 27.1%. These and other outliers were within the CLP 25% limit or the 40% poor responder limit. No qualification has been applied.
The difference in the calibration outliers verified the distinct difference in response of the instruments used for the analysis of the client samples.

Matrix Spikes:
There are 2 MS/MSD pairs analyzed by the laboratory. This is a sufficient frequency for the number of field samples (when field duplicates and blanks are excluded), but not to meet the method criteria of 1 per work group (preparation and analysis set).

The full target list has been spiked. There were outliers observed per the QAPP limits for Method 8260. There were outliers per the laboratory limits, but not the QAPP and for which no qualification is applied. They have been noted for the record.
For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. Undetected data are not qualified for high results. Data are qualified JMS#, where # is the %R. Results could be biased proportional to the spike recovery. Only the client sample is qualified.

Work Group (instrument)	**Client ID**	**Compound**	**%R**	**Qualifier**
344011 (8)	MW-148-ODPM-6	Acetone	142/ 144	JMS144
		Bromodichloromethane	123/122	OK, per QAPP
		2-butanone	144/ 144	None, ND
		Carbon disulfide	147/ 130	None, ND
344094 (11)	MW-242- ODPM-6	Carbon disulfide	187/ 182	None, ND
		Chloromethane	59.1/ 59.7	JMS59.1

Laboratory Control Samples:
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All

results associated with low recoveries are qualified. The QAPP limits are not the same as the laboratory limits.

The table below shows the outliers and the limits applied per the QAPP. Four applicable recoveries are outside of the marginal exceedence limits (60-140 %). No qualifiers are added when associated compounds are non-detect (ND) and the recoveries are high. The specific samples qualified are contained in the table at the end of the report. Data could be biased high or low proportional to the spike recovery due to laboratory accuracy for the noted compound.

Work Group (Instrument)	**Compound**	**%R**	**Qualifier**
344006 (11)	Chloromethane Acetone	69.8 121	JL69.8 JL121
344094(11)	Chloromethane	63.7	JL63.7
344274 (11)	1,2,3-trichloropropane Acetone Chloromethane Dichlorodifluoromethane 2-butanane	121 129 60.6 76.7 122	None, ND JL129 JL60.6 JL76.7 None, ND
344443 (11)	Outliers, but this is for TCE only		TCE only
3344505 (11)	Chloromethane	34.9	None, cal for TCE only
344503 (6)	Carbon disulfide Chloromethane Dichlorodifluoromethane Vinyl chloride	66.1 59 34.4 71.3	JL66 JL59 JL34 JL71
334525 (6)	bromodichloromethane Bromomethane Dichlorodifluoromethane Vinyl chloride	122 78.8 154 123	None, ND JL78.8 None, ND None, ND
344011 (8)	1,1,2,2-tetrachloroethane 1,2 dichloroethane 2-hexanone Acetone Bromodichloromethane Chloroethane Dichlorodifluoromethane, 2-butanone MIBK Trichlorofluoromethane Vinyl chloride	122 124 121 139 123 124 121 147 129 132 121	JL122 None ND JL121 JL139 None, ND None ND None ND JL147 JL129 None, ND None, ND

No LCS and LCSD pair was reported when there was no MS/MSD.

<u>Field Blanks:</u>
There are 2 trip blanks (TB in the client ID) and no rinse blanks (RB in the client ID). TB-31910 has no reported detections. There are detections observed below the reporting limit in trip blank TB-31810-ODPM-6 (chloromethane at 0.77 and methylene chloride at 0.309 ug/l). The qualifiers used in this case are UTB# for trip blanks, where # is the associated blank value. Qualifiers added are shown in the table at the end of the report. Results so qualified are usable as non-detects.
Acetone has been consistently reported in past rinse blanks. As there is no rinse blank, the presence of acetone cannot be confirmed, but data at low levels for acetone could be suspect.

Field QC:
There are 2 identified field duplicates, all in control.

Parent	Dup	Comment
MW-54-ODPM-6	DUP-1-ODPM-6	OK
MW-157-ODPM-6	DUP-2-ODPM-6	OK

SUMMARY TABLE OF QUALIFIED DATA

			ug/l				
Lab ID	Client ID	Compound	Result	Flag	RL	MDL	DV Qual
L10090659-01	MW-54-ODPM-6	1,1,2,2-Tetrachloroethane	44.9		0.5	0.2	JL122
L10090659-01	MW-54-ODPM-6	Acetone	6.67	Q	10	2.5	JL139
L10090659-01	MW-54-ODPM-6	MEK (2-Butanone)		Q	10	2.5	JL129
L10090659-01	MW-54-ODPM-6	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL129
L10090659-02	MW-70-ODPM-6	1,1,2,2-Tetrachloroethane	1.07		0.5	0.2	JL122
L10090659-02	MW-70-ODPM-6	2-Hexanone		Q	10	2.5	JL121
L10090659-02	MW-70-ODPM-6	Acetone	6.02	Q	10	2.5	JL139
L10090659-02	MW-70-ODPM-6	MEK (2-Butanone)		Q	10	2.5	JL147
L10090659-02	MW-70-ODPM-6	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL129
L10090659-03	MW-76-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-04	MW-77-ODPM-6	Acetone	5.63	F	10	2.5	JL121
L10090659-04	MW-77-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-05	MW-148-ODPM-6	2-Hexanone		Q	10	2.5	JL121
L10090659-05	MW-148-ODPM-6	Acetone	4.23	M	10	2.5	JL139MS144
L10090659-05	MW-148-ODPM-6	MEK (2-Butanone)		M	10	2.5	JL147
L10090659-05	MW-148-ODPM-6	MIBK (methyl isobutyl ketone)		Q	10	2.5	JL129
L10090659-08	MW-150-ODPM-6	Acetone	4.83	F	10	2.5	JL121
L10090659-08	MW-150-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-09	MW-155-ODPM-6	Acetone	4.1	F	10	2.5	JL121
L10090659-09	MW-155-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-10	MW-157-ODPM-6	Acetone	6.33	F	10	2.5	JL121
L10090659-10	MW-157-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-11	MW-159-ODPM-6	Acetone	4.7	F	10	2.5	JL121
L10090659-11	MW-159-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-12	MW-161-ODPM-6	Acetone	7.18	F	10	2.5	JL121
L10090659-12	MW-161-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-13	MW-162-ODPM-6	Acetone	5.15	F	10	2.5	JL121
L10090659-13	MW-162-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-14	MW-163-ODPM-6	Chloromethane		Q	1	0.5	JL69.8
L10090659-15	MW-164-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-16	MW-232-ODPM-6	Chloromethane		Q	1	0.5	JL63.7

L10090659-17	MW-241-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-18	MW-242-ODPM-6	Chloromethane		Q	1	0.5	JL63.7MS59
L10090659-21	MW-243-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-22	MW-244-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-23	MW-245-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-24	MW-251-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-25	DUP-1-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-26	DUP-2-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-27	TB-31910-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-28	MW-79-ODPM-6	Chloromethane		Q	1	0.5	JL63.7
L10090659-29	MW-149-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-29	MW-149-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-29	MW-149-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-29	MW-149-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-30	MW-151-ODPM-6	Acetone	7.08	F	10	2.5	JL129
L10090659-30	MW-151-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-30	MW-151-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-31	MW-152-ODPM-6	Acetone	5.09	F	10	2.5	JL129
L10090659-31	MW-152-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-31	MW-152-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-32	MW-158-ODPM-6	Acetone	5.64	F	10	2.5	JL129
L10090659-32	MW-158-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-32	MW-158-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-33	MW-158A-ODPM-6	Acetone	6.17	F	10	2.5	JL129
L10090659-33	MW-158A-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-33	MW-158A-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-34	MW-160-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-34	MW-160-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-35	MW-165-ODPM-6	Acetone	5.21	F	10	2.5	JL129
L10090659-35	MW-165-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-35	MW-165-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-36	MW-165A-ODPM-6	Acetone	5.88	F	10	2.5	JL129
L10090659-36	MW-165A-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-36	MW-165A-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-37	MW-166-ODPM-6	Acetone	6.69	F	10	2.5	JL129
L10090659-37	MW-166-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-37	MW-166-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-38	MW-166A-ODPM-6	Acetone	6.3	F	10	2.5	JL129

L10090659-38	MW-166A-ODPM-6	Chloromethane		Q	1	0.5	JL60.6
L10090659-38	MW-166A-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL76.7
L10090659-39	MW-246-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-39	MW-246-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-39	MW-246-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-39	MW-246-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-40	MW-247-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-40	MW-247-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-40	MW-247-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-40	MW-247-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-41	MW-248-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-41	MW-248-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-41	MW-248-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-41	MW-248-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-42	MW-249-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-42	MW-249-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-42	MW-249-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-42	MW-249-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-43	MW-250-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-43	MW-250-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-43	MW-250-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-43	MW-250-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-44	DUP-3-ODPM-6	Carbon disulfide		U	1	0.5	JL66.1
L10090659-44	DUP-3-ODPM-6	Chloromethane		U	1	0.5	JL59
L10090659-44	DUP-3-ODPM-6	Dichlorodifluoromethane		U	1	0.25	JL34.4
L10090659-44	DUP-3-ODPM-6	Methylene chloride	0.259	F	1	0.25	UTB.309
L10090659-44	DUP-3-ODPM-6	Vinyl chloride		U	1	0.25	JL71.3
L10090659-45	DUP-4-ODPM-6	Bromomethane		Q	1	0.5	JL78.8
L10090659-46	TB-31810-ODPM-6	Bromomethane		Q	1	0.5	JL78.8
L10090659-47	MW-147-ODLS-2	Bromomethane		Q	1	0.5	JL78.8
L10090659-47	MW-147-ODLS-2	Chloromethane	0.81	F	1	0.5	UTB.77

ORGANIC DATA QUALITY REVIEW REPORT
VOLATILE ORGANICS SW-846 METHOD 8260B
8260B/5030B

SDG: L11010698

PROJECT: Memphis Defense Depot, Off Depot groundwater and LTM for e2m, Denver

LABORATORY: Microbac Laboratories, Inc., Marietta, OH

SAMPLE MATRIX: Water

SAMPLING DATE (Month/Year): January 2011

NO. OF SAMPLES: 44 aqueous samples; including 2 trip blanks, 1 Rinse blank, 4 field duplicates

ANALYSES REQUESTED: SW-846 8260B

SAMPLE NO.: See attached result forms and associated EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short and Associates Inc. INITIALS/DATE: ___________

Telephone Logs included Yes____ No _X__

Contractual Violations Yes____ No _X___

The project QAPP (11/05), the EPA Contract Laboratory Program National Functional Guidelines for Organic Review, 1999 and 2001, and the SW-846 Method 8260B have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the Project Manager. Per the Scope of Work, the review of these samples includes Level III validation of all chains of custody, calibrations and QC forms referencing the QC limits in the above documents.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW), SW-846, or in the project contract.
Yes ___   No __X___
This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.

Although the samples are collected and delivered together, the laboratory splits the samples into numerous analytical batches which are run on 3 different instruments and 5 distinct QC sets (days of analysis per instrument). For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the individual and average response factors and the % RSDs. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record.

B. Chain of Custody Documentation was complete and accurate.
Yes __X__   No ___
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.
There is one standard chain with one sample and full receipt and relinquishment data. For all the other samples, there is a sampler signature on several pages, but not on all and no dates or times of relinquishment and receipt on any of the chains. There is no courier identified, but there is a tracking number on the laboratory log-in form.

C. Samples were received at the required temperature, preservation and intact with no bubbles.
Yes ___X___   No ____
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

II. ANALYTICAL REPORT FORMS

A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes _X_   No ____

B. Holding Times
1. The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis).
Yes __X___   No______

2. The Clean Water Act (40 CFR 136) or method holding times were met for all analyses (14 days from time of sample collection to analysis or extraction).
Yes _X__   No ____

III. INSTRUMENT CALIBRATION – GC/MS

A. Initial Calibration
1. The Response (RF) and Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the contract criteria of >0.01 for volatiles and 0.05 for semi-volatiles.
Yes __X__   No ____ NA____
Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common “poor responders”. Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory

has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.

Most of the low-responding compounds are highly water-soluble and capable of hydrogen bonding with water. This decreases their purge efficiency and results in the relatively low response. The implication of this low purge efficiency is that a relatively low absolute recovery of such compounds is achieved in the purge step of the analysis. If this recovery is consistent, reasonable accuracy and precision can be achieved in a given matrix, which is indicated for the lab matrix by acceptable recoveries in LCS and calibration checks. However, this causes these targets to be more sensitive to matrix variations that impact purge efficiency (such as ionic strength or the presence of varying levels of soluble non-target organic material) than are the more hydrophobic compounds typically analyzed by this method, and as a result they are more likely to exhibit matrix bias.

For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the average response factors and the % RSDs. There is a submittal of the individual standard responses. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record. The response factors could be derived from the associated continuing calibration and were acceptable. The %RSD has not been calculated as there are 10 standards submitted and for all the client list of compounds. This seems to be an ongoing missing deliverable.

2a.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for the CCCs.
Yes __X_ No_ ___ NA____
This is a method requirement and indicates that the analytical system is in control.

2b.The relative standard deviation (RSD) for the five point calibration was within the 30% limit for all other compounds, the average %RSD was <15%, or a linear curve was used.
Yes __X___ No ____ NA____

3. The 12 hour system Performance Check was performed as required in SW-846.
Yes __X__ No_____ NA____
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

B. Continuing Calibrations
1. The midpoint standard was analyzed for each analysis at the required frequency and the QC criteria of > 0.05 (.01 for CLP 2001 VOA) were met.
Yes __X___ No ____ NA____

2. The percent difference (%D) limits of $\pm$ 25% were met. The 2001 NFG also allow for 40% D for the poor responders (pr). For other compounds the QAPP notes rejection of detected compounds with %D > 40%.
Yes ___X__ No ____ NA___
When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.
The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection.
For HPMS8, acetone was out of limits at 25.3% which just exceeds the limit. It is within the 40% allowance for poor responders. No qualification has been applied.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
The BFB (VOA) performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No ____ NA____

V. INTERNAL STANDARDS
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes _X__ No ____ NA____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X__ No ____

And met the recovery limits defined in the QAPP of 70 – 130% for VOA and 45-135% for SVOA base/neutral fraction or 35-140% for the acid fraction. For SVOA, one surrogate per fraction is allowed to be at 15 – 150%.
Yes __X___ No ____
Two surrogates exceeded the lab limits, but are within the QAPP limits and no further action is required.

VII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE
A. Matrix spike (MS) and matrix spike duplicates (MSD) were analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes ___X__ No _____
There are 2 MS/MSD pairs analyzed by the laboratory. This is a sufficient frequency for the number of field samples (when field duplicates and blanks are excluded). A non-client sample was submitted to complete the requirement for each instrument.

B. The MS and MSD percent recoveries were within the limits defined in the QAPP of VOA at 70 – 130% with 5 compounds allowed to be within 60 – 140%; SVOA at 45- 135%, 5 compounds allowed to be at 15 – 150%. Reject non-detects at < 15% for SVOA.
Yes ___X__ No ____NA___
The full target list has been spiked. There were outliers observed per the QAPP limits for Method 8260. There were outliers per the laboratory limits, but not the QAPP and for which no qualification is applied.

For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. Undetected data are not qualified for high results. Data would be qualified JMS#, where # is the %R. Results could be biased proportional to the spike recovery. Only the client sample is qualified. No qualifiers were required for these data.

Analyte	**Parent**	**%R**	**Qualifier**
Vinyl chloride	MW-243-ODPM-7	134/ 140	None, U
Chloroethane	MW-243-ODPM-7	131/ 127	None, U
Dichlorodifluormethane	MW-243-ODPM-7	151 141	None, U
All ok	MW-152-ODPM-7		

C. The MSD relative percent differences (RPD) were within the defined contract limits for VOA of 30% water, 40 soil, with 5 compounds allowed to be < 40%.RPD; for SVOA of 50% for water and 60% for soil and 5 compounds allowed to be > 60% RPD.
Yes __X__ No ____NA____

Qualifiers are added only when the MS or MSD recovery is also out of limits. Data are qualified JD#, where # is the RPD. As the RPD increases, the matrix precision decreases. No qualifications was required for this set of samples.

D. The MS/MSD were client samples.
Yes _X__ No ____NA____
Sufficient MS/MSD samples were reported from client samples when the trip blank and duplicates were taken out of the count. Client samples are noted in the table above.

VIII. LABORATORY CONTROL SAMPLE
A. Laboratory Control Samples (LCS) was analyzed for every analysis performed and for every 20 samples.
Yes __X__ No ____

B. The LCS percent recoveries were within the limits defined in the QAPP for VOA of 80-120% for water and 75 – 125% for soil. Five compounds are allowed to be 60 – 140%. No soil limits are defined in the QAPP and laboratory limits will be applied. If an LCS and LCSD are analyzed, both samples must have the same compounds out for data to be qualified.
Yes ______ No __X____
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All results associated with low recoveries are qualified.

The table below shows the outliers and the limits applied per the QAPP. Four applicable recoveries are outside of the marginal exceedence limits (60-140 %). No qualifiers are added when associated compounds are non-detect (ND) and the recoveries are high. Data could be biased high or low proportional to the spike recovery due to laboratory accuracy for the noted compound.

LCS and LCSD Outliers:

Analyte	**Work Group**	**%R**
Acetone	355009	63.7/ 69.4
1,2-Dibromo-3-chloropropane	355009	77.5/ok
Bromomethane	355009	123/ 122
Dichlorodifluormethane	355009	129/ 126
MEK (2-Butanone)	355009	74.3/ 77
Chloromethane	355151	123
Bromomethane	355151	126
Dichlorodifluormethane	355151	137
2-Hexanone	355151	123
1-chlorohexane	355151	126
Chloroethane	355151	122
vinyl chloride	355151	126
Chloroethane	355296	124
Bromomethane	355296	134
Dichlorodifluormethane	355296	161
Hexachlorobutadiene	355296	76.8
Chloroethane	355149	124
Dichlorodifluormethane	355149	125

Qualifiers Applied:

Client ID	Analyte	result ug/L	MDL	Qualifier
MW-79-ODPM-7	Acetone	4.32	2.5	JL63.7
MW-79-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-151-ODPM-7	Acetone	5.02	2.5	JL63.7
MW-151-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-158-ODPM-7	Acetone	7.18	2.5	JL63.7
MW-158-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-158A-ODPM-7	Acetone	4.52	2.5	JL63.7
MW-158A-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-159-ODPM-7	Acetone	5.23	5	JL63.7
MW-159-ODPM-7	MEK (2-Butanone)	U	5	JL73.4
MW-155-ODPM-7	Acetone	5.76	2.5	JL63.7
MW-155-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-165-ODPM-7	Acetone	4.95	2.5	JL63.7
MW-165-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-70-ODPM-7	Chloromethane	0.511	0.5	JL123
MW-150-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-160-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-157-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-161-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-162-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-163-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-164-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8

IX. BLANKS

A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X__ No____

B. No blank contamination was found in the Method Blank.
Yes____ No __X__
Method blanks are undetected for client compounds with the exception of methylene chloride in WG 355151 at 0.488 ug/L and WG 355149 at 0.631 ug/L. Whenever methylene chloride, acetone, 2-butanone or phthalate esters are detected in associated samples at a level less than 10x the method blank (corrected for dilution), the result is qualified as BMB#, where # is the corrected method blank level. Such results are usable as nondetects. For other targets, the factor used is 5x. One data point was qualified BMB.63.

C. If Field Blanks were identified, no blank contamination was found.
Yes____ No __X__
There are 2 trip blanks (TB in the client ID) and one rinse blank (RB in the client ID). The trip blanks were non-detect. The rinse blank reported acetone at 4.22 ug/l and all detected data have been qualified BFB4.2 to indicate field contamination. Data are fully usable as undetected values. Toluene was also reported at 0.303 ug/L and 1,4 dichlorobenzene at 1.03 ug/L but all associated data are non-detect. Only data from the associated day of collection have been qualified even though 2 collection days are noted.

X. FIELD QC
If Field duplicates were identified, they met guidance for VOA of RPD of < 35% for water or < 50% for soils. For SVOA < 50% RPD for water, no soils RPD is defined in the QAPP. For values reported at < 5 x the reporting limit (RL), a difference of 2 x RL is used as guidance (4 x RL for soils). Data are not qualified for field duplicates as these are evaluated for the total project by the client.
Yes ___ No ___ NA____
There are 4 identified field duplicates, all in control. They are all in control.

Duplicate	Parent	RPD
DUP 1-ODPM-7	MW-79-ODPM-7	all ok
DUP 2-ODPM-7	MW-160-ODPM-7	all ok
DUP 3-ODPM-7	MW-242-ODPM-7	all ok
DUP 4-ODPM-7	MW-249-ODPM-7	all ok

XI. SYSTEM PERFORMANCE
A. The RICs, chromatograms, tunes and general system performance were acceptable for all instruments and analytical systems.
Yes ____ No____ NA__X__
Not part of this review level

B. The suggested EQLs for the sample matrices in this set were met.
Yes __X__ No____ NA____

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds.
Yes ____ No____ NA__X__
Not part of this review level

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standards quantitation set.
Yes ____ No____ NA__X__
Not part of this review level

XIII. TENTATIVELY IDENTIFIED COMPOUNDS
TICs were properly identified and met the library identification criteria.
Yes ____ No____ NA__X__
Not part of this review level

XIV. OVERALL ASSESSMENT OF THE CASE
The laboratory has complied with the requested method. Data are fully usable after consideration of qualifiers. The following is noted:

<u>General Deliverables and Data Packages</u>
This report has been requested to include the following review: Holding times and sample integrity (chains of custody, sample log in), Calibrations, Summary QC.
Although the samples are collected and delivered together, the laboratory splits the samples into numerous analytical batches which are run on 3 different instruments and 5 distinct QC sets (days of analysis per instrument). For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the individual

and average response factors and the % RSDs. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record.

Chain of Custody:
No qualifiers have been added for chain of custody issues and the project manager will update chains per the following notes to complete the project record.

Sample Condition:
EPA regulations (See Federal Register, March 12, 2007, 40CFR Part 122) require only that the temperature of samples delivered to the laboratory be equal to or less than 6^{o} C. The sample receipt conditions are fully compliant with applicable regulations.

Initial Calibration:
Method 8260: Per the project manager, the 2001 EPA CLP validation guidance has been applied to the common "poor responders". Acetone, 2-butanone, and 4-methyl-2-pentanone are the compounds for which any calibration response factors below 0.05 have been observed. The validation guidance used for this project allows for a response of 0.01 for these compounds if spectral integrity can be verified at low concentrations. These spectra are not commonly provided and are not part of the deliverable for these data sets. The laboratory has been tasked with providing to the client verification that the 0.01 RF is valid. Given the spectral verification is available, the data are not qualified for response >0.01 < 0.05. No data have been qualified.
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

For Instrument HPMS 6, there was no Initial Calibration summary form to indicate the average response factors and the % RSDs. There is a submittal of the individual standard responses. The narrative states that all calibration criteria were met and no qualification is added. The missing page needs to be submitted to complete the project record. The response factors could be derived from the associated continuing calibration and were acceptable.   The %RSD has not been calculated as there are 10 standards submitted and for all the client list of compounds. This seems to be an ongoing missing deliverable.

Review of the calibration data notes that naphthalene is 31.3% RSD for instrument HPMS11, the 8/26/10 initial calibration. As no naphthalene data are reported as detected and the response factor is sufficient to verify the non-detect, no qualification is required.
An ICV is also reported with each batch and instrument. It has the same outliers as the LCS and in the same range, so data have been qualified per the results listed in the LCS section.

Continuing Calibration:
When there are no detections, unless the %D is biased low and so large as to indicate a significant probability of false negatives, no qualifiers are added for %D outliers when targets are not detected or for a high recovery for undetected compounds. Data are qualified JC#, where # is the %D. There could be variability to the data as there is variability to the response.
The QAPP indicates that compounds in a run should be rejected if the %D is > 40%. We interpret this to mean that non-detects should be rejected and that detected targets should be J-qualified, which is the normal validation process for rejection.

Matrix Spikes:
There are 2 MS/MSD pairs analyzed by the laboratory. This is a sufficient frequency for the number of field samples (when field duplicates and blanks are excluded), but not to meet the method criteria of 1 per work group (preparation and analysis set).

The full target list has been spiked. There were outliers observed per the QAPP limits for Method 8260. There were outliers per the laboratory limits, but not the QAPP and for which no qualification is applied. They have been noted for the record.
For analytes where the parent sample concentration is > 4x the spike level, no qualifier is added because the level of the spike is similar to the normal variability expected in the method; hence recoveries for such cases are not meaningful. Undetected data are not qualified for high results. Data are qualified JMS#, where # is the %R. Results could be biased proportional to the spike recovery. Only the client sample is qualified. No data are qualified for the high spikes noted in the text.

Laboratory Control Samples:
The full target list has been spiked. When a high LCS recovery is associated with a non-detect in samples, no qualifier is added since the indicated bias is high. When the target is detected, the result is qualified as JL#, where # is the elevated recovery. Data could be biased high or low proportional to the LCS %R. All results associated with low recoveries are qualified. The QAPP limits are not the same as the laboratory limits.

The table below shows the outliers and the limits applied per the QAPP. No recoveries are outside of the marginal exceedence limits (60-140 %). No qualifiers are added when associated compounds are non-detect (ND) and the recoveries are high. The specific samples qualified are contained in the table at the end of the report. Data could be biased low proportional to the spike recovery due to laboratory accuracy for the noted compound.
No LCS and LCSD pair was reported when there was no MS/MSD.

Method Blanks:
One data point was qualified BMB.63 for methylene chloride.

Field Blanks:
The 2 trip blanks were non-detect. The rinse blank reported acetone at 4.22 ug/l and all detected data have been qualified BFB4.2 to indicate field contamination. Data are fully usable as undetected values. Toluene was also reported at 0.303 ug/L and 1,4 dichlorobenzene at 1.03 ug/L but all associated data are non-detect. Only data from the associated day of collection have been qualified even though 2 collection days are noted.

Field QC:
All precision is acceptable.

Duplicate	Parent	RPD
DUP 1-ODPM-7	MW-79-ODPM-7	all ok
DUP 2-ODPM-7	MW-160-ODPM-7	all ok
DUP 3-ODPM-7	MW-242-ODPM-7	all ok
DUP 4-ODPM-7	MW-249-ODPM-7	all ok

SUMMARY TABLE OF QUALIFIED DATA

Client ID	Analyte	result ug/L	MDL	Qualifier
MW-79-ODPM-7	Acetone	4.32	2.5	JL63.7
MW-79-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-151-ODPM-7	Acetone	5.02	2.5	JL63.7
MW-151-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-158-ODPM-7	Acetone	7.18	2.5	JL63.7
MW-158-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-158A-ODPM-7	Acetone	4.52	2.5	JL63.7
MW-158A-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-159-ODPM-7	Acetone	5.23	5	JL63.7
MW-159-ODPM-7	MEK (2-Butanone)	U	5	JL73.4
MW-155-ODPM-7	Acetone	5.76	2.5	JL63.7
MW-155-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-165-ODPM-7	Acetone	4.95	2.5	JL63.7
MW-165-ODPM-7	MEK (2-Butanone)	U	2.5	JL73.4
MW-70-ODPM-7	Chloromethane	0.511	0.5	JL123
MW-150-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-160-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-157-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-161-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-162-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-163-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-164-ODPM-7	Hexachlorobutadiene	U	0.25	JL76.8
MW-243-ODPM-7	Methylene chloride	0.269	0.25	BMB.63
MW-54-ODPM-7	Acetone	5.83	2.5	BFB4.2
MW-70-ODPM-7	Acetone	6.8	2.5	BFB4.2
MW-76-ODPM-7	Acetone	5.94	2.5	BFB4.2
MW-77-ODPM-7	Acetone	5.37	2.5	BFB4.2
MW-148-ODPM-7	Acetone	5.74	2.5	BFB4.2
MW-149-ODPM-7	Acetone	6.34	2.5	BFB4.2
MW-150-ODPM-7	Acetone	5.18	2.5	BFB4.2
MW-157-ODPM-7	Acetone	6.6	2.5	BFB4.2
MW-161-ODPM-7	Acetone	5.6	2.5	BFB4.2
MW-162-ODPM-7	Acetone	5.88	2.5	BFB4.2
MW-163-ODPM-7	Acetone	5.81	2.5	BFB4.2
MW-164-ODPM-7	Acetone	5.79	2.5	BFB4.2
MW-241-ODPM-7	Acetone	4.02	2.5	BFB4.2
MW-242-ODPM-7	Acetone	5.17	2.5	BFB4.2
MW-243-ODPM-7	Acetone	6.25	2.5	BFB4.2

MW-244-ODPM-7	Acetone	4.34	2.5	BFB4.2
MW-248-ODPM-7	Acetone	4.38	2.5	BFB4.2
MW-249-ODPM-7	Acetone	4.48	2.5	BFB4.2
DUP-3-ODPM-7	Acetone	5.06	2.5	BFB4.2
DUP-4-ODPM-7	Acetone	6.28	2.5	BFB4.2

State of New Jersey

Department of Environmental Protection

Certifies That

Accutest Laboratories

Laboratory Certification ID # 12129

is hereby approved as a

Nationally Accredited Environmental Laboratory

to perform the analyses as indicated on the Annual Certified Parameter List
which must accompany this certificate to be valid

having duly met the requirements of the

Regulations Governing The Certification Of
Laboratories And Environmental Measurements N.J.A.C. 7:18 et. seq.

and

having been found compliant with the standards approved by the

The NELAC Institute

Expiration Date June 30, 2011

NJDEP is a NELAP Recognized Accreditation Body

Joseph F. Aiello, Chief
Office of Quality Assurance

This certificate is to be conspicuously displayed at the laboratory with the annual certified parameter list in a location on the premises visible to the public.
Consumers are urged to verify the laboratory's current accreditation status with the State of NJ, NELAP.

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

MICROBAC LABORATORIES, INC.
OHIO VALLEY DIVISION

Marietta, OH

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the current DoD Quality Systems Manual for Environmental Laboratories; accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION CORPORATE SEAL 1978 DISTRICT OF COLUMBIA A2LA

Presented this 28th day of September 2009.

President & CEO
For the Accreditation Council
Certificate Number 2936.01
Valid to December 31, 2011

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.