DUNN FIELD SOURCE AREAS
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
ANNUAL OPERATIONS REPORT, YEAR FIVE

Defense Depot Memphis, Tennessee

Prepared for:

Department of the Army

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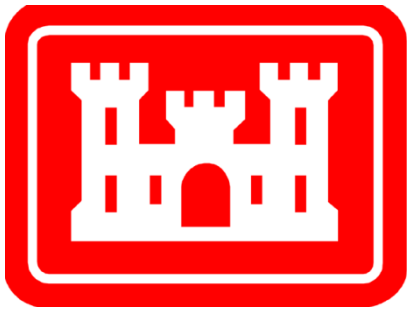

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Defense Depot Memphis, Tennessee

Prepared for:

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LIST OF ACRONYMS AND ABBREVIATIONS

acfm	actual cubic feet per minute
AWS	air/water separator
bgs	below ground surface
BRAC	base realignment and closure
BCT	BRAC Cleanup Team
cDCE	cis-1,2-dichloroethene
CERCLA	Comprehensive, Environmental, Response, Compensation, and Liability Act
CF	chloroform
CVOC	chlorinated volatile organic compound
DDMT	Defense Depot Memphis, Tennessee
DQE	data quality evaluation
DQO	data quality objectives
ET&D	excavation, transportation, and offsite disposal
FSVE	fluvial soil vapor extraction
GAC	granular activated carbon
in. H_2O	inches of water
in. Hg.	inches of mercury
lb/hr	pounds per hour
LTM	long-term monitoring
MCL	maximum contaminant level
µg/L	micrograms per liter
MI	Main Installation
MLGW	Memphis Light Gas & Water
ml/min	milliliters per minute
MSCHD	Memphis/Shelby County Health Department
O&M	operations and maintenance
PCE	tetrachloroethene
PID	photoionization detector
ppbv	parts per billion by volume
ppm	parts per million
QC	quality control
RAO	remedial action objective
RAWP	Remedial Action Work Plan

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

RA SAP	Remedial Action Sampling and Analysis Plan
RD	remedial design
RG	remediation goal
RL	reporting limit
scfm	standard cubic feet per minute
SVE	soil vapor extraction
TA	treatment area
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TeCA	1,1,2,2 tetrachloroethane
TO	task order
TSVE	thermal soil vapor extraction
U.S.	United States
USEPA	United States Environmental Protection Agency
VMP	vapor monitoring point
VOC	volatile organic compound
ZVI	zero valent iron

1.0 INTRODUCTION

HDR has prepared this Annual Operations Report for the Fluvial Soil Vapor Extraction (FSVE) System for the Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure Division (ODB) under Contract W9126G-09-D-0069, Task Order 19 to the United States Army Corps of Engineers. This report summarizes the operations and maintenance (O&M) activities and the results of system monitoring for Year Five FSVE operations on Dunn Field at Defense Depot Memphis, Tennessee (DDMT). The report covers operations from 1 August 2011 through 31 July 2012 (Year Five).

1.1 SITE DESCRIPTION AND BACKGROUND

DDMT, which originated as a military facility in the early 1940s, received, warehoused, and distributed supplies common to all United States (U.S.) military services and some civil agencies located primarily in the southeastern U.S., Puerto Rico, and Panama. Stocked items included food, clothing, petroleum products, construction materials, and industrial, medical, and general supplies. In 1995, DDMT was placed on the list of the Department of Defense facilities to be closed under Base Realignment and Closure (BRAC). Storage and distribution of material continued until the facility closed in September 1997.

DDMT is located in southeastern Memphis, Shelby County, Tennessee approximately five miles east of the Mississippi River and northeast of Interstate 240. The property consists of approximately 632 acres and includes the Main Installation (MI) and Dunn Field. The property has historically been listed as 642 acres; the revised acreage is based on recent surveys for deed transfers. The MI contains approximately 567 acres used for open storage areas, warehouses, military family housing, and outdoor recreational areas. Dunn Field contains approximately 65 acres and included former mineral storage and waste disposal areas. Dunn Field is located across Dunn Avenue from the north-northwest portion of the MI.

In 1992, DDMT was added to the National Priorities List; the facility identification number is TN4210020570. The lead agency for environmental restoration activities at DDMT was the Defense Logistics Agency; ODB assumed responsibility for restoration activities in December 2010, once all property at DDMT was approved for transfer. The regulatory oversight agencies are the U.S. Environmental Protection Agency (USEPA) Region 4 and the Tennessee Department of Environment and Conservation (TDEC).

1.2 SITE 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 from the fluvial deposits. The intermediate aquifer 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. Lignitic clay beds constitute a small percentage of the total thickness. The Memphis Sand ranges from 500 to 890 feet in thickness, and begins at a depth below ground surface (bgs) of approximately 120 to 300 feet. The Memphis aquifer 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.

1.3 SOURCE AREAS REMEDIAL ACTION

The *Memphis Depot Dunn Field Source Areas Final Remedial Design* (RD) (CH2M HILL, 2007) was approved by USEPA on 20 March and by TDEC on 23 March 2007. The approved Source Areas RD included the following components:

- Use of thermal-enhanced and conventional soil vapor extraction (SVE) to remove chlorinated volatile organic compounds (CVOCs) from subsurface soil to levels that are protective of the intended land use and groundwater.
- Excavation, transportation, and offsite disposal (ET&D) of volatile organic compound (VOC)-impacted soil from two areas.
- Injection of zero valent iron (ZVI) to remediate CVOCs in groundwater beneath onsite vadose zone source areas.
- Implementation and enforcement of land and groundwater use controls in accordance with the Dunn Field Land Use Control Implementation Plan.

Prior to completion of the Final Source Areas RD, the BRAC Cleanup Team (BCT) agreed to expedite implementation of the SVE component in the deeper, coarse-grained fluvial soils while the remedy for the shallow subsurface soil (loess) was reviewed. The *Dunn Field Source Areas Fluvial Soil Vapor Extraction Remedial Action Work Plan, Rev.1* (FSVE RAWP) (e²M, 2007) was approved by USEPA on 3 July 2007.

As part of the RD, soil analytical data were used to estimate the CVOC mass in the loess and the fluvial deposits. The estimated CVOC mass prior to treatment was estimated at 9,000 to 14,000 pounds in the loess and 90 to 230 pounds in the fluvial sands. The estimate for the fluvial sands was revised to 980 pounds based on results of soil samples collected during installation of the FSVE system.

Thermal SVE (TSVE) treatment was performed at depths of 5 to 30 feet bgs over a total area of about 1.25 acres from May to December 2008. Based on the vapor flow rate, photoionization detector (PID) readings and periodic analysis of vapor effluent, approximately 12,500 pounds of CVOCs were removed. Soil sample analyses confirmed cleanup standards were met in all treatment areas (TAs).

ET&D was completed in June 2009 with 240 tons of soil and waste material from TA-1F and 9,130 tons of soil, crushed drums and waste material from TA-3 excavated and disposed as non-hazardous waste at an approved off-site landfill. Cleanup standards were met in both areas.

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

The *Source Areas Interim Remedial Action Completion Report, Rev.1* (IRACR) (HDR|e^{2}M, 2009a) was submitted to the BCT on 25 September 2009 and was approved by USEPA on 2 November 2009. The

IRACR Rev. 0 was approved by TDEC on 13 July 2009. The memorandum, *Operating Properly and Successfully Demonstration, Source Areas Remedial Action* (e^2M, 2009a), dated 3 June 2009, was approved by USEPA on 21 October 2009.

1.4 FLUVIAL SVE SYSTEM DESCRIPTION

The FSVE system was installed to remove CVOCs from the fluvial sands at Dunn Field. The system is operated in accordance with Memphis/Shelby County Health Department (MSCHD) Operations Permit 01030-01PC, which has a maximum VOC emission limit of 5.71 pounds per hour (lb/hr). The system consists of two 13.1 horsepower regenerative blowers connected to SVE wells through seven conveyance lines. The seven initial SVE wells installed in 2007 have screen lengths of 30 to 35 feet with screened intervals ranging from 29 to 73 feet bgs; ten additional SVE wells with 25-foot screens ranging from 29 to 62 feet bgs were installed during confirmation soil sampling in November 2010. There are 20 vapor monitoring points (VMPs) located 15 to 80 feet from the initial SVE wells to monitor vacuum influence from the SVE wells and CVOC concentrations in the subsurface vapor; some of the additional SVE wells are 5 to 10 feet from VMPs. The FSVE system layout is shown on Figure 1.

Two 2,000-pound granular activated carbon (GAC) vessels are available for vapor treatment prior to discharge. Vapor treatment has not been used since October 2007 because VOC concentrations in the influent vapor have been well below MSCHD permit limits. Measurements were previously made at the influent to the GAC treatment system and at the effluent discharge. Since GAC treatment is no longer required, the influent location is the same as the effluent discharge and the terms are used interchangeably.

Moisture in the vapor from the SVE wells is removed via a 140-gallon air/water separator (AWS) located upstream of the blowers and a 240-gallon AWS located downstream of the blowers. The downstream AWS was added in December 2008 due to increased condensate from TSVE operations in the overlying loess formation. Condensate is transferred from the AWSs to a 535-gallon free-standing tank and is sampled for laboratory analysis prior to discharge.

1.5 PREVIOUS OPERATIONS AND MONITORING RESULTS

1.5.1 Year One

System uptime was 93% during Year One (27 July 2007 through 31 July 2008); combined flow from all SVE wells with both blowers operating averaged 788 standard cubic feet per minute (scfm) at 5.3 inches of mercury (in. Hg). The primary causes of downtime were high initial VOC mass removal that exceeded

the adsorption capacity of the GAC and electrical problems with the blowers. VOC concentrations in the vapor decreased quickly after system start-up and GAC treatment of the influent was halted in October 2007. The GAC vessels were filled with re-activated GAC in December 2007 to be available for treatment if needed. The electrical problems were due to the blowers operating near the peak of their performance curve because of high vacuum demand. Both blowers were replaced under manufacturer's warranty and procedures were adjusted to more closely monitor blower wiring and amperage.

Total VOC concentrations at SVE wells at system startup were above 50,000 parts per billion by volume (ppbv) at all locations except SVE-B and SVE-F, where concentrations were near 1,500 ppbv. After three months of operation, VOC concentrations generally declined by a factor of 100 or more. Concentrations continued to decline until TSVE operations began to increase VOC migration from the overlying loess. The primary CVOCs at the highest concentration were trichloroethene (TCE) in SVE-A, -B, -D, -E, and -F; 1,1,2,2 tetrachloroethane (TeCA) in SVE-C; and chloroform (CF) in SVE-G.

Approximately 2,725 pounds of VOCs were removed during Year One operations. Influent emission rates were estimated at 17 lb/hr during system startup, but declined to 0.2 lb/hr in July 2008. The emission rate discharged to the atmosphere did not exceed 2.35 lb/hr during Year One.

1.5.2 Year Two

System uptime was 97% during Year Two (1 August 2008 through 31 July 2009); combined flow from all SVE wells with both blowers operating averaged 744 scfm at 5.4 in. Hg. As in Year 1, the primary cause of downtime was electrical problems related to the blowers operating near their peak performance because of high vacuum demand. Operations were also affected by increased condensate volume as a result of the TSVE operations. An additional AWS and transfer pump were added downstream of the blowers to collect condensate and a 20,000-gallon tank was added to increase storage capacity. VOCs in the system influent remained at low concentrations and soil vapor was discharged without GAC treatment.

VOC concentrations in the FSVE system influent increased during TSVE operations. Total VOCs in the influent vapor samples increased to 28,000 ppbv in October 2008 and then decreased to 600 ppbv in June 2009. The individual CVOC with the highest concentration in the FSVE influent was TCE in the initial Year Two sample (October 2008) and CF in later samples. A similar pattern was observed in the SVE wells; TCE initially had the highest concentrations except at SVE-G where CF was the most prevalent. As overall concentrations decreased, other CVOCs, primarily CF and TeCA, had the highest concentration.

Approximately 1,206 pounds of VOCs were removed during Year Two operations, with 3,931 pounds removed since start up. Influent emission rates decreased from 0.2 lb/hr in July 2008 to 0.01 lb/hr in June 2009.

1.5.3 Year Three

System uptime was 92% during Year Three (1 August 2009 through 31 July 2010); combined flow from all SVE wells with both blowers operating averaged 788 scfm at 5.3 in. Hg. The primary cause of downtime remained electrical problems related to the blowers. The condensate generated due to residual heat from TSVE operations decreased significantly.

PID readings were at low levels throughout Year Three and were generally below 3 parts per million (ppm) in all SVE wells and system influent. The quarterly analytical results for total VOCs were similar to the PID measurements and total VOCs in the influent vapor samples were below 1 ppm throughout the year. The individual CVOC with the highest concentration in the influent stream was CF. Approximately 71 pounds of VOCs were removed during Year Three operations, with 4,002 pounds removed since start up. Influent emission rates declined from 0.012 lb/hr in June 2009 to 0.006 lb/hr in June 2010.

FSVE system performance was reviewed in the Year Three annual report. Groundwater monitoring indicated the capture zones of the SVE wells encompassed the contaminated areas, and the vacuum was sufficient to draw contaminants to the SVE wells and prevent groundwater impacts. VOC mass extraction decreased from 17 lb/hr at start-up to 0.006 lb/hr in June 2010. However, CVOC concentrations still exceeded protective soil vapor concentrations in SVE wells and VMPs. A rebound test and soil confirmation sampling were recommended for Year Four.

1.5.4 Year Four

In addition to system operations, activities for Year Four (1 August 2010 through 31 July 2011) included a rebound test from November 2010 to January 2011, confirmation soil sampling, installation of additional SVE wells, vadose zone modeling and groundwater monitoring. FSVE system uptime was 92%, not including shutdown for the rebound test. Downtime was mainly due to shutdowns for PID measurements and sampling at VMPs, minor repairs on system components, and power outages from storms.

System operations varied throughout the year with the rebound test, use of new SVE wells installed during confirmation soil sampling, and partial shutdown with use of a single blower from April to July.

Combined flow from all SVE wells averaged 743 scfm at 5.6 in. Hg with both blowers operating and 580 scfm at 3.4 in. Hg with a single blower.

PID measurements at SVE wells and system influent were generally low, less than 1 ppm, during Year Four, except for higher readings during changes in operations. The individual CVOCs with the highest concentration in the influent stream were CF and TCE. Approximately 20 pounds of VOCs were removed during Year Four operations, with 4,022 pounds removed since start up. Influent emission rates declined from 0.006 lb/hr in June 2010 to 0.002 lb/hr in July 2011.

The rebound test was performed to determine an appropriate period for pulsed operations and soil confirmation samples were collected to evaluate progress in achieving remediation goals (RGs) for fluvial soils. Increased PID measurements were not observed at the SVE wells during the shutdown, but vapor samples collected in January 2011 indicated residual VOCs remained in the fluvial soils, primarily at TA-3 (SVE-F) and TA-4 (SVE-G). Only 4 of the 60 confirmation soil samples had reported concentrations above an RG and no concentrations exceeded 10 times the RG. The average CVOC concentrations in soil confirmation samples were below the RGs in each area, meeting the remedial action objective (RAO) for fluvial soil.

Vadose zone modeling was performed to provide a conservative estimate of the necessary groundwater monitoring period following shutdown of the FSVE system. The modeling indicated rebound due to residual CVOC mass in the fluvial sand within 90 days after SVE shutdown, while rebound due to residual CVOC mass in the loess would be observed within approximately 3 years after shutdown. None of the July 2011 groundwater samples from monitoring wells near the FSVE system had CVOC concentrations above maximum contaminant levels (MCLs).

Although the soil RAOs were achieved on Dunn Field, FSVE operations with the newly installed SVE wells were to be continued through July 2012 in order to remove additional vadose zone soil contamination and reduce potential for groundwater impacts following shutdown.

1.6 SCOPE OF WORK

HDR has performed O&M activities for the FSVE system since system startup on 25 July 2007. The goals for O&M are to:

- Maintain system operations through regular field inspections, maintenance, and repairs; and

- Monitor system effectiveness through vapor extraction flow rates, vacuum measurements, PID measurements, and analysis of laboratory samples from individual SVE wells, system influent and effluent, and VMPs.

O&M activities follow procedures described in the *Dunn Field Source Areas Fluvial Soil Vapor Extraction System Operations and Maintenance Manual* (FSVE O&M Manual) (e^2M, 2008).

FSVE operations included the following activities:

- Weekly system inspections with repair or replacement of components, as required;
- Weekly readings at SVE wells and system influent for flow rate, vacuum, temperature, and operating hours;
- Weekly PID measurements at SVE wells and system influent;
- Monthly vacuum measurements at VMPs;
- Quarterly PID measurements at VMPs;
- Quarterly laboratory samples from SVE wells and system influent analyzed for VOCs;
- Annual laboratory samples from VMPs analyzed for VOCs;
- Laboratory samples from SVE condensate as needed for discharge;
- Quarterly reports to describe O&M activities, system status, performance and quarterly monitoring results; and
- Annual operations report to summarize system operations and monitoring results with data validation and to provide recommendations for future operations.

2.0 SYSTEM OPERATIONS

The FSVE system was operated with SVE wells connected to all seven lines during Year Five. The SVE well connected to the conveyance lines in each area was switched at two week intervals; the other wells were alternately opened for air inflow and then closed at one-week intervals. The schedule for well connections and venting is shown on Table 1.

The system was operated with a single blower from August 2011 to February 2012 due to problems with Blower #1; the system was generally operated with both blowers from February through July 2012. When both blowers were operating, a spare inlet was generally open to reduce the vacuum and current load. At times, a conveyance line was opened to the atmosphere and used as the open leg in order to clear moisture from the line.

A Shelby County Pollution Control representative made a scheduled inspection of the SVE systems at Dunn Field and the Off Depot area on 7 February 2012. She observed FSVE system operations, asked a few questions concerning maintenance and record-keeping, and was provided the estimated mass emissions.

The FSVE system was shut down following annual sampling on 24 July 2012. The conveyance lines were closed and the wells were opened for passive venting. The hoses used to connect SVE wells in each area to the conveyance lines were rolled up, labeled and stored. The air intakes and exhausts for the blowers were sealed on 2 August. Power at the equipment compound was switched off by HDR on 9 August; the MLGW connection remains in place for use during maintenance.

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

2.1 SYSTEM PERFORMANCE

The FSVE system operated throughout Year Five with system uptime at 93%. VOC concentrations in the system influent remained low and vapor was discharged to the atmosphere without GAC treatment. Operating percentage and downtime are summarized by quarter below.

- 1st Quarter, August-October 2011 – 98.5% uptime. There were no shutdowns from system alarms. Downtime was for repairs to Blower #1, routine maintenance and quarterly PID measurements at VMPs.
- 2nd Quarter, November 2011-January 2012 – 91.7% uptime. Downtime was for High Level alarms at the AWS, repairs to Blower #1 and quarterly PID measurements at VMPs.
- 3rd Quarter, February-April 2012 – 89.6% uptime. Downtime was for repairs to Blower #1 and the AWS pump and for quarterly PID measurements at VMPs.
- 4th Quarter, May-July 2012 – 94% uptime. Downtime was for repairs at Blower #1, a power outage and problems with a heat exchanger.

2.2 SYSTEM FLOW RATES AND VACUUMS

System flow rates and vacuum measurements at SVE wells and system influent are shown on Table 2. System flow rates are measured by a mass-flow meter and flow rates at individual wells are measured by vane-type meters at the piping manifold. The system is generally operated with all SVE wells in the 100% open position; a spare SVE inlet is open at times to decrease amperage load on the blowers. The conveyance line connections were alternated between wells as shown on Table 1.

Individual flow rates averaged 66 to 191 actual cubic feet per minute (acfm) with both blowers operating and 53 to 184 acfm with one blower operating. Combined flow from all SVE wells averaged 795 scfm at 5.5 in. Hg with two blowers and 580 scfm at 3.8 in. Hg with one blower.

2.3 SYSTEM MAINTENANCE

Routine maintenance was conducted during weekly system monitoring and included the following activities:

- Visually inspect system components and piping for cracks, rust spots, and/or corrosion.
- Inspect flex hose for holes, tears, leaks, and other signs of deterioration. Confirm connections are tight and secure.
- Clean heater coils in HVAC system.
- Clean debris from interior of AWS vessel.
- Remove accumulated water and debris from manifold and clean flow meters.
- Remove dirt and debris from SVE building louvers.

- Clean heat exchanger coil and cooling fins with water and degreasing agent.
- General housekeeping of the SVE compound.

Scheduled shutdowns were made to collect PID measurements and vapor samples at VMPs, and to perform general equipment maintenance.

Other maintenance activities and repairs for Blower #1 and for system alarms are summarized below:

- Blower #1 was removed for repair on 10 August 2011and was re-installed on 14 December 2011 following installation of parts from the German manufacturer. The blower still did not generate significant vacuum and shut-down due to a wiring problem on 21 December. The blower was removed again on 4 January 2012, rebuilt with parts from a spare blower and re-installed on 15 February.
- The system went down due to "Blower 1 failure to start" alarms during the week of 12 March. The system was checked and restarted with both blowers on 12 and 13 March. On 16 March, the wiring was checked and all connections were tightened before restarting the system with Blower #2 only. The problem was probably due to high system vacuum causing blower power levels to exceed specifications. An unused manifold leg was opened to increase the system air flow rate and decrease power levels, and Blower #1 was restarted 20 March.
- The leads on Blower #1 motor burned out between system checks on 10 and 11 May; no alarm was recorded. The system continued to operate with Blower #2. Blower #1 was removed on 18 May, the wiring was repaired and the blower was re-installed on 31 May.
- The system shut down several days in November 2011 due to "High Level" alarms at the AWS. The AWS pump would only operate manually and problems with the internet connection for the FSVE building prevented evaluation of programmed system controls. After each shutdown, the AWS was drained and the system restarted. The internet connection was restored and the system controls were corrected for automatic operation of the AWS pump on 19 December.
- The system went down due to an AWS "High Level" alarm on 16 March. The system was restarted on 17 March with Blower #2 only. A software error found to be preventing shutdown notifications was corrected. The system went down again with an AWS "High Level" alarm on 22 March and was restarted on 23 March. The auto-start and/or the float mechanism for the AWS pump were not working correctly and the AWS was manually pumped as needed.

- The system went down due to 'Heat Exchanger Failed to Start' alarms on 14 June and 5 July. The heat exchanger was re-set and the system re-started the next day.
- The system went down due to a "SVE Manifold High Vacuum" alarm on 3 July; an extra leg was opened and the system was restarted.
- The system was shutdown briefly on 20 July to remove blockages in the conveyance lines from SVE-A and SVE-E and on 23 July to replace the flow meter for SVE-G.

2.4 CONDENSATE DISCHARGE

The condensate collection system removes entrained moisture and debris from the vapor stream. Lower moisture levels improve efficiency of GAC treatment, when utilized, and removal of debris prevents damage to the blowers. Condensate is pumped from the two AWS vessels to the 535-gallon free standing tank located immediately outside of the SVE building (east side). The transfer pumps are controlled by floats within the AWS vessels. A 20,000-gallon storage tank was delivered to Dunn Field in March 2009 to increase storage capacity and minimize the frequency of condensate discharges. The water was pumped from the 535-gallon tank to the 20,000-gallon tank as necessary. As the tank neared capacity, a grab sample of the condensate was collected and submitted for laboratory analysis.

Wastewater was previously discharged to the City of Memphis sewer under Industrial Wastewater Discharge Permit #S-NN3-097. The City of Memphis notified HDR on 23 February 2011 that the city was not authorized to accept wastewater from Comprehensive, Environmental, Response, Compensation, and Liability Act sites. In July 2011, TDEC Division of Water Pollution Control approved discharge of the wastewater to a storm water inlet on Dunn Field provided concentration limits were met: copper < 32 micrograms per liter (µg/L) and zinc <521 µg/L.

Discharges to the storm water inlet were made in June and July 2012. The discharge reports submitted to TDEC are provided in Appendix A.

Following shutdown of the FSVE system, the 20,000-gallon storage tank was picked up by the vendor in August 2012.

3.0 SYSTEM MONITORING ACTIVITIES

FSVE system monitoring consists of vacuum measurements at VMPs, and PID measurements and laboratory analysis of vapor samples from the system effluent, SVE wells and VMPs. Although a spare SVE inlet is sometimes opened during operations to decrease amperage load on the blowers, the inlet is closed before taking PID measurements or collecting vapor samples for laboratory analysis.

The monitoring activities are performed in accordance with the FSVE RAWP. Sampling and analysis are performed in accordance with the *Remedial Action Sampling and Analysis Plan* (RA SAP) (MACTEC, 2005).

3.1 VACUUM MEASUREMENTS

Vacuum measurements at VMPs are recorded monthly. The measurements are collected 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 3.

Average vacuum measurements were 3.3 to 9.0 inches of water (in. H_2O) with two blowers operating and 1.7 to 5.4 in. H_2O with a single blower. The measurements indicate vacuum influence at distances greater than 80 feet from the SVE wells in each area with one or two blowers operating.

3.2 PID MEASUREMENTS

VOC concentrations are estimated through weekly field measurements at individual SVE wells, system influent, and VMPs with a MiniRae 2000 (10.6 eV lamp) PID. The PID is calibrated with a 100 ppm concentration of isobutylene prior to use. At each location, vapor is collected in a dedicated Tedlar® bag and the PID meter is connected to the tedlar bag for the measurement.

For measurements at the SVE wells and VMPs, an oil-less high vacuum sampling pump is used to draw the vapor stream into the tedlar bag. No pump is needed at the system influent location as it is under positive pressure.

The quarterly measurements are made at SVE wells and system influent first and then at VMPs. The SVE system is shutdown overnight (or for a minimum of 4 hours) prior to the VMP measurements. The VMPs are first purged of three tubing volumes using the sampling pump. Multiple PID readings are collected at each VMP using a dedicated Tedlar bag until three consecutive readings are within 10%.

3.2.1 SVE Wells and System Influent

PID measurements at the SVE wells and system influent are shown on Table 4. PID measurements at SVE wells and system influent were variable during Year Five; this may be related due to regular changes in the well connections and venting.

PID measurements increased at SVE wells and the system influent during the 1st quarter. The influent PID measurements ranged from 1.1 to 16.9 ppm. PID measurements at SVE-G (1.5 to 13 ppm) were higher than at other SVE wells. Influent PID measurements decreased during the 2nd quarter. However, PID measurements at SVE-G remained high at 10.8 to 22.4 ppm, and measurements at SVE-C rose from 3.4 to 31 ppm.

Influent PID measurements returned to low levels in the 3rd quarter (0 to 1.2 ppm). PID measurements at SVE-C and SVE-G decreased below 10 ppm and the other SVE wells ranged from 0.2 to 10 ppm. Influent PID measurements were below 3 ppm in the 4th quarter. PID measurements at SVE-G ranged from 1.6 to 15.2 ppm, and the other SVE wells ranged from 0.0 to 6.1 ppm.

3.2.2 VMPs

The PID measurements from VMPs are shown on Table 5. The measurements remained low (0 to 3.2 ppm) throughout Year Five. The final measurements collected on 25-26 July 2012, before annual vapor sampling, were 0 ppm at all VMPs. The calibration was checked and the PID appeared to be working properly; measurements were recorded the previous day at the SVE wells with a range of concentrations.

3.3 VAPOR SAMPLING

Vapor samples were collected during Year Five to monitor system performance and confirm compliance with permitted discharge limits.

Vapor samples were collected in 6-liter Summa canisters; samples from SVE wells and the system influent were collected without a flow regulator and samples from VMPs were collected with a flow regulator set at 200 milliliters per minute (ml/min). The Summa canisters were shipped from the laboratory with negative pressure; thus, a sampling pump was not required for sample collection. Samples were submitted to Columbia Analytical in Simi Valley, California for analysis of VOCs by USEPA Method TO-15.

3.3.1 SVE Wells and System Influent

During Year Five, vapor samples were collected for laboratory analysis from the SVE wells and system influent in October 2011, January-February 2012, April 2012, and July 2012.

Vapor samples were collected from each SVE conveyance line using the current well connections and from the system influent on 24 October 2011 (4Q11 event). The samples were collected from SVE wells A, B-East, C-East, D, D-South, F and G-South.

Vapor samples were collected from each SVE conveyance line using the current well connection and from the system influent on 24 January 2012 (1Q12 event). The samples were collected from SVE wells A, B, C, D, E, F-West and G-Alt. Samples collected from SVE wells A, C and D lines had excess moisture and the laboratory reporting limits (RLs) were elevated. Samples were re-collected at SVE wells C and D on 23 February; a sample was not re-collected at SVE-A, because the well is operated intermittently and the reported concentrations were consistent with past results.

Vapor samples were collected from 16 SVE wells and the system influent on 11 April 2012 (2Q12 event). SVE conveyance lines were open 6-9 April to clear the lines prior to sampling. Connections were switched between wells and samples were collected in three sets with about 1.5 hours in between sets to allow the newly connected wells to equilibrate. The initial samples were collected from SVE wells A, B-East, C-East, D, E, F-East and G-South. The connections were then changed and samples were collected from B, C-West, D-North, D-South, F-West and G-Alt. The connections were changed a final time and samples were collected from C, E-North and F and from the system influent.

Vapor samples were collected from 16 SVE wells and the system influent on 24 July 2012 (3Q12 event). SVE conveyance lines were open 21-24 July to clear moisture from the lines. Connections were switched between wells and samples were collected in three sets with about one hour between sets to allow the wells to equilibrate. The initial samples were collected from SVE wells A, B-East, C, D, E, F-East and G-South and from the system influent. The connections were then changed and samples were collected from B, C-West, D-North, E-North, F-West and G-Alt. The connections were changed a final time and samples were collected from C-East, D-South and F. The other wells in each area were closed during sampling. The SVE system was shutdown after all SVE well samples were collected.

3.3.2 VMPs

Year Five annual vapor samples were collected from all VMPs on 25-26 July 2012. The FSVE system was shutdown on 24 July after SVE well samples were collected. VMP vapor samples were collected from the sample port at each well head, after the VMPs had been purged and PID measurements recorded.

3.3.3 Quality Assurance/Quality Control Samples

Field quality control (QC) samples were collected during each vapor sampling event. Field QC samples consisted of one additional (duplicate) Summa canister collected for approximately every 10 sample locations. Laboratory quality assurance/quality control samples included surrogate spikes, method blanks, laboratory control samples (laboratory control duplicates). Sampling and analytical methods followed procedures in the *EPA Method TO-15 Determination of VOCs in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry* (USEPA, 1999).

Documentation was completed in the field to ensure that the Summa canister samples collected, chain-of-custody, and request for analysis were in agreement. Custody seals were placed on the shipping container for each canister before shipment by common carrier. Samples were typically shipped the day collected for overnight delivery to the laboratory.

4.0 SUMMARY OF ANALYTICAL RESULTS

Vapor samples were collected for laboratory analysis during the following Year Five sample events:

Event	Date	Samples
4Q11	24 October 2011	7 SVE wells; System Influent
1Q12	24 January and 23 February 2012	7 SVE wells; System Influent
2Q12	11 April 2012	16 SVE wells; System Influent
3Q12	24-26 July 2012	16 SVE wells; System Influent; VMPs

Complete analytical results are presented by event in Appendix B. Analytical results summaries are presented by event on Tables 6 to 9 for the SVE well and system influent samples and on Table 10 for the VMP samples. The summary tables list the results for the primary CVOCs and for other VOCs detected above the RL in one or more samples during that event; the totals for primary CVOCs and all VOCs above the RL are shown for each sample. The summary tables also list the protective soil vapor concentration (fluvial deposits) for the primary CVOCs.

4.1 DATA QUALITY EVALUATION

HDR performed data quality evaluation (DQE) of the laboratory data packages for the vapor samples collected during Year Five operations to qualify the data relative to the data quality objectives (DQOs) described in the RA SAP. Data qualifiers are shown on the analytical results tables. 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.

The vapor sample data collected from October 2011 through July 2012 from SVE wells, system influent and VMPs meet the DQOs and are deemed sufficient to support decisions regarding the effectiveness of SVE system performance. The DQE for Year Five samples is provided in Appendix C.

4.2 VAPOR SAMPLES

4.2.1 4Q11

Analytical results for SVE well and system influent samples collected on 24 October 2011 are summarized on Table 6. Total CVOCs in the 4Q11 system influent were 230 ppbv, lower than reported in 3Q11 (376 ppbv). The primary CVOCs detected in the influent sample were TCE at 41% and CF at 33%. Total CVOCs in the SVE wells ranged from 23.6 ppbv at SVE-E to 334 ppbv in SVE-F.

4.2.2 1Q12

Analytical results for SVE well and system influent samples, including the initial samples collected on 24 January and the re-collected samples at SVE-C and SVE-D on 23 February 2012, are summarized on Table 7. Results for the two samples from SVE-C are similar while the second sample from SVE-D has higher concentrations and is more consistent with previous results. Total CVOCs in the 1Q12 system influent were 281 ppbv. The primary CVOCs detected in the influent sample were TCE at 40%, cis-1,2-dichloroethene (cDCE) at 35% and CF at 18%. Total CVOCs in the SVE wells, omitting the initial sample from SVE-D, ranged from less than 3.8 ppbv at SVE-G to 263 ppbv in SVE-F. The concentrations at SVE-G were much lower than in most previous samples.

4.2.3 2Q12

Analytical results for SVE well and system influent samples collected on 11 April 2012 are summarized on Table 8. Total CVOCs in the 2Q11 system influent were 161 ppbv. The primary CVOCs detected in the influent sample were TCE at 41% and CF at 35%. Total CVOCs in the SVE wells ranged from 0.1 ppbv in SVE-F to 125 ppbv in SVE-B. The concentrations for all SVE wells were lower than normally observed and were lower than the system influent, indicating the samples may not have been representative. The concentrations at SVE-F area wells were all less than 1 ppbv, much lower than in previous samples.

4.2.4 3Q12

Analytical results for SVE well and system influent samples collected on 24 July 2012 are summarized on Table 9. Total CVOCs in the system influent sample were 138 ppbv. The primary CVOCs in the system influent were TCE at 52% and CF at 20%. Total CVOCs in the SVE wells ranged from 18.2 ppbv at SVE-D-North to 636 ppbv at SVE-B. The total CVOC concentrations at the SVE-F area wells, 166 to 467 ppbv, and the SVE-G area wells, 429 and 483 ppbv, were more representative of past sample results.

Analytical results for VMP samples collected on 25-26 July 2012 are summarized on Table 10. Total CVOCs ranged from 44.7 ppbv (VMP-3B) to 5,086 ppbv (VMP-8B) in the shallow ‘B’ VMPs and from 0.6 ppbv (VMP-3A) to 507 ppbv (VMP-4A) in the deep ‘A’ VMPs.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SYSTEM OPERATIONS

System uptime during Year Five (1 August 2011 through 31 July 2012) was 93%. Downtime was mainly for repairs to Blower #1 or the AWS, and for shutdowns to collect PID measurements and samples at VMPs. During operations, two blowers were in use approximately 36% of the time and a single blower for the remainder. Average operating conditions were:

	Y5 - 1 Blower		Y5 - 2 Blowers	
Location	Flow Rate	Vacuum	Flow Rate	Vacuum
	acfm	in. H_2O	acfm	in. H_2O
SVE-A	53	83	66	63
SVE-B	141	74	166	89
SVE-C	184	94	191	93
SVE-D	144	57	185	72
SVE-E	58	60	142	84
SVE-F	113	76	139	92
SVE-G	108	>100	117	>100
	scfm	in. Hg	scfm	in. Hg
Influent	580	3.8	795	5.5

The additional SVE wells installed in November 2010 were used throughout Year Five. Well connections in each area were switched at two-week intervals, and the other wells were alternately opened for air inflow and then closed at one-week intervals.

Weekly system readings (flow rates and vacuums) were relatively consistent throughout Year Five with some variation due to changing well connections and moisture build-up in the lines. Vacuum measurements at VMPs varied significantly depending on which SVE well in an area was connected to the conveyance line. However, the VMP vacuum measurements demonstrated vacuum influence at distances greater than 80 feet from all SVE wells regardless of the SVE well connections or whether one or two blowers were operating.

5.2 VAPOR FIELD MEASUREMENTS AND LABORATORY RESULTS

5.2.1 SVE Wells and System

PID measurements at SVE wells and system influent were variable during Year Five. PID measurements at the system influent increased from 1 to 17 ppm in October 2011 and then decreased to near 1 ppm in January 2012. PID measurements at several SVE wells also increased in October 2011, and the measurements at SVE-C and SVE-G increased further from January to March 2012. The increased PID measurements may indicate increased CVOC mobility from changes to well connections and venting.

The trend in the system influent concentrations for PID measurements and analytical results (total VOCs and TCE) are shown on Figure 2. Total VOCs in the influent laboratory samples were below 300 ppbv throughout the year.

The primary CVOC concentrations and total VOCs in each SVE well and the system influent samples since startup are shown on Table 11. The results for April and July 2012 are from the SVE wells in use when the influent sample was collected. The individual CVOC with the highest concentration in the influent stream during Year Five was TCE, with CF and cDCE having the next highest concentrations.

The trend in total VOC concentrations at each SVE well area and the system influent is shown on Figure 3. Concentrations generally decreased during Year Five. Total VOC concentrations in the July 2012 samples were less than in July 2011 at the system influent and at all wells, except SVE-G which increased from 386 to 498 ppbv. Total CVOC concentrations at all SVE wells in the July 2012 samples were 18 to 636 ppbv.

5.2.2 Vapor Monitoring Points

The July 2012 total VOC concentrations (Table 10) were 7.7 to 559 ppbv in the -A VMPs and 85.7 to 5,086 ppbv in the -B VMPs. Total CVOCs were 0.6 to 507 ppbv, except at VMP-2B (815 ppbv), VMP-6B (843 ppbv) and VMP-8B (5,086 ppbv). The individual CVOCs at high concentrations in VMP-8B were CF at 4,200 ppbv and TCE at 390 ppbv, while VMP-2B and -6B contained primarily TCE at 770 ppbv and 660 ppbv, respectively.

The trend in total VOC concentrations in VMPs is shown on Figure 4 for -A VMPs and Figure 5 for -B VMPs. The July 2012 total VOC concentrations were similar to the July 2011 results at most -A VMPs, except at VMP-8A where the concentration decreased from 201 to 8 ppbv. Total VOC concentrations

were higher but generally similar at –B VMPs, except for a decrease at VMP-2B from 28,574 to 840 ppbv and increases at VMP-6B from 321 to 847 ppbv and VMP-8B from 1,842 to 5,086 ppbv.

5.2.3 Results by Treatment Area

The trend in total VOC concentrations at each SVE well and the associated VMPs are shown on Figures 6 to 11; the SVE well concentrations represent the highest reported for each area in samples from April and July 2012. The most recent analytical results (3Q12), shown on Tables 9 and 10, are briefly discussed for each TA in the following paragraphs. The results are compared to the RGs for the fluvial deposits.

TA-1B contains SVE-A, VMP-1A and VMP-1B. The VMPs are located about 15 feet from the SVE well. The 3Q12 total VOC concentrations were:

Location	SVE-A	VMP-1A	VMP-1B
Total VOCs (ppbv)	101	126	135

CVOC concentrations were above RGs for tetrachloroethene (PCE) and TCE in SVE-A, and for CF, PCE and TCE in VMP-1B; no RGs were exceeded in VMP-1A. The trend in total VOC concentrations at these locations is shown on Figure 6. The concentrations were similar to those in Year Four.

TA-1C contains SVE-B, SVE-B-East, VMP-2A and VMP-2B. The VMPs are located about 30 feet from SVE-B. The 3Q12 total VOC concentrations were:

Location	SVE-B	SVE-B-East	VMP-2A	VMP-2B
Total VOCs (ppbv)	636	191	31.1	840

CVOC concentrations were above RGs for PCE and TCE in both SVE wells and VMPs; concentrations were also above RGs for TeCA, CF or cDCE in the SVE wells and VMP-2B. The trend in total VOC concentrations at these locations is shown on Figure 7. The concentrations were slightly higher than in Year Four at SVE-B, were unchanged at VMP-2A, and decreased two orders of magnitude at VMP-2B, returning to the Year Three concentration.

TA-1E contains SVE-C, SVE-C-East, SVE-C-West, VMP-3A, VMP-3B, VMP-4A and VMP-4B. The VMPs are located about 28 feet (VMP-3A/B) and 60 feet (VMP-4A/B) from SVE-C; SVE-C-West is adjacent to VMP-3A/B. The 3Q12 total VOC concentrations were:

Location	SVE-C	SVE-C-East	SVE-C-West	VMP-3A	VMP-3B	VMP-4A	VMP-4B
Total VOCs (ppbv)	45.9	95.4	36.7	22.7	115	559	380

CVOC concentrations were above RGs for PCE and TCE in all three SVE wells and for TeCA in SVE-C. RGs were exceeded for PCE, TCE and/or cDCE in VMP-3B and VMP-4A/B; no RGs were exceeded in VMP-3A. The trend in total VOC concentrations at these locations is shown on Figure 8. The concentrations in SVE-C decreased slightly in Year Five while concentrations at the VMPs were similar to those in Year Four.

TA-2 contains SVE-D, SVE-D-North, SVE-D-South, SVE-E, SVE-E-North, VMP-5A, VMP-5B, VMP-6A and VMP-6B. The VMPs are located about 31 feet (VMP-5A/B) and 45 feet (VMP-6A/B) from SVE-D; SVE-D-South is adjacent to VMP-6A/B. The 3Q12 total VOC concentrations were:

Location	SVE-D	SVE-D-North	SVE-D-South	SVE-E	SVE-E-North	VMP-5A	VMP-5B	VMP-6A	VMP-6B
Total VOCs (ppbv)	91.7	19.0	302	57.6	113	84.7	247	19.1	847

CVOC concentrations were above RGs for PCE and TCE in all five SVE wells and for TeCA in SVE-D-South, SVE-E and SVE-E-North. RGs were exceeded for PCE and TCE in VMP-5A/B and VMP-6A, and for TeCA and TCE in VMP-6B. The trend in total VOC concentrations at these locations is shown on Figure 9. Total VOC concentrations were relatively stable at the SVE wells and VMPs; concentrations in VMP-6A remained significantly lower than in VMP-6B.

TA-3 contains SVE-F, SVE-F-East, SVE-F-West, VMP-7A, VMP-7B, VMP-8A and VMP-8B. The VMPs are located about 15 feet (VMP-7A/B) and 80 feet (VMP-8A/B) from SVE-F; SVE-F-East is adjacent to VMP-8A/B. The 3Q12 total VOC concentrations were:

Location	SVE-F	SVE-F-East	SVE-F-West	VMP-7A	VMP-7B	VMP-8A	VMP-8B
Total VOCs (ppbv)	470	199	169	149	222	7.7	5086

CVOC concentrations were above RGs for PCE and TCE in all three SVE wells, and for TeCA, 1,1,2-TCA, CF, cDCE and methylene chloride in one or more wells. RGs were exceeded for several analytes in VMP-7A and VMP-8B, and for CF in VMP-7B; no RGs were exceeded in VMP-8A. The trend in total VOC concentrations at these locations is shown on Figure 10. Total VOC concentrations were relatively stable at SVE-F during Year Five, except for the anomalously low concentration in April 2012. Concentrations at VMPs 7A/B were similar to those in Year Four, while concentrations decreased

at VMP-8A and increased at VMP-8B. Concentrations at VMP-8B are an order of magnitude higher than at other locations in TA-3.

TA-4 contains SVE-G-Alt, SVE-G-South, VMP-9A, VMP-9B, VMP-10A and VMP-10B. The VMPs are located about 45 feet (VMP-9A/B) and 60 feet (VMP-10A/B) from SVE-Alt. The 3Q12 total CVOC concentrations were:

Location	SVE-G-Alt	SVE-G-South	VMP-9A	VMP-9B	VMP-10A	VMP-10B
Total CVOCs (ppbv)	547	498	447	85.7	452	394

CVOC concentrations were above RGs for several analytes in both SVE wells and for PCE, TCE, CF and/or carbon tetrachloride in the VMPs. The trend in total VOC concentrations at these locations is shown on Figure 11. Total VOC concentrations at VMPs were similar to those in Year Four and in the final sample at the SVE wells; the SVE well concentrations were abnormally low in January and April 2012 samples.

5.3 FLUVIAL SVE MASS ESTIMATES

The VOC mass removed from the fluvial soils is estimated from the average total VOC concentrations in the influent sample (based on the primary CVOC detected), system operating hours and flow rates. VOC concentrations used for mass calculations are shown on Table 12 and the mass emission calculations are shown on Table 13. Approximately 27 pounds of VOCs were removed during Year Five operations and 4,049 pounds since start up.

Influent emission rates are estimated at 0.002 to 0.004 lb/hr during Year Five with an average of 0.003 lb/hr, approximately the same rate as in Year Four. The MSCHD Permit for the SVE system has a VOC emission limit of 5.71 lb/hr.

5.4 RECOMMENDATIONS

The FSVE system was shutdown in July 2012 based on confirmation soil samples meeting the RAO and system influent asymptotically decreasing below 1 ppm. The trend charts for SVE wells and associated VMPs (Figures 6-11) show vapor concentrations have decreased two to four orders of magnitude at most locations since system startup in 2007. Vapor concentrations still exceed the protective soil vapor concentrations (RGs) from the Dunn Field Record of Decision; the CVOCs detected in the July 2012

samples above RGs at the most locations and with the highest concentrations are TCE and CF; relatively high concentrations of TeCA, PCE and cDCE were observed at a few locations.

Groundwater samples from 14 monitoring wells near the FSVE wells will be collected during long-term monitoring (LTM) and the results reviewed for contaminant rebound. None of the 14 wells had concentrations above USEPA MCLs in the most recent samples collected in April 2012. The next LTM event will be in October 2012.

6.0 REFERENCES

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TABLES

TABLE 1
SVE WELL SCHEDULE
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	SVE-A		SVE-B		SVE-C		SVE-D		SVE-E		SVE-F		SVE-G	
Start date	Well	Vents	Well	Vents	Well	Vents	Well	Vents	Well	Vents	Well	Vents	Well	Vents
8/3/2011	A	n/a	B	closed	C	closed	D	closed	-	closed	F-west	closed	G-alt	closed
8/10/2011	-	open	B	open	C	open	D	open	-	open	F-west	open	G-alt	open
8/17/2011	A	n/a	B-east	closed	C-west	closed	-	closed	D-south	closed	F	closed	G-south	closed
8/24/2011	-	open	B-east	open	C-west	open	-	open	D-south	open	F	open	G-south	open
8/31/2011	A	n/a	B	closed	C-east	closed	-	closed	E-north	closed	F	closed	G-alt	closed
9/7/2011	-	open	B	open	C-east	open	-	open	E-north	open	F	open	G-alt	open
9/14/2011	A	n/a	B-east	closed	C	closed	D-north	closed	E	closed	F-east	closed	G-south	closed
9/21/2011	-	open	B-east	open	C	open	D-north	open	E	open	F-east	open	G-south	open
9/28/2011	A	n/a	B	closed	C-west	closed	D	closed	-	closed	F-west	closed	G-alt	closed
10/5/2011	-	open	B	open	C-west	open	D	open	-	open	F-west	open	G-alt	open
10/12/2011	A	n/a	B-east	closed	C-east	closed	-	closed	D-south	closed	F	closed	G-south	closed
10/19/2011	-	open	B-east	open	C-east	open	-	open	D-south	open	F	open	G-south	open
10/26/2011	A	n/a	B	closed	C	closed	-	closed	E-north	closed	F	closed	G-alt	closed
11/2/2011	-	open	B	open	C	open	-	open	E-north	open	F	open	G-alt	open
11/9/2011	A	n/a	B-east	closed	C-west	closed	D-north	closed	E	closed	F-east	closed	G-south	closed
11/16/2011	-	open	B-east	open	C-west	open	D-north	open	E	open	F-east	open	G-south	open
11/23/2011	A	n/a	B	closed	C-east	closed	D	closed	-	closed	F-west	closed	G-alt	closed
11/30/2011	-	open	B	open	C-east	open	D	open	-	open	F-west	open	G-alt	open
12/7/2011	A	n/a	B-east	closed	C	closed	-	closed	D-south	closed	F	closed	G-south	closed
12/14/2011	-	open	B-east	open	C	open	-	open	D-south	open	F	open	G-south	open
12/21/2011	A	n/a	B	closed	C-west	closed	-	closed	E-north	closed	F	closed	G-alt	closed
12/28/2011	-	open	B	open	C-west	open	-	open	E-north	open	F	open	G-alt	open
1/4/2012	A	n/a	B-east	closed	C-east	closed	D-north	closed	E	closed	F-east	closed	G-south	closed
1/11/2012	-	open	B-east	open	C-east	open	D-north	open	E	open	F-east	open	G-south	open
1/18/2012	A	n/a	B	closed	C	closed	D	closed	-	closed	F-west	closed	G-alt	closed
1/25/2012	-	open	B	open	C	open	D	open	-	open	F-west	open	G-alt	open
2/3/2012	A	n/a	B-east	closed	C-west	closed	-	closed	D-south	closed	F	closed	G-south	closed
2/10/2012	-	open	B-east	open	C-west	open	-	open	D-south	open	F	open	G-south	open
2/16/2012	A	n/a	B	closed	C-east	closed	-	closed	E-north	closed	F	closed	G-alt	closed
2/24/2012	-	open	B	open	C-east	open	-	open	E-north	open	F	open	G-alt	open
3/2/2012	A	n/a	B-east	closed	C	closed	D-north	closed	E	closed	F-east	closed	G-south	closed
3/9/2012	-	open	B-east	open	C	open	D-north	open	E	open	F-east	open	G-south	open
3/16/2012	A	n/a	B	closed	C-west	closed	D	closed	-	closed	F-west	closed	G-alt	closed
3/22/2012	-	open	B	open	C-west	open	D	open	-	open	F-west	open	G-alt	open
3/30/2012	A	n/a	B-east	closed	C-east	closed	-	closed	D-south	closed	F	closed	G-south	closed
4/4/2012	-	open	B-east	open	C-east	open	-	open	D-south	open	F	open	G-south	open
4/11/2012	A	n/a	B	closed	C	closed	-	closed	E-north	closed	F	closed	G-alt	closed
4/20/2012	-	open	B	open	C	open	-	open	E-north	open	F	open	G-alt	open

TABLE 1
SVE WELL SCHEDULE
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FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	SVE-A		SVE-B		SVE-C		SVE-D		SVE-E		SVE-F		SVE-G	
Start date	Well	Vents	Well	Vents	Well	Vents	Well	Vents	Well	Vents	Well	Vents	Well	Vents
4/26/2012	A	n/a	B-east	closed	C-west	closed	D-north	closed	E	closed	F-east	closed	G-south	closed
5/3/2012	-	open	B-east	open	C-west	open	D-north	open	E	open	F-east	open	G-south	open
5/10/2012	A	n/a	B	closed	C-east	closed	D-south	closed	-	closed	F-west	closed	G-south	closed
5/17/2012	A	n/a	B	open	C-east	open	D-south	open	-	open	F-west	open	G-south	open
5/24/2012	A	n/a	B	closed	C	closed	D	closed	E	closed	F	closed	G-alt	closed
5/30/2012	-	open	B	open	C	open	D	open	E	open	F	open	G-alt	open
6/7/2012	A	n/a	B-east	closed	C-east	closed	D-south	closed	-	closed	F-east	closed	G-south	closed
6/14/2012	-	open	B-east	open	C-east	open	D-south	open	-	open	F-east	open	G-south	open
6/20/2012	A	n/a	B	closed	C-west	closed	D	closed	E	closed	F-west	closed	G-south	closed
6/28/2012	-	open	B	open	C-west	open	D	open	E	open	F-west	open	G-south	open
7/5/2012	A	n/a	B	closed	C-east	closed	D-south	closed	-	closed	F	closed	G-alt	closed
7/12/2012	A	n/a	B	open	C-east	open	D-south	open	-	open	F	open	G-alt	open
7/18/2012	A	n/a	B-east	closed	C	closed	D	closed	E	closed	F-east	closed	G-south	closed
7/25/2012	-	open	-	open	-	open	-	open	-	open	-	open	-	open

TABLE 2
FLOW RATE AND VACUUM READINGS AT SVE WELLS AND SYSTEM INFLUENT
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	Vent Wells	SVE-A		SVE-B		SVE-C		SVE-D		SVE-E		SVE-F		SVE-G		System	
			Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (scfm)	Vacuum (in. Hg.)
8/5/2011 15:35	1	c	50	76	150	60	180	94	140	50	40	66	100	66	110	>100	600	3.1
8/9/2011 15:38	1	v	60	78	150	60	180	86	140	50	50	64	110	66	110	>100	596	3.0
8/11/2011 15:48	1	c	50	68	150	52	190	88	140	40	50	58	110	60	110	>100	613	2.6
8/12/2011 12:05	1	v	40	86	160	68	180	88	160	56	40	8	110	80	120	>100	540	3.9
8/19/2011 00:00	1	c	80	88	150	74	190	86	110	74	50	82	110	74	120	>100	551	3.8
8/26/2011 14:31	1	v	v	v	160	80	140	94	v	v	50	88	110	80	120	>100	520	4.5
9/2/2011 06:30	1	c	70	86	160	72	180	98	c	c	50	52	140	78	120	>100	530	4.1
9/9/2011 15:33	1	v	v	v	170	78	190	>100	v	v	50	60	150	82	120	>100	515	4.7
9/16/2011 14:00	1	c	60	90	150	74	180	96	60	60	50	54	100	76	60	>100	548	4.0
9/23/2011 16:17	1	v	v	v	160	80	180	92	70	62	50	62	110	82	120	>100	517	4.5
9/30/2011 12:27	1	c	50	88	150	68	190	96	160	52	c	c	110	74	120	>100	576	3.8
10/7/2011 08:14	1	v	v	v	160	70	180	100	160	58	v	v	120	80	110	>100	563	4.1
10/14/2011 12:15	1	c	70	84	160	72	180	100	160	60	c	c	120	80	110	>100	568	4.1
10/21/2011 11:30	1	v	v	v	120	70	190	>100	130	58	v	v	110	70	100	>100	615	3.4
10/28/2011 14:15	1	c	60	84	120	74	180	100	c	c	120	60	110	70	110	>100	601	3.5
11/4/2011 12:36	1	v	v	v	120	76	180	100	v	v	120	70	110	70	110	>100	593	3.4
11/11/2011 07:15	1	c	40	84	110	76	190	98	140	62	130	60	120	72	100	>100	595	3.6
11/18/2011 10:45	1	v	v	v	130	86	190	100	130	72	20	64	130	84	110	>100	544	4.4
11/23/2011 07:20	1	c	50	100	130	90	180	>100	150	74	20	66	120	88	110	>100	537	4.7
12/2/2011 14:32	1	v	40	84	170	60	180	96	160	52	v	v	100	72	140	>100	620	3.5
12/10/2011 08:39	1	c	40	88	140	76	190	>100	c	c	20	76	110	78	100	>100	616	3.8
12/16/2011 10:44	1	v	v	v	130	82	190	>100	v	v	40	52	120	80	100	>100	591	3.9
12/22/2011 13:40	1	c	50	70	120	80	180	100	c	c	20	52	110	88	100	>100	586	3.9
12/30/2011 08:18	1	v	v	v	120	82	190	>100	v	v	20	54	120	78	100	>100	592	3.8
1/6/2012 15:00	1	c	50	70	120	82	190	98	200	40	20	54	110	80	100	>100	581	4.0
1/13/2012 08:28	1	v	v	v	120	84	190	>100	v	v	20	58	120	80	100	>100	586	4.0
1/21/2012 08:37	1	c	50	96	140	84	190	>100	180	62	c	c	110	86	110	>100	556	4.4
1/28/2012 07:30	1	v	v	v	120	80	190	>100	160	58	v	v	110	76	110	>100	596	3.9
2/4/2012 07:44	1	c	40	68	130	80	190	>100	c	c	120	66	100	76	100	>100	591	3.9
2/11/2012 08:44	1	v	v	v	130	76	190	>100	v	v	130	64	120	76	110	>100	597	3.6
2/18/2012 15:30	2	c	50	>100	170	96	200	>100	c	c	160	86	110	>100	130	>100	740	6.0
2/25/2012 09:03	2	v	v	v	170	92	190	98	v	v	140	88	140	92	120	>100	782	5.7
3/3/2012 08:44	2	c	80	>100	170	96	190	>100	190	22	140	88	140	94	120	>100	791	5.8
3/9/2012 15:19	2	v	v	v	170	100	190	96	200	76	20	90	150	100	130	>100	719	6.3
3/17/2012 17:00	1	c	60	86	150	70	190	90	170	52	c	c	110	70	110	>100	606	3.5
3/23/2012 17:04	2	v	v	v	170	88	190	98	190	72	v	v	120	94	120	>100	865	4.6

TABLE 2
FLOW RATE AND VACUUM READINGS AT SVE WELLS AND SYSTEM INFLUENT
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	Vent Wells	SVE-A		SVE-B		SVE-C		SVE-D		SVE-E		SVE-F		SVE-G		System	
			Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (acfm)	Vacuum (in. H_20)	Flow rate (scfm)	Vacuum (in. Hg.)
3/31/2012 12:04	2	c	70	>100	160	94	190	94	c	c	150	88	150	96	120	>100	705	6.1
4/6/2012 15:39	2	v	v	v	160	90	190	98	v	v	130	88	140	90	110	>100	798	5.5
4/11/2012 09:35	2	c	70	>100	160	94	190	>100	190	76	170	82	150	96	120	>100	765	5.8
4/21/2012 07:56	2	v	v	v	170	88	190	>100	v	v	140	86	140	92	110	>100	838	5.4
4/27/2012 08:00	2	c	50	>100	160	96	190	96	180	76	170	82	140	98	110	>100	772	5.7
5/4/2012 09:57	2	v	v	v	160	92	190	96	170	78	160	88	140	98	110	>100	740	5.8
5/11/2012 07:41	1	c	50	98	140	66	160	>100	150	52	c	c	110	64	100	>100	625	2.9
5/18/2012 08:20	1	v	50	80	150	62	190	98	150	56	v	v	100	70	100	>100	620	3.2
5/25/2012 15:00	1	c	50	76	140	60	190	76	150	52	120	52	100	66	100	>100	631	2.8
6/1/2012 09:45	2	v	v	v	160	74	SG	>100	170	58	150	68	140	78	120	>100	904	4.6
6/8/2012 14:26	2	c	SG	>100	160	89	190	89	SG	86	c	c	140	90	SG	>100	819	5.2
6/15/2012 12:03	2	v	v	v	152	80	200	90	160	68	v	v	130	80	SG	>100	883	4.6
7/5/2012 10:05	2	c	40	38	200	68	170	86	SG	94	c	c	140	96	VB	>100	780	5.5
7/13/2012 09:16	2	v	50	52	180	94	190	92	180	90	v	v	160	98	VB	>100	703	6.3
7/21/2012 10:13	2	c	80	>100	160	90	200	86	200	76	160	80	130	90	VB	>100	827	5.1
7/24/2012 09:15	2	-	100	98	160	80	200	90	200	58	160	74	140	82	100	>100	882	4.7

Notes:
(1) - SVE well vacuum measured at well manifold.
(2) - System vacuum measured at blower manifold.
(3) - SVE-A disconnected from conveyance line and opened for venting generally every other week
(4) - SVE-D and SVE-E wells disconnected from conveyance line periodically because of proximity.
(5) - Measurements on 6/22 and 6/29 were made by a temporary operator and are not considered valid.
(6) - Several flow rate measurements not made in June and July due to cloudy site glass (SG) or broken vane (VB)
c: SVE well closed
v: SVE well open for venting
acfm: actual cubic feet per minute
N/R: not recorded
scfm: standard cubic feet per minute
in. Hg. = inches of mercury
in. H_2O - inches of water
0.07353 x in. H_2O = in. Hg.

TABLE 3
VACUUM READINGS AT VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

			8/26/11	9/23/11	10/24/11	11/23/11	12/22/11	1/24/12	2/22/12	3/23/12	4/11/12	5/10/12	6/14/12	7/19/12
Number of Blowers Online			1	1	1	1	1	1	2	2	2	2	2	2
Vent Wells			v	v	v	c	c	c	c	v	c	c	v	c
VMP	Initial SVE Well and Distance (ft)		Vacuum (in.H_2O)											
VMP-1A	SVE-A	15.1	0.6	5.1	5.5	5.0	5.2	5.0	5.0	3.1	4.4	4.5	11.1	8.0
VMP-1B	SVE-A	21.0	0.5	4.8	5.5	5.0	5.0	5.0	4.9	3.1	5.0	4.4	11.4	8.0
VMP-2A	SVE-B	30.7	1.2	5.9	5.1	4.9	4.9	4.8	4.8	5.6	5.8	5.7	11.1	7.6
VMP-2B	SVE-B	37.5	1.2	5.5	4.8	4.6	4.8	4.6	4.7	5.8	5.7	5.4	10.6	6.8
VMP-3A	SVE-C	30.7	1.1	5.3	3.1	2.5	2.9	3.0	3.0	4.4	3.8	5.8	7.7	7.2
VMP-3B	SVE-C	25.5	0.8	3.2	1.6	1.1	1.2	2.1	1.8	14.2	5.2	17.0	7.5	8.1
VMP-4A	SVE-C	60.0	1.0	4.2	3.0	2.4	3.3	2.8	2.7	2.9	2.7	4.1	6.4	5.5
VMP-4B	SVE-C	59.5	1.1	3.6	2.8	2.2	2.9	2.4	2.3	2.6	2.5	4.0	6.0	5.1
VMP-5A	SVE-D	31.0	0.8	1.2	3.7	2.4	2.6	2.5	2.6	3.1	2.8	5.1	6.2	7.2
VMP-5B	SVE-D	31.0	0.9	1.1	3.9	2.3	2.5	2.6	2.5	3.1	2.7	5.2	6.4	7.4
VMP-6A	SVE-E	45.0	1.0	1.0	5.2	2.4	2.4	2.3	2.4	2.3	2.3	4.9	7.6	7.5
VMP-6B	SVE-E	45.0	0.8	0.9	6.3	2.3	2.4	2.4	2.5	2.2	2.3	4.4	9.4	7.4
VMP-7A	SVE-F	15.3	9.5	2.4	6.4	4.5	4.7	5.1	5.0	3.5	4.9	3.7	7.1	4.1
VMP-7B	SVE-F	15.2	9.0	2.4	5.8	4.9	4.8	5.0	4.8	4.1	4.8	3.7	6.7	3.9
VMP-8A	SVE-F	80.4	4.3	7.4	3.4	4.0	4.0	3.9	4.1	2.0	3.1	9.0	11.0	7.9
VMP-8B	SVE-F	80.2	2.9	8.6	2.8	6.0	5.1	5.6	5.2	1.7	2.8	11.7	13.9	10.5
VMP-9A	SVE-G	45.2	5.2	2.6	2.9	3.0	3.1	2.8	3.0	3.1	3.0	3.9	6.0	3.2
VMP-9B	SVE-G	45.2	5.1	2.5	2.8	2.9	3.1	2.9	3.0	3.0	2.9	3.8	5.8	3.2
VMP-10A	SVE-G	60.1	4.0	2.6	3.0	2.9	2.9	2.9	3.0	2.3	2.5	4.0	5.7	3.0
VMP-10B	SVE-G	60.5	4.0	2.6	2.9	2.9	3.0	2.8	2.9	2.0	2.3	3.9	5.5	3.0

Notes:

(1): All VMP have 5-foot screen lengths.
VMP "A" wells (e.g., VMP-1A) were constructed with a screen located near the bottom elevation of the associated SVE well screen.
VMP "B" wells (e.g., VMP-1B) were constructed with a screen located near the top elevation of the associated SVE well screen.

(2): VMP-6A and VMP-6B are located equidistant from SVE -D and SVE-E.

(3): Vacuum readings collected using a Dwyer 475-3-FM Digital Manometer

ft: feet

in. H_2O: inches of water

v: Vent wells open

c: Vent wells closed

TABLE 4
PID MEASUREMENTS AT SVE WELLS AND SYSTEM INFLUENT
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Sample Location							
	SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
Date	PID Measurement (ppm)							
7/29/2011	v	0.7	0.7	0.5	0.9	0.9	2.1	1.4
8/5/2011	0.3	0.7	0.7	0.4	0.9	0.5	1.9	1.4
8/9/2011	2.9	2.3	1.2	1.0	2.3	1.1	9.1	6.4
8/11-12/2011	v	0.9	0.7	0.7	0.8	0.8	2.2	1.5
8/19/2011	0.5	0.9	0.8	0.8	0.9	0.7	1.7	1.1
8/26/2011	v	0.7	0.8	v	0.9	0.7	1.8	1.3
9/2/2011	0.4	0.8	0.7	c	0.9	0.6	1.9	1.6
9/9/2011	v	0.9	0.9	v	1.1	1.0	1.9	1.7
9/16/2011	0.3	0.8	0.8	0.9	0.9	1.0	1.7	1.4
9/23/2011	v	0.8	0.8	0.8	0.4	1.1	1.5	1.4
9/30/2011	0.9	1.5	0.6	0.4	c	1.1	6.0	2.8
10/7/2011	v	10.7	6.5	10.0	v	4.0	7.0	16.9
10/14/2011	8.3	8.2	3.6	6.1	c	4.4	12.6	9.8
10/21/2011	v	8.7	3.2	5.9	v	5.6	12.9	13.6
10/24/2011	11.6	8.0	2.8	6.2	8.0	5.3	12.3	14.0
10/28/2011	11.4	9.1	3.4	c	8.2	5.4	13.1	12.3
11/4/2011	v	9.8	4.3	v	8.4	6.3	13.2	11.2
11/11/2011	10.5	9.2	3.1	6.0	8.3	5..8	12.7	11.8
11/18/2011	v	3.4	5.7	7.9	7.9	5.3	12.0	12.0
11/23/2011	11.4	9.8	3.3	5.8	c	5.9	13.1	13.2
12/2/2011	v	9.6	4.1	5.2	v	4.8	13.2	11.9
12/10/2011	10.1	9.8	4.0	c	8.9	4.9	11.3	10.9
12/16/2011	v	9.8	3.6	v	7.8	6.1	10.9	10.7
12/22/2011	10.5	9.5	3.9	c	7.7	5.8	11.2	10.5
12/30/2011	v	9.7	3.8	v	8.1	5.2	10.9	10.6
1/6/2012	5.5	9.8	8.9	5.7	7.9	4.9	10.8	6.8
1/13/2012	v	0.9	10.1	v	0.5	3.8	11.0	5.6
1/21/2012	0.5	0.8	15.1	7.8	c	2.1	14.4	1.6
1/24/2012	0.3	0.7	31.3	10.2	0.6	0.6	22.4	0.6
1/28/2012	v	0.7	22.4	10.1	v	0.9	21.8	0.8
2/4/2012	0.4	0.8	18.7	v	0.4	1.1	18.7	0.6
2/11/2012	v	0.6	15.5	v	0.7	0.8	15.6	0.7
2/18/2012	0.7	0.9	15.9	c	1.0	0.7	16.4	0.9
2/25/2012	v	0.9	15.5	v	0.8	0.8	15.6	0.7
3/3/2012	0.8	1.0	15.6	8.9	1.1	0.9	17.8	1.1
3/9/2012	v	1.1	15.1	9.1	0.9	1.0	15.8	1.2
3/17/2012	0.9	1.1	14.9	9.0	c	1.0	17.0	1.1
3/23/2012	v	0.8	14.9	9.2	v	0.8	13.4	0.9
3/31/2012	0.7	0.8	15.3	c	0.8	0.9	16.2	0.9
4/6/2012	v	0.6	15.5	v	0.7	0.8	15.6	0.7
4/11/2012	0.2	1.9	1.7	0.5	0.2	0.3	5.4	0.0
4/21/2012	v	0.4	0.3	v	0.3	0.5	0.8	0.4
4/27/2012	0.4	0.7	11.2	3.3	0.9	0.6	8.8	0.6
5/4/2012	v	0.8	2.3	4.1	0.6	0.6	5.9	0.7
5/11/2012	0.3	0.9	6.1	3.9	c	0.6	7.8	0.8
5/18/2012	0.4	0.7	5.9	4.3	v	0.4	5.8	0.8
5/25/2012	0.5	1.1	4.2	0.9	0.3	0.4	5.2	0.6
6/1/2012	v	5.0	4.1	2.6	2.0	2.4	3.7	1.8
6/8/2012	0.0	0.0	0.0	0.0	c	0.0	7.4	0.0
6/15/2012	0.0	0.1	0.1	0.1	v	0.2	1.6	0.2
7/13/2012	0.6	1.0	5.3	3.4	v	0.6	3.4	0.7
7/21/2012	0.5	0.8	0.2	0.0	0.1	0.7	4.0	2.9
7/24/2012	1.0	0.9	0.1	0.0	0.1	0.9	8.3	3.0
7/24/2012	v	1.9	1.4	1.2	2.1	1.4	15.2	v
7/24/2012	v	v	1.4	3.2	v	2.6	v	v

(1) Photo Ionization Detector (PID) manufactured by RAE System (Model: MiniRAE 2000) with a 10.6 eV lamp.
(2) SVE-A disconnected from conveyance line and opened for venting every other week.
(3) SVE-D and SVE-E wells disconnected from conveyance line periodically because of proximity.
(4) PID measurements made at all SVE wells prior to sampling on July 24, 2012.
(5) Measurements on June 22 & 29 were made by a temporary operator and are not considered valid.
(6) PID out of order on July 5; no measurements made.
c: SVE wells closed
PID: photoionization detector
ppm: parts per million
v: SVE wells open for venting

TABLE 5
PID MEASUREMENTS AT VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	SVE Well	Distance from SVE Well (ft)	7/22/2011	10/25/2011	1/27/2012	4/14/2012	7/25/2012
VMP-1A	SVE-A	15.1	0.0	0.4	0.3	0.4	0.0
VMP-1B	SVE-A	21.0	0.9	0.9	0.8	0.7	0.0
VMP-2A	SVE-B	30.7	0.0	0.0	0.1	0.2	0.0
VMP-2B	SVE-B	37.5	95.5	2.1	1.9	2.2	0.0
VMP-3A	SVE-C	30.7	0.0	0.9	0.8	0.6	0.0
VMP-3B	SVE-C	25.5	0.0	1.3	1.4	0.9	0.0
VMP-4A	SVE-C	60.0	0.0	0.4	0.6	0.5	0.0
VMP-4B	SVE-C	59.5	0.0	0.9	1.1	1.0	0.0
VMP-5A	SVE-D	31.0	0.0	0.8	0.9	0.7	0.0
VMP-5B	SVE-D	31.0	0.0	2.8	2.4	3.0	0.0
VMP-6A	SVE-E	45.0	0.0	1.1	1.2	0.8	0.0
VMP-6B	SVE-E	45.0	0.0	1.6	1.6	1.1	0.0
VMP-7A	SVE-F	15.3	4.4	2.4	1.8	3.2	0.0
VMP-7B	SVE-F	15.2	4.5	1.8	1.6	2.2	0.0
VMP-8A	SVE-F	80.4	0.0	1.1	1.0	0.9	0.0
VMP-8B	SVE-F	80.2	1.3	0.9	0.8	0.7	0.0
VMP-9A	SVE-G	45.2	0.0	1.0	1.3	1.1	0.0
VMP-9B	SVE-G	45.2	0.0	0.9	0.9	1.0	0.0
VMP-10A	SVE-G	60.1	2.0	0.8	0.8	0.7	0.0
VMP-10B	SVE-G	60.5	0.0	0.6	0.4	0.4	0.0

Notes:

(1) Photo Ionization Detector (PID) manufactured by RAE Systems (Model: MiniRAE 2000) with a 10.6 eV lamp.
(2) All VMP wells have 5-foot screen lengths. VMP "A" wells (e.g., VMP-1A) were constructed with a screen located near the bottom of the screen of the associated SVE well. VMP "B" wells (e.g., VMP-1B) were constructed with a screen located near the top of the screen of the associated SVE well.
(3) Measurements collected while system offline. System offline overnight prior to measurements.
ft: feet
ppm: parts per million

TABLE 6
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, OCTOBER 2011
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F
	Lab ID	Fluvial Soil	P1104110-001	P1104110-002	P1104110-003	P1104110-004	P1104110-005	P1104110-006
	Date	Vapor	10/24/2011	10/24/2011	10/24/2011	10/24/2011	10/24/2011	10/24/2011
Primary CVOCs	Units	RG						
1,1,2,2-Tetrachloroethane	ppbv	0.55	0.11 J	**29**	0.14 J	**1.3**	<0.2	**6**
1,1,2-Trichloroethane	ppbv	2.03	0.064 J	<2.1	0.076 J	0.065 J	<0.25	1.7
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	0.67	2.7 J	0.062 J	<0.35	<0.34	0.41
1,2-Dichloroethane	ppbv	0.64	<0.35	<2.8	<0.35	<0.35	<0.34	0.43
Carbon Tetrachloride	ppbv	14.22	2	0.53 J	0.32	0.068 J	0.11 J	1.4
Chloroform	ppbv	32.63	14	15	4.3	0.65	0.24 J	**250**
cis-1,2-Dichloroethene	ppbv	39.52	1.4	25	11	2.8	0.61	31
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.14 JB	0.59 JB	0.086 JB	0.12 JB	0.11 JB	**5.4**
Tetrachloroethene (PCE)	ppbv	0.99	**54**	**8**	**66**	**4.3**	**1.2**	**6.8**
trans-1,2-Dichloroethene	ppbv	133.5	0.66	9.9	1.6	1.4	0.46	1.6
Trichloroethene (TCE)	ppbv	2.06	**21**	**160**	**13**	**45**	**21**	**34**
Vinyl Chloride	ppbv	14.77	<0.55	<4.4	<0.55	<0.55	<0.53	1
Total CVOCs			93.9	250	96.5	55.6	23.6	334
Additional VOCs*								
1,1,2-Trichlorotrifluoroethane	ppbv		0.062 J	<1.5	0.064 J	0.061 J	0.061 J	0.52
1,2,4-Trichlorobenzene	ppbv		<0.19	<1.5	<0.19	<0.19	<0.18	<0.19
1,3-Dichlorobenzene	ppbv		<0.23	<1.9	<0.23	<0.23	<0.23	<0.23
2-Propanol (Isopropyl Alcohol)	ppbv		1.3	<4.6	<0.57	<0.57	0.32 J	<0.56
Acetone	ppbv		22	5.1 J	2.7 J	220	5.2	4.2
Acetonitrile	ppbv		1.1	<6.7	<0.84	0.81 J	0.25 J	0.21 J
Carbon Disulfide	ppbv		0.3 J	<18	0.16 J	<2.2	0.073 J	3.7
Dichlorodifluoromethane (CFC 12)	ppbv		0.16 J	0.51 J	1.4	0.38	0.4	1.2
Propene	ppbv		<0.82	<6.5	0.81 J	2.9	0.37 J	0.58 J
Toluene	ppbv		0.45	<3	0.084 J	0.26 J	0.11 J	0.13 J
Trichlorofluoromethane (CFC 11)	ppbv		0.17 J	0.32 J	0.21 J	0.2 J	0.19 J	0.28
Total VOCs**			119	250	97.9	279	29.2	350

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identified in associated blank
J: Analyte identified, but quantitation estimated.

TABLE 6
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, OCTOBER 2011
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-G	SVE-EFF
	Lab ID	Fluvial Soil	P1104110-007	P1104110-008
	Date	Vapor	10/24/2011	10/24/2011
Primary CVOCs	Units	RG		
1,1,2,2-Tetrachloroethane	ppbv	0.55	**8.7**	**11**
1,1,2-Trichloroethane	ppbv	2.03	**3**	1
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	4.7	1.8
1,2-Dichloroethane	ppbv	0.64	**0.96**	0.29 J
Carbon Tetrachloride	ppbv	14.22	**21**	4.9
Chloroform	ppbv	32.63	**79**	**76**
cis-1,2-Dichloroethene	ppbv	39.52	4.9	17
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.66	1.4
Tetrachloroethene (PCE)	ppbv	0.99	**12**	**19**
trans-1,2-Dichloroethene	ppbv	133.5	1.9	4.1
Trichloroethene (TCE)	ppbv	2.06	**110**	**95**
Vinyl Chloride	ppbv	14.77	0.2 J	0.38 J
Total CVOCs			246	230
Additional VOCs*				
1,1,2-Trichlorotrifluoroethane	ppbv		3.2	0.82
1,2,4-Trichlorobenzene	ppbv		1	0.19
1,3-Dichlorobenzene	ppbv		0.53	0.11 J
2-Propanol (Isopropyl Alcohol)	ppbv		<0.57	<0.5
Acetone	ppbv		19	1.9 J
Acetonitrile	ppbv		0.72 J	<0.73
Carbon Disulfide	ppbv		0.37 J	0.15 J
Dichlorodifluoromethane (CFC 12)	ppbv		0.77	0.8
Propene	ppbv		1.4	0.49 J
Toluene	ppbv		0.18 J	0.064 J
Trichlorofluoromethane (CFC 11)	ppbv		0.62	0.35
Total VOCs**			273	234

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identified in associated blank
J: Analyte identified, but quantitation estimated.

TABLE 7
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, JANUARY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-C	SVE-C	SVE-D	SVE-D
	Lab ID	Fluvial Soil	P1200313-001	P1200313-002	P1200313-003	P1200734-001	P1200313-004	P1200734-002
	Date	Vapor	1/24/2012	1/24/2012	1/24/2012	2/23/2012	1/24/2012	2/23/2012
Primary CVOCs	Units	RG						
1,1,2,2-Tetrachloroethane	ppbv	0.55	<21	**36**	<21	<0.23	<4.1	**1**
1,1,2-Trichloroethane	ppbv	2.03	<27	0.5	<26	<0.29	<5.1	<0.28
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	<37	1.1	<36	<0.4	<7.1	<0.39
1,2-Dichloroethane	ppbv	0.64	<36	<0.36	<36	<0.4	<6.9	<0.38
Carbon Tetrachloride	ppbv	14.22	<23	0.62	<23	0.4	<4.5	0.058 J
Chloroform	ppbv	32.63	8.5 J	13	<29	8.8	<5.7	0.26 J
cis-1,2-Dichloroethene	ppbv	39.52	<37	16	<36	5.1	<7.1	0.6
Dichloromethane (Methylene Chloride)	ppbv	2.85	**7.2 JB**	0.14 JB	**7.5 JB**	0.092 JB	1.5 JB	0.12 JB
Tetrachloroethene	ppbv	0.99	**37**	**6.6**	**21 J**	**17**	<4.1	**14**
trans-1,2-Dichloroethene	ppbv	133.5	<37	4.6	<36	0.25 J	<7.1	0.18 J
Trichloroethene (TCE)	ppbv	2.06	**15 J**	**90**	**11 J**	1.9	1.7 J	**9.2**
Vinyl Chloride	ppbv	14.77	<58	0.18 J	<56	<0.63	<11	<0.61
Total CVOCs			60.5	169	32.0	33.5	1.70	25.3
Additional VOCs*								
1,1,2-Trichlorotrifluoroethane	ppbv		<19	0.067 J	<19	0.061 J	<3.7	0.044 J
1,3-Dichlorobenzene	ppbv		<24	<0.24	<24	<0.27	<4.7	<0.26
2-Butanone (MEK)	ppbv		<250	0.64 J	<240	0.32 J	<47	3
Acetone	ppbv		<310	16	65 J	2.1 J	<59	47
Benzene	ppbv		<46	0.13 J	<45	0.29 J	<8.8	0.14 J
Carbon Disulfide	ppbv		<240	4.5	<230	0.86 J	2.2 J	0.26 J
Dichlorodifluoromethane (CFC 12)	ppbv		<30	0.37	<29	1	<5.7	0.19 J
Ethyl Acetate	ppbv		<41	<0.41	<40	<0.44	<7.8	<0.43
Propene	ppbv		<85	0.63 J	<84	1	<16	0.48 J
Toluene	ppbv		<39	0.14 J	<38	0.12 J	<7.4	0.18 J
Trichlorofluoromethane (CFC 11)	ppbv		<26	0.33	<26	0.25 J	<5	0.15 J
Total VOCs**			60.5	190	32.0	35.5	1.70	75.3

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 7
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, JANUARY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-E	SVE-F	SVE-G	SVE-EFF
	Lab ID	Fluvial Soil	P1200313-005	P1200313-006	P1200313-007	P1200313-008
	Date	Vapor	1/24/2012	1/24/2012	1/24/2012	1/24/2012
Primary CVOCs	Units	RG				
1,1,2,2-Tetrachloroethane	ppbv	0.55	**0.7**	0.13 J	0.064 J	**6.5**
1,1,2-Trichloroethane	ppbv	2.03	0.11 J	0.099 J	<0.26	0.86
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	0.089 J	0.36 J	<0.36	1.4
1,2-Dichloroethane	ppbv	0.64	<0.35	0.16 J	<0.35	0.12 J
Carbon Tetrachloride	ppbv	14.22	0.069 J	1.1	0.22 J	4.1
Chloroform	ppbv	32.63	0.78	22	1.8	**50**
cis-1,2-Dichloroethene	ppbv	39.52	2.9	**220**	0.22 J	**97**
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.13 JB	0.43 B	0.14 JB	0.37 B
Tetrachloroethene	ppbv	0.99	**1.9**	**2.6**	0.18 J	**17**
trans-1,2-Dichloroethene	ppbv	133.5	1.8	0.6	<0.36	3.9
Trichloroethene (TCE)	ppbv	2.06	**53**	**15**	1.3	100
Vinyl Chloride	ppbv	14.77	<0.55	0.93	<0.56	0.48
Total CVOCs			61.3	263	3.78	281
Additional VOCs*						
1,1,2-Trichlorotrifluoroethane	ppbv		0.064 J	0.33	0.12 J	1.2
1,3-Dichlorobenzene	ppbv		<0.23	<0.24	<0.24	0.54
2-Butanone (MEK)	ppbv		0.5 J	0.34 J	0.19 J	0.22 J
Acetone	ppbv		3.1	2.2 J	1.5 J	1.9 J
Benzene	ppbv		0.25 J	0.55	0.13 J	0.28 J
Carbon Disulfide	ppbv		0.072 J	0.11 J	<2.3	3.6
Dichlorodifluoromethane (CFC 12)	ppbv		0.41	1	0.46	1.3
Ethyl Acetate	ppbv		1.1	<0.4	<0.39	<0.33
Propene	ppbv		2.6	<0.83	0.23 J	1.5
Toluene	ppbv		0.78	0.72	0.19 J	0.099 J
Trichlorofluoromethane (CFC 11)	ppbv		0.2 J	0.24 J	0.2 J	0.37
Total VOCs**			69.3	266	4.24	290

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 8
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, APRIL 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-B-East	SVE-C	SVE-C-East	SVE-C-West	SVE-D	SVE-D-North	SVE-D-South
	Lab ID	Fluvial Soil	P1201435-001	P1201435-009	P1201435-002	P1201435-016	P1201435-003	P1201435-010	P1201435-004	P1201435-011	P1201435-012
	Date	Vapor	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012
Primary CVOCs	Units	RG									
1,1,2,2-Tetrachloroethane	ppbv	0.55	<0.09	**7.8**	**5.4**	**0.67**	0.17	0.17	0.2	<0.11	**8.4**
1,1,2-Trichloroethane	ppbv	2.03	<0.11	0.046 J	0.043 J	<0.13	0.069 J	<0.14	<0.13	<0.13	0.14 J
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	0.35	0.88	0.48	<0.19	<0.19	<0.19	<0.18	<0.19	<0.19
1,2-Dichloroethane	ppbv	0.64	0.093 J	<0.18	<0.18	<0.18	<0.19	<0.19	<0.18	<0.18	<0.18
Carbon Tetrachloride	ppbv	14.22	0.23	0.18	0.054 J	0.042 J	0.094 J	0.043 J	<0.12	0.039 J	0.04 J
Chloroform	ppbv	32.63	7	13	3.1	0.3	6.9	0.15 J	0.31	0.092 J	0.8
cis-1,2-Dichloroethene	ppbv	39.52	0.13 J	14	1.5	0.96	16	0.58	0.69	0.23	2.6
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.33 B	0.12 JB	0.18 JB	0.12 JB	0.1 JB	0.13 JB	0.14 JB	0.11 JB	0.1 JB
Tetrachloroethene	ppbv	0.99	**8.3**	**5.1**	**1.1**	**2.5**	**33**	**1.1**	**5.3**	**4.4**	**2.8**
trans-1,2-Dichloroethene	ppbv	133.5	0.92	6.5	0.56	0.93	1.1	0.76	0.24	<0.19	1
Trichloroethene (TCE)	ppbv	2.06	**3.3**	**77**	**9.4**	**21**	**10**	**14**	**11**	**2.3**	**46**
Vinyl Chloride	ppbv	14.77	<0.24	<0.29	<0.29	<0.29	<0.3	<0.3	<0.28	<0.29	<0.29
Total CVOCs			20.3	125	21.6	26.4	67.3	16.8	17.7	7.06	61.8
Additional VOCs*											
1,1,2-Trichlorotrifluoroethane	ppbv		0.066 J	0.066 J	0.066 J	0.066 J	0.079 J	0.065 J	0.075 J	0.072 J	0.066 J
1,2,4-Trimethylbenzene	ppbv		0.6	<0.15	<0.15	<0.15	<0.15	0.071 J	<0.15	0.11 J	<0.15
1,2-Dichloropropane	ppbv		0.39	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	0.059 J	<0.16
1,3,5-Trimethylbenzene	ppbv		0.19	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
1,3-Butadiene	ppbv		0.53	<0.33	<0.33	<0.33	<0.34	<0.34	<0.33	<0.33	<0.34
2-Butanone (MEK)	ppbv		2.2	0.47 J	0.29 J	0.47 J	0.4 J	0.47 J	0.35 J	0.6 J	1 J
2-Propanol (Isopropyl Alcohol)	ppbv		4.6	<0.6	<0.6	0.3 J	<0.62	0.26 J	<0.59	<0.6	<0.61
4-Ethyltoluene	ppbv		0.18	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Acetone	ppbv		4.9	2.8 J	18	4	3.9	3.8	2.4 J	3.5	7.2
Acetonitrile	ppbv		0.72	<0.44	0.22 J	0.19 J	<0.45	<0.45	<0.43	<0.44	<0.44
Benzene	ppbv		1.9	0.099 J	0.095 J	0.24	0.15 J	0.2 J	0.075 J	0.48	0.096 J
Cyclohexane	ppbv		1.2	<0.43	<0.43	<0.43	<0.44	<0.44	<0.42	0.21 J	<0.43
Dichlorodifluoromethane (CFC 12)	ppbv		0.34	0.41	0.33	0.44	0.65	0.43	0.35	0.34	0.34
d-Limonene	ppbv		0.29	<0.13	<0.13	<0.13	<0.14	<0.14	<0.13	<0.13	<0.13
Ethanol	ppbv		37	<3.9	<3.9	1.6 J	<4	<4	<3.8	5.8	<4
Ethyl Acetate	ppbv		16	<0.41	<0.41	<0.41	<0.42	<0.42	<0.4	2.2	<0.41
Ethylbenzene	ppbv		0.7	<0.17	<0.17	0.051 J	<0.18	<0.17	<0.17	0.11 J	<0.17
m,p-Xylenes	ppbv		2	<0.34	<0.34	0.18 J	<0.35	0.18 J	<0.33	0.43	<0.34
n-Heptane	ppbv		0.86	<0.18	<0.18	0.064 J	0.096 J	<0.18	<0.18	0.17 J	<0.18
n-Hexane	ppbv		8.3	<0.21	0.077 J	0.19 J	0.17 J	0.09 J	<0.21	0.6	0.098 J
n-Nonane	ppbv		0.44	<0.14	0.05 J	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
n-Octane	ppbv		0.31	<0.16	0.049 J	<0.16	0.07 J	<0.16	<0.16	<0.16	<0.16
o-Xylene	ppbv		0.71	<0.17	<0.17	0.067 J	<0.18	0.074 J	<0.17	0.15 J	<0.17
Propene	ppbv		3.3	0.21 J	0.24 J	1.3	0.65	0.71	0.17 J	0.14 J	0.78
Styrene	ppbv		0.23	<0.17	<0.17	<0.17	<0.18	<0.18	<0.17	<0.17	<0.18
Toluene	ppbv		12	0.089 J	0.14 J	0.54	0.14 J	0.32	0.089 J	1.9	0.08 J
Trichlorofluoromethane (CFC 11)	ppbv		0.16	0.23	0.16	0.15	0.16	0.16	0.16	0.15	0.16
Total VOCs**			121	125	40.1	33.1	72.6	22.2	18.3	22.5	70.3

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 8
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, APRIL 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-E	SVE-E-North	SVE-F	SVE-F-East	SVE-F-West	SVE-G-ALT	SVE-G-South	FSVE-EFF
	Lab ID	Fluvial Soil	P1201435-005	P1201435-017	P1201435-018	P1201435-006	P1201435-013	P1201435-014	P1201435-007	P1201435-019
	Date	Vapor	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012	4/11/2012
Primary CVOCs	Units	RG								
1,1,2,2-Tetrachloroethane	ppbv	0.55	0.045 J	**1.1**	<0.16	<0.11	<0.11	<0.11	**1.1**	**7.1**
1,1,2-Trichloroethane	ppbv	2.03	<0.13	<0.13	<0.2	<0.13	<0.14	<0.14	0.34	0.89
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	<0.18	<0.18	<0.27	<0.19	<0.19	<0.19	1.2 J	0.86
1,2-Dichloroethane	ppbv	0.64	<0.18	<0.18	<0.26	<0.18	<0.18	<0.19	0.12 J	0.1 J
Carbon Tetrachloride	ppbv	14.22	0.06 J	0.067 J	<0.17	0.05 J	<0.12	0.099 J	2.8 J	2.3
Chloroform	ppbv	32.63	0.43	0.55	<0.22	0.42	<0.15	0.92	6.6	**56**
cis-1,2-Dichloroethene	ppbv	39.52	0.55	1.6	<0.27	<0.19	<0.19	<0.19	0.76 J	13
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.19 JB	0.1 JB	0.15 JB	0.21 JB	0.11 JB	0.13 JB	0.22 JB	0.98
Tetrachloroethene	ppbv	0.99	0.52	0.9	<0.16	0.041 J	<0.11	0.22	**1.1 J**	**11**
trans-1,2-Dichloroethene	ppbv	133.5	0.26	0.31	<0.27	<0.19	<0.19	<0.19	0.19	3.2
Trichloroethene (TCE)	ppbv	2.06	**7.5**	**22**	0.06 J	0.16	0.13 J	1.2	**15 J**	**66**
Vinyl Chloride	ppbv	14.77	<0.28	<0.28	<0.42	<0.29	<0.29	<0.3	<0.3	0.28
Total CVOCs			9.37	26.5	0.060	0.671	0.130	2.44	29.2	161
Additional VOCs*										
1,1,2-Trichlorotrifluoroethane	ppbv		0.067 J	0.064 J	0.066 J	0.071 J	0.067 J	0.26	1.1 J	2.3
1,2,4-Trimethylbenzene	ppbv		0.52	<0.15	<0.22	<0.15	<0.15	<0.16	<0.15	0.14
1,2-Dichloropropane	ppbv		0.25	<0.16	<0.23	<0.16	<0.16	<0.17	<0.16	0.095 J
1,3,5-Trimethylbenzene	ppbv		0.14 J	<0.15	<0.22	<0.15	<0.15	<0.16	<0.15	<0.12
1,3-Butadiene	ppbv		<0.32	<0.33	<0.48	<0.33	<0.33	<0.35	<0.34	<0.27
2-Butanone (MEK)	ppbv		1.6 J	0.82 J	0.3 J	0.48 J	0.31 J	0.32 J	0.67 J	0.49 J
2-Propanol (Isopropyl Alcohol)	ppbv		0.69	0.27 J	<0.87	<0.6	<0.6	<0.62	<0.62	0.28 J
4-Ethyltoluene	ppbv		0.14 J	<0.15	<0.22	<0.15	<0.15	<0.16	<0.15	<0.12
Acetone	ppbv		4.8	4.7	3.7 J	2.6 J	1.9 J	2.5 J	3.9	2.8
Acetonitrile	ppbv		0.18 J	<0.43	<0.63	<0.44	<0.44	<0.46	<0.45	<0.36
Benzene	ppbv		2.9	0.069 J	<0.33	0.088 J	0.077 J	0.092 J	0.088 J	0.62
Cyclohexane	ppbv		1.9	<0.42	<0.62	<0.43	<0.43	<0.44	<0.44	0.28 J
Dichlorodifluoromethane (CFC 12)	ppbv		0.35	0.34	0.35	0.35	0.35	0.43	0.55	0.79
d-Limonene	ppbv		0.066 J	<0.13	<0.19	<0.13	<0.13	<0.14	<0.14	<0.11
Ethanol	ppbv		34	1.3 J	<5.7	<3.9	<3.9	<4.1	<4	7
Ethyl Acetate	ppbv		14	<0.4	<0.59	<0.41	<0.41	<0.42	<0.42	1.4
Ethylbenzene	ppbv		0.73	<0.17	<0.25	<0.17	<0.17	<0.18	<0.18	0.15
m,p-Xylenes	ppbv		2.7	<0.33	<0.49	<0.34	<0.34	<0.35	<0.35	0.54
n-Heptane	ppbv		1.1	<0.18	<0.26	<0.18	<0.18	<0.19	<0.19	0.22
n-Hexane	ppbv		3.8	0.072 J	<0.3	<0.21	<0.21	<0.22	<0.22	0.74
n-Nonane	ppbv		0.095 J	<0.14	<0.2	<0.14	<0.14	<0.15	<0.14	<0.12
n-Octane	ppbv		0.26	<0.16	<0.23	<0.16	<0.16	<0.16	<0.16	0.051 J
o-Xylene	ppbv		0.93	<0.17	<0.25	<0.17	<0.17	<0.18	<0.18	0.19
Propene	ppbv		0.46	0.62	<0.62	0.15 J	<0.43	<0.44	0.27 J	0.68
Styrene	ppbv		<0.17	<0.17	<0.25	<0.17	<0.17	<0.18	<0.18	<0.14
Toluene	ppbv		10	<0.19	<0.28	0.11 J	0.066 J	0.15 J	0.087 J	2.2
Trichlorofluoromethane (CFC 11)	ppbv		0.16	0.15	0.16 J	0.16	0.15	0.18	0.26	0.24
Total VOCs**			88.9	32.3	0.41	1.18	0.63	3.31	35.0	182

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 9
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location	Fluvial Soil	SVE-A	SVE-B	SVE-B-East	SVE-C	SVE-C-East	SVE-C-West
	Lab ID	Vapor	P1203035-001	P1203035-010	P1203035-002	P1203035-003	P1203035-017	P1203035-011
	Date	RG	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012
Primary CVOCs	Units							
1,1,2,2-Tetrachloroethane	ppbv	0.55	<0.44	**50**	**34**	**1.3**	0.05 J	0.24
1,1,2-Trichloroethane	ppbv	2.03	<0.55	0.54 J	0.29 J	0.058 J	<0.14	<0.14
1,1-Dichloroethene	ppbv	29.03	0.43 J	2.3	2.9	<0.18	<0.19	<0.19
1,2-Dichloroethane	ppbv	0.64	<0.75	<1.8	<0.73	<0.18	<0.19	<0.19
Carbon Tetrachloride	ppbv	14.22	0.92	1 J	0.7	0.11 J	0.34	0.11 J
Chloroform	ppbv	32.63	7.6	**54**	24	0.64	1	0.7
cis-1,2-Dichloroethene	ppbv	39.52	1.4	**72**	17	1.8	1.1	1.1
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.4 J	<2.1	<0.85	<0.21	<0.22	0.25
Tetrachloroethene	ppbv	0.99	**69**	**26**	**9.9**	**17**	**87**	**18**
trans-1,2-Dichloroethene	ppbv	133.5	0.52 J	40	6.8	1.2	0.15 J	0.69
Trichloroethene (TCE)	ppbv	2.06	**19**	**390**	**95**	**17**	**4.8**	**7.6**
Vinyl Chloride	ppbv	14.77	<1.2	<2.9	0.35 J	<0.29	<0.3	<0.29
Total CVOCs			99.3	636	191	39.1	94.4	28.7
Additional VOCs*								
1,1,2-Trichlorotrifluoroethane	ppbv		<0.39	<0.97	<0.39	0.12	0.17	0.089 J
1,1-Dichloroethane	ppbv		<0.75	<1.8	<0.73	<0.18	<0.19	<0.19
1,2,4-Trichlorobenzene	ppbv		<0.41	<1	<0.4	<0.098	<0.1	<0.1
1,2-Dichloropropane	ppbv		<0.65	<1.6	<0.64	<0.16	<0.16	<0.16
Acetone	ppbv		<13	7.4 J	4.2 J	5.3	1.2 J	1.8 J
Acetonitrile	ppbv		<1.8	<4.4	<1.8	<0.43	<0.45	<0.45
Benzene	ppbv		<0.95	<2.3	<0.93	0.066 J	0.16 J	0.082 J
Bromomethane	ppbv		<0.78	<1.9	<0.76	<0.19	<0.19	<0.19
Cyclohexane	ppbv		<1.8	<4.3	<1.7	<0.42	<0.44	<0.44
Dichlorodifluoromethane (CFC 12)	ppbv		0.45 J	0.71 J	0.53 J	1.2	0.53	0.69
Ethyl Acetate	ppbv		2.2	<4.1	<1.6	<0.41	<0.42	6.1
n-Hexane	ppbv		<0.86	<2.1	<0.84	<0.21	<0.21	0.088 J
Propene	ppbv		<1.8	<4.3	<1.7	0.28 J	0.13 J	0.62
Toluene	ppbv		<0.8	<2	<0.79	<0.19	<0.2	0.39
Trichlorofluoromethane (CFC 11)	ppbv		0.19 J	0.52 J	0.36 J	0.22	0.22	0.24
Total VOCs**			101	636	191	45.9	95.4	36.7

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 9
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location Lab ID Date	Fluvial Soil Vapor RG	SVE-D P1203035-004 7/24/2012	SVE-D-North P1203035-012 7/24/2012	SVE-D-South P1203035-018 7/24/2012	SVE-E P1203035-005 7/24/2012	SVE-E-North P1203035-013 7/24/2012	SVE-F P1203035-019 7/24/2012
Primary CVOCs	Units							
1,1,2,2-Tetrachloroethane	ppbv	0.55	0.26	0.11	**9.5**	**0.92**	**18**	**2.4**
1,1,2-Trichloroethane	ppbv	2.03	<0.13	<0.13	0.15	0.047 J	0.17	0.56
1,1-Dichloroethene	ppbv	29.03	<0.18	<0.19	0.26	0.13 J	0.076 J	1.4
1,2-Dichloroethane	ppbv	0.64	<0.18	<0.18	<0.18	<0.18	<0.18	0.31
Carbon Tetrachloride	ppbv	14.22	0.059 J	0.054 J	0.079 J	0.12	0.074 J	1.9
Chloroform	ppbv	32.63	0.33	0.23	2.1	1	1.2	**230**
cis-1,2-Dichloroethene	ppbv	39.52	2.4	0.48	8.7	2.4	3.4	**170**
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.073 J	<0.21	<0.21	<0.21	0.069 J	2.3
Tetrachloroethene	ppbv	0.99	**9**	**5**	**7.7**	**2.1**	**2.1**	**9.8**
trans-1,2-Dichloroethene	ppbv	133.5	1.8	0.31	12	2.2	1.6	1.3
Trichloroethene (TCE)	ppbv	2.06	**77**	**12**	**260**	**48**	**79**	**43**
Vinyl Chloride	ppbv	14.77	<0.28	<0.29	<0.29	<0.28	<0.29	4.1
Total CVOCs			90.9	18.2	300	56.9	106	467
Additional VOCs*								
1,1,2-Trichlorotrifluoroethane	ppbv		0.094	0.12	0.063 J	0.068 J	0.059 J	0.71
1,1-Dichloroethane	ppbv		<0.18	<0.18	<0.18	<0.18	<0.18	0.45
1,2,4-Trichlorobenzene	ppbv		<0.096	<0.099	<0.099	<0.098	<0.099	<0.098
1,2-Dichloropropane	ppbv		<0.15	<0.16	<0.16	<0.16	<0.16	0.25
Acetone	ppbv		2 J	1.7 J	1.9 J	2.5 J	5.6	1.8 J
Acetonitrile	ppbv		<0.43	<0.44	<0.44	<0.43	0.26 J	<0.43
Benzene	ppbv		0.089 J	<0.23	0.13 J	0.07 J	<0.23	0.27
Bromomethane	ppbv		<0.18	<0.19	0.056 J	<0.19	0.16 J	<0.19
Cyclohexane	ppbv		<0.42	<0.43	<0.43	<0.42	<0.43	0.13 J
Dichlorodifluoromethane (CFC 12)	ppbv		0.48	0.46	0.42	0.5	0.41	1.1
Ethyl Acetate	ppbv		0.18 J	<0.41	<0.41	<0.4	<0.41	<0.41
n-Hexane	ppbv		<0.2	<0.21	0.076 J	0.07 J	0.28	0.097 J
Propene	ppbv		0.27 J	0.15 J	0.69	0.31 J	0.66	0.36 J
Toluene	ppbv		<0.19	<0.2	<0.2	<0.19	0.06 J	<0.19
Trichlorofluoromethane (CFC 11)	ppbv		0.22	0.2	0.21	0.22	0.18	0.29
Total VOCs**			91.7	19.0	302	57.6	113	470

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 9
ANALYTICAL RESULTS SUMMARY - SVE WELLS AND SYSTEM INFLUENT, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	Location	Fluvial Soil	SVE-F-East	SVE-F-West	SVE-G-South	SVE-G-ALT	EFF
	Lab ID	Vapor	P1203035-006	P1203035-014	P1203035-007	P1203035-015	P1203035-008
	Date	RG	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012
Primary CVOCs	Units						
1,1,2,2-Tetrachloroethane	ppbv	0.55	**2.1**	0.17	**3.2**	**3.9**	**6.5**
1,1,2-Trichloroethane	ppbv	2.03	**2.8**	0.35	**2.3**	**3.9**	0.66
1,1-Dichloroethene	ppbv	29.03	0.28	2	14	1.3	2.2
1,2-Dichloroethane	ppbv	0.64	0.25	0.17 J	**1.8 J**	0.57	0.24
Carbon Tetrachloride	ppbv	14.22	0.56	0.5	**43**	**21**	5.6
Chloroform	ppbv	32.63	**140**	20	**69**	**220**	28
cis-1,2-Dichloroethene	ppbv	39.52	13	**96**	11	7.1	6.5
Dichloromethane (Methylene Chloride)	ppbv	2.85	**6.2**	0.26	<2.1	0.52	0.8
Tetrachloroethene	ppbv	0.99	**3.1**	**2.9**	**13**	**38**	**13**
trans-1,2-Dichloroethene	ppbv	133.5	1.4	2	2.1	5.8	2.3
Trichloroethene (TCE)	ppbv	2.06	**28**	**30**	**270**	**180**	**72**
Vinyl Chloride	ppbv	14.77	0.7	12	<2.9	1.1	0.2 J
Total CVOCs			198	166	429	483	138
Additional VOCs*							
1,1,2-Trichlorotrifluoroethane	ppbv		0.078 J	0.064 J	13	30	1.5
1,1-Dichloroethane	ppbv		0.18 J	0.24	<1.8	0.16 J	0.051 J
1,2,4-Trichlorobenzene	ppbv		<0.1	<0.1	1.5	0.28	0.22
1,2-Dichloropropane	ppbv		0.089 J	0.06 J	<1.6	0.15 J	<0.14
Acetone	ppbv		2.6 J	2 J	49	28	2.8
Acetonitrile	ppbv		<0.44	<0.45	<4.4	0.62	0.22 J
Benzene	ppbv		0.21 J	0.52	<2.3	0.18 J	0.069 J
Bromomethane	ppbv		<0.19	<0.2	<1.9	0.28	<0.16
Cyclohexane	ppbv		<0.43	0.52	<4.3	<0.44	<0.37
Dichlorodifluoromethane (CFC 12)	ppbv		0.5	0.61	3.4	2.9	0.98
Ethyl Acetate	ppbv		<0.41	<0.42	<4.1	<0.42	0.23 J
n-Hexane	ppbv		0.15 J	0.3	<2.1	0.19 J	0.073 J
Propene	ppbv		0.39 J	0.61	2 J	1.3	0.56
Toluene	ppbv		0.22	<0.2	<2	0.067 J	0.067 J
Trichlorofluoromethane (CFC 11)	ppbv		0.21	0.26	1.6	0.47	0.4
Total VOCs**			199	169	498	547	144

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 10
ANALYTICAL RESULTS SUMMARY - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis Tennessee

	Location Lab ID Date	Fluvial Soil Vapor RG	VMP1A P1203073-001 7/25/2012	VMP1B P1203073-002 7/25/2012	VMP2A P1203073-003 7/25/2012	VMP2B P1203073-004 7/25/2012	VMP3A P1203073-005 7/25/2012	VMP3B P1203073-006 7/25/2012	VMP4A P1203073-007 7/25/2012	VMP4B P1203073-008 7/25/2012
Primary CVOCs	Units									
1,1,2,2-Tetrachloroethane	ppbv	0.55	<0.11	<0.4	<0.11	<2.9	<0.096	0.065 J	<0.56	<0.12
1,1,2-Trichloroethane	ppbv	2.03	<0.13	<0.5	<0.13	<3.6	<0.12	0.084 J	<0.7	<0.15
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	0.073 J	<0.69	7.4	2.8 J	<0.17	0.073 J	<0.97	0.54
1,2-Dichloroethane	ppbv	0.64	<0.18	<0.67	<0.18	<4.9	<0.16	<0.22	<0.95	<0.2
Carbon Tetrachloride	ppbv	14.22	0.1 J	4.4	0.06 J	<3.2	0.046 J	0.31	<0.61	0.039 J
Chloroform	ppbv	32.63	0.56	**39**	2.8	2.9 J	<0.14	1.1	3.6	1.8
cis-1,2-Dichloroethene	ppbv	39.52	<0.19	0.79	1.6	**81**	<0.17	4.4	**160**	7.6
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.08 J	<0.78	<0.21	<5.7	0.41	0.096 J	0.34 J	0.076 J
Tetrachloroethene	ppbv	0.99	0.14	**72**	**1.1**	**7.6**	<0.097	**11**	**2.7**	0.63
trans-1,2-Dichloroethene	ppbv	133.5	<0.19	0.94	0.5	18	<0.17	1.6	110	28
Trichloroethene (TCE)	ppbv	2.06	0.14	**15**	**9.6**	**700**	0.11 J	**26**	**230**	**28**
Vinyl Chloride	ppbv	14.77	<0.29	<1.1	<0.29	2.4 J	<0.26	<0.35	<1.5	0.11 J
Total CVOCs			1.1	132	23.1	815	0.57	44.7	507	66.8
Additional VOCs*										
1,1,2-Trichlorotrifluoroethane	ppbv		0.061 J	<0.35	0.072 J	<2.6	0.059 J	0.11 J	<0.5	0.063 J
1,1-Dichloroethane (1,1-DCA)	ppbv		<0.18	<0.67	0.083 J	<4.9	<0.16	<0.22	<0.95	<0.2
1,2,4-Trimethylbenzene	ppbv		0.4	<0.55	0.047 J	<4	0.082 J	<0.18	<0.78	0.13 J
1,3-Butadiene	ppbv		<0.33	1 J	0.13 J	<9	0.098 J	1.2	0.58 J	1.7
1,4-Dichlorobenzene	ppbv		2.3	0.26 J	0.4	<3.3	0.083 J	0.37	0.36 J	0.3
2-Butanone (MEK)	ppbv		23	1.2 J	2.4 J	<67	1.1 J	1.6 J	2.3 J	0.71 J
2-Hexanone	ppbv		7.5	<0.66	0.19	<4.9	0.087 J	0.12 J	<0.93	0.088 J
Acetone	ppbv		45	6.4 J	6.1	<84	8.6	12	12 J	20
Acetonitrile	ppbv		0.85	<1.6	0.37 J	<12	0.26 J	<0.53	<2.3	1.2
Acrolein	ppbv		1.7	0.65 J	0.45 J	<35	0.65 J	1.1 J	<6.7	0.48 J
Acrylonitrile	ppbv		0.37	<1.3	<0.34	<9.2	<0.3	<0.41	<1.8	0.58
alpha-Pinene	ppbv		0.046 J	<0.49	<0.13	<3.6	<0.12	0.05 J	<0.69	0.25
Benzene	ppbv		0.093 J	<0.85	<0.23	<6.2	0.22	0.14 J	0.69 J	0.83
Bromomethane	ppbv		<0.19	<0.7	0.061 J	<5.1	<0.17	0.26	<0.99	0.5
Carbon Disulfide	ppbv		34	2.6 J	0.24 J	8.2 J	0.88 J	1 J	30	270
Dichlorodifluoromethane (CFC 12)	ppbv		0.34	0.36 J	0.31	<4	0.34	3.5	22	9.9
Ethanol	ppbv		5.9	<14	2.1 J	<110	9.6	2.4 J	<20	2.1 J
Ethyl Acetate	ppbv		<0.41	<1.5	<0.41	<11	1.4	<0.49	<2.1	<0.44
Naphthalene	ppbv		0.78	<0.52	0.34	<3.8	0.12 J	0.17	<0.73	0.39
n-Hexane	ppbv		0.3	<0.77	0.12 J	<5.6	0.11 J	<0.25	<1.1	0.15 J
n-Nonane	ppbv		0.85	<0.52	<0.14	<3.8	0.12 J	<0.17	<0.73	0.07 J
n-Octane	ppbv		0.22	<0.58	<0.16	<4.3	0.072 J	<0.19	<0.82	0.076 J
Propene	ppbv		1.2	3.2	0.31 J	25	0.65	51	<2.2	5
Tetrahydrofuran (THF)	ppbv		<0.25	0.53 J	0.51	<6.7	0.47	1.1	1 J	3.1
Toluene	ppbv		0.21	<0.72	0.092 J	<5.3	0.68	0.087 J	<1	0.34
Trichlorofluoromethane (CFC 11)	ppbv		0.17 J	0.16 J	0.23 J	<3.5	0.17 J	0.2 J	<0.68	0.17 J
Total VOCs**			126	135	31.1	840	22.7	115	559	380

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 10
ANALYTICAL RESULTS SUMMARY - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis Tennessee

	Location Lab ID Date	Fluvial Soil Vapor RG	VMP5A P1203073-009 7/25/2012	VMP5B P1203073-010 7/25/2012	VMP6A P1203073-011 7/25/2012	VMP6B P1203073-012 7/25/2012	VMP7A P1203073-014 7/26/2012	VMP7B P1203073-015 7/26/2012	VMP8A P1203073-016 7/26/2012	VMP8B P1203073-017 7/26/2012
Primary CVOCs	Units									
1,1,2,2-Tetrachloroethane	ppbv	0.55	0.42	0.53 J	<0.12	**130**	<1.2	<0.38	<0.19	<17
1,1,2-Trichloroethane	ppbv	2.03	<0.15	<1.5	<0.15	<3.6	<1.6	0.13 J	<0.24	**7.7 J**
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	<0.21	<2	<0.21	<5	<2.1	<0.65	<0.33	<30
1,2-Dichloroethane	ppbv	0.64	<0.2	<2	<0.2	<4.9	<2.1	<0.64	<0.33	<29
Carbon Tetrachloride	ppbv	14.22	<0.13	<1.3	<0.13	<3.1	<1.4	<0.41	<0.21	<19
Chloroform	ppbv	32.63	0.38	<1.6	0.64	<4	1.7 J	**88**	1.9	**4200**
cis-1,2-Dichloroethene	ppbv	39.52	0.53	3.8	0.68	15	**75**	0.78	<0.33	**120**
Dichloromethane (Methylene Chloride)	ppbv	2.85	0.074 J	<2.3	<0.23	<5.7	<2.4	1.8	0.39	**210**
Tetrachloroethene	ppbv	0.99	**8**	**21**	**1**	**18**	0.78 J	0.76	0.7	**140**
trans-1,2-Dichloroethene	ppbv	133.5	1.3	2 J	0.18 J	20	<2.1	<0.65	<0.33	18 J
Trichloroethene (TCE)	ppbv	2.06	**48**	**220**	**11**	**660**	**8.4**	0.88	0.3	**390**
Vinyl Chloride	ppbv	14.77	<0.32	<3.1	<0.32	<7.7	<3.3	<1	<0.52	<46
Total CVOCs			58.7	247	13.5	843	85.9	92.4	3.3	5086
Additional VOCs*										
1,1,2-Trichlorotrifluoroethane	ppbv		0.088 J	<1	0.055 J	<2.6	<1.1	<0.34	<0.17	<15
1,1-Dichloroethane (1,1-DCA)	ppbv		<0.2	<2	<0.2	<4.9	<2.1	<0.64	<0.33	<29
1,2,4-Trimethylbenzene	ppbv		<0.17	<1.6	<0.17	<4	<1.7	<0.52	0.13 J	<24
1,3-Butadiene	ppbv		0.5	<3.6	<0.37	<8.9	<3.8	<1.2	1.2	<53
1,4-Dichlorobenzene	ppbv		0.24	<1.3	0.28	<3.3	<1.4	0.24 J	0.27	<20
2-Butanone (MEK)	ppbv		0.71 J	<27	1.7 J	<67	<29	2.9 J	2.1 J	<400
2-Hexanone	ppbv		<0.2	<2	0.11 J	<4.8	<2.1	0.41 J	<0.32	<29
Acetone	ppbv		2 J	8.7 J	3.6	19 J	<36	40	3.2 J	<500
Acetonitrile	ppbv		<0.49	<4.8	0.49	<12	<5.1	<1.5	<0.78	<70
Acrolein	ppbv		<1.4	<14	0.19 J	<34	<15	0.63 J	0.43 J	<210
Acrylonitrile	ppbv		<0.38	<3.7	<0.38	<9	<3.9	<1.2	<0.61	<54
alpha-Pinene	ppbv		<0.15	<1.4	<0.15	<3.5	<1.5	<0.46	<0.24	<21
Benzene	ppbv		0.22 J	<2.5	<0.26	<6.1	<2.7	<0.81	<0.41	<37
Bromomethane	ppbv		<0.21	<2.1	<0.21	<5.1	<2.2	<0.66	<0.34	<30
Carbon Disulfide	ppbv		7.8	<26	0.27 J	29 J	1.1 J	85	1 J	12 J
Dichlorodifluoromethane (CFC 12)	ppbv		0.28	<1.6	0.29	<4	<1.7	0.38 J	0.44	<24
Ethanol	ppbv		1.2 J	<42	2.1 J	<100	63	3.8 J	1.7 J	<630
Ethyl Acetate	ppbv		<0.46	<4.4	<0.45	3.7 J	<4.7	4.5	0.31 J	<65
Naphthalene	ppbv		0.18	<1.5	0.14 J	3.9	<1.6	<0.49	0.11 J	<22
n-Hexane	ppbv		0.44	<2.3	<0.23	<5.6	<2.4	0.36 J	<0.37	<33
n-Nonane	ppbv		<0.16	<1.5	<0.16	<3.7	<1.6	<0.49	<0.25	<22
n-Octane	ppbv		<0.18	<1.7	<0.17	<4.2	<1.8	<0.55	<0.28	<25
Propene	ppbv		16	3.3 J	0.25 J	<11	2.5 J	<1.5	0.77	27 J
Tetrahydrofuran (THF)	ppbv		0.35	<2.7	0.79	<6.7	<2.9	<0.87	1.5	<40
Toluene	ppbv		0.17 J	<2.1	0.09 J	<5.2	<2.3	0.66 J	0.16 J	<31
Trichlorofluoromethane (CFC 11)	ppbv		0.17 J	<1.4	0.18 J	<3.5	<1.5	0.18 J	0.24 J	<21
Total VOCs**			84.7	247	19.1	847	149	222	7.7	5086

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 10
ANALYTICAL RESULTS SUMMARY - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis Tennessee

	Location	Fluvial Soil	VMP9A	VMP9B	VMP10A	VMP10B
	Lab ID	Vapor	P1203073-018	P1203073-019	P1203073-020	P1203073-021
	Date	RG	7/26/2012	7/26/2012	7/26/2012	7/26/2012
Primary CVOCs	Units					
1,1,2,2-Tetrachloroethane	ppbv	0.55	<0.72	<0.12	<1.3	0.37 J
1,1,2-Trichloroethane	ppbv	2.03	<0.91	<0.15	<1.6	<0.72
1,1-Dichloroethene (1,1-DCE)	ppbv	29.03	2.8	0.23	1.8 J	0.49 J
1,2-Dichloroethane	ppbv	0.64	0.47 J	<0.2	<2.2	<0.97
Carbon Tetrachloride	ppbv	14.22	9	3.5	**79**	10
Chloroform	ppbv	32.63	**330**	**43**	8.3	**200**
cis-1,2-Dichloroethene	ppbv	39.52	6.2	0.37	<2.2	1.3
Dichloromethane (Methylene Chloride)	ppbv	2.85	<1.4	<0.23	<2.5	<1.1
Tetrachloroethene	ppbv	0.99	**6.9**	**12**	**44**	**70**
trans-1,2-Dichloroethene	ppbv	133.5	1.4	1.7	<2.2	8.1
Trichloroethene (TCE)	ppbv	2.06	**75**	**8.4**	**250**	**96**
Vinyl Chloride	ppbv	14.77	<1.9	<0.32	<3.4	<1.5
Total CVOCs			432	69.2	383	386
Additional VOCs*						
1,1,2-Trichlorotrifluoroethane	ppbv		<0.65	0.099 J	67	6.5
1,1-Dichloroethane (1,1-DCA)	ppbv		1.8	0.26	<2.2	<0.97
1,2,4-Trimethylbenzene	ppbv		<1	0.057 J	<1.8	<0.8
1,3-Butadiene	ppbv		<2.2	0.13 J	<4	<1.8
1,4-Dichlorobenzene	ppbv		0.4 J	0.31	<1.5	<0.65
2-Butanone (MEK)	ppbv		1.1 J	1.8 J	<30	2.2 J
2-Hexanone	ppbv		<1.2	0.19 J	<2.1	<0.96
Acetone	ppbv		8.5 J	6.6	10 J	7.3 J
Acetonitrile	ppbv		<3	1.2	<5.2	<2.3
Acrolein	ppbv		<8.7	0.2 J	<15	<6.9
Acrylonitrile	ppbv		<2.3	<0.37	<4	<1.8
alpha-Pinene	ppbv		<0.89	<0.15	<1.6	<0.7
Benzene	ppbv		<1.6	0.13 J	<2.7	0.49 J
Bromomethane	ppbv		<1.3	0.63	<2.3	<1
Carbon Disulfide	ppbv		0.8 J	4.1	3.6 J	7.7 J
Dichlorodifluoromethane (CFC 12)	ppbv		13	0.67	2.2	0.61 J
Ethanol	ppbv		<26	2.8 J	<47	<21
Ethyl Acetate	ppbv		<2.8	<0.45	<4.9	<2.2
Naphthalene	ppbv		<0.95	0.3	<1.7	<0.75
n-Hexane	ppbv		<1.4	0.12 J	<2.5	<1.1
n-Nonane	ppbv		<0.95	<0.15	<1.7	<0.75
n-Octane	ppbv		<1.1	<0.17	<1.9	<0.84
Propene	ppbv		<2.9	1.3	<5.1	<2.3
Tetrahydrofuran (THF)	ppbv		0.99 J	0.9	<3	1.4
Toluene	ppbv		<1.3	0.12 J	<2.3	0.5 J
Trichlorofluoromethane (CFC 11)	ppbv		0.57 J	0.21 J	0.94 J	0.32 J
Total VOCs**			447	85.7	452	394

Notes:
ppbv: parts per billion volume
RG: remediation goal
RL: Reporting Limit
<: Analyte not detected above RL
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
Analytes reported above RG in **bold**
DQE Flags:
B: Analyte identifed in associated blank
J: Analyte positively identified, but quantitation estimated.

TABLE 11
HISTORICAL RESULTS FOR PRIMARY CVOCs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Sample Date	Analyte	SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
		ppb(v/v)							
7/25/2007	1,1,2,2-Tetrachloroethane	410	230	110000	140000	<3800	150	2600	290000
Base 1	Chloroform	850	52	4400	530	<3800	32	610000	53000
	cis-1,2-Dichloroethene	10000	210	450000	10000	5500F	130	5500	220000
	Tetrachloroethene	590	16	10000	18000	5700	10	13000	19000
	Trichloroethene	38000	960	1300000	740000	320000	670	260000	670000
	Total VOCs	50570	1503	1876600	908000	330300	1003	925500	1261100
8/23/2007	1,1,2,2-Tetrachloroethane	13	14	23000	26000	35	12	13000	8500
Base 4	Chloroform	1600	4.7	330	110	6.8	4.2	94000	4000
	cis-1,2-Dichloroethene	210	4.1	17000	1600	28	3.8	1400	3500
	Tetrachloroethene	120	0.72	1000	1500	4.8	0.62	2800	530
	Trichloroethene	700	17	37000	37000	540	15	27000	14000
	Total VOCs	3400	48	80020	66920	628	41	149440	31560
9/19/2007	1,1,2,2-Tetrachloroethane	4	2	1900	81	740	0.95	4000	70
Base 5	Chloroform	7200	3.8	76	6.3	30	4.6	22000	3100
	cis-1,2-Dichloroethene	240	4.7	2700	26	340	5.8	260	3200
	Tetrachloroethene	420	0.21	190	9.7	63	0.2	1300	<170
	Trichloroethene	1600	15	7300	370	5200	19	5900	12000
	Total VOCs	11130	28	12340	493	6406	33	37860	19090
10/18/2007	1,1,2,2-Tetrachloroethane	14	3.3	3200	3700	3.1	2.8	1100	3100
4Q07	Chloroform	4200	1.6	110	35	1.4	1.5	6200	2000
	cis-1,2-Dichloroethene	120	1.2	3300	210	1.1	1	73	1600
	Tetrachloroethene	260	0.78	340	450	0.73	0.86	390	470
	Trichloroethene	1100	6	16000	4600	5.5	5.3	1500	8100
	Total VOCs	6507	18	22840	8960	17	17	10663	15930
1/17/2008	1,1,2,2-Tetrachloroethane	730	10	410	4500	14	9.9	450	1000
1Q08	Chloroform	5300	16	60	38	17	21	32000	3100
	cis-1,2-Dichloroethene	140	17	2100	140	18	22	210	3500
	Tetrachloroethene	190	2.5	170	300	3.5	860	1100	330
	Trichloroethene	720	51	13000	3100	68	68	5500	11000
	Total VOCs	7985	101	15680	8040	127	981	40550	19830
4/24/2008	1,1,2,2-Tetrachloroethane	76	1.5	500	4300	2.7	<0.2	9.5	1800
2Q08	Chloroform	4800	0.48	170	7	5.1	0.47	6.3	2200
	cis-1,2-Dichloroethene	21	1.3	2500	110	11	0.64	0.72	3100
	Tetrachloroethene	22	0.062	180	190	2	<0.2	0.29	170
	Trichloroethene	94	2	13000	2600	120	1.1	3.5	7400
	Total VOCs	5095.3	9.99	16350	7200	147.16	5.15	25.38	15204
7/16/2008	1,1,2,2-Tetrachloroethane	4.4	9.8	20000	14000	7.2	9.4	420	2700
3Q08	Chloroform	6.7	1.9	160	<240	1.6	1.6 F	2000	420
	cis-1,2-Dichloroethene	1	6	4000	880	5.2	5.7	47	1400
	Tetrachloroethene	2	0.55	59	670	0.49	0.46 F	27	140
	Trichloroethene	13	24	13000	28000	24	24	600	6800
	Total VOCs	24.1	39.8	37429	43550	36.4	39.1	3212.3	11557
10/17/2008	1,1,2,2-Tetrachloroethane	5.2	2.8	9400	29000	20	38	25	6500
4Q08	Chloroform	5	5.9	160 F	70	6.7	8.7	9.8	2000
	cis-1,2-Dichloroethene	6.8	7.1	3500	320	7.8	11	8.6	2200
	Tetrachloroethene	3.8	<2	330	680	0.88	1.1	0.91	200
	Trichloroethene	12	45	38000	37000	55	70	63	15000
	Total VOCs	32.8	60.8	60590	84280	107.5	135.9	112.4	27470

TABLE 11
HISTORICAL RESULTS FOR PRIMARY CVOCs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Sample Date	Analyte	SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
		ppb(v/v)							
1/19/2009	1,1,2,2-Tetrachloroethane	65	0.76	N/A	11	<2	<2	18	29
1Q09	Chloroform	89	1.2	N/A	0.54	<2	<2	100	970
	cis-1,2-Dichloroethene	59	8.2	N/A	0.78	<3	<3	6.4	350
	Tetrachloroethene	9.3	0.84	N/A	2.8	<2	<2	<1.9	18
	Trichloroethene	36	14	N/A	9.8	<2	<2	5.9	580
	Total VOCs	272	35.8	N/A	29	1.3	2.4	140.7	2168
4/24/2009	1,1,2,2-Tetrachloroethane	0.06	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	28
2Q09	Chloroform	0.18	0.12	0.12 F	0.11	0.1	0.076	0.1	680
	cis-1,2-Dichloroethene	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	110
	Tetrachloroethene	0.21	0.13	0.1 F	<0.2	<0.2	0.054	<0.2	32
	Trichloroethene	0.18	0.19	0.14 F	0.14	0.091	0.14	0.16	330
	Total VOCs	2	0.92	3.6	0.6	1.18	5.43	1.4	1291
6/29/2009	1,1,2,2-Tetrachloroethane	69	0.082	2.1	58	0.066	0.086	1.6	47
3Q09	Chloroform	43	0.12	0.88	4.4	0.079	0.44	3.7	220
	cis-1,2-Dichloroethene	15	0.096	0.34	11	<0.3	<0.3	0.14	110
	Tetrachloroethene	33	0.062	0.098	51	0.41	0.046	0.083	31
	Trichloroethene	37	0.2	2.5	130	0.12	0.13	1.3	140
	Total VOCs	215	14.0	20.2	270	14.8	18.1	20.0	649
11/10/2009	1,1,2,2-Tetrachloroethane	58	0.05	0.61	<0.22	<0.22	<0.22	0.62	27
4Q09	Chloroform	41	0.14	1	0.15	0.14	0.16	0.54	300
	cis-1,2-Dichloroethene	6.4	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	54
	Tetrachloroethene	53	<0.23	<0.54	<0.22	<0.22	<0.22	<0.23	27
	Trichloroethene	75	0.13	0.93	0.1	0.11	0.089	0.29	240
	Total VOCs	265	6.59	59.3	4.78	3.74	7.83	16.3	730
1/27/2010	1,1,2,2-Tetrachloroethane	31	0.23	0.3	30	0.053	0.11	0.4	17
1Q10	Chloroform	3.1	0.56	0.64	31	0.52	0.51	1	210
	cis-1,2-Dichloroethene	6	0.11	0.17	8.4	0.1	>0.39	0.1	30
	Tetrachloroethene	74	0.089	0.11	42	0.96	0.075	0.12	24
	Trichloroethene	54	0.4	0.88	66	0.36	0.32	0.75	130
	Total VOCs	170	72	25	294	33	11	69	472
4/28/2010	1,1,2,2-Tetrachloroethane	2.1	33	0.98	19	5.3	8.6	140	24
2Q10	Chloroform	11	20	5.4	3.5	2.7	430	690	200
	cis-1,2-Dichloroethene	3.3	23	8	5.5	8.8	120	26	51
	Tetrachloroethene	20	5.3	11	46	3	19	17	19
	Trichloroethene	20	86	20	53	78	71	350	110
	Total VOCs	59	178	92	130	106	714	1330	428
7/13/2010	1,1,2,2-Tetrachloroethane	4.5	66	0.48	20	3.2	11	280	22
3Q10	Chloroform	9.1	24	2.3	3	4.7	530	1100	130
	cis-1,2-Dichloroethene	3.2	59	5.1	5.1	14	160	55	50
	Tetrachloroethene	35	14	65	11	4	18	57	21
	Trichloroethene	29	240	28	42	160	80	950	100
	Total VOCs	96.8	442	118	122	216	888	2617	353
10/21/2010	1,1,2,2-Tetrachloroethane	17	<0.23	<0.24	15	<0.22	<0.23	<0.23	2.4
4Q10	Chloroform	18	<0.32	0.11	1.7	<0.31	0.076	0.07	15
	cis-1,2-Dichloroethene	3.3	<0.39	<0.41	4.9	<0.39	<0.4	<0.4	5.9
	Tetrachloroethene	47	<0.23	<0.24	6.6	<0.23	<0.23	<0.23	3.1
	Trichloroethene	41	<0.29	<0.31	45	<0.28	<0.29	<0.29	14
	Total VOCs	171	7.3	9.8	80.9	11.2	7.6	5.7	47.2

TABLE 11
HISTORICAL RESULTS FOR PRIMARY CVOCs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Sample Date	Analyte	SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
		ppb(v/v)							
1/11/2011	1,1,2,2-Tetrachloroethane	0.65	0.24	0.34	1.4	9.8	16	51	20
2/5/2011	Chloroform	26	7.3	15	12	270	3300	2400	60
1Q11	cis-1,2-Dichloroethene	3.3	7.3	1.3	0.64	14	130	76	110
Rebound	Tetrachloroethene	140	5.8	13	1.1	7.6	160	70	27
	Trichloroethene	42	24	15	35	190	720	3400	76
	Total VOCs	216	282	50.4	52.8	512	4481	6157	321
4/20/2011	1,1,2,2-Tetrachloroethane	1.5	38	0.15	9.7	8.1	<2.2	130	31
2Q11	Chloroform	13	28	9.1	0.61	6.8	4.2	370	130
	cis-1,2-Dichloroethene	0.55	30	16	2.1	2.7	<3.8	15	19
	Tetrachloroethene	12	12	8.2	14	0.97	0.44	22	15
	Trichloroethene	10	130	13	16	30	1.1	180	74
	Total VOCs	61	258	209	49.5	52.5	1072	849	362
7/20/2011	1,1,2,2-Tetrachloroethane	9.1	34	13	15	6.5	5.4	21	15
3Q11	Chloroform	140	80	85	100	92	210	180	220
	cis-1,2-Dichloroethene	26	37	24	18	99	58	4.2	40
	Tetrachloroethene	7.9	7.9	5.6	6.8	8.6	6.2	14	11
	Trichloroethene	46	100	60	44	50	29	100	67
	Total VOCs	449	666	433	370	287	343	386	388
10/24/2011	1,1,2,2-Tetrachloroethane	0.11	29	0.14	1.3	<0.2	6	8.7	11
4Q11	Chloroform	14	15	4.3	0.65	0.24	250	79	76
	cis-1,2-Dichloroethene	1.4	25	11	2.8	0.61	31	4.9	17
	Tetrachloroethene	54	8	66	4.3	1.2	6.8	12	19
	Trichloroethene	21	160	13	45	21	34	110	95
	Total VOCs	119	250	98	279	29	350	273	234
1/24/2012	1,1,2,2-Tetrachloroethane	<21	36	<0.23	1	0.7	0.13	0.064	6.5
2/23/2012	Chloroform	8.5	13	8.8	0.26	0.78	22	1.8	50
1Q12	cis-1,2-Dichloroethene	<37	16	5.1	0.6	2.9	220	0.22	97
	Tetrachloroethene	37	6.6	17	14	1.9	2.6	0.18	17
	Trichloroethene	15	90	1.9	9.2	53	15	1.3	100
	Total VOCs	61	190	35	75	69	266	4	290
4/11/2012	1,1,2,2-Tetrachloroethane	<0.09	7.8	0.7	0.2	1.1	<0.16	<0.11	7.1
2Q12	Chloroform	7	13	0.3	0.3	0.6	<0.22	0.9	56
	cis-1,2-Dichloroethene	0.1	14	1.0	0.7	1.6	<0.27	<0.19	13
	Tetrachloroethene	8.3	5.1	2.5	5.3	0.9	<0.16	0.2	11
	Trichloroethene	3.3	77	21	11	22	0.1	1.2	66
	Total VOCs	121	125	33	18	32	0.4	3.3	182
7/24/2012	1,1,2,2-Tetrachloroethane	<0.44	34	1.3	0.26	0.92	2.1	3.2	6.5
3Q12	Chloroform	7.6	24	0.64	0.33	1	140	69	28
	cis-1,2-Dichloroethene	1.4	17	1.8	2.4	2.4	13	11	6.5
	Tetrachloroethene	69	9.9	17	9	2.1	3.1	13	13
	Trichloroethene	19	95	17	77	48	28	270	72
	Total VOCs	101	191	46	92	58	199	498	144

Notes
<: Result is less than laboratory reporting limit.
Total VOCs = Sum of detected analytes above reporting limit.
ppb v/v: parts per billion volume per volume
SVE: soil vapor extraction
VOC: volatile organic compound

TABLE 12
VOC CONCENTRATIONS FOR MASS CALCULATIONS
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

	System Influent		
Sample Date	PID Reading (ppm)	Laboratory Total VOC Influent Concentration (ppbv)	VOC Concentration Used for Mass Emission Calculations (ppbv)
7/25/2007	NR	1,261,000	1,261,000
7/26/2007	>10,000	NS	903,250 (2)
7/27/2007	1091	NS	545,500
7/28/2007	538	NS	269,000
7/29/2007	486	NS	243,000
7/30/2007	279	NS	139,500
8/3/2007	NR(3)	119,700	119,700
8/13/2007	NR	NS	109,745(4)
8/16/2007	116	99,790	99,790
8/23/2007	74.3	31,560	31,560
9/19/2007	21.3	14,800	14,800
10/18/2007	17.5	15,930	15,930
1/17/2008	18.8	19,830	19,830
3/20/2008	10.4	NS	19,076(5)
4/17/2005	34.5	NS	34,500(6)
4/24/2008	13.5	15,204	15,204
7/16/2008	17.6	11,557	11,557
10/17/2008	44.3	27,470	27,470
1/19/2009	3.7	2,168	2,168
4/24/2009	12.1	1,291	1,291
6/29/2009	0.8	649	649
11/5/2009	0.7	730	730
1/27/2010	0.5	472	472
4/28/2010	0.6	428	428
7/13/2010	1.2	353	353
10/21/2010	0.8	47.2	47
2/5/2011	0.6	321	321
4/20/2011	0.7	362	362
7/20/2011	11.2	388	388
10/24/2011	14.0	234	234
1/24/2012	0.6	290	290
4/11/2012	0.0	182	182
7/24/2012	3.0	144	144

Notes:

1) Laboratory total VOC concentration or PID reading used for calculation unless noted otherwise.
2) Concentration is average of concentrations from 07/25/07 and 07/27/07.
3) To minimize system operation time, the SVE system was online for laboratory sampling only.
4) Concentration is average of concentrations from 08/03/07 and 08/16/07.
5) Start of Rebound Event #1. 96.2% of 1/17/08 concentration based on online SVE wells.
6) End of Rebound Event #1. Concentration from PID readings.
7) System shutdown for Rebound #2 on 10/21/10 and re-started 1/19/11.
8) Partial shutdown 4/28/11 to 7/25/11; only SVE-F and SVE-G connected to blower.

NR: PID reading not collected
NS: Sample not collected.
PID: Photoionization Detector
ppbv: parts per billion by volume
ppm: parts per million

TABLE 13
MASS EMISSIONS CALCULATIONS
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

SVE System Data				Influent			
Start Date	End Date	Hours Operating Between Dates	Average Flow Rate (scfm)	Average Influent VOC Concentration (ppbv)	Influent Emission Rate[(1)] (lb/hr)	Estimated VOC Mass Removal During Period (lbs)	Cumulative Mass Removed From Fluvial Subsurface (lbs)
7/25/2007	7/25/2007	4	755	1,082,125	17.0	68.0	68
7/26/2007	7/26/2007	4	755	724,375	11.4	45.5	113
7/27/2007	7/27/2007	24	785	407,250	6.7	159.6	273
7/28/2007	7/28/2007	24	746	256,000	4.0	95.3	368
7/29/2007	7/29/2007	24	741	191,250	2.9	70.8	439
7/30/2007	8/2/2007	66	739	129,600	2.0	131.5	571
8/3/2007	8/12/2007	20	740	114,723	1.8	35.3	606
8/13/2007	8/15/2007	39	602	104,768	1.3	51.2	657
8/16/2007	8/22/2007	167	596	65,675	0.81	136.0	793
8/23/2007	9/19/2007	640	758	23,180	0.37	233.9	1,027
9/19/2007	10/18/2007	699	795	15,365	0.25	177.6	1,205
10/18/2007	1/17/2008	2,077	748	17,880	0.28	577.6	1,782
1/17/2008	3/20/2008	1413	738	17,517	0.27	380.0	2,162
3/20/2008	4/17/2008	626	385	19,076	0.15	95.6	2,258
4/17/2008	4/24/2008	145	784	24,852	0.41	58.8	2,317
4/24/2008	7/16/2008	1981	741	13,381	0.21	408.8	2,725
7/16/2008	10/17/2008	2118	752	19,514	0.31	646.2	3,372
10/17/2008	1/19/2009	2162	737	14,819	0.23	491.3	3,863
1/19/2009	4/24/2009	2252	655	1,730	0.02	48.3	3,911
4/24/2009	6/29/2009	1560	675	970	0.01	19.3	3,931
6/29/2009	11/5/2009	2945	811	690	0.01	31.2	3,962
11/5/2009	1/27/2010	1763	774	601	0.009	15.5	3,977
1/27/2010	4/28/2010	2040	779	450	0.007	13.5	3,991
4/28/2010	7/30/2010	2031	763	390	0.006	11.4	4,002
7/30/2010	10/21/2010	1875	731	200	0.003	5.2	4,007
1/19/2011	2/5/2011	411	745	321	0.004	1.5	4,009
2/5/2011	4/20/2011	1564	748	342	0.005	7.6	4,017
4/20/2011	4/28/2011	132	736	362	0.005	0.7	4,017
4/28/2011	7/20/2011	1974	336	375	0.002	4.7	4,022
7/25/2011	10/24/2011	2176	564	311	0.003	7.2	4,029
10/25/2011	1/24/2012	2678	586	262	0.003	8.6	4,038
1/25/2012	4/11/2012	1661	724	236	0.004	5.9	4,044
4/12/2012	4/30/2012	433	783	182	0.003	1.3	4,045
5/1/2012	7/24/2012	1845	764	144	0.002	4.2	4,049

Notes:
(1) Calculation based on primary constituent.
(2) Rebound Event #1 occurred from 3/20/08 to 4/17/08. SVE-B, SVE-E, and SVE-F were offline and closed.
(3) Rebound Event #2 occurred from 10/21/10 to 1/19/11. All SVE wells were offline and closed.
(4) Rebound Event #3 occurred from 4/28/11 to 7/20/11. SVE-A through SVE-E were offline but open for passive venting.
lbs: pounds
lbs/hr: pounds per hour
ppbv: parts per billion by volume
scfm: standard cubic feet per minute
SVE: soil vapor extraction
VOC: volatile organic compound

FIGURES

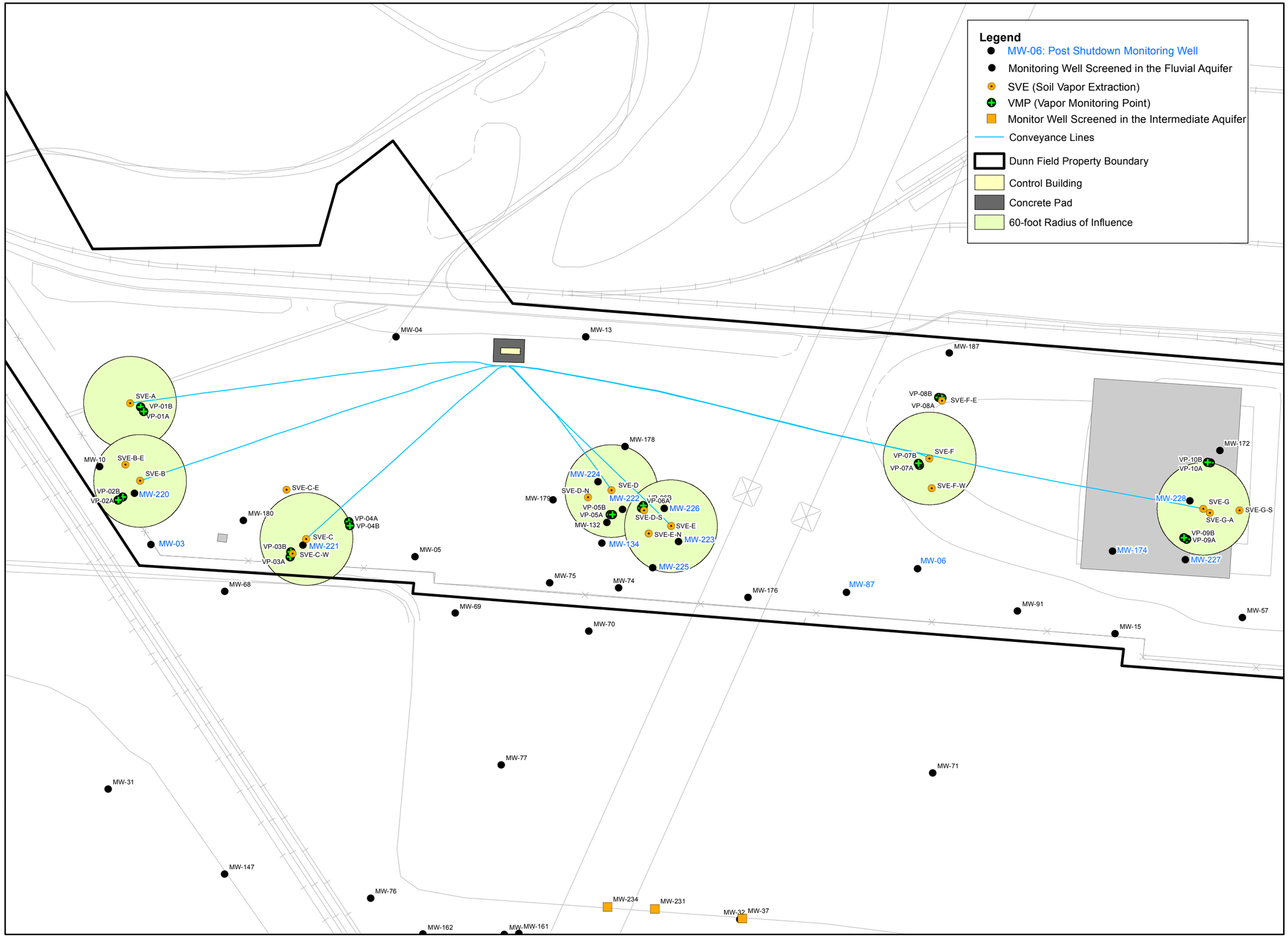

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Figure 1

FLUVIAL SVE SYSTEM

ANNUAL OPERATIONS
REPORT - YEAR FIVE

FLUVIAL SOIL VAPOR
EXTRACTION SYSTEM

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

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

0 50 100 150 200 Feet

Installation Location
Memphis, Tennessee

Date: September 2012
Edition: Rev 0

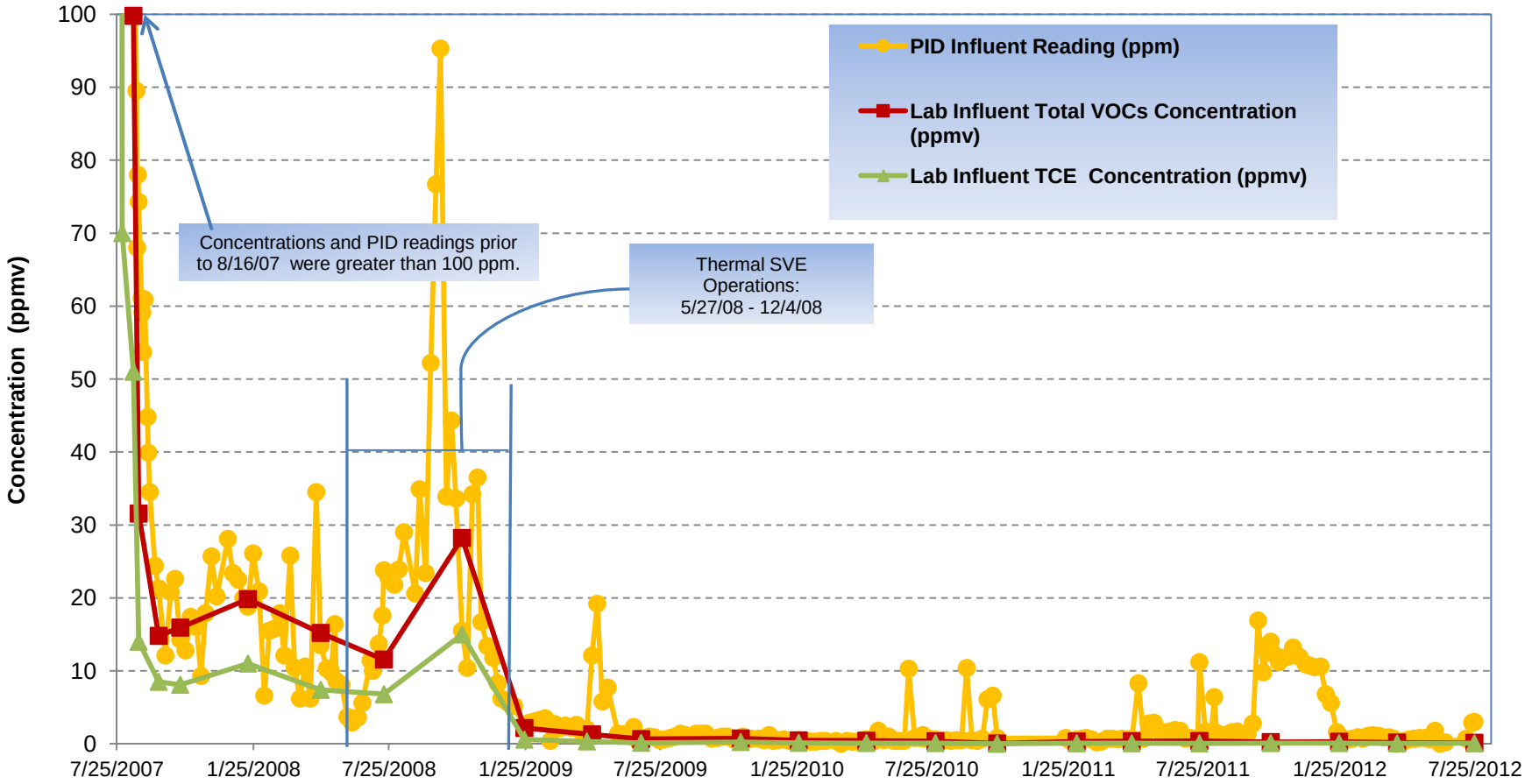

Figure 2.
INFLUENT CONCENTRATION TREND - ANALYTICAL RESULTS AND FIELD PID MEASUREMENTS
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

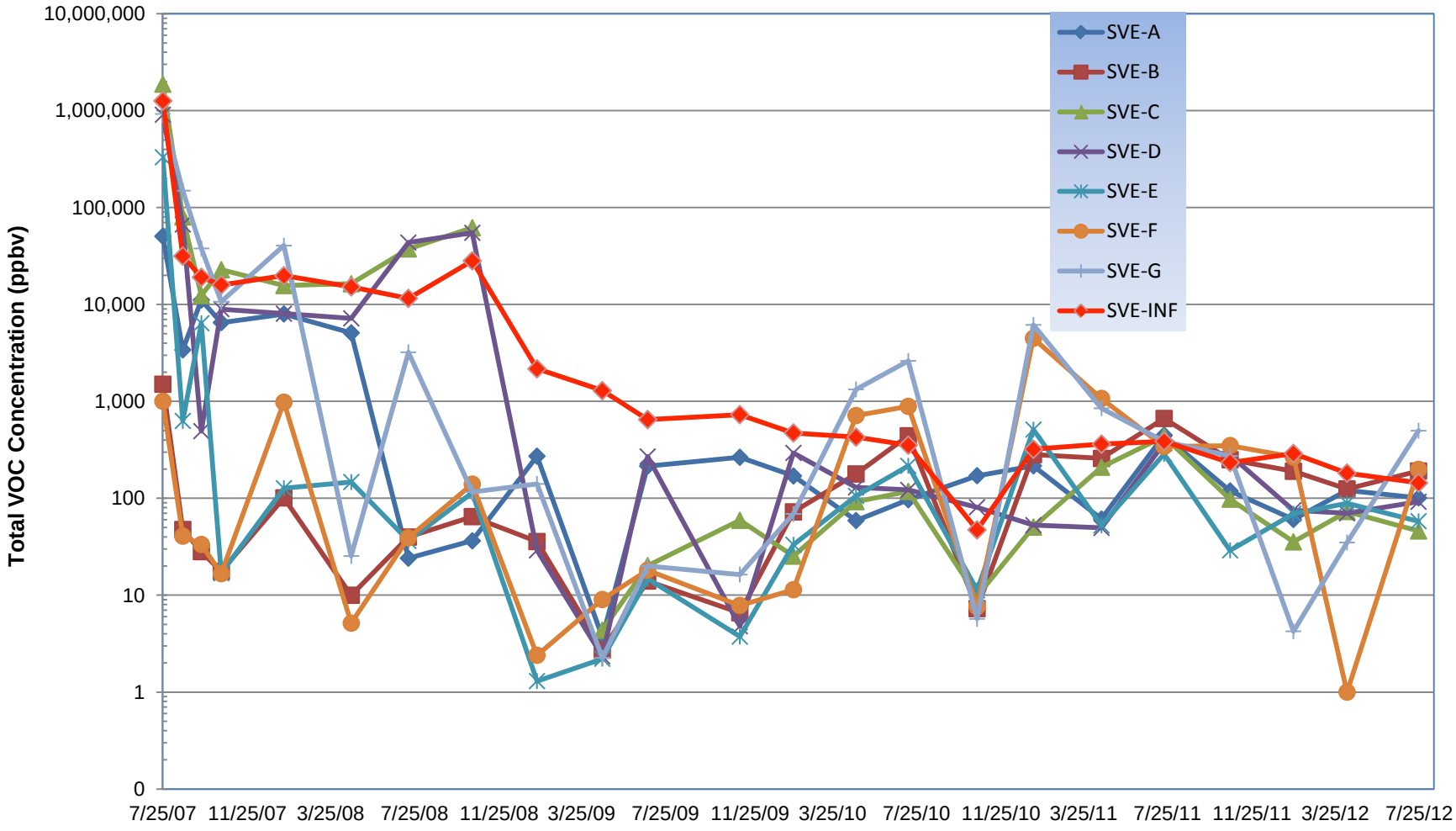

Figure 3.
TREND OF TOTAL VOC CONCENTRATIONS AT SVE WELLS AND INFLUENT
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

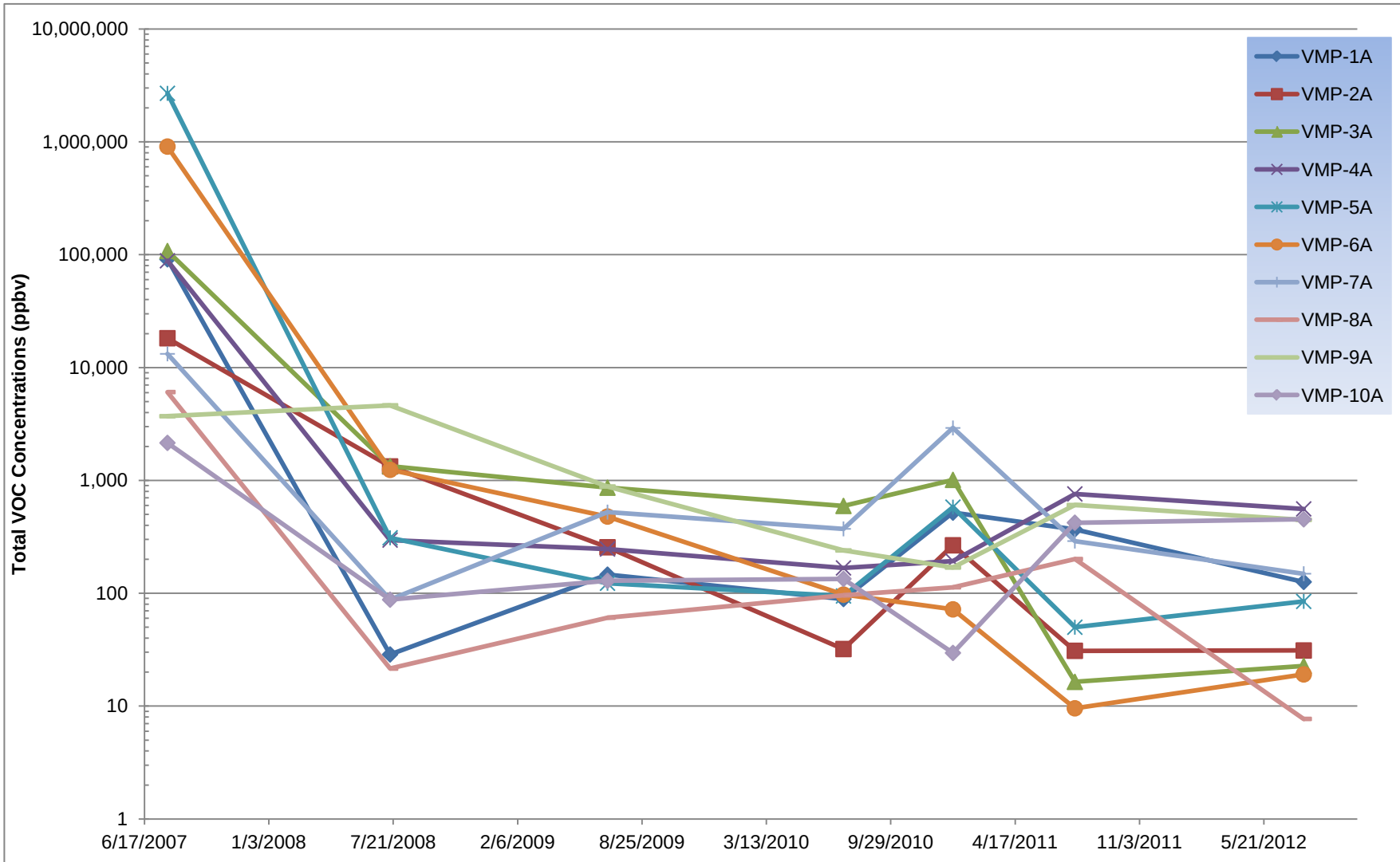

Figure 4.
TREND OF TOTAL VOC CONCENTRATIONS AT VMP-A WELLS
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

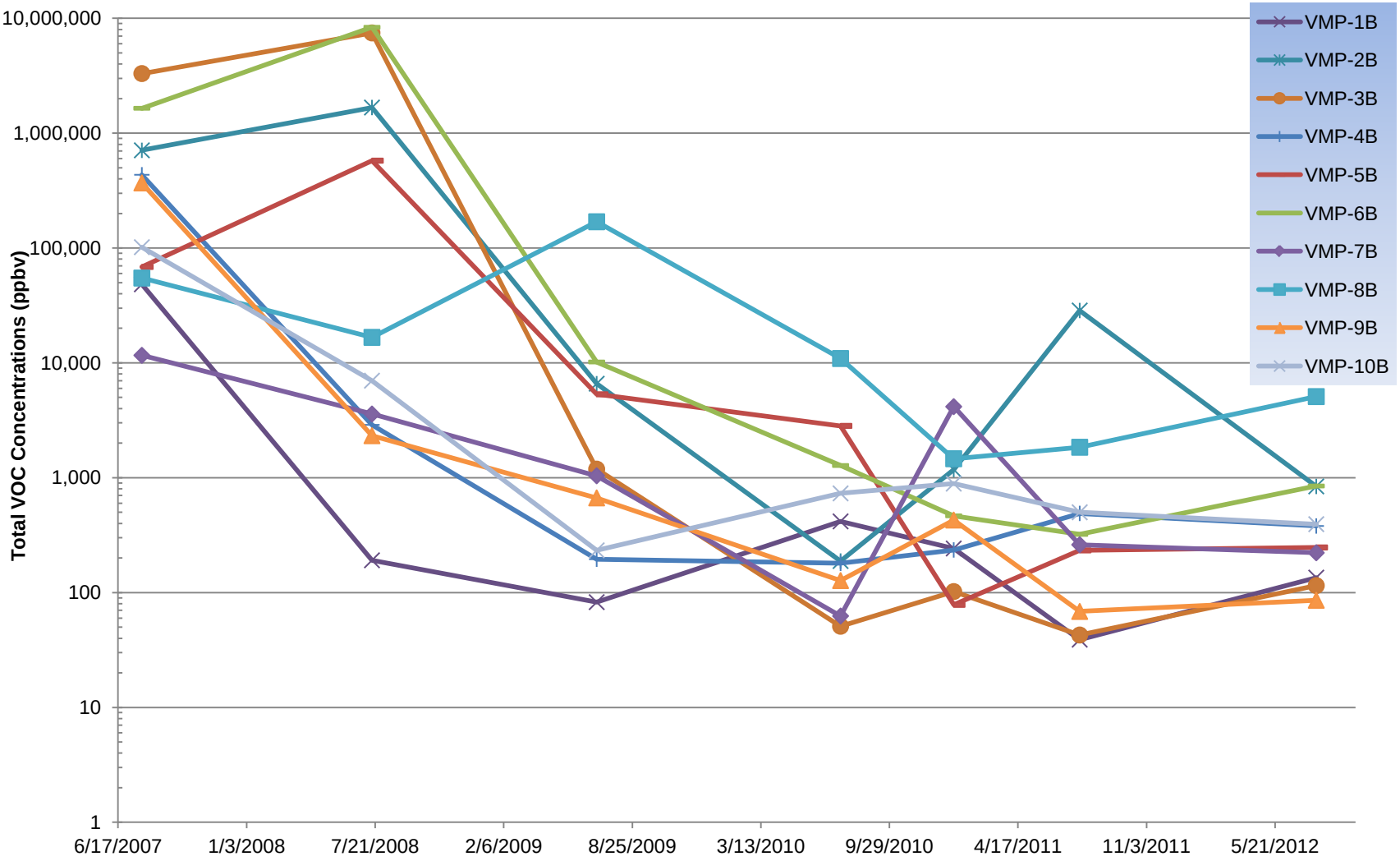

Figure 5.
TREND OF TOTAL VOC CONCENTRATIONS AT VMP-B WELLS
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

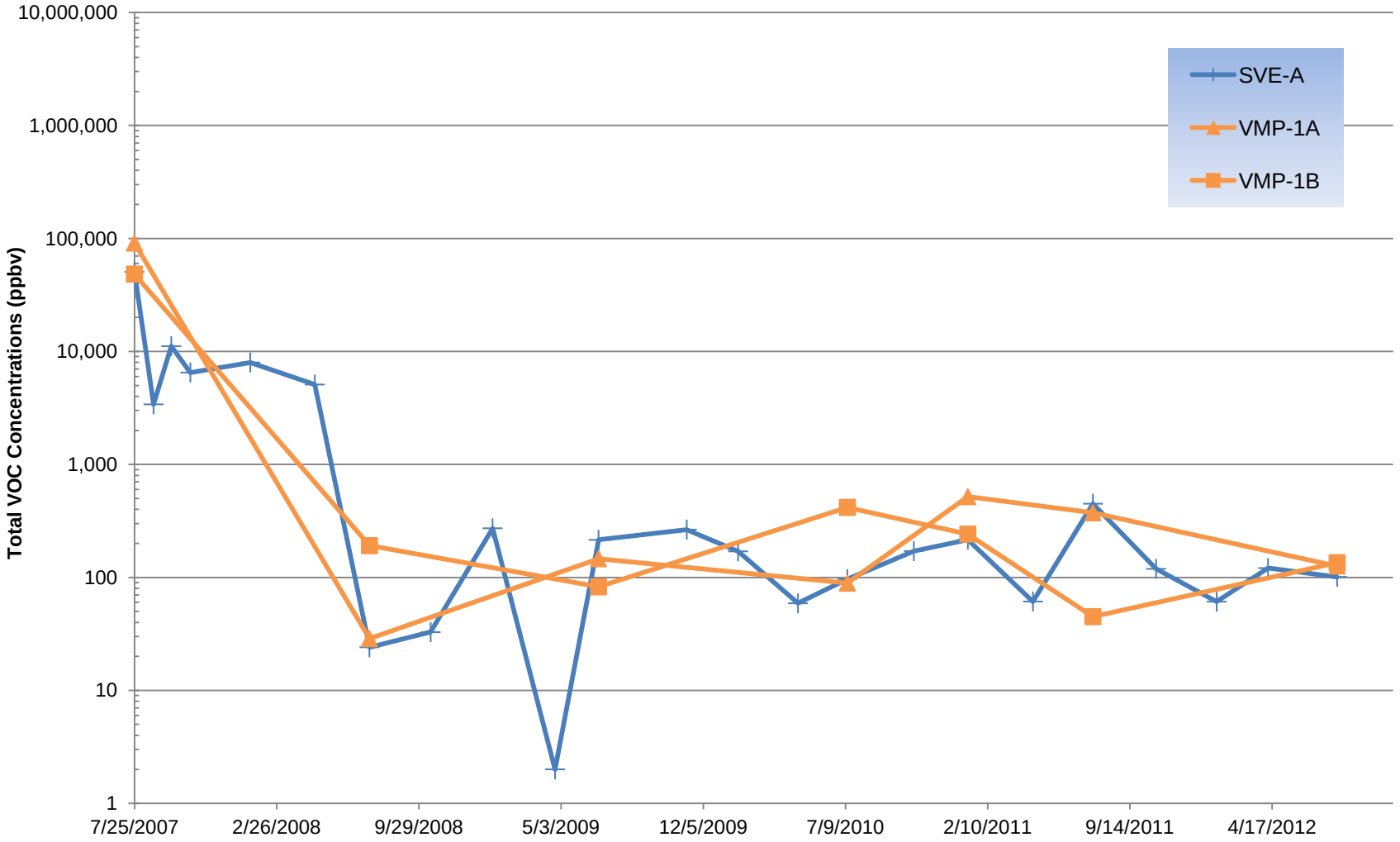

Figure 6.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-1B SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

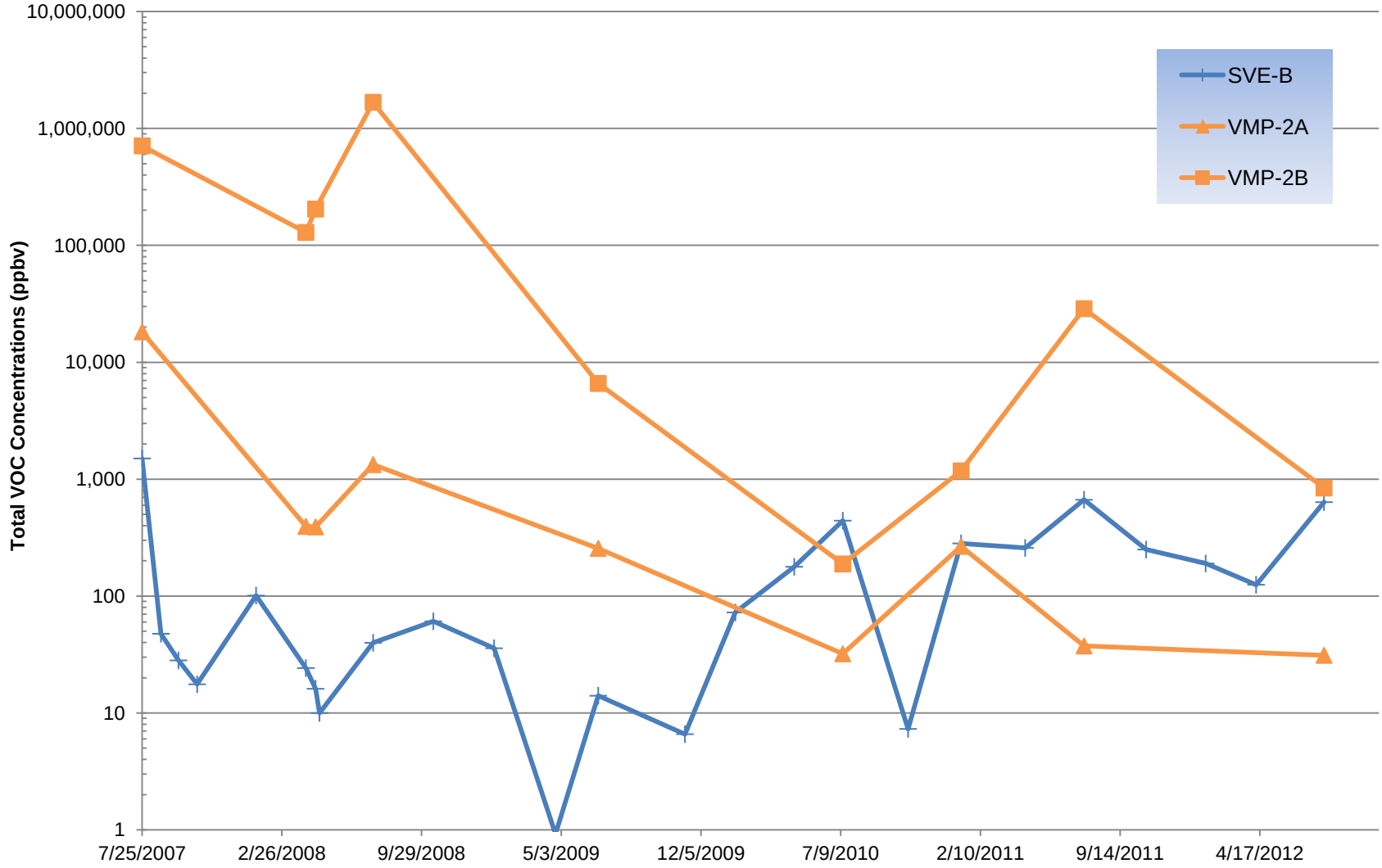

Figure 7.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-1C SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

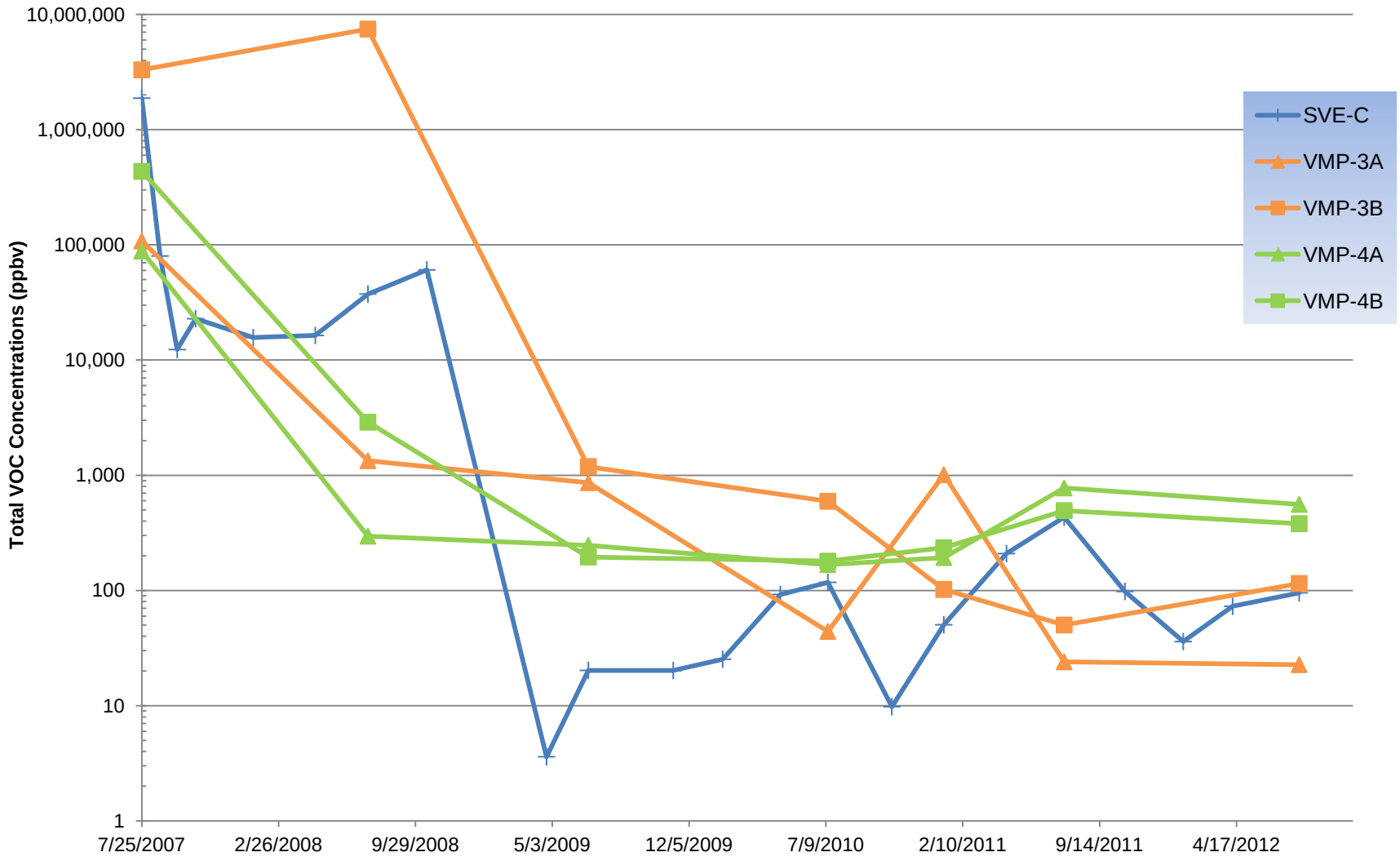

Figure 8.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-1E SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

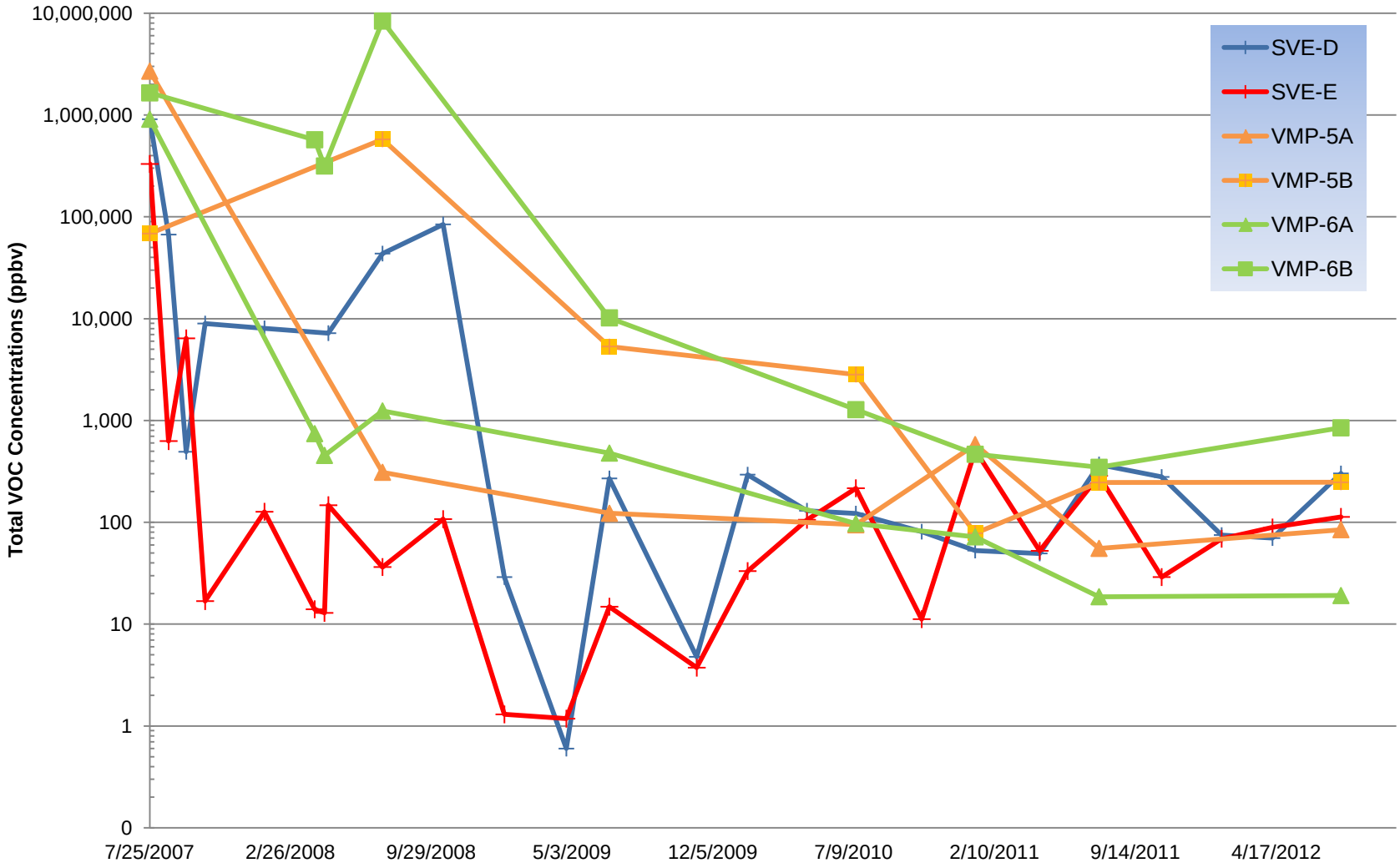

Figure 9.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-2 SVE WELLS AND VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

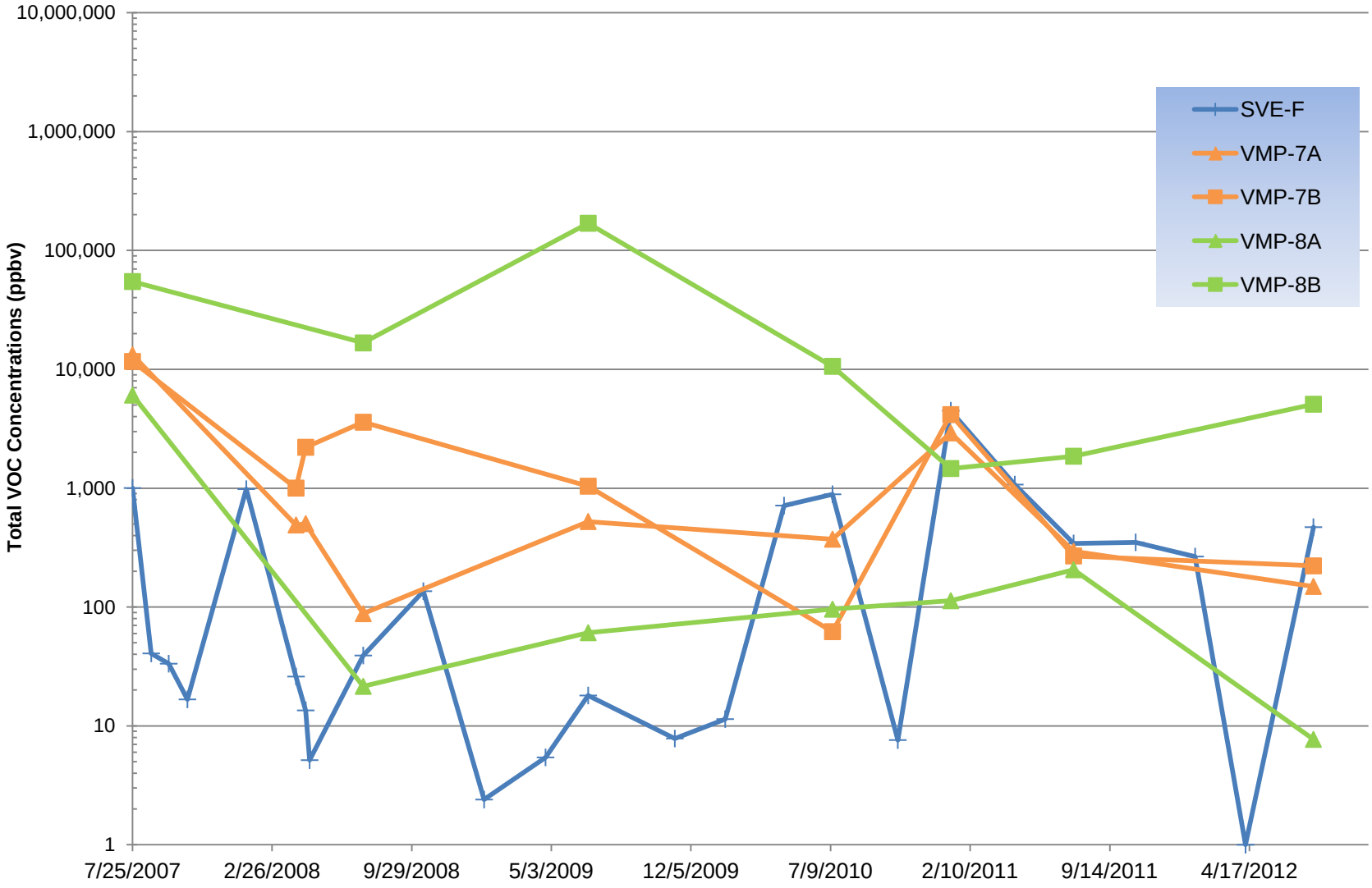

Figure 10.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-3 SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

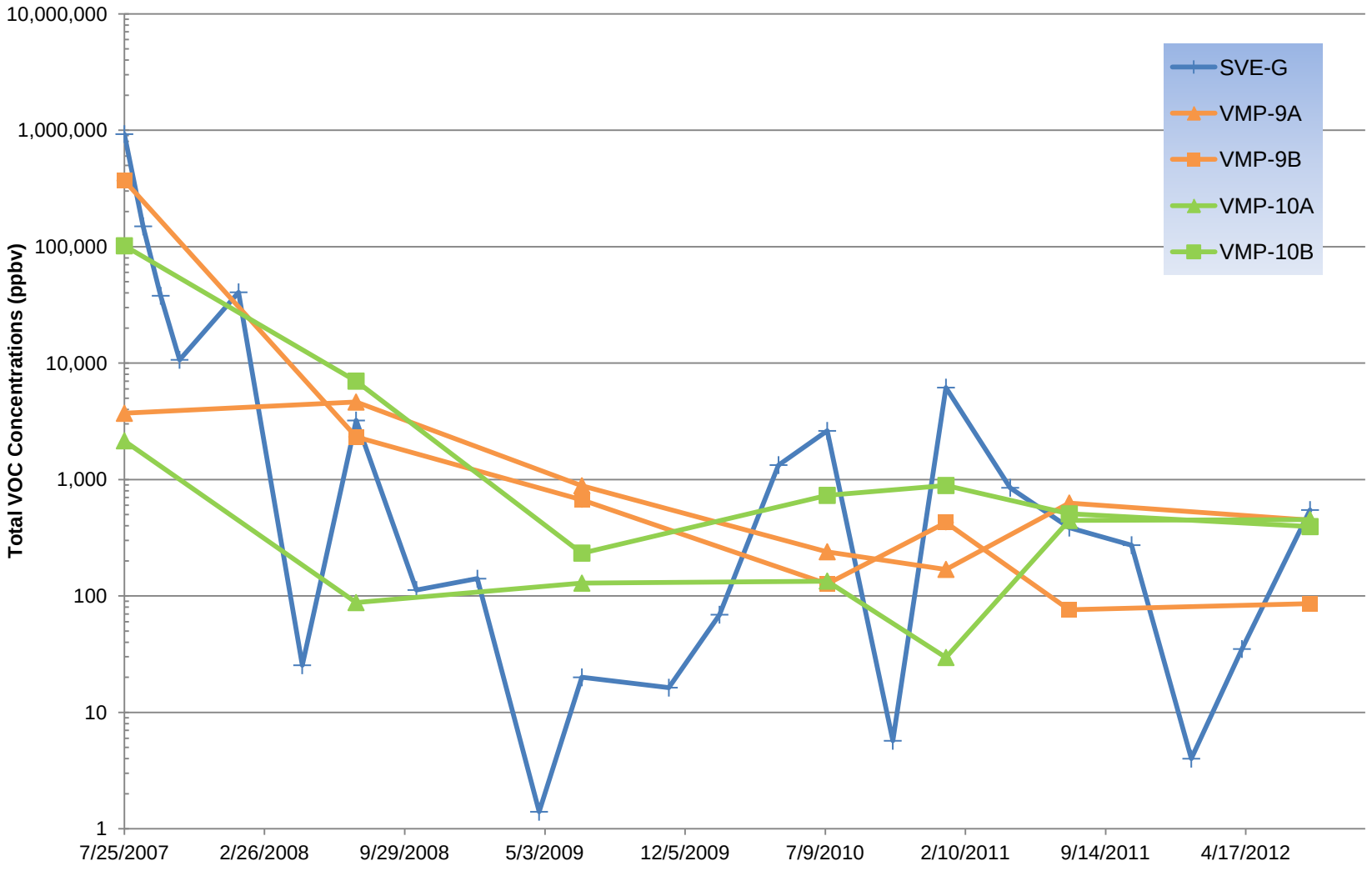

Figure 11.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-4 SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

APPENDIX A

CONDENSATE DISCHARGES

HDR | ONE COMPANY *Many Solutions*®

26 June 2012

Mr. Jamie Woods
Tennessee Department of Environment and Conservation
8383 Wolf Lake Dr.
Bartlett, TN 38133-4119

Reference: Wastewater Discharge Report – Fluvial SVE Condensate
Defense Depot Memphis Tennessee

Dear Mr. Woods:

Wastewater generated during environmental restoration activities at Defense Depot Memphis Tennessee (DDMT) was previously discharged to the City of Memphis sewer under Industrial Wastewater Discharge Permit #S-NN3-097. The City of Memphis notified HDR on 23 February 2011 that the city was not authorized to accept wastewater from CERCLA sites. Following review of past wastewater analyses and communications with you and staff from TDEC Division of Water Pollution Control, it was agreed that wastewater from environmental restoration activities at DDMT could be discharged to a storm water inlet on Dunn Field. The discharges are subject to the following concentration limits: copper <0.032 milligrams per liter (mg/L) and zinc <0.521 mg/L. The wastewater will be discharged through a bag filter to remove sediment prior to discharge.

Wastewater samples were collected on 24 May 2012. A 5-micron mesh was installed in the bag filter to remove sediment and the water was returned to the holding tank during sampling. Grab samples of unfiltered (NF) and filtered water were collected from sample ports on the bag filter. The samples were submitted to Microbac Laboratories, Inc., in Marietta, Ohio for analysis of copper and zinc per TDEC requirements; the samples were also analyzed for volatile organic compounds to evaluate mass removal by the SVE system. The laboratory report and chain of custody are attached. The filtered sample met the concentration limits as shown below.

Analyte	Limit (mg/L)	BT-052412 (mg/L)
Copper	<0.032	0.0282
Zinc	<0.521	0.151

The wastewater was discharged through the bag filter (5-micron mesh) to the storm sewer on 14-15 June. The flow rate was approximately 30 gallons per minute; approximately 11,500 gallons were discharged.

If you need additional information, please contact the undersigned at (402) 237-3982 or thomas.holmes@hdrinc.com. You may also contact HDR's Memphis field office by phone at 901-776-6717 or mail at 2241 Truitt St., Memphis, TN 38114.

Sincerely,
HDR

Thomas C Holmes

Thomas Holmes
Project Manager

cc: Carolyn Jones, DAIM-ODB
Joan Hutton, Calibre

LABORATORY REPORT

L12050788

06/04/12 16:31

Submitted By

Microbac Laboratories Inc.
158 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: HDR Environmental
1978 S. Garrison St
Suite 114
Lakewood, CO 80227
Attention: Diane Short & Associates

Project Number: 2886.001
Project: Memphis Depot
Site: DEFENSE DEPOT MEMPHIS TN

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
BT-052412-NF	L12050788-01	05/24/2012 15:22	05/25/2012
BT-052412	L12050788-02	05/24/2012 15:29	05/25/2012
TB-052412	L12050788-03	05/24/2012 15:00	05/25/2012

Report Number: **L12050788**
Report Date : **June 4, 2012**

Sample Number: **L12050788-01**
Client ID: **BT-052412-NF**
Matrix: **Water**
Workgroup Number: **WG399214**
Collect Date: **05/24/2012 15:22**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **ICP-THERMO2**
Prep Date: **05/29/2012 08:17**
Cal Date: **05/29/2012 11:58**
Run Date: **05/29/2012 14:51**
File ID: **T2.052912.145132**

Analyte	CAS. Number	Result	Qual	RL	MDL
Copper, Total	7440-50-8	0.0346		0.0200	0.0100
Zinc, Total	7440-66-6	0.0888		0.0200	0.0100

Sample Number: **L12050788-01**
Client ID: **BT-052412-NF**
Matrix: **Water**
Workgroup Number: **WG399569**
Collect Date: **05/24/2012 15:22**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **5030B/5030C/5035**
Analytical Method: **8260B**
Analyst: **FJB**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS11**
Prep Date: **06/01/2012 20:19**
Cal Date: **05/03/2012 21:37**
Run Date: **06/01/2012 20:19**
File ID: **11M84227**

Analyte	CAS. Number	Result	Qual	RL	MDL
1,1,1,2-Tetrachloroethane	630-20-6		U	0.500	0.250
1,1,1-Trichloroethane	71-55-6		U	1.00	0.250
1,1,2,2-Tetrachloroethane	79-34-5		U	0.500	0.200
1,1,2-Trichloroethane	79-00-5		U	1.00	0.250
1,1-Dichloroethane	75-34-3		U	1.00	0.125
1,1-Dichloroethene	75-35-4		U	1.00	0.500
1,1-Dichloropropene	563-58-6		U	1.00	0.250
1,2,3-Trichlorobenzene	87-61-6		U	1.00	0.150
1,2,3-Trichloropropane	96-18-4		U	1.00	0.500
1,2,4-Trichlorobenzene	120-82-1		U	1.00	0.200
1,2,4-Trimethylbenzene	95-63-6		U	1.00	0.250
1,2-Dichloroethane	107-06-2		U	0.500	0.250
1,2-Dichlorobenzene	95-50-1		U	1.00	0.125
1,2-Dibromo-3-chloropropane	96-12-8		U	2.00	1.00
1,2-Dichloropropane	78-87-5		U	1.00	0.200
1,2-Dibromoethane	106-93-4		U	1.00	0.250
1,3,5-Trimethylbenzene	108-67-8		U	1.00	0.250
1,3-Dichlorobenzene	541-73-1		U	1.00	0.250
1,3-Dichloropropane	142-28-9		U	0.400	0.200
1,4-Dichlorobenzene	106-46-7		U	0.500	0.125
1-Chlorohexane	544-10-5		U	1.00	0.125
2,2-Dichloropropane	594-20-7		U	1.00	0.250
2-Hexanone	591-78-6		U	10.0	2.50
2-Chlorotoluene	95-49-8		U	1.00	0.125
4-Chlorotoluene	106-43-4		U	1.00	0.250
Acetone	67-64-1		U	10.0	2.50
Benzene	71-43-2		U	0.400	0.125
Bromobenzene	108-86-1		U	1.00	0.125
Bromochloromethane	74-97-5		U	1.00	0.200
Bromodichloromethane	75-27-4		U	0.500	0.250
Bromoform	75-25-2		U	1.00	0.500
Bromomethane	74-83-9		U	1.00	0.500
Carbon disulfide	75-15-0		U	1.00	0.500
Carbon tetrachloride	56-23-5		U	1.00	0.250
Chlorobenzene	108-90-7		U	0.500	0.125
Chloroethane	75-00-3		U	1.00	0.500
Chloroform	67-66-3		U	0.300	0.125
Chloromethane	74-87-3		U	1.00	0.500
cis-1,2-Dichloroethene	156-59-2		U	1.00	0.250
cis-1,3-Dichloropropene	10061-01-5		U	0.500	0.250
Dibromochloromethane	124-48-1		U	0.500	0.250
Dibromomethane	74-95-3		U	1.00	0.250

Report Number: **L12050788**
Report Date : **June 4, 2012**

Sample Number: **L12050788-01**
Client ID: **BT-052412-NF**
Matrix: **Water**
Workgroup Number: **WG399569**
Collect Date: **05/24/2012 15:22**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **5030B/5030C/5035**
Analytical Method: **8260B**
Analyst: **FJB**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS11**
Prep Date: **06/01/2012 20:19**
Cal Date: **05/03/2012 21:37**
Run Date: **06/01/2012 20:19**
File ID: **11M84227**

Analyte	CAS. Number	Result	Qual	RL	MDL
Dichlorodifluoromethane	75-71-8		U	1.00	0.250
Ethylbenzene	100-41-4		U	1.00	0.250
Hexachlorobutadiene	87-68-3		U	0.600	0.250
Isopropylbenzene	98-82-8		U	1.00	0.250
Methylene chloride	75-09-2		U	1.00	0.250
Methyl t-butyl ether (MTBE)	1634-04-4		U	5.00	0.500
MEK (2-Butanone)	78-93-3		U	10.0	2.50
MIBK (methyl isobutyl ketone)	108-10-1		U	10.0	2.50
n-Butylbenzene	104-51-8		U	1.00	0.250
n-Propylbenzene	103-65-1		U	1.00	0.125
m-,p-Xylene	179601-23-1		U	2.00	0.500
Naphthalene	91-20-3		U	1.00	0.200
o-Xylene	95-47-6		U	1.00	0.250
p-Isopropyltoluene	99-87-6		U	1.00	0.250
sec-Butylbenzene	135-98-8		U	1.00	0.250
Styrene	100-42-5		U	1.00	0.125
Trichloroethene	79-01-6		U	1.00	0.250
tert-Butylbenzene	98-06-6		U	1.00	0.250
Tetrachloroethene	127-18-4		U	1.00	0.250
Toluene	108-88-3		U	1.00	0.250
trans-1,2-Dichloroethene	156-60-5		U	1.00	0.250
trans-1,3-Dichloropropene	10061-02-6		U	1.00	0.500
Trichlorofluoromethane	75-69-4		U	1.00	0.250
Vinyl chloride	75-01-4		U	1.00	0.250

Surrogate	% Recovery	Lower	Upper	Qual
Dibromofluoromethane	92.9	85	115	
1,2-Dichloroethane-d4	88.0	72	119	
Toluene-d8	102	81	120	
4-Bromofluorobenzene	114	76	119	

U Undetected; the analyte was analyzed for, but not detected.

Sample Number: **L12050788-02**
Client ID: **BT-052412**
Matrix: **Water**
Workgroup Number: **WG399214**
Collect Date: **05/24/2012 15:29**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **ICP-THERMO2**
Prep Date: **05/29/2012 08:17**
Cal Date: **05/29/2012 11:58**
Run Date: **05/29/2012 14:54**
File ID: **T2.052912.145451**

Analyte	CAS. Number	Result	Qual	RL	MDL
Copper, Total	7440-50-8	0.0282		0.0200	0.0100
Zinc, Total	7440-66-6	0.151		0.0200	0.0100

Report Number: **L12050788**
Report Date : **June 4, 2012**

Sample Number: **L12050788-02**
Client ID: **BT-052412**
Matrix: **Water**
Workgroup Number: **WG399292**
Collect Date: **05/24/2012 15:29**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **5030B/5030C/5035**
Analytical Method: **8260B**
Analyst: **ADC**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS8**
Prep Date: **05/30/2012 16:40**
Cal Date: **03/27/2012 15:49**
Run Date: **05/30/2012 16:40**
File ID: **8M379583**

Analyte	CAS. Number	Result	Qual	RL	MDL
1,1,1,2-Tetrachloroethane	630-20-6		U	0.500	0.250
1,1,1-Trichloroethane	71-55-6		U	1.00	0.250
1,1,2,2-Tetrachloroethane	79-34-5		U	0.500	0.200
1,1,2-Trichloroethane	79-00-5		U	1.00	0.250
1,1-Dichloroethane	75-34-3		U	1.00	0.125
1,1-Dichloroethene	75-35-4		U	1.00	0.500
1,1-Dichloropropene	563-58-6		U	1.00	0.250
1,2,3-Trichlorobenzene	87-61-6		U	1.00	0.150
1,2,3-Trichloropropane	96-18-4		U	1.00	0.500
1,2,4-Trichlorobenzene	120-82-1		U	1.00	0.200
1,2,4-Trimethylbenzene	95-63-6		U	1.00	0.250
1,2-Dichloroethane	107-06-2		U	0.500	0.250
1,2-Dichlorobenzene	95-50-1		U	1.00	0.125
1,2-Dibromo-3-chloropropane	96-12-8		U	2.00	1.00
1,2-Dichloropropane	78-87-5		U	1.00	0.200
1,2-Dibromoethane	106-93-4		U	1.00	0.250
1,3,5-Trimethylbenzene	108-67-8		U	1.00	0.250
1,3-Dichlorobenzene	541-73-1		U	1.00	0.250
1,3-Dichloropropane	142-28-9		U	0.400	0.200
1,4-Dichlorobenzene	106-46-7		U	0.500	0.125
1-Chlorohexane	544-10-5		U	1.00	0.125
2,2-Dichloropropane	594-20-7		U	1.00	0.250
2-Hexanone	591-78-6		U	10.0	2.50
2-Chlorotoluene	95-49-8		U	1.00	0.125
4-Chlorotoluene	106-43-4		U	1.00	0.250
Acetone	67-64-1		U	10.0	2.50
Benzene	71-43-2		U	0.400	0.125
Bromobenzene	108-86-1		U	1.00	0.125
Bromochloromethane	74-97-5		U	1.00	0.200
Bromodichloromethane	75-27-4		U	0.500	0.250
Bromoform	75-25-2		U	1.00	0.500
Bromomethane	74-83-9		U	1.00	0.500
Carbon disulfide	75-15-0		U	1.00	0.500
Carbon tetrachloride	56-23-5		U	1.00	0.250
Chlorobenzene	108-90-7		U	0.500	0.125
Chloroethane	75-00-3		U	1.00	0.500
Chloroform	67-66-3		U	0.300	0.125
Chloromethane	74-87-3		U	1.00	0.500
cis-1,2-Dichloroethene	156-59-2		U	1.00	0.250
cis-1,3-Dichloropropene	10061-01-5		U	0.500	0.250
Dibromochloromethane	124-48-1		U	0.500	0.250
Dibromomethane	74-95-3		U	1.00	0.250
Dichlorodifluoromethane	75-71-8		U	1.00	0.250
Ethylbenzene	100-41-4		U	1.00	0.250
Hexachlorobutadiene	87-68-3		U	0.600	0.250
Isopropylbenzene	98-82-8		U	1.00	0.250
Methylene chloride	75-09-2		U	1.00	0.250
Methyl t-butyl ether (MTBE)	1634-04-4		U	5.00	0.500
MEK (2-Butanone)	78-93-3		U	10.0	2.50
MIBK (methyl isobutyl ketone)	108-10-1		U	10.0	2.50
n-Butylbenzene	104-51-8		U	1.00	0.250
n-Propylbenzene	103-65-1		U	1.00	0.125
m-,p-Xylene	179601-23-1		U	2.00	0.500
Naphthalene	91-20-3		U	1.00	0.200
o-Xylene	95-47-6		U	1.00	0.250
p-Isopropyltoluene	99-87-6		U	1.00	0.250
sec-Butylbenzene	135-98-8		U	1.00	0.250
Styrene	100-42-5		U	1.00	0.125
Trichloroethene	79-01-6		U	1.00	0.250

Report Number: **L12050788**
Report Date : **June 4, 2012**

Sample Number: **L12050788-02**
Client ID: **BT-052412**
Matrix: **Water**
Workgroup Number: **WG399292**
Collect Date: **05/24/2012 15:29**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **5030B/5030C/5035**
Analytical Method: **8260B**
Analyst: **ADC**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS8**
Prep Date: **05/30/2012 16:40**
Cal Date: **03/27/2012 15:49**
Run Date: **05/30/2012 16:40**
File ID: **8M379583**

Analyte	CAS. Number	Result	Qual	RL	MDL
tert-Butylbenzene	98-06-6		U	1.00	0.250
Tetrachloroethene	127-18-4		U	1.00	0.250
Toluene	108-88-3		U	1.00	0.250
trans-1,2-Dichloroethene	156-60-5		U	1.00	0.250
trans-1,3-Dichloropropene	10061-02-6		U	1.00	0.500
Trichlorofluoromethane	75-69-4		U	1.00	0.250
Vinyl chloride	75-01-4		U	1.00	0.250

Surrogate	% Recovery	Lower	Upper	Qual
Dibromofluoromethane	98.0	85	115	
1,2-Dichloroethane-d4	105	72	119	
Toluene-d8	98.0	81	120	
4-Bromofluorobenzene	101	76	119	

U Undetected; the analyte was analyzed for, but not detected.

Sample Number: **L12050788-03**
Client ID: **TB-052412**
Matrix: **Water**
Workgroup Number: **WG399569**
Collect Date: **05/24/2012 15:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **5030B/5030C/5035**
Analytical Method: **8260B**
Analyst: **FJB**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS11**
Prep Date: **06/01/2012 17:15**
Cal Date: **05/03/2012 21:37**
Run Date: **06/01/2012 17:15**
File ID: **11M84221**

Analyte	CAS. Number	Result	Qual	RL	MDL
1,1,1,2-Tetrachloroethane	630-20-6		U	0.500	0.250
1,1,1-Trichloroethane	71-55-6		U	1.00	0.250
1,1,2,2-Tetrachloroethane	79-34-5		U	0.500	0.200
1,1,2-Trichloroethane	79-00-5		U	1.00	0.250
1,1-Dichloroethane	75-34-3		U	1.00	0.125
1,1-Dichloroethene	75-35-4		U	1.00	0.500
1,1-Dichloropropene	563-58-6		U	1.00	0.250
1,2,3-Trichlorobenzene	87-61-6		U	1.00	0.150
1,2,3-Trichloropropane	96-18-4		U	1.00	0.500
1,2,4-Trichlorobenzene	120-82-1		U	1.00	0.200
1,2,4-Trimethylbenzene	95-63-6		U	1.00	0.250
1,2-Dichloroethane	107-06-2		U	0.500	0.250
1,2-Dichlorobenzene	95-50-1		U	1.00	0.125
1,2-Dibromo-3-chloropropane	96-12-8		U	2.00	1.00
1,2-Dichloropropane	78-87-5		U	1.00	0.200
1,2-Dibromoethane	106-93-4		U	1.00	0.250
1,3,5-Trimethylbenzene	108-67-8		U	1.00	0.250
1,3-Dichlorobenzene	541-73-1		U	1.00	0.250
1,3-Dichloropropane	142-28-9		U	0.400	0.200
1,4-Dichlorobenzene	106-46-7		U	0.500	0.125
1-Chlorohexane	544-10-5		U	1.00	0.125
2,2-Dichloropropane	594-20-7		U	1.00	0.250
2-Hexanone	591-78-6		U	10.0	2.50
2-Chlorotoluene	95-49-8		U	1.00	0.125
4-Chlorotoluene	106-43-4		U	1.00	0.250
Acetone	67-64-1		U	10.0	2.50
Benzene	71-43-2		U	0.400	0.125
Bromobenzene	108-86-1		U	1.00	0.125
Bromochloromethane	74-97-5		U	1.00	0.200
Bromodichloromethane	75-27-4		U	0.500	0.250
Bromoform	75-25-2		U	1.00	0.500
Bromomethane	74-83-9		U	1.00	0.500
Carbon disulfide	75-15-0		U	1.00	0.500
Carbon tetrachloride	56-23-5		U	1.00	0.250

Report Number: **L12050788**
Report Date : **June 4, 2012**

Sample Number: **L12050788-03**
Client ID: **TB-052412**
Matrix: **Water**
Workgroup Number: **WG399569**
Collect Date: **05/24/2012 15:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **5030B/5030C/5035**
Analytical Method: **8260B**
Analyst: **FJB**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS11**
Prep Date: **06/01/2012 17:15**
Cal Date: **05/03/2012 21:37**
Run Date: **06/01/2012 17:15**
File ID: **11M84221**

Analyte	CAS. Number	Result	Qual	RL	MDL
Chlorobenzene	108-90-7		U	0.500	0.125
Chloroethane	75-00-3		U	1.00	0.500
Chloroform	67-66-3		U	0.300	0.125
Chloromethane	74-87-3		U	1.00	0.500
cis-1,2-Dichloroethene	156-59-2		U	1.00	0.250
cis-1,3-Dichloropropene	10061-01-5		U	0.500	0.250
Dibromochloromethane	124-48-1		U	0.500	0.250
Dibromomethane	74-95-3		U	1.00	0.250
Dichlorodifluoromethane	75-71-8		U	1.00	0.250
Ethylbenzene	100-41-4		U	1.00	0.250
Hexachlorobutadiene	87-68-3		U	0.600	0.250
Isopropylbenzene	98-82-8		U	1.00	0.250
Methylene chloride	75-09-2		U	1.00	0.250
Methyl t-butyl ether (MTBE)	1634-04-4		U	5.00	0.500
MEK (2-Butanone)	78-93-3		U	10.0	2.50
MIBK (methyl isobutyl ketone)	108-10-1		U	10.0	2.50
n-Butylbenzene	104-51-8		U	1.00	0.250
n-Propylbenzene	103-65-1		U	1.00	0.125
m-,p-Xylene	179601-23-1		U	2.00	0.500
Naphthalene	91-20-3		U	1.00	0.200
o-Xylene	95-47-6		U	1.00	0.250
p-Isopropyltoluene	99-87-6		U	1.00	0.250
sec-Butylbenzene	135-98-8		U	1.00	0.250
Styrene	100-42-5		U	1.00	0.125
Trichloroethene	79-01-6		U	1.00	0.250
tert-Butylbenzene	98-06-6		U	1.00	0.250
Tetrachloroethene	127-18-4		U	1.00	0.250
Toluene	108-88-3		U	1.00	0.250
trans-1,2-Dichloroethene	156-60-5		U	1.00	0.250
trans-1,3-Dichloropropene	10061-02-6		U	1.00	0.500
Trichlorofluoromethane	75-69-4		U	1.00	0.250
Vinyl chloride	75-01-4		U	1.00	0.250

Surrogate	% Recovery	Lower	Upper	Qual
Dibromofluoromethane	94.2	85	115	
1,2-Dichloroethane-d4	87.0	72	119	
Toluene-d8	99.4	81	120	
4-Bromofluorobenzene	114	76	119	

U Undetected; the analyte was analyzed for, but not detected.

COC No. A 32309

158 Starlite Drive
Marietta, OH 45750

Microbac

CHAIN-OF-CUSTODY RECORD

Phone: 740-373-4071
Fax: 740-373-4835

Company Name: HDR

Project Contact: Tom Holmes

Contact Phone #: 401-774-6717

Turn Around Requirements: 5 ~~Bday~~ day

Location: DDMT

Project ID: 145803 004

Sampler (print): P Scott Marshall II

Signature: P Scott Marshall II

Program: ☐ CWA ☐ RCRA ☐ DOD ☐ AFCEE ☐ Other _____

ADDITIONAL REQUIREMENTS

Sample I.D. No.	Comp	Grab	Date	Time	Matrix*	NUMBER OF CONTAINERS	Hold	VOC 8260	Metals 6010B	TOTAL # (LAB USE)
BT-052412-NF		X	052412	1522	Water	4		X	X	4
BT-052412		X	052412	1529	Water	4		X	X	4
TB-052412		X	052412	1500	Water	3		X		3

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
P Scott Marshall II	5/24/12	1630	Fedex				

Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time	Remarks:

*Water (W), Soil (S), Solid Waste (SD), Unknown (X)

HDR | ONE COMPANY *Many Solutions*®

24 August 2012

Mr. Jamie Woods
Tennessee Department of Environment and Conservation
8383 Wolf Lake Dr.
Bartlett, TN 38133-4119

Reference: Wastewater Discharge Report – Fluvial SVE Condensate
Defense Depot Memphis Tennessee

Dear Mr. Woods:

Wastewater generated during environmental restoration activities at Defense Depot Memphis Tennessee is discharged to a storm water inlet on Dunn Field per agreement with you and staff from TDEC Division of Water Pollution Control. The discharges are subject to the following concentration limits: copper <0.032 milligrams per liter (mg/L) and zinc <0.521 mg/L. The wastewater is discharged through a bag filter to remove sediment prior to discharge.

Wastewater samples were collected on 16 July 2012. A 5-micron mesh filter was installed in the bag filter to remove sediment and the water was returned to the holding tank during sampling. Grab samples of unfiltered (NF) and filtered water were collected from sample ports on the bag filter. The samples were submitted to Microbac Laboratories, Inc., in Marietta, Ohio for analysis of copper and zinc per TDEC requirements; the samples were also analyzed for volatile organic compounds to evaluate mass removal by the SVE system. The laboratory report and chain of custody are attached. The filtered sample met the concentration limits as shown below.

Analyte	Limit (mg/L)	OD-IDW-071612 (mg/L)
Copper	<0.032	0.0146
Zinc	<0.521	0.0103

The wastewater was discharged through the bag filter (5-micron mesh) to the storm sewer on 30 July. Approximately 2,350 gallons were discharged at a flow rate of 10 gallons per minute.

If you need additional information, please contact the undersigned at (402) 237-3982 or thomas.holmes@hdrinc.com.

Sincerely,
HDR

Thomas C Holmes

Thomas Holmes
Project Manager

cc: Joan Hutton, Calibre

Microbac

Laboratory Report Number: L12070473

Diane Short & Associates
HDR Environmental
1978 S. Garrison St
Lakewood, CO 80227
Site: DEFENSE DEPOT MEMPHIS TN

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Stephanie Mossburg – Team Chemist/Data Specialist
(740) 373-4071
Stephanie.Mossburg@microbac.com

I certify that all test results meet all of the requirements of the accrediting authority listed below. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories. The reported results are related only to the samples analyzed as received.

This report was certified on July 24 2012

David E. Vandenberg

David Vandenberg – Managing Director

State of Origin: TN
Accrediting Authority: N/A ID:N/A
QAPP: AFCEE Ver. 4.0

Certificate of Analysis

Sample #:	L12070473-01	**PrePrep Method:**	N/A	**Instrument:**	HPMS10
Client ID:	OD-IDW-071612	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	06/26/2012 15:11
Workgroup #:	WG403830	**Analyst:**	TMB	**Run Date:**	07/19/2012 20:32
Collect Date:	07/16/2012 16:15	**Dilution:**	1	**File ID:**	10M97097
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	RL	MDL
1,1,1,2-Tetrachloroethane	630-20-6		U	0.500	0.250
1,1,1-Trichloroethane	71-55-6		U	1.00	0.250
1,1,2,2-Tetrachloroethane	79-34-5		U	0.500	0.200
1,1,2-Trichloroethane	79-00-5		U	1.00	0.250
1,1-Dichloroethane	75-34-3		U	1.00	0.125
1,1-Dichloroethene	75-35-4		U	1.00	0.500
1,1-Dichloropropene	563-58-6		U	1.00	0.250
1,2,3-Trichlorobenzene	87-61-6		U	1.00	0.150
1,2,3-Trichloropropane	96-18-4		U	1.00	0.500
1,2,4-Trichlorobenzene	120-82-1		U	1.00	0.200
1,2,4-Trimethylbenzene	95-63-6		U	1.00	0.250
1,2-Dichloroethane	107-06-2		U	0.500	0.250
1,2-Dichlorobenzene	95-50-1		U	1.00	0.125
1,2-Dibromo-3-chloropropane	96-12-8		U	2.00	1.00
1,2-Dichloropropane	78-87-5		U	1.00	0.200
1,2-Dibromoethane	106-93-4		U	1.00	0.250
1,3,5-Trimethylbenzene	108-67-8		U	1.00	0.250
1,3-Dichlorobenzene	541-73-1		U	1.00	0.250
1,3-Dichloropropane	142-28-9		U	0.400	0.200
1,4-Dichlorobenzene	106-46-7		U	0.500	0.125
1-Chlorohexane	544-10-5		U	1.00	0.125
2,2-Dichloropropane	594-20-7		U	1.00	0.250
2-Hexanone	591-78-6		U	10.0	2.50
2-Chlorotoluene	95-49-8		U	1.00	0.125
4-Chlorotoluene	106-43-4		U	1.00	0.250
Acetone	67-64-1	5.07	F	10.0	2.50
Benzene	71-43-2		U	0.400	0.125
Bromobenzene	108-86-1		U	1.00	0.125
Bromochloromethane	74-97-5		U	1.00	0.200
Bromodichloromethane	75-27-4		U	0.500	0.250
Bromoform	75-25-2		U	1.00	0.500
Bromomethane	74-83-9		U	1.00	0.500
Carbon disulfide	75-15-0		U	1.00	0.500

Certificate of Analysis

Analyte	CAS #	Result	Qual	RL	MDL
Carbon tetrachloride	56-23-5		U	1.00	0.250
Chlorobenzene	108-90-7		U	0.500	0.125
Chloroethane	75-00-3		U	1.00	0.500
Chloroform	67-66-3		U	0.300	0.125
Chloromethane	74-87-3		U	1.00	0.500
cis-1,2-Dichloroethene	156-59-2		U	1.00	0.250
cis-1,3-Dichloropropene	10061-01-5		U	0.500	0.250
Dibromochloromethane	124-48-1		U	0.500	0.250
Dibromomethane	74-95-3		U	1.00	0.250
Dichlorodifluoromethane	75-71-8		U	1.00	0.250
Ethylbenzene	100-41-4		U	1.00	0.250
Hexachlorobutadiene	87-68-3		U	0.600	0.250
Isopropylbenzene	98-82-8		U	1.00	0.250
Methylene chloride	75-09-2		U	1.00	0.250
Methyl t-butyl ether (MTBE)	1634-04-4		U	5.00	0.500
MEK (2-Butanone)	78-93-3		U	10.0	2.50
MIBK (methyl isobutyl ketone)	108-10-1		U	10.0	2.50
n-Butylbenzene	104-51-8		U	1.00	0.250
n-Propylbenzene	103-65-1		U	1.00	0.125
m-,p-Xylene	179601-23-1		U	2.00	0.500
Naphthalene	91-20-3		U	1.00	0.200
o-Xylene	95-47-6		U	1.00	0.250
p-Isopropyltoluene	99-87-6		U	1.00	0.250
sec-Butylbenzene	135-98-8		U	1.00	0.250
Styrene	100-42-5		U	1.00	0.125
Trichloroethene	79-01-6		U	1.00	0.250
tert-Butylbenzene	98-06-6		U	1.00	0.250
Tetrachloroethene	127-18-4		U	1.00	0.250
Toluene	108-88-3		U	1.00	0.250
trans-1,2-Dichloroethene	156-60-5		U	1.00	0.250
trans-1,3-Dichloropropene	10061-02-6		U	1.00	0.500
Trichlorofluoromethane	75-69-4		U	1.00	0.250
Vinyl chloride	75-01-4		U	1.00	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	93.6	85	115	
1,2-Dichloroethane-d4	89.9	72	119	
Toluene-d8	98.4	81	120	
4-Bromofluorobenzene	107	76	119	

F	Found; the analyte was positively identified with concentration above MDL but below RL.

U	Undetected; the analyte was analyzed for, but not detected.

Certificate of Analysis

Sample #:	L12070473-01	**PrePrep Method:**	N/A	**Instrument:**	PE-ICP2
Client ID:	OD-IDW-071612	**Prep Method:**	3005A	**Prep Date:**	07/18/2012 09:48
Matrix:	Water	**Analytical Method:**	6010B	**Cal Date:**	07/19/2012 08:11
Workgroup #:	WG403773	**Analyst:**	KHR	**Run Date:**	07/19/2012 09:07
Collect Date:	07/16/2012 16:15	**Dilution:**	1	**File ID:**	P2.071912.090738
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	RL	MDL
Copper, Total	7440-50-8	0.0146	F	0.0200	0.0100
Zinc, Total	7440-66-6	0.0103	F	0.0200	0.0100

F	Found; the analyte was positively identified with concentration above MDL but below RL.

Certificate of Analysis

Sample #:	L12070473-02	**PrePrep Method:**	N/A	**Instrument:**	HPMS10
Client ID:	OD-IDW-TB-071612	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	06/26/2012 15:11
Workgroup #:	WG403830	**Analyst:**	TMB	**Run Date:**	07/19/2012 17:35
Collect Date:	07/16/2012 09:58	**Dilution:**	1	**File ID:**	10M97091
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	RL	MDL
1,1,1,2-Tetrachloroethane	630-20-6		U	0.500	0.250
1,1,1-Trichloroethane	71-55-6		U	1.00	0.250
1,1,2,2-Tetrachloroethane	79-34-5		U	0.500	0.200
1,1,2-Trichloroethane	79-00-5		U	1.00	0.250
1,1-Dichloroethane	75-34-3		U	1.00	0.125
1,1-Dichloroethene	75-35-4		U	1.00	0.500
1,1-Dichloropropene	563-58-6		U	1.00	0.250
1,2,3-Trichlorobenzene	87-61-6		U	1.00	0.150
1,2,3-Trichloropropane	96-18-4		U	1.00	0.500
1,2,4-Trichlorobenzene	120-82-1		U	1.00	0.200
1,2,4-Trimethylbenzene	95-63-6		U	1.00	0.250
1,2-Dichloroethane	107-06-2		U	0.500	0.250
1,2-Dichlorobenzene	95-50-1		U	1.00	0.125
1,2-Dibromo-3-chloropropane	96-12-8		U	2.00	1.00
1,2-Dichloropropane	78-87-5		U	1.00	0.200
1,2-Dibromoethane	106-93-4		U	1.00	0.250
1,3,5-Trimethylbenzene	108-67-8		U	1.00	0.250
1,3-Dichlorobenzene	541-73-1		U	1.00	0.250
1,3-Dichloropropane	142-28-9		U	0.400	0.200
1,4-Dichlorobenzene	106-46-7		U	0.500	0.125
1-Chlorohexane	544-10-5		U	1.00	0.125
2,2-Dichloropropane	594-20-7		U	1.00	0.250
2-Hexanone	591-78-6		U	10.0	2.50
2-Chlorotoluene	95-49-8		U	1.00	0.125
4-Chlorotoluene	106-43-4		U	1.00	0.250
Acetone	67-64-1		U	10.0	2.50
Benzene	71-43-2		U	0.400	0.125
Bromobenzene	108-86-1		U	1.00	0.125
Bromochloromethane	74-97-5		U	1.00	0.200
Bromodichloromethane	75-27-4		U	0.500	0.250
Bromoform	75-25-2		U	1.00	0.500
Bromomethane	74-83-9		U	1.00	0.500

Certificate of Analysis

Analyte	CAS #	Result	Qual	RL	MDL
Carbon disulfide	75-15-0		U	1.00	0.500
Carbon tetrachloride	56-23-5		U	1.00	0.250
Chlorobenzene	108-90-7		U	0.500	0.125
Chloroethane	75-00-3		U	1.00	0.500
Chloroform	67-66-3		U	0.300	0.125
Chloromethane	74-87-3		U	1.00	0.500
cis-1,2-Dichloroethene	156-59-2		U	1.00	0.250
cis-1,3-Dichloropropene	10061-01-5		U	0.500	0.250
Dibromochloromethane	124-48-1		U	0.500	0.250
Dibromomethane	74-95-3		U	1.00	0.250
Dichlorodifluoromethane	75-71-8		U	1.00	0.250
Ethylbenzene	100-41-4		U	1.00	0.250
Hexachlorobutadiene	87-68-3		U	0.600	0.250
Isopropylbenzene	98-82-8		U	1.00	0.250
Methylene chloride	75-09-2		U	1.00	0.250
Methyl t-butyl ether (MTBE)	1634-04-4		U	5.00	0.500
MEK (2-Butanone)	78-93-3		U	10.0	2.50
MIBK (methyl isobutyl ketone)	108-10-1		U	10.0	2.50
n-Butylbenzene	104-51-8		U	1.00	0.250
n-Propylbenzene	103-65-1		U	1.00	0.125
m-,p-Xylene	179601-23-1		U	2.00	0.500
Naphthalene	91-20-3		U	1.00	0.200
o-Xylene	95-47-6		U	1.00	0.250
p-Isopropyltoluene	99-87-6		U	1.00	0.250
sec-Butylbenzene	135-98-8		U	1.00	0.250
Styrene	100-42-5		U	1.00	0.125
Trichloroethene	79-01-6		U	1.00	0.250
tert-Butylbenzene	98-06-6		U	1.00	0.250
Tetrachloroethene	127-18-4		U	1.00	0.250
Toluene	108-88-3		U	1.00	0.250
trans-1,2-Dichloroethene	156-60-5		U	1.00	0.250
trans-1,3-Dichloropropene	10061-02-6		U	1.00	0.500
Trichlorofluoromethane	75-69-4		U	1.00	0.250
Vinyl chloride	75-01-4		U	1.00	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	91.1	85	115	
1,2-Dichloroethane-d4	88.0	72	119	
Toluene-d8	97.2	81	120	
4-Bromofluorobenzene	107	76	119	

U	Undetected; the analyte was analyzed for, but not detected.

COC No. A 30961

158 Starlite Drive
Marietta, OH 45750

Microbac

CHAIN-OF-CUSTODY RECORD

Phone: 740-373-4071
Fax: 740-373-4835

Company Name: HDR

Project Contact: Tom Holmes

Contact Phone #: 901-774-6717

Turn Around Requirements: 5 day

Location: DOMT

Project ID: 145803 004

Sampler (print): P Scott Marshall III

Signature: P Scott Marshall III

Program: ☐ CWA ☐ RCRA ☐ DOD ☐ AFCEE ☐ Other _____

ADDITIONAL REQUIREMENTS

Sample I.D. No.	Comp	Grab	Date	Time	Matrix*	NUMBER OF CONTAINERS	Hold	VOC 8260	Metals 6010B	TOTAL # (LAB USE)
OD-IDW-071612		X	07/16/12	1615	Water	4		X	X	
OD-IDW-TB-071612		X	12-July-2012	09:58	Water	2		X		

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
P Scott Marshall III	7/16/12	1800	Fed Ex				

Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time	Remarks:

*Water (W), Soil (S), Solid Waste (SD), Unknown (X)

APPENDIX B

RESULTS OF LABORATORY ANALYSES

TABLE B-1
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, OCTOBER 2011
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location / Date / Lab ID	Units	SVE-A 10/24/2011 P1104110-001	SVE-B 10/24/2011 P1104110-002	SVE-C 10/24/2011 P1104110-003	SVE-D 10/24/2011 P1104110-004	SVE-E 10/24/2011 P1104110-005	SVE-E DUP 10/24/2011 P1104110-009
1,1,1-Trichloroethane (TCA)		ppbv	<0.26	<2.1	<0.26	<0.26	<0.25	<0.25
1,1,2,2-Tetrachloroethane		ppbv	0.11 J	29	0.14 J	1.3	<0.2	<0.2
1,1,2-Trichloroethane		ppbv	0.064 J	<2.1	0.076 J	0.065 J	<0.25	<0.25
1,1,2-Trichlorotrifluoroethane		ppbv	0.062 J	<1.5	0.064 J	0.061 J	0.061 J	0.064 J
1,1-Dichloroethane (1,1-DCA)		ppbv	<0.35	<2.8	<0.35	<0.35	<0.34	<0.34
1,1-Dichloroethene (1,1-DCE)		ppbv	0.67	2.7 J	0.062 J	<0.35	<0.34	<0.34
1,2,4-Trichlorobenzene		ppbv	<0.19	<1.5	<0.19	<0.19	<0.18	<0.18
1,2,4-Trimethylbenzene		ppbv	<0.29	<2.3	<0.29	<0.28	<0.28	<0.28
1,2-Dibromo-3-chloropropane (DBCP)		ppbv	<0.15	<1.2	<0.15	<0.14	<0.14	<0.14
1,2-Dibromoethane		ppbv	<0.18	<1.5	<0.18	<0.18	<0.18	<0.18
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)		ppbv	<0.2	<1.6	<0.2	<0.2	<0.19	<0.19
1,2-Dichlorobenzene		ppbv	<0.23	<1.9	<0.23	<0.23	<0.23	<0.23
1,2-Dichloroethane		ppbv	<0.35	<2.8	<0.35	<0.35	<0.34	<0.34
1,2-Dichloropropane		ppbv	<0.31	<2.4	<0.31	<0.3	<0.29	<0.29
1,3,5-Trimethylbenzene		ppbv	<0.29	<2.3	<0.29	<0.28	<0.28	<0.28
1,3-Butadiene		ppbv	<0.64	<5.1	<0.64	<0.63	<0.62	<0.62
1,3-Dichlorobenzene		ppbv	<0.23	<1.9	<0.23	<0.23	<0.23	<0.23
1,4-Dichlorobenzene		ppbv	<0.23	<1.9	<0.23	<0.23	<0.23	<0.23
1,4-Dioxane		ppbv	0.16 J	<3.1	<0.39	<0.39	<0.38	<0.38
2-Butanone (MEK)		ppbv	1.1 J	<19	0.32 J	1.8 J	0.54 J	0.45 J
2-Hexanone		ppbv	0.16 J	<2.7	0.087 J	0.23 J	0.083 J	0.088 J
2-Propanol (Isopropyl Alcohol)		ppbv	1.3	<4.6	<0.57	<0.57	0.32 J	0.3 J
3-Chloro-1-propene (Allyl Chloride)		ppbv	<0.45	<3.6	<0.45	<0.45	<0.43	<0.43
4-Ethyltoluene		ppbv	<0.29	<2.3	<0.29	<0.28	<0.28	<0.28
4-Methyl-2-pentanone		ppbv	0.054 J	<2.7	<0.34	0.1 J	<0.33	<0.33
Acetone		ppbv	22	5.1 J	2.7 J	220	5.2	2.1 J
Acetonitrile		ppbv	1.1	<6.7	<0.84	0.81 J	0.25 J	0.23 J
Acrolein		ppbv	0.8 J	<9.8	0.23 J	0.49 J	0.31 J	0.18 J
Acrylonitrile		ppbv	<0.65	<5.2	<0.65	<0.65	<0.63	<0.63
alpha-Pinene		ppbv	0.067 J	<2	0.041 J	<0.25	<0.24	<0.24
Benzene		ppbv	0.17 J	<3.5	0.17 J	0.17 J	0.13 J	0.13 J
Benzyl Chloride		ppbv	<0.27	<2.2	<0.27	<0.27	<0.26	<0.26
Bromodichloromethane		ppbv	<0.21	<1.7	<0.21	<0.21	<0.2	<0.2
Bromoform		ppbv	<0.14	<1.1	<0.14	<0.14	<0.13	<0.13
Bromomethane		ppbv	0.32 J	<2.9	0.1 J	0.15 J	0.15 J	0.18 J
Carbon Disulfide		ppbv	0.3 J	<18	0.16 J	<2.2	0.073 J	<2.2
Carbon Tetrachloride		ppbv	2	0.53 J	0.32	0.068 J	0.11 J	0.11 J
Chlorobenzene		ppbv	<0.31	<2.4	<0.31	<0.3	<0.3	<0.3
Chloroethane		ppbv	<0.53	<4.2	<0.53	<0.53	<0.52	<0.52
Chloroform		ppbv	14	15	4.3	0.65	0.24 J	0.27 J
Chloromethane		ppbv	<0.68	<5.4	<0.68	<0.68	<0.66	<0.66
cis-1,2-Dichloroethene		ppbv	1.4	25	11	2.8	0.61	0.67
cis-1,3-Dichloropropene		ppbv	<0.31	<2.5	<0.31	<0.31	<0.3	<0.3
Cyclohexane		ppbv	<0.41	<3.3	<0.41	<0.41	<0.4	<0.4
Dibromochloromethane		ppbv	<0.17	<1.3	<0.17	<0.16	<0.16	<0.16
Dichlorodifluoromethane (CFC 12)		ppbv	0.16 J	0.51 J	1.4	0.38	0.4	0.42
Dichloromethane (Methylene Chloride)		ppbv	0.14 JB	0.59 JB	0.086 JB	0.12 JB	0.11 JB	0.11 JB
d-Limonene		ppbv	<0.25	<2	<0.25	<0.25	<0.24	<0.24
Ethanol		ppbv	<3.7	<30	<3.7	<3.7	1.3 J	1.3 J
Ethyl Acetate		ppbv	<0.39	<3.1	<0.39	<0.39	<0.38	<0.38
Ethylbenzene		ppbv	<0.32	<2.6	<0.32	<0.32	<0.31	<0.31
Hexachlorobutadiene		ppbv	<0.13	<1.1	<0.13	<0.13	<0.13	<0.13
Isopropylbenzene (Cumene)		ppbv	<0.29	<2.3	<0.29	<0.28	<0.28	<0.28
m,p-Xylenes		ppbv	<0.32	<2.6	<0.32	<0.32	<0.31	<0.31
Methyl Methacrylate		ppbv	<0.34	<2.7	<0.34	<0.34	<0.33	<0.33
Methyl tert-Butyl Ether		ppbv	<0.39	<3.1	<0.39	<0.39	<0.38	<0.38
Naphthalene		ppbv	<0.27	<2.1	<0.27	<0.27	<0.26	<0.26
n-Butyl Acetate		ppbv	<0.3	<2.4	<0.3	<0.29	<0.29	<0.29
n-Heptane		ppbv	0.061 J	<2.7	<0.34	0.17 J	<0.33	<0.33
n-Hexane		ppbv	0.28 J	<3.2	0.11 J	0.38 J	0.084 J	<0.39
n-Nonane		ppbv	<0.27	<2.1	<0.27	<0.27	<0.26	<0.26
n-Octane		ppbv	0.16 J	<2.4	<0.3	0.065 J	<0.29	<0.29
n-Propylbenzene		ppbv	<0.29	<2.3	<0.29	<0.28	<0.28	<0.28
o-Xylene		ppbv	<0.32	<2.6	<0.32	<0.32	<0.31	<0.31
Propene		ppbv	<0.82	<6.5	0.81 J	2.9	0.37 J	0.38 J
Styrene		ppbv	<0.33	<2.6	<0.33	<0.33	<0.32	<0.32
Tetrachloroethene (PCE)		ppbv	54	8	66	4.3	1.2	1.2
Tetrahydrofuran (THF)		ppbv	0.29 J	<3.8	<0.48	<0.47	<0.46	<0.46
Toluene		ppbv	0.45	<3	0.084 J	0.26 J	0.11 J	0.092 J
trans-1,2-Dichloroethene		ppbv	0.66	9.9	1.6	1.4	0.46	0.49
trans-1,3-Dichloropropene		ppbv	<0.31	<2.5	<0.31	<0.31	<0.3	<0.3
Trichloroethene (TCE)		ppbv	21	160	13	45	21	22
Trichlorofluoromethane (CFC 11)		ppbv	0.17 J	0.32 J	0.21 J	0.2 J	0.19 J	0.2 J
Vinyl Acetate		ppbv	1.5 J	<16	0.49 J	1.3 J	0.79 J	0.36 J
Vinyl Chloride		ppbv	<0.55	<4.4	<0.55	<0.55	<0.53	<0.53

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-1
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, OCTOBER 2011
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVE-F 10/24/2011 P1104110-006	SVE-G 10/24/2011 P1104110-007	SVE-EFF 10/24/2011 P1104110-008
1,1,1-Trichloroethane (TCA)	ppbv	<0.25	<0.26	<0.22
1,1,2,2-Tetrachloroethane	ppbv	6	8.7	11
1,1,2-Trichloroethane	ppbv	1.7	3	1
1,1,2-Trichlorotrifluoroethane	ppbv	0.52	3.2	0.82
1,1-Dichloroethane (1,1-DCA)	ppbv	0.24 J	0.076 J	0.082 J
1,1-Dichloroethene (1,1-DCE)	ppbv	0.41	4.7	1.8
1,2,4-Trichlorobenzene	ppbv	<0.19	1	0.19
1,2,4-Trimethylbenzene	ppbv	<0.28	<0.28	<0.25
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.14	<0.14	<0.13
1,2-Dibromoethane	ppbv	<0.18	<0.18	<0.16
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.2	<0.2	<0.17
1,2-Dichlorobenzene	ppbv	<0.23	0.067 J	<0.2
1,2-Dichloroethane	ppbv	0.43	0.96	0.29 J
1,2-Dichloropropane	ppbv	0.23 J	0.064 J	0.065 J
1,3,5-Trimethylbenzene	ppbv	<0.28	<0.28	<0.25
1,3-Butadiene	ppbv	<0.62	<0.63	<0.55
1,3-Dichlorobenzene	ppbv	<0.23	0.53	0.11 J
1,4-Dichlorobenzene	ppbv	<0.23	0.068 J	<0.2
1,4-Dioxane	ppbv	<0.38	0.14 J	<0.34
2-Butanone (MEK)	ppbv	0.55 J	0.66 J	0.26 J
2-Hexanone	ppbv	0.096 J	0.17 J	<0.3
2-Propanol (Isopropyl Alcohol)	ppbv	<0.56	<0.57	<0.5
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.44	<0.45	<0.39
4-Ethyltoluene	ppbv	<0.28	<0.28	<0.25
4-Methyl-2-pentanone	ppbv	<0.34	0.17 J	<0.3
Acetone	ppbv	4.2	19	1.9 J
Acetonitrile	ppbv	0.21 J	0.72 J	<0.73
Acrolein	ppbv	0.52 J	<1.2	0.18 J
Acrylonitrile	ppbv	<0.64	<0.65	<0.56
alpha-Pinene	ppbv	<0.25	<0.25	<0.22
Benzene	ppbv	0.3 J	0.19 J	0.16 J
Benzyl Chloride	ppbv	<0.27	<0.27	<0.24
Bromodichloromethane	ppbv	0.065 J	0.044 J	0.036 J
Bromoform	ppbv	<0.13	<0.14	<0.12
Bromomethane	ppbv	<0.36	0.18 J	0.13 J
Carbon Disulfide	ppbv	3.7	0.37 J	0.15 J
Carbon Tetrachloride	ppbv	1.4	21	4.9
Chlorobenzene	ppbv	<0.3	0.059 J	<0.27
Chloroethane	ppbv	<0.52	<0.53	<0.46
Chloroform	ppbv	250	79	76
Chloromethane	ppbv	<0.67	0.29 J	<0.59
cis-1,2-Dichloroethene	ppbv	31	4.9	17
cis-1,3-Dichloropropene	ppbv	<0.3	<0.31	<0.27
Cyclohexane	ppbv	<0.4	<0.41	<0.35
Dibromochloromethane	ppbv	<0.16	<0.16	<0.14
Dichlorodifluoromethane (CFC 12)	ppbv	1.2	0.77	0.8
Dichloromethane (Methylene Chloride)	ppbv	5.4	0.66	1.4
d-Limonene	ppbv	<0.25	<0.25	<0.22
Ethanol	ppbv	2.9 J	<3.7	<3.2
Ethyl Acetate	ppbv	<0.38	<0.39	<0.34
Ethylbenzene	ppbv	<0.32	<0.32	<0.28
Hexachlorobutadiene	ppbv	<0.13	<0.13	<0.11
Isopropylbenzene (Cumene)	ppbv	<0.28	<0.28	<0.25
m,p-Xylenes	ppbv	<0.32	<0.32	<0.28
Methyl Methacrylate	ppbv	<0.34	<0.34	<0.3
Methyl tert-Butyl Ether	ppbv	<0.38	<0.39	<0.34
Naphthalene	ppbv	<0.26	<0.27	<0.23
n-Butyl Acetate	ppbv	<0.29	<0.29	<0.26
n-Heptane	ppbv	0.063 J	0.095 J	<0.3
n-Hexane	ppbv	0.19 J	0.26 J	0.088 J
n-Nonane	ppbv	<0.26	<0.27	<0.23
n-Octane	ppbv	<0.3	0.065 J	<0.26
n-Propylbenzene	ppbv	<0.28	<0.28	<0.25
o-Xylene	ppbv	<0.32	<0.32	<0.28
Propene	ppbv	0.58 J	1.4	0.49 J
Styrene	ppbv	<0.32	<0.33	<0.29
Tetrachloroethene (PCE)	ppbv	6.8	12	19
Tetrahydrofuran (THF)	ppbv	<0.47	<0.47	<0.41
Toluene	ppbv	0.13 J	0.18 J	0.064 J
trans-1,2-Dichloroethene	ppbv	1.6	1.9	4.1
trans-1,3-Dichloropropene	ppbv	<0.3	<0.31	<0.27
Trichloroethene (TCE)	ppbv	34	110	95
Trichlorofluoromethane (CFC 11)	ppbv	0.28	0.62	0.35
Vinyl Acetate	ppbv	0.66 J	0.3 J	0.31 J
Vinyl Chloride	ppbv	1	0.2 J	0.38 J

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-2
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, JANUARY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVE-A 1/24/2012 P1200313-001	SVE-B 1/24/2012 P1200313-002	SVE-C 1/24/2012 P1200313-003	SVE-C 2/23/2012 P1200734-001	SVE-D 1/24/2012 P1200313-004	SVE-D 2/23/2012 P1200734-002
1,1,1-Trichloroethane (TCA)	ppbv	<27	<0.27	<26	<0.29	<5.1	<0.28
1,1,2,2-Tetrachloroethane	ppbv	<21	36	<21	<0.23	<4.1	1
1,1,2-Trichloroethane	ppbv	<27	0.5	<26	<0.29	<5.1	<0.28
1,1,2-Trichlorotrifluoroethane	ppbv	<19	0.067 J	<19	0.061 J	<3.7	0.044 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<36	<0.36	<36	<0.4	<6.9	<0.38
1,1-Dichloroethene (1,1-DCE)	ppbv	<37	1.1	<36	<0.4	<7.1	<0.39
1,2,4-Trichlorobenzene	ppbv	<20	<0.2	<19	<0.22	<3.8	<0.21
1,2,4-Trimethylbenzene	ppbv	<30	<0.3	<29	<0.33	<5.7	<0.32
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<15	<0.15	<15	<0.17	<2.9	<0.16
1,2-Dibromoethane	ppbv	<19	<0.19	<19	<0.21	<3.6	<0.2
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<21	<0.21	<21	<0.23	<4	<0.22
1,2-Dichlorobenzene	ppbv	<24	<0.24	<24	<0.27	<4.7	<0.26
1,2-Dichloroethane	ppbv	<36	<0.36	<36	<0.4	<6.9	<0.38
1,2-Dichloropropane	ppbv	<32	<0.32	<31	<0.35	<6.1	<0.34
1,3,5-Trimethylbenzene	ppbv	<30	<0.3	<29	<0.33	<5.7	<0.32
1,3-Butadiene	ppbv	<66	<0.66	<65	<0.72	<13	<0.7
1,3-Dichlorobenzene	ppbv	<24	<0.24	<24	<0.27	<4.7	<0.26
1,4-Dichlorobenzene	ppbv	<24	<0.24	<24	<0.27	<4.7	<0.26
1,4-Dioxane	ppbv	<41	<0.41	<40	<0.44	<7.8	<0.43
2-Butanone (MEK)	ppbv	<250	0.64 J	<240	0.32 J	<47	3
2-Hexanone	ppbv	<36	0.096 J	<35	0.093 J	<6.8	0.22 J
2-Propanol (Isopropyl Alcohol)	ppbv	<60	<0.59	<59	0.4 J	<11	<0.63
3-Chloro-1-propene (Allyl Chloride)	ppbv	<47	<0.47	<46	<0.51	<8.9	<0.5
4-Ethyltoluene	ppbv	<30	<0.3	<29	<0.33	<5.7	<0.32
4-Methyl-2-pentanone	ppbv	<36	<0.36	<35	<0.39	<6.8	0.093 J
Acetone	ppbv	<310	16	65 J	2.1 J	<59	47
Acetonitrile	ppbv	<88	<0.87	<86	<0.95	<17	<0.92
Acrolein	ppbv	<130	<1.3	<130	0.14 J	<24	<1.4
Acrylonitrile	ppbv	<68	<0.67	<66	<0.74	<13	<0.71
alpha-Pinene	ppbv	<26	0.069 J	<26	0.13 J	<5	<0.28
Benzene	ppbv	<46	0.13 J	<45	0.29 J	<8.8	0.14 J
Benzyl Chloride	ppbv	<28	<0.28	<28	<0.31	<5.4	<0.3
Bromodichloromethane	ppbv	<22	<0.22	<22	<0.24	<4.2	<0.23
Bromoform	ppbv	<14	<0.14	<14	<0.15	<2.7	<0.15
Bromomethane	ppbv	<38	0.11 J	<37	<0.41	<7.2	<0.4
Carbon Disulfide	ppbv	<240	4.5	<230	0.86 J	2.2 J	0.26 J
Carbon Tetrachloride	ppbv	<23	0.62	<23	0.4	<4.5	0.058 J
Chlorobenzene	ppbv	<32	<0.32	<31	<0.35	<6.1	<0.34
Chloroethane	ppbv	<56	<0.55	<55	<0.61	<11	<0.59
Chloroform	ppbv	8.5 J	13	<29	8.8	<5.7	0.26 J
Chloromethane	ppbv	<71	<0.71	<70	<0.78	<14	<0.75
cis-1,2-Dichloroethene	ppbv	<37	16	<36	5.1	<7.1	0.6
cis-1,3-Dichloropropene	ppbv	<32	<0.32	<32	<0.35	<6.2	<0.34
Cyclohexane	ppbv	<43	<0.42	<42	<0.47	<8.1	<0.45
Dibromochloromethane	ppbv	<17	<0.17	<17	<0.19	<3.3	<0.18
Dichlorodifluoromethane (CFC 12)	ppbv	<30	0.37	<29	1	<5.7	0.19 J
Dichloromethane (Methylene Chloride)	ppbv	7.2 JB	0.14 JB	7.5 JB	0.092 JB	1.5 JB	0.12 JB
d-Limonene	ppbv	<26	<0.26	<26	<0.29	<5	<0.28
Ethanol	ppbv	<390	<3.9	<380	<4.2	<74	<4.1
Ethyl Acetate	ppbv	<41	<0.41	<40	<0.44	<7.8	<0.43
Ethylbenzene	ppbv	<34	<0.34	<33	<0.37	<6.4	<0.36
Hexachlorobutadiene	ppbv	<14	<0.14	<14	<0.15	<2.6	<0.15
Isopropylbenzene (Cumene)	ppbv	<30	<0.3	<29	<0.33	<5.7	<0.32
m,p-Xylenes	ppbv	<34	<0.34	<33	<0.37	<6.4	<0.36
Methyl Methacrylate	ppbv	<36	<0.36	<35	<0.39	<6.8	<0.38
Methyl tert-Butyl Ether	ppbv	<41	<0.41	<40	<0.44	<7.8	<0.43
Naphthalene	ppbv	<28	<0.28	<27	<0.31	<5.3	<0.3
n-Butyl Acetate	ppbv	<31	<0.31	<30	<0.34	<5.9	<0.33
n-Heptane	ppbv	<36	<0.36	<35	<0.39	<6.8	<0.38
n-Hexane	ppbv	<42	<0.41	<41	0.12 J	<7.9	0.081 J
n-Nonane	ppbv	<28	<0.28	<27	<0.31	<5.3	<0.3
n-Octane	ppbv	<31	<0.31	<31	<0.34	<6	<0.33
n-Propylbenzene	ppbv	<30	<0.3	<29	<0.33	<5.7	<0.32
o-Xylene	ppbv	<34	<0.34	<33	<0.37	<6.4	<0.36
Propene	ppbv	<85	0.63 J	<84	1	<16	0.48 J
Styrene	ppbv	<35	<0.34	<34	<0.38	<6.6	<0.36
Tetrachloroethene	ppbv	37	6.6	21 J	17	<4.1	14
Tetrahydrofuran (THF)	ppbv	<50	<0.5	<49	<0.54	<9.5	<0.53
Toluene	ppbv	<39	0.14 J	<38	0.12 J	<7.4	0.18 J
trans-1,2-Dichloroethene	ppbv	<37	4.6	<36	0.25 J	<7.1	0.18 J
trans-1,3-Dichloropropene	ppbv	<32	<0.32	<32	<0.35	<6.2	<0.34
Trichloroethene (TCE)	ppbv	15 J	90	11 J	1.9	1.7 J	9.2
Trichlorofluoromethane (CFC 11)	ppbv	<26	0.33	<26	0.25 J	<5	0.15 J
Vinyl Acetate	ppbv	<210	<2.1	<200	0.41 J	<40	<2.2
Vinyl Chloride	ppbv	<58	0.18 J	<56	<0.63	<11	<0.61

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-2
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, JANUARY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVE-E 1/24/2012 P1200313-005	SVE-F 1/24/2012 P1200313-006	SVE-G 1/24/2012 P1200313-007	SVE-EFF 1/24/2012 P1200313-008	SVE-EFF DUP 1/24/2012 P1200313-009
1,1,1-Trichloroethane (TCA)	ppbv	<0.26	<0.26	<0.26	<0.22	<0.22
1,1,2,2-Tetrachloroethane	ppbv	0.7	0.13 J	0.064 J	6.5	6.2
1,1,2-Trichloroethane	ppbv	0.11 J	0.099 J	<0.26	0.86	0.86
1,1,2-Trichlorotrifluoroethane	ppbv	0.064 J	0.33	0.12 J	1.2	1.3
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.35	0.063 J	<0.35	0.081 J	<0.3
1,1-Dichloroethene (1,1-DCE)	ppbv	0.089 J	0.36 J	<0.36	1.4	1.4
1,2,4-Trichlorobenzene	ppbv	<0.19	<0.19	<0.19	<0.16	<0.16
1,2,4-Trimethylbenzene	ppbv	<0.29	<0.29	<0.29	0.11 J	<0.25
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.15	<0.15	<0.15	<0.12	<0.13
1,2-Dibromoethane	ppbv	<0.18	<0.19	<0.18	<0.15	<0.16
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.2	<0.2	<0.2	<0.17	<0.17
1,2-Dichlorobenzene	ppbv	<0.23	<0.24	<0.24	<0.2	<0.2
1,2-Dichloroethane	ppbv	<0.35	0.16 J	<0.35	0.12 J	0.12 J
1,2-Dichloropropane	ppbv	<0.31	<0.31	<0.31	<0.26	<0.26
1,3,5-Trimethylbenzene	ppbv	<0.29	<0.29	<0.29	<0.24	<0.25
1,3-Butadiene	ppbv	<0.64	<0.65	<0.64	<0.54	<0.55
1,3-Dichlorobenzene	ppbv	<0.23	<0.24	<0.24	0.54	<0.2
1,4-Dichlorobenzene	ppbv	<0.23	<0.24	<0.24	<0.2	<0.2
1,4-Dioxane	ppbv	<0.39	0.19 J	<0.39	<0.33	<0.34
2-Butanone (MEK)	ppbv	0.5 J	0.34 J	0.19 J	0.22 J	0.47 J
2-Hexanone	ppbv	<0.34	<0.35	<0.35	0.08 J	0.12 J
2-Propanol (Isopropyl Alcohol)	ppbv	0.23 J	<0.58	<0.58	<0.48	<0.49
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.45	<0.46	<0.45	<0.38	<0.39
4-Ethyltoluene	ppbv	<0.29	<0.29	<0.29	<0.24	<0.25
4-Methyl-2-pentanone	ppbv	0.048 J	<0.35	<0.35	<0.29	0.074 J
Acetone	ppbv	3.1	2.2 J	1.5 J	1.9 J	3.1
Acetonitrile	ppbv	<0.84	0.22 J	<0.85	<0.71	<0.72
Acrolein	ppbv	0.25 J	0.45 J	0.13 J	0.13 J	0.23 J
Acrylonitrile	ppbv	<0.65	<0.66	<0.65	<0.55	<0.56
alpha-Pinene	ppbv	<0.25	<0.26	<0.25	<0.21	<0.22
Benzene	ppbv	0.25 J	0.55	0.13 J	0.28 J	0.29 J
Benzyl Chloride	ppbv	<0.27	<0.28	<0.27	<0.23	<0.23
Bromodichloromethane	ppbv	<0.21	0.044 J	<0.21	0.035 J	0.035 J
Bromoform	ppbv	<0.14	<0.14	<0.14	<0.12	<0.12
Bromomethane	ppbv	0.097 J	<0.37	<0.37	0.11 J	0.11 J
Carbon Disulfide	ppbv	0.072 J	0.11 J	<2.3	3.6	0.45 J
Carbon Tetrachloride	ppbv	0.069 J	1.1	0.22 J	4.1	4
Chlorobenzene	ppbv	<0.31	<0.31	<0.31	<0.26	<0.26
Chloroethane	ppbv	<0.53	<0.54	<0.54	<0.45	<0.46
Chloroform	ppbv	0.78	22	1.8	50	50
Chloromethane	ppbv	<0.68	0.15 J	0.17 J	<0.58	<0.59
cis-1,2-Dichloroethene	ppbv	2.9	220	0.22 J	97	99
cis-1,3-Dichloropropene	ppbv	<0.31	<0.32	<0.31	<0.26	<0.27
Cyclohexane	ppbv	<0.41	<0.42	<0.41	<0.35	<0.35
Dibromochloromethane	ppbv	<0.17	<0.17	<0.17	<0.14	<0.14
Dichlorodifluoromethane (CFC 12)	ppbv	0.41	1	0.46	1.3	1.3
Dichloromethane (Methylene Chloride)	ppbv	0.13 JB	0.43 B	0.14 JB	0.37 B	0.38 B
d-Limonene	ppbv	<0.25	<0.26	<0.25	<0.21	<0.22
Ethanol	ppbv	<3.7	<3.8	<3.8	<3.2	<3.2
Ethyl Acetate	ppbv	1.1	<0.4	<0.39	<0.33	<0.34
Ethylbenzene	ppbv	<0.32	<0.33	<0.33	0.044 J	<0.28
Hexachlorobutadiene	ppbv	<0.13	<0.13	<0.13	<0.11	<0.11
Isopropylbenzene (Cumene)	ppbv	<0.29	<0.29	<0.29	<0.24	<0.25
m,p-Xylenes	ppbv	0.12 J	0.12 J	0.12 J	<0.27	<0.28
Methyl Methacrylate	ppbv	<0.34	<0.35	<0.35	<0.29	<0.3
Methyl tert-Butyl Ether	ppbv	<0.39	<0.4	<0.39	<0.33	<0.34
Naphthalene	ppbv	<0.27	<0.27	<0.27	<0.23	<0.23
n-Butyl Acetate	ppbv	<0.3	<0.3	<0.3	<0.25	<0.25
n-Heptane	ppbv	<0.34	<0.35	<0.35	<0.29	<0.3
n-Hexane	ppbv	0.2 J	0.16 J	<0.4	0.093 J	0.093 J
n-Nonane	ppbv	<0.27	<0.27	<0.27	0.047 J	<0.23
n-Octane	ppbv	<0.3	<0.31	<0.3	<0.25	<0.26
n-Propylbenzene	ppbv	<0.29	<0.29	<0.29	<0.24	<0.25
o-Xylene	ppbv	0.048 J	<0.33	<0.33	0.039 J	<0.28
Propene	ppbv	2.6	<0.83	0.23 J	1.5	1.5
Styrene	ppbv	<0.33	<0.34	<0.33	<0.28	<0.28
Tetrachloroethene	ppbv	1.9	2.6	0.18 J	17	18
Tetrahydrofuran (THF)	ppbv	<0.48	<0.49	<0.48	<0.4	<0.41
Toluene	ppbv	0.78	0.72	0.19 J	0.099 J	0.14 J
trans-1,2-Dichloroethene	ppbv	1.8	0.6	<0.36	3.9	3.7
trans-1,3-Dichloropropene	ppbv	<0.31	<0.32	<0.31	<0.26	<0.27
Trichloroethene (TCE)	ppbv	53	15	1.3	100	98
Trichlorofluoromethane (CFC 11)	ppbv	0.2 J	0.24 J	0.2 J	0.37	0.37
Vinyl Acetate	ppbv	0.41 J	0.34 J	<2	0.26 J	0.44 J
Vinyl Chloride	ppbv	<0.55	0.93	<0.56	0.48	0.47 J

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-3
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, APRIL 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVEA 4/11/2012 P1201435-001	SVEB 4/11/2012 P1201435-009	SVEB-East 4/11/2012 P1201435-002	SVEC 4/11/2012 P1201435-016	SVEC-East 4/11/2012 P1201435-003	SVEC-West 4/11/2012 P1201435-010	SVEC-West DUP 4/11/2012 P1201435-015
1,1,1-Trichloroethane (TCA)	ppbv	<0.11	<0.13	<0.13	<0.13	<0.14	<0.14	<0.14
1,1,2,2-Tetrachloroethane	ppbv	<0.09	7.8	5.4	0.67	0.17	0.17	0.13
1,1,2-Trichloroethane	ppbv	<0.11	0.046 J	0.043 J	<0.13	0.069 J	<0.14	<0.14
1,1,2-Trichlorotrifluoroethane	ppbv	0.066 J	0.066 J	0.066 J	0.066 J	0.079 J	0.065 J	0.063 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.15	<0.18	<0.18	<0.18	<0.19	<0.19	<0.18
1,1-Dichloroethene (1,1-DCE)	ppbv	0.35	0.88	0.48	<0.19	<0.19	<0.19	<0.19
1,2,4-Trichlorobenzene	ppbv	<0.084	<0.099	<0.099	<0.099	<0.1	<0.1	<0.1
1,2,4-Trimethylbenzene	ppbv	0.6	<0.15	<0.15	<0.15	<0.15	0.071 J	<0.15
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.064	<0.076	<0.076	<0.076	<0.079	<0.078	<0.077
1,2-Dibromoethane	ppbv	<0.081	<0.096	<0.096	<0.096	<0.099	<0.098	<0.097
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.089	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
1,2-Dichlorobenzene	ppbv	<0.1	<0.12	<0.12	<0.12	<0.13	<0.13	<0.12
1,2-Dichloroethane	ppbv	0.093 J	<0.18	<0.18	<0.18	<0.19	<0.19	<0.18
1,2-Dichloropropane	ppbv	0.39	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
1,3,5-Trimethylbenzene	ppbv	0.19	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
1,3-Butadiene	ppbv	0.53	<0.33	<0.33	<0.33	<0.34	<0.34	<0.34
1,3-Dichlorobenzene	ppbv	<0.1	<0.12	<0.12	<0.12	<0.13	<0.13	<0.12
1,4-Dichlorobenzene	ppbv	<0.1	<0.12	<0.12	<0.12	<0.13	<0.13	<0.12
1,4-Dioxane	ppbv	<0.17	<0.2	<0.2	<0.2	<0.21	<0.21	<0.21
2-Butanone (MEK)	ppbv	2.2	0.47 J	0.29 J	0.47 J	0.4 J	0.47 J	0.34 J
2-Hexanone	ppbv	<0.15	<0.18	<0.18	<0.18	<0.19	<0.18	<0.18
2-Propanol (Isopropyl Alcohol)	ppbv	4.6	<0.6	<0.6	0.3 J	<0.62	0.26 J	<0.61
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.2	<0.23	<0.23	<0.23	<0.24	<0.24	<0.24
4-Ethyltoluene	ppbv	0.18	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
4-Methyl-2-pentanone	ppbv	0.097 J	<0.18	<0.18	<0.18	<0.19	<0.18	<0.18
Acetone	ppbv	4.9	2.8 J	18	4	3.9	3.8	3.2
Acetonitrile	ppbv	0.72	<0.44	0.22 J	0.19 J	<0.45	<0.45	<0.44
Acrolein	ppbv	0.4 J	0.16 J	<1.3	0.15 J	0.33 J	0.19 J	0.14 J
Acrylonitrile	ppbv	<0.29	<0.34	<0.34	<0.34	<0.35	<0.35	<0.34
alpha-Pinene	ppbv	0.097 J	<0.13	<0.13	<0.13	<0.14	<0.14	<0.13
Benzene	ppbv	1.9	0.099 J	0.095 J	0.24	0.15 J	0.2 J	0.17 J
Benzyl Chloride	ppbv	<0.12	<0.14	<0.14	<0.14	<0.15	<0.15	<0.14
Bromodichloromethane	ppbv	<0.093	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Bromoform	ppbv	<0.06	<0.071	<0.071	<0.071	<0.074	<0.073	<0.072
Bromomethane	ppbv	<0.16	<0.19	0.081 J	<0.19	<0.2	<0.19	<0.19
Carbon Disulfide	ppbv	0.13 J	<2.4	0.18 J	0.086 J	0.13 J	<2.4	<2.4
Carbon Tetrachloride	ppbv	0.23	0.18	0.054 J	0.042 J	0.094 J	0.043 J	0.043 J
Chlorobenzene	ppbv	<0.13	<0.16	<0.16	<0.16	<0.17	<0.16	<0.16
Chloroethane	ppbv	<0.24	<0.28	<0.28	<0.28	<0.29	<0.29	<0.28
Chloroform	ppbv	7	13	3.1	0.3	6.9	0.15 J	0.13 J
Chloromethane	ppbv	<0.3	0.17 J	<0.36	<0.36	<0.37	0.15 J	0.15 J
cis-1,2-Dichloroethene	ppbv	0.13 J	14	1.5	0.96	16	0.58	0.51
cis-1,3-Dichloropropene	ppbv	<0.14	<0.16	<0.16	<0.16	<0.17	<0.17	<0.16
Cyclohexane	ppbv	1.2	<0.43	<0.43	<0.43	<0.44	<0.44	<0.43
Dibromochloromethane	ppbv	<0.073	<0.086	<0.086	<0.086	<0.089	<0.089	<0.087
Dichlorodifluoromethane (CFC 12)	ppbv	0.34	0.41	0.33	0.44	0.65	0.43	0.42
Dichloromethane (Methylene Chloride)	ppbv	0.33 B	0.12 JB	0.18 JB	0.12 JB	0.1 JB	0.13 JB	0.12 JB
d-Limonene	ppbv	0.29	<0.13	<0.13	<0.13	<0.14	<0.14	<0.13
Ethanol	ppbv	37	<3.9	<3.9	1.6 J	<4	<4	<4
Ethyl Acetate	ppbv	16	<0.41	<0.41	<0.41	<0.42	<0.42	<0.41
Ethylbenzene	ppbv	0.7	<0.17	<0.17	0.051 J	<0.18	<0.17	<0.17
Hexachlorobutadiene	ppbv	<0.058	<0.069	<0.069	<0.069	<0.071	<0.071	<0.07
Isopropylbenzene (Cumene)	ppbv	<0.13	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
m,p-Xylenes	ppbv	2	<0.34	<0.34	0.18 J	<0.35	0.18 J	0.11 J
Methyl Methacrylate	ppbv	0.19 J	<0.36	<0.36	<0.36	<0.37	<0.37	<0.36
Methyl tert-Butyl Ether	ppbv	<0.17	<0.2	<0.2	<0.2	<0.21	<0.21	<0.21
Naphthalene	ppbv	<0.12	<0.14	<0.14	<0.14	<0.15	<0.14	<0.14
n-Butyl Acetate	ppbv	0.12 J	<0.15	<0.15	<0.15	<0.16	<0.16	<0.16
n-Heptane	ppbv	0.86	<0.18	<0.18	0.064 J	0.096 J	<0.18	<0.18
n-Hexane	ppbv	8.3	<0.21	0.077 J	0.19 J	0.17 J	0.09 J	0.082 J
n-Nonane	ppbv	0.44	<0.14	0.05 J	<0.14	<0.14	<0.14	<0.14
n-Octane	ppbv	0.31	<0.16	0.049 J	<0.16	0.07 J	<0.16	<0.16
n-Propylbenzene	ppbv	0.095 J	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
o-Xylene	ppbv	0.71	<0.17	<0.17	0.067 J	<0.18	0.074 J	<0.17
Propene	ppbv	3.3	0.21 J	0.24 J	1.3	0.65	0.71	0.56
Styrene	ppbv	0.23	<0.17	<0.17	<0.17	<0.18	<0.18	<0.18
Tetrachloroethene	ppbv	8.3	5.1	1.1	2.5	33	1.1	0.92
Tetrahydrofuran (THF)	ppbv	0.14 J	<0.25	<0.25	<0.25	<0.26	<0.26	<0.25
Toluene	ppbv	12	0.089 J	0.14 J	0.54	0.14 J	0.32	0.26
trans-1,2-Dichloroethene	ppbv	0.92	6.5	0.56	0.93	1.1	0.76	0.63
trans-1,3-Dichloropropene	ppbv	<0.14	<0.16	<0.16	<0.16	<0.17	<0.17	<0.16
Trichloroethene (TCE)	ppbv	3.3	77	9.4	21	10	14	12
Trichlorofluoromethane (CFC 11)	ppbv	0.16	0.23	0.16	0.15	0.16	0.16	0.15
Vinyl Acetate	ppbv	<1.8	<2.1	<2.1	<2.1	0.56 J	0.58 J	0.39 J
Vinyl Chloride	ppbv	<0.24	<0.29	<0.29	<0.29	<0.3	<0.3	<0.29

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-3
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, APRIL 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVED 4/11/2012 P1201435-004	SVED-North 4/11/2012 P1201435-011	SVED-South 4/11/2012 P1201435-012	SVEE 4/11/2012 P1201435-005	SVEE-North 4/11/2012 P1201435-017	SVEF 4/11/2012 P1201435-018	SVEF-East 4/11/2012 P1201435-006
1,1,1-Trichloroethane (TCA)	ppbv	<0.13	<0.13	<0.14	<0.13	<0.13	<0.2	<0.13
1,1,2,2-Tetrachloroethane	ppbv	0.2	<0.11	8.4	0.045 J	1.1	<0.16	<0.11
1,1,2-Trichloroethane	ppbv	<0.13	<0.13	0.14 J	<0.13	<0.13	<0.2	<0.13
1,1,2-Trichlorotrifluoroethane	ppbv	0.075 J	0.072 J	0.066 J	0.067 J	0.064 J	0.066 J	0.071 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.18	<0.18	<0.18	<0.18	<0.18	<0.26	<0.18
1,1-Dichloroethene (1,1-DCE)	ppbv	<0.18	<0.19	<0.19	<0.18	<0.18	<0.27	<0.19
1,2,4-Trichlorobenzene	ppbv	<0.098	<0.099	<0.1	<0.096	<0.098	<0.14	<0.099
1,2,4-Trimethylbenzene	ppbv	<0.15	0.11 J	<0.15	0.52	<0.15	<0.22	<0.15
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.075	<0.076	<0.077	<0.073	<0.075	<0.11	<0.076
1,2-Dibromoethane	ppbv	<0.094	<0.096	<0.097	<0.092	<0.094	<0.14	<0.096
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.1	<0.11	<0.11	<0.1	<0.1	<0.15	<0.11
1,2-Dichlorobenzene	ppbv	<0.12	<0.12	<0.12	<0.12	<0.12	<0.18	<0.12
1,2-Dichloroethane	ppbv	<0.18	<0.18	<0.18	<0.18	<0.18	<0.26	<0.18
1,2-Dichloropropane	ppbv	<0.16	0.059 J	<0.16	0.25	<0.16	<0.23	<0.16
1,3,5-Trimethylbenzene	ppbv	<0.15	<0.15	<0.15	0.14 J	<0.15	<0.22	<0.15
1,3-Butadiene	ppbv	<0.33	<0.33	<0.34	<0.32	<0.33	<0.48	<0.33
1,3-Dichlorobenzene	ppbv	<0.12	<0.12	<0.12	<0.12	<0.12	<0.18	<0.12
1,4-Dichlorobenzene	ppbv	<0.12	<0.12	<0.12	<0.12	<0.12	<0.18	<0.12
1,4-Dioxane	ppbv	<0.2	<0.2	<0.21	<0.2	<0.2	<0.3	<0.2
2-Butanone (MEK)	ppbv	0.35 J	0.6 J	1 J	1.6 J	0.82 J	0.3 J	0.48 J
2-Hexanone	ppbv	<0.18	<0.18	0.072 J	<0.17	0.097 J	<0.26	<0.18
2-Propanol (Isopropyl Alcohol)	ppbv	<0.59	<0.6	<0.61	0.69	0.27 J	<0.87	<0.6
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.23	<0.23	<0.24	<0.23	<0.23	<0.34	<0.23
4-Ethyltoluene	ppbv	<0.15	<0.15	<0.15	0.14 J	<0.15	<0.22	<0.15
4-Methyl-2-pentanone	ppbv	<0.18	<0.18	<0.18	0.091 J	<0.18	<0.26	<0.18
Acetone	ppbv	2.4 J	3.5	7.2	4.8	4.7	3.7 J	2.6 J
Acetonitrile	ppbv	<0.43	<0.44	<0.44	0.18 J	<0.43	<0.63	<0.44
Acrolein	ppbv	<1.3	<1.3	0.22 J	0.18 J	0.31 J	<1.9	<1.3
Acrylonitrile	ppbv	<0.33	<0.34	<0.34	<0.33	<0.33	<0.49	<0.34
alpha-Pinene	ppbv	<0.13	<0.13	<0.13	<0.13	<0.13	<0.19	<0.13
Benzene	ppbv	0.075 J	0.48	0.096 J	2.9	0.069 J	<0.33	0.088 J
Benzyl Chloride	ppbv	<0.14	<0.14	<0.14	<0.14	<0.14	<0.21	<0.14
Bromodichloromethane	ppbv	<0.11	<0.11	<0.11	<0.11	<0.11	<0.16	<0.11
Bromoform	ppbv	<0.07	<0.071	<0.072	<0.069	<0.07	<0.1	<0.071
Bromomethane	ppbv	<0.19	<0.19	0.11 J	<0.18	0.12 J	<0.27	<0.19
Carbon Disulfide	ppbv	<2.3	<2.4	0.095 J	0.14 J	0.13 J	<3.4	0.16 J
Carbon Tetrachloride	ppbv	<0.12	0.039 J	0.04 J	0.06 J	0.067 J	<0.17	0.05 J
Chlorobenzene	ppbv	<0.16	<0.16	<0.16	<0.15	<0.16	<0.23	<0.16
Chloroethane	ppbv	<0.27	<0.28	<0.28	<0.27	<0.27	<0.4	<0.28
Chloroform	ppbv	0.31	0.092 J	0.8	0.43	0.55	<0.22	0.42
Chloromethane	ppbv	<0.35	0.2 J	<0.36	0.14 J	<0.35	0.22 J	0.22 J
cis-1,2-Dichloroethene	ppbv	0.69	0.23	2.6	0.55	1.6	<0.27	<0.19
cis-1,3-Dichloropropene	ppbv	<0.16	<0.16	<0.16	<0.16	<0.16	<0.23	<0.16
Cyclohexane	ppbv	<0.42	0.21 J	<0.43	1.9	<0.42	<0.62	<0.43
Dibromochloromethane	ppbv	<0.085	<0.086	<0.087	<0.083	<0.085	<0.13	<0.086
Dichlorodifluoromethane (CFC 12)	ppbv	0.35	0.34	0.34	0.35	0.34	0.35	0.35
Dichloromethane (Methylene Chloride)	ppbv	0.14 JB	0.11 JB	0.1 JB	0.19 JB	0.1 JB	0.15 JB	0.21 JB
d-Limonene	ppbv	<0.13	<0.13	<0.13	0.066 J	<0.13	<0.19	<0.13
Ethanol	ppbv	<3.8	5.8	<4	34	1.3 J	<5.7	<3.9
Ethyl Acetate	ppbv	<0.4	2.2	<0.41	14	<0.4	<0.59	<0.41
Ethylbenzene	ppbv	<0.17	0.11 J	<0.17	0.73	<0.17	<0.25	<0.17
Hexachlorobutadiene	ppbv	<0.068	<0.069	<0.07	<0.067	<0.068	<0.1	<0.069
Isopropylbenzene (Cumene)	ppbv	<0.15	<0.15	<0.15	<0.14	<0.15	<0.22	<0.15
m,p-Xylenes	ppbv	<0.33	0.43	<0.34	2.7	<0.33	<0.49	<0.34
Methyl Methacrylate	ppbv	<0.35	<0.36	<0.36	0.19 J	<0.35	<0.52	<0.36
Methyl tert-Butyl Ether	ppbv	<0.2	<0.2	<0.21	<0.2	<0.2	<0.3	<0.2
Naphthalene	ppbv	<0.14	<0.14	<0.14	<0.14	<0.14	<0.2	<0.14
n-Butyl Acetate	ppbv	<0.15	<0.15	<0.16	0.073 J	<0.15	<0.22	<0.15
n-Heptane	ppbv	<0.18	0.17 J	<0.18	1.1	<0.18	<0.26	<0.18
n-Hexane	ppbv	<0.21	0.6	0.098 J	3.8	0.072 J	<0.3	<0.21
n-Nonane	ppbv	<0.14	<0.14	<0.14	0.095 J	<0.14	<0.2	<0.14
n-Octane	ppbv	<0.16	<0.16	<0.16	0.26	<0.16	<0.23	<0.16
n-Propylbenzene	ppbv	<0.15	<0.15	<0.15	0.084 J	<0.15	<0.22	<0.15
o-Xylene	ppbv	<0.17	0.15 J	<0.17	0.93	<0.17	<0.25	<0.17
Propene	ppbv	0.17 J	0.14 J	0.78	0.46	0.62	<0.62	0.15 J
Styrene	ppbv	<0.17	<0.17	<0.18	<0.17	<0.17	<0.25	<0.17
Tetrachloroethene	ppbv	5.3	4.4	2.8	0.52	0.9	<0.16	0.041 J
Tetrahydrofuran (THF)	ppbv	<0.25	<0.25	<0.25	0.13 J	<0.25	<0.36	<0.25
Toluene	ppbv	0.089 J	1.9	0.08 J	10	<0.19	<0.28	0.11 J
trans-1,2-Dichloroethene	ppbv	0.24	<0.19	1	0.26	0.31	<0.27	<0.19
trans-1,3-Dichloropropene	ppbv	<0.16	<0.16	<0.16	<0.16	<0.16	<0.23	<0.16
Trichloroethene (TCE)	ppbv	11	2.3	46	7.5	22	0.06 J	0.16
Trichlorofluoromethane (CFC 11)	ppbv	0.16	0.15	0.16	0.16	0.15	0.16 J	0.16
Vinyl Acetate	ppbv	<2.1	<2.1	1.4 J	<2	0.59 J	<3	<2.1
Vinyl Chloride	ppbv	<0.28	<0.29	<0.29	<0.28	<0.28	<0.42	<0.29

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-3
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, APRIL 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVEF-West 4/11/2012 P1201435-013	SVEG-ALT 4/11/2012 P1201435-014	SVEG-South 4/11/2012 P1201435-007	SVEG-South DUP 4/11/2012 P1201435-008	FSVE-EFF 4/11/2012 P1201435-019
1,1,1-Trichloroethane (TCA)	ppbv	<0.14	<0.14	<0.14	<0.14	<0.11
1,1,2,2-Tetrachloroethane	ppbv	<0.11	<0.11	1.1	0.63	7.1
1,1,2-Trichloroethane	ppbv	<0.14	<0.14	0.34	0.14 J	0.89
1,1,2-Trichlorotrifluoroethane	ppbv	0.067 J	0.26	1.1 J	0.46 J	2.3
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.18	<0.19	<0.19	<0.19	0.066 J
1,1-Dichloroethene (1,1-DCE)	ppbv	<0.19	<0.19	1.2 J	0.45 J	0.86
1,2,4-Trichlorobenzene	ppbv	<0.1	<0.1	<0.1	<0.1	<0.082
1,2,4-Trimethylbenzene	ppbv	<0.15	<0.16	<0.15	<0.15	0.14
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.077	<0.079	<0.079	<0.078	<0.063
1,2-Dibromoethane	ppbv	<0.096	<0.1	<0.099	<0.098	<0.079
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.11	<0.11	<0.11	<0.11	<0.087
1,2-Dichlorobenzene	ppbv	<0.12	<0.13	<0.13	<0.13	<0.1
1,2-Dichloroethane	ppbv	<0.18	<0.19	0.12 J	<0.19	0.1 J
1,2-Dichloropropane	ppbv	<0.16	<0.17	<0.16	<0.16	0.095 J
1,3,5-Trimethylbenzene	ppbv	<0.15	<0.16	<0.15	<0.15	<0.12
1,3-Butadiene	ppbv	<0.33	<0.35	<0.34	<0.34	<0.27
1,3-Dichlorobenzene	ppbv	<0.12	<0.13	<0.13	<0.13	<0.1
1,4-Dichlorobenzene	ppbv	<0.12	<0.13	<0.13	<0.13	<0.1
1,4-Dioxane	ppbv	<0.21	<0.21	<0.21	<0.21	<0.17
2-Butanone (MEK)	ppbv	0.31 J	0.32 J	0.67 J	0.26 J	0.49 J
2-Hexanone	ppbv	<0.18	<0.19	0.094 J	<0.18	0.055 J
2-Propanol (Isopropyl Alcohol)	ppbv	<0.6	<0.62	<0.62	<0.61	0.28 J
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.24	<0.24	<0.24	<0.24	<0.19
4-Ethyltoluene	ppbv	<0.15	<0.16	<0.15	<0.15	<0.12
4-Methyl-2-pentanone	ppbv	<0.18	<0.19	<0.19	<0.18	<0.15
Acetone	ppbv	1.9 J	2.5 J	3.9	2.9 J	2.8
Acetonitrile	ppbv	<0.44	<0.46	<0.45	<0.45	<0.36
Acrolein	ppbv	<1.3	<1.3	0.18 J	<1.3	<1.1
Acrylonitrile	ppbv	<0.34	<0.35	<0.35	<0.35	<0.28
alpha-Pinene	ppbv	<0.13	<0.14	<0.14	<0.14	<0.11
Benzene	ppbv	0.077 J	0.092 J	0.088 J	0.086 J	0.62
Benzyl Chloride	ppbv	<0.14	<0.15	<0.15	<0.15	<0.12
Bromodichloromethane	ppbv	<0.11	<0.11	<0.11	<0.11	<0.09
Bromoform	ppbv	<0.072	<0.074	<0.074	<0.073	<0.059
Bromomethane	ppbv	<0.19	<0.2	<0.2	<0.19	0.084 J
Carbon Disulfide	ppbv	<2.4	<2.5	0.18 J	<2.4	0.086 J
Carbon Tetrachloride	ppbv	<0.12	0.099 J	2.8 J	1 J	2.3
Chlorobenzene	ppbv	<0.16	<0.17	<0.17	<0.16	<0.13
Chloroethane	ppbv	<0.28	<0.29	<0.29	<0.29	<0.23
Chloroform	ppbv	<0.15	0.92	6.6	2.5	56
Chloromethane	ppbv	0.22 J	0.26 J	0.24 J	0.23 J	<0.29
cis-1,2-Dichloroethene	ppbv	<0.19	<0.19	0.76 J	0.28 J	13
cis-1,3-Dichloropropene	ppbv	<0.16	<0.17	<0.17	<0.17	<0.13
Cyclohexane	ppbv	<0.43	<0.44	<0.44	<0.44	0.28 J
Dibromochloromethane	ppbv	<0.087	<0.09	<0.089	<0.089	<0.071
Dichlorodifluoromethane (CFC 12)	ppbv	0.35	0.43	0.55	0.42	0.79
Dichloromethane (Methylene Chloride)	ppbv	0.11 JB	0.13 JB	0.22 JB	0.18 JB	0.98
d-Limonene	ppbv	<0.13	<0.14	<0.14	<0.14	<0.11
Ethanol	ppbv	<3.9	<4.1	<4	<4	7
Ethyl Acetate	ppbv	<0.41	<0.42	<0.42	<0.42	1.4
Ethylbenzene	ppbv	<0.17	<0.18	<0.18	<0.17	0.15
Hexachlorobutadiene	ppbv	<0.069	<0.072	<0.071	<0.071	<0.057
Isopropylbenzene (Cumene)	ppbv	<0.15	<0.16	<0.15	<0.15	<0.12
m,p-Xylenes	ppbv	<0.34	<0.35	<0.35	<0.35	0.54
Methyl Methacrylate	ppbv	<0.36	<0.37	<0.37	<0.37	<0.3
Methyl tert-Butyl Ether	ppbv	<0.21	<0.21	<0.21	<0.21	<0.17
Naphthalene	ppbv	<0.14	<0.15	<0.15	<0.14	<0.12
n-Butyl Acetate	ppbv	<0.16	<0.16	<0.16	<0.16	<0.13
n-Heptane	ppbv	<0.18	<0.19	<0.19	<0.18	0.22
n-Hexane	ppbv	<0.21	<0.22	<0.22	<0.21	0.74
n-Nonane	ppbv	<0.14	<0.15	<0.14	<0.14	<0.12
n-Octane	ppbv	<0.16	<0.16	<0.16	<0.16	0.051 J
n-Propylbenzene	ppbv	<0.15	<0.16	<0.15	<0.15	<0.12
o-Xylene	ppbv	<0.17	<0.18	<0.18	<0.17	0.19
Propene	ppbv	<0.43	<0.44	0.27 J	<0.44	0.68
Styrene	ppbv	<0.17	<0.18	<0.18	<0.18	<0.14
Tetrachloroethene	ppbv	<0.11	0.22	1.1 J	0.57 J	11
Tetrahydrofuran (THF)	ppbv	<0.25	<0.26	<0.26	<0.26	<0.21
Toluene	ppbv	0.066 J	0.15 J	0.087 J	0.12 J	2.2
trans-1,2-Dichloroethene	ppbv	<0.19	<0.19	0.19	0.066 J	3.2
trans-1,3-Dichloropropene	ppbv	<0.16	<0.17	<0.17	<0.17	<0.13
Trichloroethene (TCE)	ppbv	0.13 J	1.2	15 J	6.7 J	66
Trichlorofluoromethane (CFC 11)	ppbv	0.15	0.18	0.26	0.2	0.24
Vinyl Acetate	ppbv	<2.1	<2.2	0.31 J	<2.1	<1.7
Vinyl Chloride	ppbv	<0.29	<0.3	<0.3	<0.3	0.28

Notes:
<: Result is less than laboratory reporting limit.
B: Analyte in associated blank
J: Estimated concentration
ppbv: part per billion volume

TABLE B-4
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	SVE-A 7/24/2012 P1203035-001	SVE-B 7/24/2012 P1203035-010	SVE-B DUP 7/24/2012 P1203035-016	SVE-B-East 7/24/2012 P1203035-002	SVE-C 7/24/2012 P1203035-003	SVE-C-East 7/24/2012 P1203035-017	SVE-C-West 7/24/2012 P1203035-011
1,1,1-Trichloroethane (TCA)	ppbv	<0.55	<1.4	<0.12	<0.54	<0.13	<0.14	<0.14
1,1,2,2-Tetrachloroethane	ppbv	<0.44	50	44	34	1.3	0.05 J	0.24
1,1,2-Trichloroethane	ppbv	<0.55	0.54 J	0.47	0.29 J	0.058 J	<0.14	<0.14
1,1,2-Trichlorotrifluoroethane	ppbv	<0.39	<0.97	0.067 J	<0.39	0.12	0.17	0.089 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.75	<1.8	<0.16	<0.73	<0.18	<0.19	<0.19
1,1-Dichloroethene (1,1-DCE)	ppbv	0.43 J	2.3	2.1	2.9	<0.18	<0.19	<0.19
1,2,4-Trichlorobenzene	ppbv	<0.41	<1	<0.088	<0.4	<0.098	<0.1	<0.1
1,2,4-Trimethylbenzene	ppbv	<0.61	<1.5	<0.13	<0.6	<0.15	<0.15	<0.15
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.31	<0.77	<0.067	<0.31	<0.076	<0.078	<0.078
1,2-Dibromoethane	ppbv	<0.39	<0.97	<0.085	<0.39	<0.095	<0.098	<0.098
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.43	<1.1	<0.093	<0.42	<0.1	<0.11	<0.11
1,2-Dichlorobenzene	ppbv	<0.5	<1.2	<0.11	<0.49	<0.12	<0.13	<0.12
1,2-Dichloroethane	ppbv	<0.75	<1.8	<0.16	<0.73	<0.18	<0.19	<0.19
1,2-Dichloropropane	ppbv	<0.65	<1.6	<0.14	<0.64	<0.16	<0.16	<0.16
1,3,5-Trimethylbenzene	ppbv	<0.61	<1.5	<0.13	<0.6	<0.15	<0.15	<0.15
1,3-Butadiene	ppbv	<1.4	<3.4	<0.29	<1.3	<0.33	<0.34	<0.34
1,3-Dichlorobenzene	ppbv	<0.5	<1.2	<0.11	<0.49	<0.12	<0.13	<0.12
1,4-Dichlorobenzene	ppbv	<0.5	<1.2	0.041 J	<0.49	<0.12	<0.13	0.11 J
1,4-Dioxane	ppbv	<0.84	<2.1	<0.18	<0.82	<0.2	<0.21	<0.21
2-Butanone (MEK)	ppbv	0.49 J	<25	0.17 J	0.57 J	0.29 J	0.16 J	0.36 J
2-Hexanone	ppbv	<0.74	<1.8	<0.16	<0.72	<0.18	<0.18	0.074 J
2-Propanol (Isopropyl Alcohol)	ppbv	<12	<30	<2.6	<12	<3	<3.1	0.35 J
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.97	<2.4	<0.21	<0.95	<0.23	<0.24	<0.24
4-Ethyltoluene	ppbv	<0.61	<1.5	<0.13	<0.6	<0.15	<0.15	<0.15
4-Methyl-2-pentanone	ppbv	<0.74	<1.8	<0.16	<0.72	<0.18	<0.18	<0.18
Acetone	ppbv	<13	7.4 J	1.6 J	4.2 J	5.3	1.2 J	1.8 J
Acetonitrile	ppbv	<1.8	<4.4	0.61	<1.8	<0.43	<0.45	<0.45
Acrolein	ppbv	<5.3	<13	<1.1	<5.2	<1.3	<1.3	<1.3
Acrylonitrile	ppbv	<1.4	<3.4	<0.3	<1.4	<0.34	<0.35	<0.35
alpha-Pinene	ppbv	<0.54	<1.3	<0.12	<0.53	<0.13	<0.14	<0.13
Benzene	ppbv	<0.95	<2.3	0.13 J	<0.93	0.066 J	0.16 J	0.082 J
Benzyl Chloride	ppbv	<0.58	<1.4	<0.13	<0.57	<0.14	<0.15	<0.14
Bromodichloromethane	ppbv	<0.45	<1.1	<0.097	<0.44	<0.11	<0.11	<0.11
Bromoform	ppbv	<0.29	<0.72	<0.063	<0.29	<0.071	<0.073	<0.073
Bromomethane	ppbv	<0.78	<1.9	<0.17	<0.76	<0.19	<0.19	<0.19
Carbon Disulfide	ppbv	1.3 J	2.9 J	0.32 J	<9.5	<2.3	0.21 J	2.4 J
Carbon Tetrachloride	ppbv	0.92	1 J	0.93	0.7	0.11 J	0.34	0.11 J
Chlorobenzene	ppbv	<0.66	<1.6	0.043 J	<0.64	<0.16	<0.16	<0.16
Chloroethane	ppbv	<1.1	<2.8	<0.25	<1.1	<0.28	<0.29	<0.28
Chloroform	ppbv	7.6	54	44	24	0.64	1	0.7
Chloromethane	ppbv	<1.5	<3.6	<0.31	<1.4	<0.35	<0.37	<0.36
cis-1,2-Dichloroethene	ppbv	1.4	72	59	17	1.8	1.1	1.1
cis-1,3-Dichloropropene	ppbv	<0.67	<1.6	<0.14	<0.65	<0.16	<0.17	<0.17
Cyclohexane	ppbv	<1.8	<4.3	<0.38	<1.7	<0.42	<0.44	<0.44
Dibromochloromethane	ppbv	<0.35	<0.87	<0.076	<0.35	<0.086	<0.089	<0.088
Dichlorodifluoromethane (CFC 12)	ppbv	0.45 J	0.71 J	0.64	0.53 J	1.2	0.53	0.69
Dichloromethane (Methylene Chloride)	ppbv	0.4 J	<2.1	0.29	<0.85	<0.21	<0.22	0.25
d-Limonene	ppbv	<0.54	<1.3	<0.12	<0.53	<0.13	<0.14	<0.13
Ethanol	ppbv	<16	<40	<3.5	<16	<3.9	<4	2.4 J
Ethyl Acetate	ppbv	2.2	<4.1	0.52	<1.6	<0.41	<0.42	6.1
Ethylbenzene	ppbv	<0.7	<1.7	<0.15	<0.68	<0.17	<0.17	<0.17
Hexachlorobutadiene	ppbv	<0.28	<0.7	0.048 J	<0.28	<0.068	<0.071	<0.07
Isopropylbenzene (Cumene)	ppbv	<0.61	<1.5	<0.13	<0.6	<0.15	<0.15	<0.15
m,p-Xylenes	ppbv	<1.4	<3.4	<0.3	<1.4	<0.34	<0.35	<0.35
Methyl Methacrylate	ppbv	<1.5	<3.6	<0.32	<1.4	<0.36	<0.37	<0.37
Methyl tert-Butyl Ether	ppbv	<0.84	<2.1	<0.18	<0.82	<0.2	<0.21	<0.21
Naphthalene	ppbv	<0.58	<1.4	<0.12	<0.56	<0.14	<0.14	<0.14
n-Butyl Acetate	ppbv	<0.64	<1.6	<0.14	<0.62	<0.15	<0.16	<0.16
n-Heptane	ppbv	<0.74	<1.8	<0.16	<0.72	<0.18	<0.18	<0.18
n-Hexane	ppbv	<0.86	<2.1	0.29	<0.84	<0.21	<0.21	0.088 J
n-Nonane	ppbv	<0.58	<1.4	<0.12	<0.56	<0.14	<0.14	<0.14
n-Octane	ppbv	<0.65	<1.6	<0.14	<0.63	<0.16	<0.16	<0.16
n-Propylbenzene	ppbv	<0.61	<1.5	<0.13	<0.6	<0.15	<0.15	<0.15
o-Xylene	ppbv	<0.7	<1.7	<0.15	<0.68	<0.17	<0.17	<0.17
Propene	ppbv	<1.8	<4.3	0.64	<1.7	0.28 J	0.13 J	0.62
Styrene	ppbv	<0.71	<1.8	<0.15	<0.7	<0.17	<0.18	<0.18
Tetrachloroethene	ppbv	69	26	21	9.9	17	87	18
Tetrahydrofuran (THF)	ppbv	<1	<2.5	<0.22	<1	<0.25	<0.26	<0.25
Toluene	ppbv	<0.8	<2	0.42	<0.79	<0.19	<0.2	0.39
trans-1,2-Dichloroethene	ppbv	0.52 J	40	31	6.8	1.2	0.15 J	0.69
trans-1,3-Dichloropropene	ppbv	<0.67	<1.6	<0.14	<0.65	<0.16	<0.17	<0.17
Trichloroethene (TCE)	ppbv	19	390	330	95	17	4.8	7.6
Trichlorofluoromethane (CFC 11)	ppbv	0.19 J	0.52 J	0.45	0.36 J	0.22	0.22	0.24
Vinyl Acetate	ppbv	<8.6	<21	0.28 J	<8.4	<2.1	<2.1	0.57 J
Vinyl Chloride	ppbv	<1.2	<2.9	0.42	0.35 J	<0.29	<0.3	<0.29

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

TABLE B-4
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	SVE-D	SVE-D-North	SVE-D-South	SVE-E	SVE-E-North	SVE-F	SVE-F-East
	Date	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012
	Lab ID	P1203035-004	P1203035-012	P1203035-018	P1203035-005	P1203035-013	P1203035-019	P1203035-006
	Units							
1,1,1-Trichloroethane (TCA)	ppbv	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.14
1,1,2,2-Tetrachloroethane	ppbv	0.26	0.11	9.5	0.92	18	2.4	2.1
1,1,2-Trichloroethane	ppbv	<0.13	<0.13	0.15	0.047 J	0.17	0.56	2.8
1,1,2-Trichlorotrifluoroethane	ppbv	0.094	0.12	0.063 J	0.068 J	0.059 J	0.71	0.078 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.18	<0.18	<0.18	<0.18	<0.18	0.45	0.18 J
1,1-Dichloroethene (1,1-DCE)	ppbv	<0.18	<0.19	0.26	0.13 J	0.076 J	1.4	0.28
1,2,4-Trichlorobenzene	ppbv	<0.096	<0.099	<0.099	<0.098	<0.099	<0.098	<0.1
1,2,4-Trimethylbenzene	ppbv	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.074	<0.076	<0.076	<0.075	<0.076	<0.076	<0.077
1,2-Dibromoethane	ppbv	<0.093	<0.096	<0.096	<0.094	<0.096	<0.095	<0.097
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.1	<0.11	<0.11	<0.1	<0.11	<0.1	<0.11
1,2-Dichlorobenzene	ppbv	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
1,2-Dichloroethane	ppbv	<0.18	<0.18	<0.18	<0.18	<0.18	0.31	0.25
1,2-Dichloropropane	ppbv	<0.15	<0.16	<0.16	<0.16	<0.16	0.25	0.089 J
1,3,5-Trimethylbenzene	ppbv	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
1,3-Butadiene	ppbv	<0.32	<0.33	<0.33	<0.33	<0.33	<0.33	<0.34
1,3-Dichlorobenzene	ppbv	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
1,4-Dichlorobenzene	ppbv	0.042 J	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
1,4-Dioxane	ppbv	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.21
2-Butanone (MEK)	ppbv	0.32 J	0.27 J	0.23 J	0.42 J	1.2 J	0.16 J	0.37 J
2-Hexanone	ppbv	<0.17	<0.18	<0.18	<0.18	0.17 J	<0.18	<0.18
2-Propanol (Isopropyl Alcohol)	ppbv	<2.9	<3	<3	<3	<3	<3	<3
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.24
4-Ethyltoluene	ppbv	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
4-Methyl-2-pentanone	ppbv	<0.17	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
Acetone	ppbv	2 J	1.7 J	1.9 J	2.5 J	5.6	1.8 J	2.6 J
Acetonitrile	ppbv	<0.43	<0.44	<0.44	<0.43	0.26 J	<0.43	<0.44
Acrolein	ppbv	0.13 J	<1.3	0.21 J	<1.3	0.25 J	<1.3	0.15 J
Acrylonitrile	ppbv	<0.33	<0.34	<0.34	<0.33	<0.34	<0.34	<0.34
alpha-Pinene	ppbv	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	0.038 J
Benzene	ppbv	0.089 J	<0.23	0.13 J	0.07 J	<0.23	0.27	0.21 J
Benzyl Chloride	ppbv	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Bromodichloromethane	ppbv	<0.11	<0.11	<0.11	<0.11	<0.11	0.069 J	<0.11
Bromoform	ppbv	<0.069	<0.071	<0.071	<0.07	<0.071	<0.071	<0.072
Bromomethane	ppbv	<0.18	<0.19	0.056 J	<0.19	0.16 J	<0.19	<0.19
Carbon Disulfide	ppbv	<2.3	0.26 J	1.2 J	<2.3	0.74 J	0.2 J	<2.4
Carbon Tetrachloride	ppbv	0.059 J	0.054 J	0.079 J	0.12	0.074 J	1.9	0.56
Chlorobenzene	ppbv	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
Chloroethane	ppbv	<0.27	<0.28	<0.28	<0.27	<0.28	<0.28	<0.28
Chloroform	ppbv	0.33	0.23	2.1	1	1.2	230	140
Chloromethane	ppbv	<0.35	<0.36	<0.36	<0.35	<0.36	<0.35	0.33 J
cis-1,2-Dichloroethene	ppbv	2.4	0.48	8.7	2.4	3.4	170	13
cis-1,3-Dichloropropene	ppbv	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
Cyclohexane	ppbv	<0.42	<0.43	<0.43	<0.42	<0.43	0.13 J	<0.43
Dibromochloromethane	ppbv	<0.084	<0.086	<0.086	<0.085	<0.086	<0.086	<0.087
Dichlorodifluoromethane (CFC 12)	ppbv	0.48	0.46	0.42	0.5	0.41	1.1	0.5
Dichloromethane (Methylene Chloride)	ppbv	0.073 J	<0.21	<0.21	<0.21	0.069 J	2.3	6.2
d-Limonene	ppbv	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
Ethanol	ppbv	<3.8	<3.9	<3.9	<3.8	<3.9	<3.9	<4
Ethyl Acetate	ppbv	0.18 J	<0.41	<0.41	<0.4	<0.41	<0.41	<0.41
Ethylbenzene	ppbv	<0.16	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Hexachlorobutadiene	ppbv	0.04 J	<0.069	<0.069	<0.068	<0.069	<0.068	<0.07
Isopropylbenzene (Cumene)	ppbv	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
m,p-Xylenes	ppbv	<0.33	<0.34	<0.34	<0.33	<0.34	<0.34	<0.34
Methyl Methacrylate	ppbv	<0.35	<0.36	<0.36	<0.35	<0.36	<0.36	<0.36
Methyl tert-Butyl Ether	ppbv	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.21
Naphthalene	ppbv	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
n-Butyl Acetate	ppbv	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.16
n-Heptane	ppbv	<0.17	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
n-Hexane	ppbv	<0.2	<0.21	0.076 J	0.07 J	0.28	0.097 J	0.15 J
n-Nonane	ppbv	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
n-Octane	ppbv	<0.15	<0.16	<0.16	<0.16	<0.16	<0.16	0.05 J
n-Propylbenzene	ppbv	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
o-Xylene	ppbv	<0.16	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Propene	ppbv	0.27 J	0.15 J	0.69	0.31 J	0.66	0.36 J	0.39 J
Styrene	ppbv	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.18
Tetrachloroethene	ppbv	9	5	7.7	2.1	2.1	9.8	3.1
Tetrahydrofuran (THF)	ppbv	<0.24	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Toluene	ppbv	<0.19	<0.2	<0.2	<0.19	0.06 J	<0.19	0.22
trans-1,2-Dichloroethene	ppbv	1.8	0.31	12	2.2	1.6	1.3	1.4
trans-1,3-Dichloropropene	ppbv	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
Trichloroethene (TCE)	ppbv	77	12	260	48	79	43	28
Trichlorofluoromethane (CFC 11)	ppbv	0.22	0.2	0.21	0.22	0.18	0.29	0.21
Vinyl Acetate	ppbv	0.45 J	0.6 J	0.38 J	<2.1	1.6 J	0.37 J	0.73 J
Vinyl Chloride	ppbv	<0.28	<0.29	<0.29	<0.28	<0.29	4.1	0.7

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

TABLE B-4
ANALYTICAL RESULTS - SVE WELLS AND SYSTEM INFLUENT, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	SVE-F-West	SVE-G-South	SVE-G-ALT	EFF	EFF DUP
	Date	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012
	Lab ID	P1203035-014	P1203035-007	P1203035-015	P1203035-008	P1203035-009
	Units					
1,1,1-Trichloroethane (TCA)	ppbv	<0.14	<1.4	0.039 J	<0.12	<0.11
1,1,2,2-Tetrachloroethane	ppbv	0.17	3.2	3.9	6.5	6.6
1,1,2-Trichloroethane	ppbv	0.35	2.3	3.9	0.66	0.71
1,1,2-Trichlorotrifluoroethane	ppbv	0.064 J	13	30	1.5	1.5
1,1-Dichloroethane (1,1-DCA)	ppbv	0.24	<1.8	0.16 J	0.051 J	0.058 J
1,1-Dichloroethene (1,1-DCE)	ppbv	2	14	1.3	2.2	2.2
1,2,4-Trichlorobenzene	ppbv	<0.1	1.5	0.28	0.22	0.11
1,2,4-Trimethylbenzene	ppbv	<0.15	<1.5	<0.15	<0.13	0.042 J
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.079	<0.77	<0.079	<0.066	<0.065
1,2-Dibromoethane	ppbv	<0.099	<0.97	<0.099	<0.083	<0.081
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.11	<1.1	<0.11	<0.091	<0.089
1,2-Dichlorobenzene	ppbv	<0.13	<1.2	<0.13	<0.11	<0.1
1,2-Dichloroethane	ppbv	0.17 J	1.8 J	0.57	0.24	0.25
1,2-Dichloropropane	ppbv	0.06 J	<1.6	0.15 J	<0.14	<0.14
1,3,5-Trimethylbenzene	ppbv	<0.15	<1.5	<0.15	<0.13	<0.13
1,3-Butadiene	ppbv	<0.34	<3.4	<0.34	<0.29	<0.28
1,3-Dichlorobenzene	ppbv	<0.13	1 J	0.053 J	0.13	0.11
1,4-Dichlorobenzene	ppbv	<0.13	<1.2	0.044 J	0.042 J	<0.1
1,4-Dioxane	ppbv	<0.21	<2.1	<0.21	<0.18	<0.17
2-Butanone (MEK)	ppbv	0.3 J	2.1 J	1.1 J	0.49 J	0.55 J
2-Hexanone	ppbv	0.074 J	<1.8	0.086 J	<0.16	0.1 J
2-Propanol (Isopropyl Alcohol)	ppbv	<3.1	<30	<3.1	<2.6	<2.5
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.24	<2.4	<0.24	<0.2	<0.2
4-Ethyltoluene	ppbv	<0.15	<1.5	<0.15	<0.13	<0.13
4-Methyl-2-pentanone	ppbv	<0.19	0.67 J	<0.19	<0.16	<0.15
Acetone	ppbv	2 J	49	28	2.8	3.7
Acetonitrile	ppbv	<0.45	<4.4	0.62	0.22 J	<0.37
Acrolein	ppbv	<1.3	<13	0.29 J	0.18 J	0.21 J
Acrylonitrile	ppbv	<0.35	<3.4	<0.35	<0.29	<0.29
alpha-Pinene	ppbv	<0.14	<1.3	<0.14	<0.11	<0.11
Benzene	ppbv	0.52	<2.3	0.18 J	0.069 J	0.079 J
Benzyl Chloride	ppbv	<0.15	<1.4	<0.15	<0.12	<0.12
Bromodichloromethane	ppbv	<0.11	<1.1	<0.11	<0.095	<0.093
Bromoform	ppbv	<0.074	<0.72	<0.074	<0.061	<0.06
Bromomethane	ppbv	<0.2	<1.9	0.28	<0.16	<0.16
Carbon Disulfide	ppbv	0.23 J	1.2 J	<2.4	0.39 J	0.16 J
Carbon Tetrachloride	ppbv	0.5	43	21	5.6	5.6
Chlorobenzene	ppbv	<0.17	<1.6	<0.17	<0.14	<0.14
Chloroethane	ppbv	<0.29	<2.8	<0.29	<0.24	<0.24
Chloroform	ppbv	20	69	220	28	30
Chloromethane	ppbv	0.14 J	<3.6	0.25 J	0.18 J	0.16 J
cis-1,2-Dichloroethene	ppbv	96	11	7.1	6.5	6.8
cis-1,3-Dichloropropene	ppbv	<0.17	<1.6	<0.17	<0.14	<0.14
Cyclohexane	ppbv	0.52	<4.3	<0.44	<0.37	<0.36
Dibromochloromethane	ppbv	<0.089	<0.87	<0.089	<0.075	<0.073
Dichlorodifluoromethane (CFC 12)	ppbv	0.61	3.4	2.9	0.98	0.98
Dichloromethane (Methylene Chloride)	ppbv	0.26	<2.1	0.52	0.8	0.86
d-Limonene	ppbv	<0.14	<1.3	<0.14	<0.11	<0.11
Ethanol	ppbv	<4	<40	<4	<3.4	<3.3
Ethyl Acetate	ppbv	<0.42	<4.1	<0.42	0.23 J	<0.35
Ethylbenzene	ppbv	<0.18	<1.7	<0.18	<0.15	<0.14
Hexachlorobutadiene	ppbv	<0.071	<0.7	0.057 J	<0.06	<0.059
Isopropylbenzene (Cumene)	ppbv	<0.15	<1.5	<0.15	<0.13	<0.13
m,p-Xylenes	ppbv	<0.35	<3.4	<0.35	<0.29	<0.29
Methyl Methacrylate	ppbv	<0.37	<3.6	<0.37	<0.31	<0.31
Methyl tert-Butyl Ether	ppbv	<0.21	<2.1	<0.21	<0.18	<0.17
Naphthalene	ppbv	<0.15	<1.4	0.071 J	<0.12	0.053 J
n-Butyl Acetate	ppbv	<0.16	<1.6	<0.16	<0.13	<0.13
n-Heptane	ppbv	<0.19	<1.8	<0.19	<0.16	<0.15
n-Hexane	ppbv	0.3	<2.1	0.19 J	0.073 J	0.073 J
n-Nonane	ppbv	<0.14	<1.4	<0.14	<0.12	<0.12
n-Octane	ppbv	<0.16	<1.6	0.077 J	<0.14	<0.13
n-Propylbenzene	ppbv	<0.15	<1.5	<0.15	<0.13	<0.13
o-Xylene	ppbv	<0.18	<1.7	<0.18	<0.15	<0.14
Propene	ppbv	0.61	2 J	1.3	0.56	0.57
Styrene	ppbv	<0.18	<1.8	<0.18	<0.15	<0.15
Tetrachloroethene	ppbv	2.9	13	38	13	13
Tetrahydrofuran (THF)	ppbv	<0.26	<2.5	<0.26	<0.22	<0.21
Toluene	ppbv	<0.2	<2	0.067 J	0.067 J	0.067 J
trans-1,2-Dichloroethene	ppbv	2	2.1	5.8	2.3	2.4
trans-1,3-Dichloropropene	ppbv	<0.17	<1.6	<0.17	<0.14	<0.14
Trichloroethene (TCE)	ppbv	30	270	180	72	75
Trichlorofluoromethane (CFC 11)	ppbv	0.26	1.6	0.47	0.4	0.41
Vinyl Acetate	ppbv	0.81 J	<21	0.74 J	0.41 J	0.81 J
Vinyl Chloride	ppbv	12	<2.9	1.1	0.2 J	0.28

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

TABLE B-5
ANALYTICAL RESULTS - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location / Date / Lab ID / Units	VMP1A 7/25/2012 P1203073-001	VMP1B 7/25/2012 P1203073-002	VMP2A 7/25/2012 P1203073-003	VMP2B 7/25/2012 P1203073-004	VMP-2B DUP 7/25/2012 P1203073-013	VMP3A 7/25/2012 P1203073-005
1,1,1-Trichloroethane (TCA)	ppbv	<0.13	<0.5	<0.13	<3.6	<3.8	<0.12
1,1,2,2-Tetrachloroethane	ppbv	<0.11	<0.4	<0.11	<2.9	<3	<0.096
1,1,2-Trichloroethane	ppbv	<0.13	<0.5	<0.13	<3.6	<3.8	<0.12
1,1,2-Trichlorotrifluoroethane	ppbv	0.061 J	<0.35	0.072 J	<2.6	<2.7	0.059 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.18	<0.67	0.083 J	<4.9	<5.1	<0.16
1,1-Dichloroethene (1,1-DCE)	ppbv	0.073 J	<0.69	7.4	2.8 J	2.8 J	<0.17
1,2,4-Trichlorobenzene	ppbv	<0.099	<0.37	<0.099	<2.7	<2.8	<0.089
1,2,4-Trimethylbenzene	ppbv	0.4	<0.55	0.047 J	<4	<4.2	0.082 J
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.076	<0.28	<0.076	<2.1	<2.1	<0.068
1,2-Dibromoethane	ppbv	<0.096	<0.35	<0.096	<2.6	<2.7	<0.086
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.11	<0.39	<0.11	<2.8	<3	<0.094
1,2-Dichlorobenzene	ppbv	<0.12	<0.45	<0.12	<3.3	<3.4	<0.11
1,2-Dichloroethane	ppbv	<0.18	<0.67	<0.18	<4.9	<5.1	<0.16
1,2-Dichloropropane	ppbv	<0.16	<0.59	<0.16	<4.3	<4.5	<0.14
1,3,5-Trimethylbenzene	ppbv	0.078 J	<0.55	<0.15	<4	<4.2	<0.13
1,3-Butadiene	ppbv	<0.33	1 J	0.13 J	<9	<9.3	0.098 J
1,3-Dichlorobenzene	ppbv	<0.12	<0.45	<0.12	<3.3	<3.4	<0.11
1,4-Dichlorobenzene	ppbv	2.3	0.26 J	0.4	<3.3	<3.4	0.083 J
1,4-Dioxane	ppbv	0.066 J	<0.75	<0.2	<5.5	<5.7	<0.18
2-Butanone (MEK)	ppbv	23	1.2 J	2.4 J	<67	<70	1.1 J
2-Hexanone	ppbv	7.5	<0.66	0.19	<4.9	<5	0.087 J
2-Propanol (Isopropyl Alcohol)	ppbv	0.31 J	<11	0.35 J	<81	<84	0.71 J
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.23	<0.87	<0.23	<6.4	<6.6	<0.21
4-Ethyltoluene	ppbv	<0.15	<0.55	<0.15	<4	<4.2	<0.13
4-Methyl-2-pentanone	ppbv	0.11 J	<0.66	<0.18	<4.9	<5	<0.16
Acetone	ppbv	45	6.4 J	6.1	<84	<87	8.6
Acetonitrile	ppbv	0.85	<1.6	0.37 J	<12	<12	0.26 J
Acrolein	ppbv	1.7	0.65 J	0.45 J	<35	<36	0.65 J
Acrylonitrile	ppbv	0.37	<1.3	<0.34	<9.2	<9.5	<0.3
alpha-Pinene	ppbv	0.046 J	<0.49	<0.13	<3.6	<3.7	<0.12
Benzene	ppbv	0.093 J	<0.85	<0.23	<6.2	<6.5	0.22
Benzyl Chloride	ppbv	<0.14	<0.52	<0.14	<3.8	<4	<0.13
Bromodichloromethane	ppbv	<0.11	<0.41	0.093 J	<3	<3.1	<0.099
Bromoform	ppbv	<0.071	<0.26	<0.071	<1.9	<2	<0.064
Bromomethane	ppbv	<0.19	<0.7	0.061 J	<5.1	<5.3	<0.17
Carbon Disulfide	ppbv	34	2.6 J	0.24 J	8.2 J	8 J	0.88 J
Carbon Tetrachloride	ppbv	0.1 J	4.4	0.06 J	<3.2	<3.3	0.046 J
Chlorobenzene	ppbv	<0.16	<0.59	<0.16	<4.3	<4.5	<0.14
Chloroethane	ppbv	<0.28	<1	<0.28	<7.5	<7.8	<0.25
Chloroform	ppbv	0.56	39	2.8	2.9 J	2.9 J	<0.14
Chloromethane	ppbv	<0.36	<1.3	<0.36	<9.6	<10	0.15 J
cis-1,2-Dichloroethene	ppbv	<0.19	0.79	1.6	81	80	<0.17
cis-1,3-Dichloropropene	ppbv	<0.16	<0.6	<0.16	<4.4	<4.5	<0.15
Cyclohexane	ppbv	<0.43	<1.6	<0.43	<12	<12	<0.38
Dibromochloromethane	ppbv	<0.086	<0.32	<0.086	<2.3	<2.4	<0.078
Dichlorodifluoromethane (CFC 12)	ppbv	0.34	0.36 J	0.31	<4	<4.2	0.34
Dichloromethane (Methylene Chloride)	ppbv	0.08 J	<0.78	<0.21	<5.7	<5.9	0.41
d-Limonene	ppbv	<0.13	<0.49	<0.13	<3.6	<3.7	<0.12
Ethanol	ppbv	5.9	<14	2.1 J	<110	<110	9.6
Ethyl Acetate	ppbv	<0.41	<1.5	<0.41	<11	<11	1.4
Ethylbenzene	ppbv	<0.17	<0.63	<0.17	<4.6	<4.8	0.063 J
Hexachlorobutadiene	ppbv	<0.069	<0.25	<0.069	<1.9	<1.9	<0.062
Isopropylbenzene (Cumene)	ppbv	<0.15	<0.55	<0.15	<4	<4.2	<0.13
m,p-Xylenes	ppbv	0.19 J	<1.3	<0.34	<9.2	<9.5	0.2 J
Methyl Methacrylate	ppbv	<0.36	<1.3	<0.36	<9.7	<10	<0.32
Methyl tert-Butyl Ether	ppbv	<0.2	<0.75	<0.2	<5.5	<5.7	<0.18
Naphthalene	ppbv	0.78	<0.52	0.34	<3.8	<3.9	0.12 J
n-Butyl Acetate	ppbv	<0.15	<0.57	<0.15	<4.2	<4.3	<0.14
n-Heptane	ppbv	0.2	<0.66	0.058 J	<4.9	<5	0.059 J
n-Hexane	ppbv	0.3	<0.77	0.12 J	<5.6	<5.9	0.11 J
n-Nonane	ppbv	0.85	<0.52	<0.14	<3.8	<3.9	0.12 J
n-Octane	ppbv	0.22	<0.58	<0.16	<4.3	<4.4	0.072 J
n-Propylbenzene	ppbv	<0.15	<0.55	<0.15	<4	<4.2	<0.13
o-Xylene	ppbv	0.086 J	<0.63	<0.17	<4.6	<4.8	0.058 J
Propene	ppbv	1.2	3.2	0.31 J	25	23	0.65
Styrene	ppbv	0.069 J	<0.64	<0.17	<4.7	<4.8	0.059 J
Tetrachloroethene	ppbv	0.14	72	1.1	7.6	7.7	<0.097
Tetrahydrofuran (THF)	ppbv	<0.25	0.53 J	0.51	<6.7	<7	0.47
Toluene	ppbv	0.21	<0.72	0.092 J	<5.3	<5.5	0.68
trans-1,2-Dichloroethene	ppbv	<0.19	0.94	0.5	18	18	<0.17
trans-1,3-Dichloropropene	ppbv	<0.16	<0.6	<0.16	<4.4	<4.5	<0.15
Trichloroethene (TCE)	ppbv	0.14	15	9.6	700	710	0.11 J
Trichlorofluoromethane (CFC 11)	ppbv	0.17 J	0.16 J	0.23 J	<3.5	<3.7	0.17 J
Vinyl Acetate	ppbv	0.36 J	<7.7	<2.1	<56	<59	0.55 J
Vinyl Chloride	ppbv	<0.29	<1.1	<0.29	2.4 J	2.5 J	<0.26

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

TABLE B-5
ANALYTICAL RESULTS - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location Date Lab ID Units	VMP3B 7/25/2012 P1203073-006	VMP4A 7/25/2012 P1203073-007	VMP4B 7/25/2012 P1203073-008	VMP5A 7/25/2012 P1203073-009	VMP5B 7/25/2012 P1203073-010	VMP6A 7/25/2012 P1203073-011
1,1,1-Trichloroethane (TCA)	ppbv	<0.16	<0.7	<0.15	<0.15	<1.5	<0.15
1,1,2,2-Tetrachloroethane	ppbv	0.065 J	<0.56	<0.12	0.42	0.53 J	<0.12
1,1,2-Trichloroethane	ppbv	0.084 J	<0.7	<0.15	<0.15	<1.5	<0.15
1,1,2-Trichlorotrifluoroethane	ppbv	0.11 J	<0.5	0.063 J	0.088 J	<1	0.055 J
1,1-Dichloroethane (1,1-DCA)	ppbv	<0.22	<0.95	<0.2	<0.2	<2	<0.2
1,1-Dichloroethene (1,1-DCE)	ppbv	0.073 J	<0.97	0.54	<0.21	<2	<0.21
1,2,4-Trichlorobenzene	ppbv	<0.12	<0.52	<0.11	<0.11	<1.1	<0.11
1,2,4-Trimethylbenzene	ppbv	<0.18	<0.78	0.13 J	<0.17	<1.6	<0.17
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.092	<0.4	<0.083	<0.085	<0.83	<0.084
1,2-Dibromoethane	ppbv	<0.12	<0.5	<0.1	<0.11	<1	<0.11
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.13	<0.55	<0.11	<0.12	<1.1	<0.12
1,2-Dichlorobenzene	ppbv	<0.15	<0.64	<0.13	<0.14	<1.3	<0.14
1,2-Dichloroethane	ppbv	<0.22	<0.95	<0.2	<0.2	<2	<0.2
1,2-Dichloropropane	ppbv	<0.19	<0.83	<0.17	<0.18	<1.7	<0.18
1,3,5-Trimethylbenzene	ppbv	<0.18	<0.78	<0.16	<0.17	<1.6	<0.17
1,3-Butadiene	ppbv	1.2	0.58 J	1.7	0.5	<3.6	<0.37
1,3-Dichlorobenzene	ppbv	<0.15	<0.64	<0.13	<0.14	<1.3	<0.14
1,4-Dichlorobenzene	ppbv	0.37	0.36 J	0.3	0.24	<1.3	0.28
1,4-Dioxane	ppbv	<0.25	<1.1	0.064 J	<0.23	<2.2	<0.23
2-Butanone (MEK)	ppbv	1.6 J	2.3 J	0.71 J	0.71 J	<27	1.7 J
2-Hexanone	ppbv	0.12 J	<0.93	0.088 J	<0.2	<2	0.11 J
2-Propanol (Isopropyl Alcohol)	ppbv	<3.6	<16	0.38 J	0.35 J	<33	<3.3
3-Chloro-1-propene (Allyl Chloride)	ppbv	<0.28	<1.2	<0.26	<0.26	<2.6	<0.26
4-Ethyltoluene	ppbv	<0.18	<0.78	<0.16	<0.17	<1.6	<0.17
4-Methyl-2-pentanone	ppbv	<0.22	<0.93	<0.2	<0.2	<2	<0.2
Acetone	ppbv	12	12 J	20	2 J	8.7 J	3.6
Acetonitrile	ppbv	<0.53	<2.3	1.2	<0.49	<4.8	0.49
Acrolein	ppbv	1.1 J	<6.7	0.48 J	<1.4	<14	0.19 J
Acrylonitrile	ppbv	<0.41	<1.8	0.58	<0.38	<3.7	<0.38
alpha-Pinene	ppbv	0.05 J	<0.69	0.25	<0.15	<1.4	<0.15
Benzene	ppbv	0.14 J	0.69 J	0.83	0.22 J	<2.5	<0.26
Benzyl Chloride	ppbv	<0.17	<0.74	<0.15	<0.16	<1.5	<0.16
Bromodichloromethane	ppbv	<0.13	<0.57	<0.12	<0.12	<1.2	<0.12
Bromoform	ppbv	<0.086	<0.37	<0.077	<0.079	<0.77	<0.079
Bromomethane	ppbv	0.26	<0.99	0.5	<0.21	<2.1	<0.21
Carbon Disulfide	ppbv	1 J	30	270	7.8	<26	0.27 J
Carbon Tetrachloride	ppbv	0.31	<0.61	0.039 J	<0.13	<1.3	<0.13
Chlorobenzene	ppbv	<0.19	<0.83	<0.17	<0.18	<1.7	<0.18
Chloroethane	ppbv	<0.34	<1.5	<0.3	0.097 J	<3	<0.31
Chloroform	ppbv	1.1	3.6	1.8	0.38	<1.6	0.64
Chloromethane	ppbv	<0.43	<1.9	0.3 J	<0.4	<3.9	<0.39
cis-1,2-Dichloroethene	ppbv	4.4	160	7.6	0.53	3.8	0.68
cis-1,3-Dichloropropene	ppbv	<0.2	<0.84	<0.18	<0.18	<1.8	<0.18
Cyclohexane	ppbv	<0.52	<2.2	<0.47	<0.48	<4.7	<0.47
Dibromochloromethane	ppbv	<0.1	<0.45	<0.094	<0.096	<0.94	<0.096
Dichlorodifluoromethane (CFC 12)	ppbv	3.5	22	9.9	0.28	<1.6	0.29
Dichloromethane (Methylene Chloride)	ppbv	0.096 J	0.34 J	0.076 J	0.074 J	<2.3	<0.23
d-Limonene	ppbv	<0.16	<0.69	0.063 J	<0.15	<1.4	<0.15
Ethanol	ppbv	2.4 J	<20	2.1 J	1.2 J	<42	2.1 J
Ethyl Acetate	ppbv	<0.49	<2.1	<0.44	<0.46	<4.4	<0.45
Ethylbenzene	ppbv	<0.2	<0.88	0.062 J	<0.19	<1.8	<0.19
Hexachlorobutadiene	ppbv	<0.083	<0.36	<0.075	<0.077	<0.75	<0.076
Isopropylbenzene (Cumene)	ppbv	<0.18	<0.78	<0.16	<0.17	<1.6	<0.17
m,p-Xylenes	ppbv	<0.41	<1.8	0.19 J	<0.38	<3.7	<0.38
Methyl Methacrylate	ppbv	<0.43	<1.9	<0.39	<0.4	<3.9	<0.4
Methyl tert-Butyl Ether	ppbv	<0.25	<1.1	<0.22	<0.23	<2.2	<0.23
Naphthalene	ppbv	0.17	<0.73	0.39	0.18	<1.5	0.14 J
n-Butyl Acetate	ppbv	<0.19	<0.81	<0.17	<0.17	<1.7	<0.17
n-Heptane	ppbv	<0.22	<0.93	0.092 J	<0.2	<2	<0.2
n-Hexane	ppbv	<0.25	<1.1	0.15 J	0.44	<2.3	<0.23
n-Nonane	ppbv	<0.17	<0.73	0.07 J	<0.16	<1.5	<0.16
n-Octane	ppbv	<0.19	<0.82	0.076 J	<0.18	<1.7	<0.17
n-Propylbenzene	ppbv	<0.18	<0.78	<0.16	<0.17	<1.6	<0.17
o-Xylene	ppbv	<0.2	<0.88	0.08 J	<0.19	<1.8	<0.19
Propene	ppbv	51	<2.2	5	16	3.3 J	0.25 J
Styrene	ppbv	<0.21	<0.9	0.066 J	<0.19	<1.9	<0.19
Tetrachloroethene	ppbv	11	2.7	0.63	8	21	1
Tetrahydrofuran (THF)	ppbv	1.1	1 J	3.1	0.35	<2.7	0.79
Toluene	ppbv	0.087 J	<1	0.34	0.17 J	<2.1	0.09 J
trans-1,2-Dichloroethene	ppbv	1.6	110	28	1.3	2 J	0.18 J
trans-1,3-Dichloropropene	ppbv	<0.2	<0.84	<0.18	<0.18	<1.8	<0.18
Trichloroethene (TCE)	ppbv	26	230	28	48	220	11
Trichlorofluoromethane (CFC 11)	ppbv	0.2 J	<0.68	0.17 J	0.17 J	<1.4	0.18 J
Vinyl Acetate	ppbv	1.4 J	<11	1.2 J	<2.3	<23	0.6 J
Vinyl Chloride	ppbv	<0.35	<1.5	0.11 J	<0.32	<3.1	<0.32

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

TABLE B-5
ANALYTICAL RESULTS - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location / Date / Lab ID / Units	VMP6B 7/25/2012 P1203073-012	VMP7A 7/26/2012 P1203073-014	VMP-7A DUP 7/26/2012 P1203073-022	VMP7B 7/26/2012 P1203073-015	VMP8A 7/26/2012 P1203073-016	VMP8B 7/26/2012 P1203073-017
1,1,1-Trichloroethane (TCA)	ppbv	<3.6	<1.6	<0.39	<0.47	<0.24	<22
1,1,2,2-Tetrachloroethane	ppbv	130	<1.2	<0.31	<0.38	<0.19	<17
1,1,2-Trichloroethane	ppbv	<3.6	<1.6	<0.39	0.13 J	<0.24	7.7 J
1,1,2-Trichlorotrifluoroethane	ppbv	<2.6	<1.1	<0.28	<0.34	<0.17	<15
1,1-Dichloroethane (1,1-DCA)	ppbv	<4.9	<2.1	<0.52	<0.64	<0.33	<29
1,1-Dichloroethene (1,1-DCE)	ppbv	<5	<2.1	0.19 J	<0.65	<0.33	<30
1,2,4-Trichlorobenzene	ppbv	<2.6	<1.1	<0.28	<0.35	<0.18	<16
1,2,4-Trimethylbenzene	ppbv	<4	<1.7	<0.43	<0.52	0.13 J	<24
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<2	<0.88	<0.22	<0.27	<0.14	<12
1,2-Dibromoethane	ppbv	<2.6	<1.1	<0.27	<0.34	<0.17	<15
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<2.8	<1.2	<0.3	<0.37	<0.19	<17
1,2-Dichlorobenzene	ppbv	<3.3	<1.4	<0.35	<0.43	<0.22	<20
1,2-Dichloroethane	ppbv	<4.9	<2.1	<0.52	<0.64	<0.33	<29
1,2-Dichloropropane	ppbv	<4.2	<1.8	<0.46	<0.56	<0.29	<26
1,3,5-Trimethylbenzene	ppbv	<4	<1.7	<0.43	<0.52	<0.27	<24
1,3-Butadiene	ppbv	<8.9	<3.8	<0.96	<1.2	1.2	<53
1,3-Dichlorobenzene	ppbv	<3.3	<1.4	<0.35	<0.43	<0.22	<20
1,4-Dichlorobenzene	ppbv	<3.3	<1.4	<0.35	0.24 J	0.27	<20
1,4-Dioxane	ppbv	<5.4	<2.4	<0.59	<0.72	<0.37	<33
2-Butanone (MEK)	ppbv	<67	<29	0.68 J	2.9 J	2.1 J	<400
2-Hexanone	ppbv	<4.8	<2.1	<0.52	0.41 J	<0.32	<29
2-Propanol (Isopropyl Alcohol)	ppbv	<80	<35	<8.6	1.5 J	<5.4	<480
3-Chloro-1-propene (Allyl Chloride)	ppbv	<6.3	<2.7	<0.68	<0.82	<0.42	<38
4-Ethyltoluene	ppbv	<4	<1.7	<0.43	<0.52	<0.27	<24
4-Methyl-2-pentanone	ppbv	<4.8	<2.1	<0.52	<0.63	<0.32	<29
Acetone	ppbv	19 J	<36	2.2 J	40	3.2 J	<500
Acetonitrile	ppbv	<12	<5.1	<1.3	<1.5	<0.78	<70
Acrolein	ppbv	<34	<15	<3.7	0.63 J	0.43 J	<210
Acrylonitrile	ppbv	<9	<3.9	<0.97	<1.2	<0.61	<54
alpha-Pinene	ppbv	<3.5	<1.5	<0.38	<0.46	<0.24	<21
Benzene	ppbv	<6.1	<2.7	0.24 J	<0.81	<0.41	<37
Benzyl Chloride	ppbv	<3.8	<1.6	<0.41	<0.5	<0.25	<23
Bromodichloromethane	ppbv	<2.9	<1.3	<0.32	<0.38	0.18 J	<18
Bromoform	ppbv	<1.9	<0.82	<0.2	<0.25	<0.13	<11
Bromomethane	ppbv	<5.1	<2.2	<0.54	<0.66	<0.34	<30
Carbon Disulfide	ppbv	29 J	1.1 J	1 J	85	1 J	12 J
Carbon Tetrachloride	ppbv	<3.1	<1.4	0.11 J	<0.41	<0.21	<19
Chlorobenzene	ppbv	<4.3	<1.8	<0.46	<0.56	<0.29	<26
Chloroethane	ppbv	<7.4	<3.2	<0.8	<0.98	<0.5	<45
Chloroform	ppbv	<4	1.7 J	1.6	88	1.9	4200
Chloromethane	ppbv	<9.5	<4.1	<1	0.38 J	<0.64	<57
cis-1,2-Dichloroethene	ppbv	15	75	81	0.78	<0.33	120
cis-1,3-Dichloropropene	ppbv	<4.3	<1.9	<0.47	<0.57	<0.29	<26
Cyclohexane	ppbv	<11	<4.9	<1.2	<1.5	<0.77	<69
Dibromochloromethane	ppbv	<2.3	<1	<0.25	<0.3	0.089 J	<14
Dichlorodifluoromethane (CFC 12)	ppbv	<4	<1.7	0.37 J	0.38 J	0.44	<24
Dichloromethane (Methylene Chloride)	ppbv	<5.7	<2.4	<0.61	1.8	0.39	210
d-Limonene	ppbv	<3.5	<1.5	<0.38	<0.46	<0.24	<21
Ethanol	ppbv	<100	63	40	3.8 J	1.7 J	<630
Ethyl Acetate	ppbv	3.7 J	<4.7	<1.2	4.5	0.31 J	<65
Ethylbenzene	ppbv	<4.5	<2	<0.49	<0.59	<0.3	<27
Hexachlorobutadiene	ppbv	<1.8	<0.8	<0.2	<0.24	<0.12	<11
Isopropylbenzene (Cumene)	ppbv	<4	<1.7	<0.43	<0.52	<0.27	<24
m,p-Xylenes	ppbv	<9	<3.9	<0.97	<1.2	<0.61	<54
Methyl Methacrylate	ppbv	<9.6	<4.2	<1	<1.3	<0.64	<58
Methyl tert-Butyl Ether	ppbv	<5.4	<2.4	<0.59	<0.71	<0.37	<33
Naphthalene	ppbv	3.9	<1.6	<0.4	<0.49	0.11 J	<22
n-Butyl Acetate	ppbv	<4.1	<1.8	<0.44	<0.54	<0.28	<25
n-Heptane	ppbv	<4.8	<2.1	<0.52	0.19 J	<0.32	<29
n-Hexane	ppbv	<5.6	<2.4	0.2 J	0.36 J	<0.37	<33
n-Nonane	ppbv	<3.7	<1.6	<0.4	<0.49	<0.25	<22
n-Octane	ppbv	<4.2	<1.8	<0.45	<0.55	<0.28	<25
n-Propylbenzene	ppbv	<4	<1.7	<0.43	<0.52	<0.27	<24
o-Xylene	ppbv	<4.5	<2	<0.49	<0.59	<0.3	<27
Propene	ppbv	<11	2.5 J	1.7	<1.5	0.77	27 J
Styrene	ppbv	<4.6	<2	<0.5	<0.61	<0.31	<28
Tetrachloroethene	ppbv	18	0.78 J	0.79	0.76	0.7	140
Tetrahydrofuran (THF)	ppbv	<6.7	<2.9	<0.72	<0.87	1.5	<40
Toluene	ppbv	<5.2	<2.3	<0.56	0.66 J	0.16 J	<31
trans-1,2-Dichloroethene	ppbv	20	<2.1	0.39 J	<0.65	<0.33	18 J
trans-1,3-Dichloropropene	ppbv	<4.3	<1.9	<0.47	<0.57	<0.29	<26
Trichloroethene (TCE)	ppbv	660	8.4	8.9	0.88	0.3	390
Trichlorofluoromethane (CFC 11)	ppbv	<3.5	<1.5	0.17 J	0.18 J	0.24 J	<21
Vinyl Acetate	ppbv	<56	<24	<6	<7.3	0.46 J	<330
Vinyl Chloride	ppbv	<7.7	<3.3	1.2	<1	<0.52	<46

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

TABLE B-5
ANALYTICAL RESULTS - VAPOR MONITORING POINTS, JULY 2012
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	VMP9A	VMP9B	VMP10A	VMP10B
	Date	7/26/2012	7/26/2012	7/26/2012	7/26/2012
	Lab ID	P1203073-018	P1203073-019	P1203073-020	P1203073-021
	Units				
1,1,1-Trichloroethane (TCA)	ppbv	<0.91	<0.15	<1.6	<0.72
1,1,2,2-Tetrachloroethane	ppbv	<0.72	<0.12	<1.3	0.37 J
1,1,2-Trichloroethane	ppbv	<0.91	<0.15	<1.6	<0.72
1,1,2-Trichlorotrifluoroethane	ppbv	<0.65	0.099 J	67	6.5
1,1-Dichloroethane (1,1-DCA)	ppbv	1.8	0.26	<2.2	<0.97
1,1-Dichloroethene (1,1-DCE)	ppbv	2.8	0.23	1.8 J	0.49 J
1,2,4-Trichlorobenzene	ppbv	0.25 J	<0.11	<1.2	<0.53
1,2,4-Trimethylbenzene	ppbv	<1	0.057 J	<1.8	<0.8
1,2-Dibromo-3-chloropropane (DBCP)	ppbv	<0.51	<0.084	<0.91	<0.41
1,2-Dibromoethane	ppbv	<0.65	<0.11	<1.1	<0.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppbv	<0.71	<0.12	<1.3	<0.56
1,2-Dichlorobenzene	ppbv	<0.83	<0.13	<1.5	<0.65
1,2-Dichloroethane	ppbv	0.47 J	<0.2	<2.2	<0.97
1,2-Dichloropropane	ppbv	<1.1	<0.18	<1.9	<0.85
1,3,5-Trimethylbenzene	ppbv	<1	<0.16	<1.8	<0.8
1,3-Butadiene	ppbv	<2.2	0.13 J	<4	<1.8
1,3-Dichlorobenzene	ppbv	<0.83	<0.13	<1.5	<0.65
1,4-Dichlorobenzene	ppbv	0.4 J	0.31	<1.5	<0.65
1,4-Dioxane	ppbv	<1.4	<0.22	<2.4	<1.1
2-Butanone (MEK)	ppbv	1.1 J	1.8 J	<30	2.2 J
2-Hexanone	ppbv	<1.2	0.19 J	<2.1	<0.96
2-Propanol (Isopropyl Alcohol)	ppbv	2.7 J	0.42 J	<36	<16
3-Chloro-1-propene (Allyl Chloride)	ppbv	<1.6	<0.26	<2.8	<1.3
4-Ethyltoluene	ppbv	<1	<0.16	<1.8	<0.8
4-Methyl-2-pentanone	ppbv	<1.2	<0.2	<2.1	<0.96
Acetone	ppbv	8.5 J	6.6	10 J	7.3 J
Acetonitrile	ppbv	<3	1.2	<5.2	<2.3
Acrolein	ppbv	<8.7	0.2 J	<15	<6.9
Acrylonitrile	ppbv	<2.3	<0.37	<4	<1.8
alpha-Pinene	ppbv	<0.89	<0.15	<1.6	<0.7
Benzene	ppbv	<1.6	0.13 J	<2.7	0.49 J
Benzyl Chloride	ppbv	<0.96	<0.16	<1.7	<0.76
Bromodichloromethane	ppbv	<0.74	<0.12	<1.3	<0.59
Bromoform	ppbv	<0.48	<0.078	<0.85	<0.38
Bromomethane	ppbv	<1.3	0.63	<2.3	<1
Carbon Disulfide	ppbv	0.8 J	4.1	3.6 J	7.7 J
Carbon Tetrachloride	ppbv	9	3.5	79	10
Chlorobenzene	ppbv	<1.1	<0.18	<1.9	<0.85
Chloroethane	ppbv	<1.9	<0.31	<3.3	<1.5
Chloroform	ppbv	330	43	8.3	200
Chloromethane	ppbv	<2.4	<0.39	<4.3	<1.9
cis-1,2-Dichloroethene	ppbv	6.2	0.37	<2.2	1.3
cis-1,3-Dichloropropene	ppbv	<1.1	<0.18	<1.9	<0.86
Cyclohexane	ppbv	<2.9	0.18 J	<5.1	<2.3
Dibromochloromethane	ppbv	<0.58	<0.095	<1	<0.46
Dichlorodifluoromethane (CFC 12)	ppbv	13	0.67	2.2	0.61 J
Dichloromethane (Methylene Chloride)	ppbv	<1.4	<0.23	<2.5	<1.1
d-Limonene	ppbv	<0.89	<0.15	<1.6	<0.7
Ethanol	ppbv	<26	2.8 J	<47	<21
Ethyl Acetate	ppbv	<2.8	<0.45	<4.9	<2.2
Ethylbenzene	ppbv	<1.1	<0.19	<2	<0.9
Hexachlorobutadiene	ppbv	<0.47	<0.076	<0.82	<0.37
Isopropylbenzene (Cumene)	ppbv	<1	<0.16	<1.8	<0.8
m,p-Xylenes	ppbv	<2.3	<0.37	<4	<1.8
Methyl Methacrylate	ppbv	<2.4	<0.4	<4.3	<1.9
Methyl tert-Butyl Ether	ppbv	<1.4	<0.22	<2.4	<1.1
Naphthalene	ppbv	<0.95	0.3	<1.7	<0.75
n-Butyl Acetate	ppbv	<1	<0.17	<1.8	<0.83
n-Heptane	ppbv	<1.2	<0.2	<2.1	<0.96
n-Hexane	ppbv	<1.4	0.12 J	<2.5	<1.1
n-Nonane	ppbv	<0.95	<0.15	<1.7	<0.75
n-Octane	ppbv	<1.1	<0.17	<1.9	<0.84
n-Propylbenzene	ppbv	<1	<0.16	<1.8	<0.8
o-Xylene	ppbv	<1.1	<0.19	<2	<0.9
Propene	ppbv	<2.9	1.3	<5.1	<2.3
Styrene	ppbv	<1.2	<0.19	<2.1	<0.92
Tetrachloroethene	ppbv	6.9	12	44	70
Tetrahydrofuran (THF)	ppbv	0.99 J	0.9	<3	1.4
Toluene	ppbv	<1.3	0.12 J	<2.3	0.5 J
trans-1,2-Dichloroethene	ppbv	1.4	1.7	<2.2	8.1
trans-1,3-Dichloropropene	ppbv	<1.1	<0.18	<1.9	<0.86
Trichloroethene (TCE)	ppbv	75	8.4	250	96
Trichlorofluoromethane (CFC 11)	ppbv	0.57 J	0.21 J	0.94 J	0.32 J
Vinyl Acetate	ppbv	<14	1.2 J	<25	<11
Vinyl Chloride	ppbv	<1.9	<0.32	<3.4	<1.5

Notes:
<: Result is less than laboratory reporting limit.
J: Estimated concentration
ppbv: part per billion volume

APPENDIX C

DATA QUALITY EVALUATION

DATA QUALITY EVALUATION

System monitoring for the Fluvial Soil Vapor Extraction (SVE) System at Dunn Field included sampling and analysis of vapor samples from the system influent, SVE wells and vapor monitoring points (VMPs) to evaluate progress toward remedial action objectives. Procedures were in accordance with the field and laboratory procedures specified in the *Remedial Action Sampling and Analysis Plan, Revision 1* (RA SAP) (MACTEC, 2005) and the draft *Remedial Action Operations and Long Term Monitoring Quality Assurance Project Plan* (QAPP) (HDR, 2011). Vapor samples were submitted to Columbia Analytical Services in Simi Valley, California for analysis under subcontract to Microbac Laboratories in Marietta, Ohio.

The data quality evaluation (DQE) process involves assessment of field and laboratory procedures, including independent data validation completed by Diane Short and Associates, Inc. (DSA) in accordance with the RA SAP. The assessment is designed to evaluate 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 vapor samples using 6-Liter (L) Summa canisters at SVE wells, VMPs, and system influent and effluent. The Summa canisters were equipped with flow regulators pre-set at 200 milliliters per minute (mL/min) for collection of all VMP samples; flow regulators were not used during collection of SVE system influent and well samples. Documentation of the sampling was performed in the field to ensure that the sample collected, labeling, chain-of-custody, and request for analysis were in agreement.

ANALYTICAL METHODS

The vapor samples were analyzed for volatile organic compounds (VOCs) by EPA method TO-15.

LABORATORY QUALITY CONTROL

The required 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, laboratory personnel using the sample, and disposal. Laboratory control consists of instrument calibration and maintenance, laboratory control samples (LCS), surrogates, method blanks and laboratory duplicates. 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 completed in a timely manner.

DATA QUALITY EVALUATION

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 DQOs 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 following 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
- Sample Completeness
- Sample Holding Times
- Laboratory Methods for Preparation and Analysis
- Calibration
- Method Accuracy (Surrogate and LCS Recoveries)
- Method Precision (Laboratory Duplicate and Field Duplicate RPD)
- Laboratory Performance Criteria (Method Blanks)

Field QC parameters were evaluated through field duplicates, 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 to this appendix. The SDGs and associated samples are listed on Table C-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) included sample integrity, holding times, trip blanks, field blanks, method blanks, internal standards, calibrations, surrogate recoveries, LCS recoveries and field duplicate precision. These DQIs are expressed in terms of precision, accuracy (bias), representativeness, completeness, comparability, and sensitivity (PARCCS). The results of the DQE are summarized below.

Precision

Eight field duplicates were collected to assess sampling precision. They consisted of duplicate Summa canisters collected at selected locations. Precision is expressed in terms of relative percent difference (RPD).

Seven field duplicates compared very well and all relative percent differences (RPDs) were within control limits. In the field duplicate pair FSVE-SVEG-South-2Q12 and FSVE-DUP1-2Q12, results for 1,1,2-trichlorotrifluoroethane, cis-1,2-dichloroethene, 1,1-dichloroethene, chloroform, carbon tetrachloride, trichloroethene (TCE) and tetrachloroethene (PCE) had RPDs between 63% and 95%, above the control limit of 35%, or differences greater than twice the reporting limit (RL), and results for these seven analytes were qualified as estimated "J". Complete discussion of the field duplicates is provided in the attached DQE narratives.

Precision was also assessed by analysis of laboratory duplicates. Six laboratory duplicate analyses were performed and all results were within control limits. Complete discussion of the laboratory duplicates is provided in the attached DQE narratives.

Accuracy

Accuracy was measured through the analysis of LCSs. Sample specific accuracy was measured through surrogate recovery. Accuracy is expressed as percent recovery (%R). All LCS and surrogate recoveries were within control limits. Complete discussion of the LCS and surrogate results is discussed 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 and analysis of holding times helps in providing this assessment. Sampling procedures followed the work plan. Laboratory preparation and analysis followed method guidelines. Sample data were considered representative.

Comparability

The selection of standardized methods and consistent field and laboratory practices facilitates the comparison of data between sampling events. Previous event data are comparable to Year Five event data.

Completeness

Completeness is determined for both field and analytical objectives. Field completeness is calculated from the number of samples planned versus the actual number of samples collected. All planned field samples

were collected and analyzed, therefore field completeness was 100% complete. Analytical completeness is expressed in terms of usable data. The project completeness goal stated in the DDMT RA SAP for DDMT is 90%. Data from the SVE events was 100% complete and therefore met this completeness DQO.

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 laboratory as their reasonable and defensible quantitation limit for environmental samples above the method detection limit (MDL), which is established by the laboratory using clean matrix. The RL varies among laboratories dependent upon their SOPs and expertise.

The analytical method RLs and MDLs were compared to protective soil vapor concentrations as provided in Dunn Field Record of Decision and were determined to meet the overall project objectives. A number of samples had RLs above the protective concentrations, but most had TCE concentrations above the protective concentration; those samples that did not have TCE above the protective concentration had MDLs below the protective concentrations.

The following sections discuss the deficiencies encountered during the evaluation that resulted in qualified and/or unusable data, as well as other issues that were noted during validation but did not result in qualification.

SVE SAMPLING EVENTS – 24 OCTOBER 2011 TO 26 JULY 2012

A total of 73 summa canister air samples, including field duplicates, were collected during four quarterly events from 24 October 2011 through 26 July 2012. All planned samples were collected, analyzed and reported.

Samples were analyzed for VOCs using EPA Method TO-15. Any result reported below the reporting limit (RL) but above the method detection limit (MDL) was flagged "J" and considered an estimated result (unless overridden by other QC flags).

Chain-of-Custody

Custody seals were not placed on sealed boxes before shipment by common carrier. This issue has been determined not to have impacted use of the data for its intended purpose.

Method Blanks

Methylene chloride was detected between the MDL and RL in two method blanks from October 2011, three method blanks from January 2012 , one method blank from February 2012 and two method blanks from April 2012. This analyte was detected at less than 10 times the method blank concentration in most of the associated samples (six in the 4Q11 event, 11 in the 1Q12 event and 18 in the 2Q12 event) and was qualified with a "B". These data are usable and possibly biased high.

Calibration

The method calibration %RSD and %D limits are 30%. Where calibration is outside of QC limits, associated detections are qualified as "J". Such results may be biased to a degree proportional to the calibration drift observed. One detected result for 2-propanol (isopropyl alcohol), in sample FSVE-SVEC-West-3Q12, and 15 results for trichlorofluoromethane in 3Q12 samples were qualified as estimated "J" because the continuing calibration %D values at 32% and 36%, respectively, were above the 30% control limit.

Laboratory Control or Laboratory Duplicate Samples

For LCS or Laboratory Duplicate runs which had outliers that were below the control limits, associated data are typically qualified estimated "J", since results may be biased low. Similarly those with outliers above the control limits may be biased high and associated data are qualified estimated "J". No LCS or Laboratory Duplicate runs were outside control limits.

Field Duplicate Samples

In the field duplicate pair FSVE-SVEG-South-2Q12 and FSVE-DUP1-2Q12, results for 1,1,2-trichlorotrifluoroethane, cis-1,2-dichloroethene, 1,1-dichloroethene, chloroform, carbon tetrachloride, trichloroethene (TCE) and tetrachloroethene (PCE) had RPDs between 63% and 95%, above the control limit of 35%, or differences greater than twice the reporting limit (RL), and results for these seven analytes were qualified as estimated "J". Except for TCE and PCE, the detected concentrations in the parent sample as well as the FD were both well below the screening level. For both samples, TCE was well above the screening level. These issues have been determined not to have impacted use of the data for its intended purpose.

Quantitation

No data are qualified based upon dilutions above the calibration range since these were all brought into the calibration range on subsequent runs. Any value falling between the MDL and the RL is qualified as estimated J.

SUMMARY

The vapor sample data collected from 24 October 2011 through 26 July 2012 from system effluent, SVE wells and VMPs have met the data quality objectives and are deemed sufficient to support decisions regarding the effectiveness of SVE system performance.

TABLE C-1
SDG SUMMARY TABLE
ANNUAL OPERATIONS REPORT - YEAR FIVE
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
Dunn Field - Defense Depot Memphis, Tennessee

SDG	6-Liter Summa Air Canister Samples			Quality Control Samples
October 24, 2011				
P1104110	FSVE-SVEA-4Q11	FSVE-SVED-4Q11	FSVE-SVEG-4Q11	FSVE-DUP-4Q11 (SVE-E)
	FSVE-SVEB-4Q11	FSVE-SVEE-4Q11	FSVE-EFF-4Q11	
	FSVE-SVEC-4Q11	FSVE-SVEF-4Q11		
January 24, 2012				
P1200313 P1200734	FSVE-SVEA-1Q12	FSVE-SVED-1Q12	FSVE-SVEG-1Q12	FSVE-DUP-1Q12 (EFF)
	FSVE-SVEB-1Q12	FSVE-SVEE-1Q12	FSVE-EFF-1Q12	
	FSVE-SVEC-1Q12	FSVE-SVEF-1Q12		
February 23, 2012				
P1100483	FSVE-SVEC-1Q12-2	FSVE-SVED-1Q12-2		
April 11, 2012				
P1201435	FSVE-SVEA-2Q12	FSVE-SVED-2Q12	FSVE-SVEF-East-2Q12	FSVE-DUP1-2Q12 (SVEG-South)
	FSVE-SVEB-2Q12	FSVE-SVED-North-2Q12	FSVE-SVEF-West-2Q12	FSVE-DUP2-2Q12 (SVEC-West)
	FSVE-SVEB-East-2Q12	FSVE-SVED-South-2Q12	FSVE-SVEG-South-2Q12	
	FSVE-SVEC-2Q12	FSVE-SVEE-2Q12	FSVE-SVEG-ALT-2Q12	
	FSVE-SVEC-East-2Q12	FSVE-SVEE-North-2Q12	FSVE-EFF-2Q12	
	FSVE-SVEC-West-2Q12	FSVE-SVEF-2Q12		
July 24, 25 and 26, 2012				
P1203035 P1203073	FSVE-SVEA-3Q12	FSVE-SVEE-North-3Q12	FSVE-VMP2B-3Q12	FSVE-DUP1-3Q12 (EFF)
	FSVE-SVEB-3Q12	FSVE-SVEF-3Q12	FSVE-VMP3A-3Q12	FSVE-DUP2-3Q12 (SVE-B)
	FSVE-SVEB-East-3Q12	FSVE-SVEF-East-3Q12	FSVE-VMP3B-3Q12	FSVE-DUP3-3Q12 (VMP-2B)
	FSVE-SVEC-3Q12	FSVE-SVEF-West-3Q12	FSVE-VMP4A-3Q12	FSVE-DUP4-3Q12 (VMP7A)
	FSVE-SVEC-East-3Q12	FSVE-SVEG-South-3Q12	FSVE-VMP4B-3Q12	
	FSVE-SVEC-West-3Q12	FSVE-SVEG-ALT-3Q12	FSVE-VMP5A-3Q12	
	FSVE-SVED-3Q12	FSVE-EFF-3Q12	FSVE-VMP5B-3Q12	
	FSVE-SVED-North-3Q12	FSVE-VMP1A-3Q12	FSVE-VMP6A-3Q12	
	FSVE-SVED-South-3Q12	FSVE-VMP1B-3Q12	FSVE-VMP6B-3Q12	
	FSVE-SVEE-3Q12	FSVE-VMP2A-3Q12	FSVE-VMP7A-3Q12	

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ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: P11004110, P120313 , project 145803-004

PROJECT: Memphis Defense Depot Fluvial soil vapor extraction for HDR Inc. (formerly e2m)

LABORATORY: Microbac, subcontracted to Columbia Analytical Services Laboratories, CA

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): October, 2011, January 2012

NUMBER OF SAMPLES: 18 samples including two field duplicate

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: See project EDD for sample IDs

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __DLS_3/5/2012_____

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP); the current project QAPP, (9/2011), 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. Level III data packages were submitted and 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.
There are gaps from relinquishment to sample receipt. The courier is identified as FedEx and there is no airbill number on the chain or log-in. The client notes that the coolers are often sealed before the airbill number is known.

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 field initial and final pressures and the laboratory final pressure and were acceptable.

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____

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 ___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 validation guidance. There were original calibrations and those for analysis of dilutions.

2. The percent difference (%D) limits of 30% were met.
Yes __X__ No ____
Outliers were not client 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 ____
Tunes were provided and were acceptable.

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 three surrogates are used. 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. See below.

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.
P1104110: The laboratory duplicates was sample FSVE-SVEC-4Q11-NS. RPDs were reported above the limit, but these were low level results that met the 2 x PQL criteria.
P120313: The duplicate was FSVE-SVEE-1Q12 and precision was 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 ___
Only the LCS was required or reported.

B. And percent recoveries were acceptable at 70 – 130%.
Yes _X___ No ____

For air data, the laboratory limits are used as there are no air limits defined in the QAPP. There was an LCS reported for all days of analysis.

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__
LCSDs have not been performed, and are not required by the method.

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 _____ No ___X__
Methylene chloride was reported in all method blanks. For the October sampling there were also a few low level di- and tri-chlorobenzenes, but none effected client samples.
The samples have been diluted for most reported results. The blank is multiplied by a factor determined from the reported MRL for each sample/compound. See the EDD and table at the end of the report for the final blank value as data are qualified BMB#, where # is the blank corrected value. Only data that are less than 10 x the blank (corrected for dilution) are qualified.

LAB_ID	CLIENT_ID	ANALYTE	Result ppbv	flag	dil'n	MDL	Qualifier
P1200313-001	FSVE-SVEA-1Q12	Dichloromethane (Methylene Chloride)	7.2	F, B	147	6.3	BMB5
P1200313-002	FSVE-SVEB-1Q12	Dichloromethane (Methylene Chloride)	0.14	F, B	1.46	0.063	BMB.05
P1200313-003	FSVE-SVEC-1Q12	Dichloromethane (Methylene Chloride)	7.5	F, B	144	6.2	BMB5
P1200313-004	FSVE-SVED-1Q12	Dichloromethane (Methylene Chloride)	1.5	F, B	28	1.2	BMB1
P1200313-005	FSVE-SVEE-1Q12	Dichloromethane (Methylene Chloride)	0.13	F, B	1.41	0.061	BMB.05
P1200313-006	FSVE-SVEF-1Q12	Dichloromethane (Methylene Chloride)	0.43	B	1.43	0.062	BMB.05
P1200313-007	FSVE-SVEG-1Q12	Dichloromethane (Methylene Chloride)	0.14	F, B	1.42	0.061	BMB.05
P1200313-008	FSVE-EFF-1Q12	Dichloromethane (Methylene Chloride)	0.37	B	1.19	0.051	BMB.05
P1200313-009	FSVE-DUP-1Q12	Dichloromethane (Methylene Chloride)	0.38	B	1.21	0.052	BMB.05
P1200313-005DUP	FSVE-SVEE-1Q12	Dichloromethane (Methylene Chloride)	0.134	F, B	1.41	0.061	BMB.05
P1104110-001	FSVE-SVEA-4Q11	Dichloromethane (Methylene Chloride)	0.14	F, B	1.41	0.061	BMB.05
P1104110-002	FSVE-SVEB-4Q11	Dichloromethane (Methylene Chloride)	0.59	F, B	11.2	0.48	BMB.5
P1104110-003	FSVE-SVEC-4Q11	Dichloromethane (Methylene Chloride)	0.086	F, B	1.41	0.061	BMB.05
P1104110-004	FSVE-SVED-4Q11	Dichloromethane (Methylene Chloride)	0.12	F, B	1.4	0.06	BMB.05
P1104110-005	FSVE-SVEE-4Q11	Dichloromethane (Methylene Chloride)	0.11	F, B	1.36	0.059	BMB.05
P1104110-009	FSVE-Dup-4Q11	Dichloromethane (Methylene Chloride)	0.11	F, B	1.36	0.059	BMB.05
P1104110-002DUP	FSVE-SVEB-4Q11	Dichloromethane (Methylene Chloride)	0.613	F, B	11.2	0.48	BMB.5

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___
One field duplicate pair is reported with each set:

October: FSVE-SVEE-4Q11 and DUP- precision is within the 25% RPD or ± 2 x RL. January FSVE-EFF-1Q12 and DUP – results within precision limits with a few low level analytes below the RL in the EFF that are not in the duplicate.
These are regularly sampled locations and the precision is built in as the sites are sampled routinely. Qualifiers of JFD#, where # is the RPD (or the difference for low level values) are added for field duplicate differences. When results are > 5x the reporting limit, a 25% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x MRL is considered by the validator to be acceptable reproducibility. (The laboratory uses MRL not PQL for these reports). The QAPP defines air QC at 25% RPD and does not account for low level results where the RPD is not statistically valid. Note that the times of collection indicate that these samples are not collected at the same time, but are sequential samples. An RPD of 50% is recommended for a precision limit for these samples and a low level limit of ± 4 x RL.

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 __X_ No____ NA___
It is noted that there are high dilutions for tetrachloroethene; 1,1,2,2-tetrachloroethane, trichloroethene and chloroform and some other compounds. No dilution factors are noted on the results forms but dilutions have been estimated from the MDLs. For compounds that are reported from a re-analysis at the higher dilution, the lab has added a "D" flag. Dilutions are acceptable per the method.

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of qualifiers or comments. Points of significance are summarized below:
Note an extended list of volatile compounds was reported. Level III data packages were submitted and Level III validation was performed for holding times, chain of custody, calibrations and QC.

Laboratory Duplicate
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.
P1104110: The laboratory duplicates was sample FSVE-SVEC-4Q11-NS. RPDs were reported above the limit, but these were low level results that met the 2 x PQL criteria.
P120313: The duplicate was FSVE-SVEE-1Q12 and precision was acceptable.

Method Blanks
Methylene chloride was reported in all method blanks. For the October sampling there were also a few low level di- and tri-chlorobenzenes, but none effected client samples.

The samples have been diluted for most reported results. The blank is multiplied by a factor determined from the reported MRL for each sample/compound. See the EDD and table at the end of the report for the final blank value as data are qualified BMB#, where # is the blank corrected value. Only data that are less than 10 x the blank (corrected for dilution) are qualified.

Field Duplicates

One field duplicate pair is reported with each set:
October: FSVE-SVEE-4Q11 and DUP- precision is within the 25% RPD or ± 2 x RL. January FSVE-EFF-1Q12 and DUP – results within precision limits with a few low level analytes below the RL in the EFF that are not in the duplicate.
These are regularly sampled locations and the precision is built in as the sites are sampled routinely. Qualifiers of JFD#, where # is the RPD (or the difference for low level values) are added for field duplicate differences. When results are > 5x the reporting limit, a 25% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x MRL is considered by the validator to be acceptable reproducibility. (The laboratory uses MRL not PQL for these reports). The QAPP defines air QC at 25% RPD and does not account for low level results where the RPD is not statistically valid. Note that the times of collection indicate that these samples are not collected at the same time, but are sequential samples. An RPD of 50% is recommended for a precision limit for these samples and a low level ± 4 x RL.

Reporting Limits

It is noted that there are high dilutions for tetrachloroethene; 1,1,2,2-tetrachloroethane, trichloroethene and chloroform and some other compounds. No dilution factors are noted on the results forms but dilutions have been estimated from the MDLs and are accpetable.

TABLE OF QUALIFIED DATA

LAB_ID	CLIENT_ID	ANALYTE	Result ppbv	flag	dil'n	MDL	Qualifier
P1200313-001	FSVE-SVEA-1Q12	Dichloromethane (Methylene Chloride)	7.2	F, B	147	6.3	BMB5
P1200313-002	FSVE-SVEB-1Q12	Dichloromethane (Methylene Chloride)	0.14	F, B	1.46	0.063	BMB.05
P1200313-003	FSVE-SVEC-1Q12	Dichloromethane (Methylene Chloride)	7.5	F, B	144	6.2	BMB5
P1200313-004	FSVE-SVED-1Q12	Dichloromethane (Methylene Chloride)	1.5	F, B	28	1.2	BMB1
P1200313-005	FSVE-SVEE-1Q12	Dichloromethane (Methylene Chloride)	0.13	F, B	1.41	0.061	BMB.05
P1200313-006	FSVE-SVEF-1Q12	Dichloromethane (Methylene Chloride)	0.43	B	1.43	0.062	BMB.05
P1200313-007	FSVE-SVEG-1Q12	Dichloromethane (Methylene Chloride)	0.14	F, B	1.42	0.061	BMB.05
P1200313-008	FSVE-EFF-1Q12	Dichloromethane (Methylene Chloride)	0.37	B	1.19	0.051	BMB.05
P1200313-009	FSVE-DUP-1Q12	Dichloromethane (Methylene Chloride)	0.38	B	1.21	0.052	BMB.05
P1200313-005DUP	FSVE-SVEE-1Q12	Dichloromethane (Methylene Chloride)	0.134	F, B	1.41	0.061	BMB.05
P1104110-001	FSVE-SVEA-4Q11	Dichloromethane (Methylene Chloride)	0.14	F, B	1.41	0.061	BMB.05
P1104110-002	FSVE-SVEB-4Q11	Dichloromethane (Methylene Chloride)	0.59	F, B	11.2	0.48	BMB.5
P1104110-003	FSVE-SVEC-4Q11	Dichloromethane (Methylene Chloride)	0.086	F, B	1.41	0.061	BMB.05
P1104110-004	FSVE-SVED-4Q11	Dichloromethane (Methylene Chloride)	0.12	F, B	1.4	0.06	BMB.05
P1104110-005	FSVE-SVEE-4Q11	Dichloromethane (Methylene Chloride)	0.11	F, B	1.36	0.059	BMB.05
P1104110-009	FSVE-Dup-4Q11	Dichloromethane (Methylene Chloride)	0.11	F, B	1.36	0.059	BMB.05
P1104110-002DUP	FSVE-SVEB-4Q11	Dichloromethane (Methylene Chloride)	0.613	F, B	11.2	0.48	BMB.5

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ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: P1200734 , project 145803-004

PROJECT: Memphis Defense Depot Fluvial soil vapor extraction for HDR Inc. (formerly e2m)

LABORATORY: Microbac, subcontracted to Columbia Analytical Services Laboratories, CA

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): February 2012

NUMBER OF SAMPLES: 2 samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: FSVE: SVEC-1Q12-2, SVED-1Q12-2

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __ DLS _4/3/2012_____

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP); the current project QAPP, (9/2011), 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. Level III data packages were submitted and 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.
There are gaps from relinquishment to sample receipt. The courier is identified as FedEx and there is no airbill number on the chain or log-in. The client notes that the coolers are often sealed before the airbill number is known. The required tracking is in the project record.

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 field initial and final pressures and the laboratory final pressure and were acceptable.

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____

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 ___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 validation guidance. There were original calibrations and those for analysis of dilutions.

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 ____
Tunes were provided and were acceptable.

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 three surrogates are used. 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. See below.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes ___ No ____ NA__X_
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 duplicate run was reported.

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 ___
Only the LCS was required or reported.

B. And percent recoveries were acceptable at 70 – 130%.
Yes _X___ No ____
There was an LCS reported for all days of analysis.

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__
LCSDs have not been performed, and are not required by the method.

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 _____ No ___X__
Methylene chloride was reported in all method blanks. Data are qualified BMB#, where # is the blank corrected value. Only data that are less than 10 x the blank (corrected for dilution) are qualified.

LAB_ID	CLIENT_ID	ANALYTE	Result ppbv	flag	MDL	Qualifier
P1200734-001	FSVE-SVEC-1Q12-2	Dichloromethane (Methylene Chloride)	.092	F, B	0.069	BMB.056
P1200734-002	FSVE-SVED-1Q12-2	Dichloromethane (Methylene Chloride)	0.12	F, B	0.067	BMB.056

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__
No field duplicate pair is reported in this set.

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 __X_ No____ NA___
No high dilutions were reported for this set of samples.

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of qualifiers or comments. Points of significance are summarized below:
Note an extended list of volatile compounds was reported. Level III data packages were submitted and Level III validation was performed for holding times, chain of custody, calibrations and QC.

Laboratory Duplicate
No laboratory duplicates was reported.

Method Blanks
Methylene chloride was reported in all method blanks. Data are qualified BMB#, where # is the blank corrected value. Only data that are less than 10 x the blank (corrected for dilution) are qualified.

Field Duplicates
No field duplicate pair is reported. These are regularly sampled locations and the precision is built in as the sites are sampled routinely.

TABLE OF QUALIFIED DATA

LAB_ID	CLIENT_ID	ANALYTE	Result ppbv	flag	MDL	Qualifier
P1200734-001	FSVE-SVEC-1Q12-2	Dichloromethane (Methylene Chloride)	.092	F, B	0.069	BMB.056
P1200734-002	FSVE-SVED-1Q12-2	Dichloromethane (Methylene Chloride)	0.12	F, B	0.067	BMB.056

Final Data Qualification and Usability Report

Project:	Defense Depot Memphis, TN (DDMT) FSVE
Sampling Event:	FSVE October 2011
Project / Task Number:	121842-004
Sample Data Package(s):	P1104110
Data Validation Performed by:	Diane Short & Associates (DSA)
Final Data Qualification and Usability Report Prepared by:	Lynn K. Lutz, HDR Inc.

Data Validation Report Review and Comments

The data validation report was acceptable.

Final Data Qualifiers

Final qualifiers for detected methylene chloride results associated with method blanks with methylene chloride were B where DSA had qualified as BMB.05, BMB.5, BMB1 or BMB5.

Final qualifiers were J where detected results were between the MDL and RL.

Final qualifiers were JB where both the above instances occurred.

Data Usability

There were no rejected sample results. All results are usable as qualified.

20 March 2012

Lynn K. Lutz, HDR Inc. Date

Final Data Qualification and Usability Report

Project:	Defense Depot Memphis, TN (DDMT) FSVE
Sampling Event:	FSVE January and February 2012
Project / Task Number:	145803-004
Sample Data Package(s):	P1200313 and P1200734
Data Validation Performed by:	Diane Short & Associates (DSA)
Final Data Qualification and Usability Report Prepared by:	Lynn K. Lutz, HDR Inc.

Data Validation Report Review and Comments

The data validation reports were acceptable.

Final Data Qualifiers

Final qualifiers for detected methylene chloride results associated with method blanks with methylene chloride were B where DSA had qualified as BMB.05, BMB.056, BMB.5, BMB1 or BMB5.

Final qualifiers were J where detected results were between the MDL and RL.

Final qualifiers were JB where both the above instances occurred.

Data Usability

There were no rejected sample results. All results are usable as qualified.

3 April 2012

Lynn K. Lutz, HDR Inc. Date

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ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: P1201435 , project 145803-AC004

PROJECT: Memphis Defense Depot DDMT event for HDR Inc. (formerly e2m)

LABORATORY: Microbac, subcontracted to Columbia Analytical Services Laboratories, CA

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): April 2012

NUMBER OF SAMPLES: 19 samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: See project EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __DLS_6/5/2012_____

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP); the current project QAPP, (9/2011), 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. Level III data packages were submitted and 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 laboratory log-in notes" canister tag has SVEB-East; COC has SVEB for sample -002". It is not clear from the IDs on the chain what this means and no corrective action is noted nor contact with the client.
The project manager is informed of the following and the project record is being updated.
There are gaps from relinquishment to sample receipt. The courier is identified as FedEx and there is no airbill number on the chain or log-in. The client notes that the coolers are often sealed before the airbill number is known. The required tracking is in the project record.

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 field initial and final pressures and the laboratory final pressure and were acceptable.

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____

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 ___X__ No ____
For client compounds

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. There were original calibrations and those for analysis of dilutions.

2. The percent difference (%D) limits of 30% were met.
Yes __X__ No ____
For client 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 _____ No____ NA __X__
No tunes were provided and are not necessarily part of the Level III deliverable.

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 three surrogates are used. 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. See below.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes ___ No ____ NA__X_
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 run was reported for sample 17, FSVE-SVEE-North-2Q12.

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 ___
There was one LCS for each QC batch that reported.

B. And percent recoveries were acceptable at 70 – 130%.
Yes _X___ No ____
There was an LCS reported for all days of analysis. The QAPP limits noted above are used, not the laboratory limits.

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__
LCSDs have not been performed, and are not required by the method.

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 _____ No ___X__
Methylene chloride was reported in all method blanks. Data are qualified BMB#, where # is the blank corrected value. Only data that are less than 10 x the blank (corrected for dilution) are qualified. See the Qualifier Summary table as no other qualifiers have been applied.

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. The EDD contains only pbbV results

XI. FIELD QC
If Field duplicates or Performance Check Compounds were identified, they met the $\leq$ 25 %RPD or % recovery criteria for the project.
Yes ___ No _X___ NA___
Two field duplicate pairs are reported in this set.
FSVE-SVEG-South-2Q12 and FSVE-DUP1-2Q12
FSVE-SVEC-West-2Q12 and FSVE-DUP2-2Q12 – Results within limits.
The 25% RPD limits were applied unless the results are less than 5 x RL in which case the RPD is not considered to be statistically valid. A difference of 2 x RL is used for these results as it most closely compares to the 25% RPD limit. This low level distinction is not in the QAPP, but is recommended for accurate statistical comparison. The times of collection also would verify that these are co-located duplicates and more realistic limits given the additional variables would be 40 to 50% RPD and 4 x RL.
Data are not qualified for field duplicates as final decisions regarding field precision are made by the project manager.
Note that Trichlorotrifluoroethane on the hard copy is 1,1,2- Trichlorotrifluoroethane in the EDD.

Compound	FSVE-SVEG-South-2Q12	FSVE-DUP1-2Q12	RL	difference	RPD
1,1,2-Trichlorotrifluoroethane	1.1 ppbV	0.46 ppbV	0.1	0.64	82
1,1-Dichloroethene (1,1-DCE)	0.45	1.2	0.19	0.75	90.9
cis-1,2-Dichloroethene	0.28	0.76	0.19	0.48	use diff

Chloroform	2.5	6.6	0.16	4.1	90.1
Carbon Tetrachloride	1	2.8	0.12	1.8	94.7
Trichloroethene (TCE)	6.7	15	0.14	8.3	76.5
Tetrachloroethene	0.57	1.1	0.11	0.53	63.5

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 __X_ No____ NA___

No high dilutions were reported for this set of samples. No raw data are required or reported. The laboratory notes in the narrative that manual integration was performed for the following compounds in several samples. This is usually required when compounds do not resolve chromatographically or if there are interferences. Ethanol, acetone, propene, isopropanol

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set

Yes___ No ____ NA___X__

OVERALL ASSESSMENT

Data are considered to be usable for project purposes after consideration of qualifiers or comments. Points of significance are summarized below:

Note an extended list of volatile compounds was reported. Level III data packages were submitted and Level III validation was performed for holding times, chain of custody, calibrations and QC.

Sample Integrity

The laboratory log-in notes" canister tag has SVEB-East; COC has SVEB for sample -002". It is not clear from the IDs on the chain what this means and no corrective action is noted nor contact with the client.

The project manager is informed of the following and the project record is being updated.

There are gaps from relinquishment to sample receipt. The courier is identified as FedEx and there is no airbill number on the chain or log-in. The client notes that the coolers are often sealed before the airbill number is known. The required tracking is in the project record.

Laboratory Duplicate

The duplicate run was reported for sample 17, FSVE-SVEE-North-2Q12. It was within QAPP limits for precision.

Method Blanks

Methylene chloride was reported in all method blanks. Data are qualified BMB#, where # is the blank corrected value. Only data that are less than 10 x the blank (corrected for dilution) are qualified. See table below.

Field Duplicates

Two field duplicate pairs are reported in this set.

FSVE-SVEG-South-2Q12 and FSVE-DUP1-2Q12

FSVE-SVEC-West-2Q12 and FSVE-DUP2-2Q12 – Results within limits.

The 25% RPD limits were applied unless the results are less than 5 x RL in which case the RPD is not considered to be statistically valid. A difference of 2 x RL is used for these results as it most closely compares to the 25% RPD limit. This low level distinction is not in the QAPP, but is recommended for accurate statistical comparison. The times of collection also would verify that these are co-located duplicates and more realistic limits given the additional variables would be 40 to 50% RPD and 4 x RL.

Data are not qualified for field duplicates as final decisions regarding field precision are made by the project manager.
Note that Trichlorotrifluoroethane on the hard copy is 1,1,2- Trichlorotrifluoroethane in the EDD.

Compound	FSVE-SVEG-South-2Q12	FSVE-DUP1-2Q12	RL	difference	RPD
1,1,2-Trichlorotrifluoroethane	1.1 ppbV	0.46 ppbV	0.1	0.64	82
1,1-Dichloroethene (1,1-DCE)	0.45	1.2	0.19	0.75	90.9
cis-1,2-Dichloroethene	0.28	0.76	0.19	0.48	use diff
Chloroform	2.5	6.6	0.16	4.1	90.1
Carbon Tetrachloride	1	2.8	0.12	1.8	94.7
Trichloroethene (TCE)	6.7	15	0.14	8.3	76.5
Tetrachloroethene	0.57	1.1	0.11	0.53	63.5

TABLE OF QUALIFIED DATA

Lab_ID	Client ID	Compound	Result ppbV	Flag	MDL	Qualifier
P1201435-001	FSVE-SVEA-2Q12	Dichloromethane (Methylene Chloride)	0.33	B	0.054	BMB.049
P1201435-002	FSVE-SVEB-East-2Q12	Dichloromethane (Methylene Chloride)	0.18	F, B	0.063	BMB.049
P1201435-003	FSVE-SVEC-East-2Q12	Dichloromethane (Methylene Chloride)	0.1	F, B	0.066	BMB.049
P1201435-004	FSVE-SVED-2Q12	Dichloromethane (Methylene Chloride)	0.14	F, B	0.063	BMB.049
P1201435-005	FSVE-SVEE-2Q12	Dichloromethane (Methylene Chloride)	0.19	F, B	0.061	BMB.049
P1201435-006	FSVE-SVEF-East-2Q12	Dichloromethane (Methylene Chloride)	0.21	F, B	0.063	BMB.049
P1201435-007	FSVE-SVEG-South-2Q12	Dichloromethane (Methylene Chloride)	0.22	F, B	0.066	BMB.049
P1201435-008	FSVE-DUP1-2Q12	Dichloromethane (Methylene Chloride)	0.18	F, B	0.065	BMB.049
P1201435-009	FSVE-SVEB-2Q12	Dichloromethane (Methylene Chloride)	0.12	F, B	0.063	BMB.049
P1201435-010	FSVE-SVEC-West-2Q12	Dichloromethane (Methylene Chloride)	0.13	F, B	0.065	BMB.049
P1201435-011	FSVE-SVED-North-2Q12	Dichloromethane (Methylene Chloride)	0.11	F, B	0.063	BMB.049
P1201435-012	FSVE-SVED-South-2Q12	Dichloromethane (Methylene Chloride)	0.1	F, B	0.064	BMB.049
P1201435-013	FSVE-SVEF-West-2Q12	Dichloromethane (Methylene Chloride)	0.11	F, B	0.064	BMB.049
P1201435-014	FSVE-SVEG-ALT-2Q12	Dichloromethane (Methylene Chloride)	0.13	F, B	0.066	BMB.049
P1201435-015	FSVE-DUP2-2Q12	Dichloromethane (Methylene Chloride)	0.12	F, B	0.064	BMB.047
P1201435-016	FSVE-SVEC-2Q12	Dichloromethane (Methylene Chloride)	0.12	F, B	0.063	BMB.047
P1201435-017	FSVE-SVEE-North-2Q12	Dichloromethane (Methylene Chloride)	0.1	F, B	0.063	BMB.047
P1201435-018	FSVE-SVEF-2Q12	Dichloromethane (Methylene Chloride)	0.15	F, B	0.092	BMB.047
P1201435-017DUP	FSVE-SVEE-North-2Q12	Dichloromethane (Methylene Chloride)	0.103	F, B	0.063	BMB.047

Final Data Qualification and Usability Report

Project:	Defense Depot Memphis, TN (DDMT) FSVE
Sampling Event:	FSVE April 2012
Project / Task Number:	145803-004
Sample Data Package(s):	P1201435
Data Validation Performed by:	Diane Short & Associates (DSA)
Final Data Qualification and Usability Report Prepared by:	Lynn K. Lutz, HDR Inc.

Data Validation Report Review and Comments

The data validator noted: "The laboratory log-in notes 'canister tag has SVEB-East; COC has SVEB for sample -002'. It is not clear from the IDs on the chain what this means and no corrective action is noted nor contact with the client." This issue was resolved between the laboratory, sampler, project manager and chemist; sample -002, canister SC00881 was sample SVEB-East.

The data validator noted that "[n]o [BFB] tunes were provided and are not necessarily part of the Level III deliverable." BFB tunes were actually included in the pdf data package and were acceptable.

The data validator assessed field duplicate results but did not apply qualifiers to the data. The chemist added estimated "J" qualifiers to results that were outside control limits.

The data validation report was acceptable.

Final Data Qualifiers

Final qualifiers for detected methylene chloride results associated with method blanks with methylene chloride were B where DSA had qualified as BMB.047 or BMB.049.

Final qualifiers were J where detected results were between the MDL and RL.

Final qualifiers were JB where both the above instances occurred.

Final qualifiers were J where comparison between parent and field duplicate sample results were outside control limits (1,1,2-trichlorotrifluoroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, chloroform, carbon tetrachloride, trichloroethene, and tetrachloroethene in samples FSVE-SVEG-South-2Q12 and it field duplicate, FSVE-DUP1-2Q12).

Data Usability

There were no rejected sample results. All results are usable as qualified.

11 July 2012

Lynn K. Lutz, HDR Inc. Date

DIANE SHORT & ASSOCIATES, INC.
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ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: P1203035, P12003073 , project 145803-AC004

PROJECT: Memphis Defense Depot fluvial soil vapor event for HDR Inc. (formerly e2m)

LABORATORY: Microbac, subcontracted to Columbia Analytical Services Laboratories, CA

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): July 2012

NUMBER OF SAMPLES: 22 and 21 samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: See project EDD

DATA REVIEWER: Diane Short

QA REVIEWER: Diane Short & Associates, Inc. INITIALS/DATE: __DLS_9/5/2012_____

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP); the current project QAPP, (9/2011), 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. Level III data packages were submitted and 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.
There are gaps from relinquishment to sample receipt. The courier is identified as FedEx and there is no airbill number on the chain or log-in. The client notes that the coolers are often sealed before the airbill number is known. The required tracking is in the project record.

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 field initial and final pressures and the laboratory final pressure and were acceptable.

All readings met the limits or exceptions were noted and pressure corrected
Yes ___X__ No ____ NA ____

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 were out of limits for the following compounds. There could be variability to the reported data as there is variability to the response. Linear curves are not reported in the calibration data.

Lab ID	Client ID	Compound	Result ppbV	Flag	Dil'n	MDL	Qualifier

P1203035-011	FSVE-SVEC-West-3Q12	2-Propanol (Isopropyl Alcohol)	0.35	F	1.5	0.21	JC31.86
P1203073-001	FSVE-VMP1A-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.47	0.034	JC36
P1203073-002	FSVE-VMP1B-3Q12	Trichlorofluoromethane (CFC 11)	0.16	F	5.43	0.13	JC36
P1203073-003	FSVE-VMP2A-3Q12	Trichlorofluoromethane (CFC 11)	0.23		1.47	0.034	JC36
P1203073-005	FSVE-VMP3A-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.32	0.031	JC36
P1203073-006	FSVE-VMP3B-3Q12	Trichlorofluoromethane (CFC 11)	0.2		1.78	0.041	JC36
P1203073-008	FSVE-VMP4B-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.6	0.037	JC36
P1203073-009	FSVE-VMP5A-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.64	0.038	JC36
P1203073-011	FSVE-VMP6A-3Q12	Trichlorofluoromethane (CFC 11)	0.18		1.63	0.038	JC36
P1203073-015	FSVE-VMP7B-3Q12	Trichlorofluoromethane (CFC 11)	0.18	F	5.15	0.12	JC36
P1203073-016	FSVE-VMP8A-3Q12	Trichlorofluoromethane (CFC 11)	0.24		2.63	0.061	JC36
P1203073-018	FSVE-VMP9A-3Q12	Trichlorofluoromethane (CFC 11)	0.57	F	9.94	0.23	JC36
P1203073-019	FSVE-VMP9B-3Q12	Trichlorofluoromethane (CFC 11)	0.21		1.62	0.037	JC36
P1203073-020	FSVE-VMP10A-3Q12	Trichlorofluoromethane (CFC 11)	0.94	F	17.56	0.41	JC36
P1203073-021	FSVE-VMP10B-3Q12	Trichlorofluoromethane (CFC 11)	0.32	F	7.85	0.18	JC36
P1203073-022	FSVE-DUP4-3Q12	Trichlorofluoromethane (CFC 11)	0.17	F	4.23	0.098	JC36

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. There were original calibrations and those for analysis of dilutions.

2. The percent difference (%D) limits of 30% were met.
Yes __X__ No ____
For client 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 _____ No____ NA __X__
No tunes were provided and are not necessarily part of the Level III deliverable.

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 three surrogates are used. 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. See below.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes ___ No ____ NA__X_
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 run was reported for FSVE-SVEB-East-3Q12, FSVE-SVEf-West-3Q12, FSVE-VMP8B-3Q12. All are within limits.

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 ___
There was one LCS for each QC batch that was reported.

B. And percent recoveries were acceptable at 70 – 130%.
Yes _X___ No ____
There was an LCS reported for all days of analysis. The QAPP limits noted above are used, not the laboratory limits. Both limits are met as the lab limits are sometimes tighter.

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__
LCSDs have not been performed, and are not required by the method.

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. The EDD contains only pbbV results

XI. FIELD QC

If Field duplicates or Performance Check Compounds were identified, they met the ≤ 25 %RPD or % recovery criteria for the project.
Yes ___ No _X___ NA___
Four field duplicate pairs are reported in these sets. Results within limits with the exceptions noted below.

FSVE-EFF-3Q12 and FSVE-DUP1-3Q12 – a few low level detections (< 2 x RL) in each sample that are not detected in the associated pair.
FSVE-SVEB-3Q12 and FSVE-DUP2-3Q12 -a number of low level detections (< 2 x RL) in DUP2 and not in SVEB
FSVE-VMP2B-3Q12 and FSVE-DUP3-3Q12
FSVE-7A-3Q12 and FSVE-DUP4-3Q12 - a few low level detections (< 2 x RL) in 7A and not in Dup4.

The 25% RPD limits were applied unless the results are less than 5 x RL in which case the RPD is not considered to be statistically valid. A difference of 2 x RL is used for these results as it most closely compares to the 25% RPD limit. This low level distinction is not in the QAPP, but is recommended for accurate statistical comparison. The times of collection also would verify that these are co-located duplicates and more realistic limits given the additional variables would be 40 to 50% RPD and 4 x RL.
Data are not qualified for field duplicates as final decisions regarding field precision are made by the project manager.

Compound	SVEB	Dup2	RDL	RPD
Acetone	7.4 ppbV	1.6	0.25	95
Carbon Disulfide	2.9	0.32	0.12	diff : 2.58
cis-1,2-Dichloroethene	72	59	0.19	ok
Chloroform	54	44	0.085	ok

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 __X_ No____ NA___
Dilutions up to 30x were reported for this set of samples. No raw data are required or reported. The laboratory notes in the narrative that manual integration was performed for the following compounds in several samples. This is usually required when compounds do not resolve chromatographically or if there are interferences.
Vinyl chloride (for 4 samples in P1203035), Ethyl acetate, acetone, propene, isopropanol, dichlorodifluoromethane, bromomethane, trichlorofluoromethane (the last 3 compounds and propene for sample FSVE-VMP9B-3Q12), trans-1,2-dichloroethene.

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__

OVERALL ASSESSMENT
Data are considered to be usable for project purposes after consideration of qualifiers or comments. Points of significance are summarized below:
Note an extended list of volatile compounds was reported. Level III data packages were submitted and Level III validation was performed for holding times, chain of custody, calibrations and QC.

Calibration:
Calibrations were out of limits for the following compounds. There could be variability to the reported data as there is variability to the response. Linear curves are not reported in the calibration data.

Lab ID	Client ID	Compound	Result ppbV	Flag	Dil'n	MDL	Qualifier
P1203035-011	FSVE-SVEC-West-3Q12	2-Propanol (Isopropyl Alcohol)	0.35	F	1.5	0.21	JC31.86
P1203073-001	FSVE-VMP1A-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.47	0.034	JC36
P1203073-002	FSVE-VMP1B-3Q12	Trichlorofluoromethane (CFC 11)	0.16	F	5.43	0.13	JC36
P1203073-003	FSVE-VMP2A-3Q12	Trichlorofluoromethane (CFC 11)	0.23		1.47	0.034	JC36
P1203073-005	FSVE-VMP3A-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.32	0.031	JC36
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P1203073-008	FSVE-VMP4B-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.6	0.037	JC36
P1203073-009	FSVE-VMP5A-3Q12	Trichlorofluoromethane (CFC 11)	0.17		1.64	0.038	JC36
P1203073-011	FSVE-VMP6A-3Q12	Trichlorofluoromethane (CFC 11)	0.18		1.63	0.038	JC36
P1203073-015	FSVE-VMP7B-3Q12	Trichlorofluoromethane (CFC 11)	0.18	F	5.15	0.12	JC36
P1203073-016	FSVE-VMP8A-3Q12	Trichlorofluoromethane (CFC 11)	0.24		2.63	0.061	JC36
P1203073-018	FSVE-VMP9A-3Q12	Trichlorofluoromethane (CFC 11)	0.57	F	9.94	0.23	JC36
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P1203073-022	FSVE-DUP4-3Q12	Trichlorofluoromethane (CFC 11)	0.17	F	4.23	0.098	JC36

Laboratory Duplicates:
The duplicate run was reported for FSVE-SVEB-East-3Q12, FSVE-SVEf-West-3Q12, FSVE-VMP8B-3Q12. All are within limits.

Field Duplicates
Four field duplicate pairs are reported in these sets. Results within limits with the exceptions noted below.
FSVE-EFF-3Q12 and FSVE-DUP1-3Q12 – a few low level detections (< 2 x RL) in each sample that are not detected in the associated pair.
FSVE-SVEB-3Q12 and FSVE-DUP2-3Q12 -a number of low level detections (< 2 x RL) in DUP2 and not in SVEB
FSVE-VMP2B-3Q12 and FSVE-DUP3-3Q12
FSVE-7A-3Q12 and FSVE-DUP4-3Q12 - a few low level detections (< 2 x RL) in 7A and not in Dup4.

The 25% RPD limits were applied unless the results are less than 5 x RL in which case the RPD is not considered to be statistically valid. A difference of 2 x RL is used for these results as it most closely compares to the 25% RPD limit. This low level distinction is not in the QAPP, but is recommended for accurate statistical comparison. The times of collection also would verify that these are co-located duplicates and more realistic limits given the additional variables would be 40 to 50% RPD and 4 x RL.
Data are not qualified for field duplicates as final decisions regarding field precision are made by the project manager.

Compound	SVEB	Dup2	RDL	RPD
Acetone	7.4 ppbV	1.6	0.25	95
Carbon Disulfide	2.9	0.32	0.12	diff : 2.58
cis-1,2-Dichloroethene	72	59	0.19	ok
Chloroform	54	44	0.085	ok

Compound Identification and Reporting Limits
Dilutions up to 30x were reported for this set of samples. No raw data are required or reported. The laboratory notes in the narrative that manual integration was performed for the following compounds in

several samples. This is usually required when compounds do not resolve chromatographically or if there are interferences.
Vinyl chloride (for 4 samples in P1203035), Ethyl acetate, acetone, propene, isopropanol, dichlorodifluoromethane, bromomethane, trichlorofluoromethane (the last 3 compounds and propene for sample FSVE-VMP9B-3Q12), trans-1,2-dichloroethene.

Final Data Qualification and Usability Report

Project:	Defense Depot Memphis, TN (DDMT) FSVE
Sampling Event:	FSVE July 2012
Project / Task Number:	145803-004
Sample Data Package(s):	P1203035, P1203073
Data Validation Performed by:	Diane Short & Associates (DSA)
Final Data Qualification and Usability Report Prepared by:	Lynn K. Lutz, HDR Inc.

Data Validation Report Review and Comments

The data validator noted that there were 21 samples and 22 samples in the two packages. The 21 samples included two lab duplicates, and the 22 samples included one lab duplicate, so there were 40 field samples.

In Section XI, the data validator noted field duplicate results that were possibly outside control limits, The RDLs shown in the table are incorrect but the analytes and values are correct. All result pairs are either above the RLs and have acceptable RPDs, or are both below the RLs and already qualified J.

The data validation report was acceptable.

Final Data Qualifiers

Final qualifiers were J where detected results were between the MDL and RL.

Final qualifiers were J where validator's qualifiers were JC31.86 or JC36.

Data Usability

There were no rejected sample results. All results are usable as qualified.

7 September 2012

Lynn K. Lutz, HDR Inc. Date