ANNUAL OPERATIONS REPORT – 2009/10
DUNN FIELD SOURCE AREAS
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM
YEAR THREE

Defense Depot Memphis, Tennessee

Defense Logistics Agency

Air Force Center for Engineering and the Environment
Contract No. FA8903-08-D-8771
Task Order No. 0019

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LIST OF ACRONYMS AND ABBREVIATIONS

acfm	actual cubic feet per minute
AFCEE	Air Force Center for Engineering and the Environment
AWS	air/water separator
bgs	below ground surface
BRAC	Base Realignment and Closure
BCT	BRAC Cleanup Team
cDCE	cis-1,2-dichloroethene
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
gpd	gallons per day
in. Hg.	inches of mercury
IRA	Interim Remedial Action
IRACR	Interim Remedial Action Completion Report
lb/hr	pounds per hour
MI	Main Installation
MSCHD	Memphis/Shelby County Health Department
ml/min	milliliters per minute
O&M	operations and maintenance
PCE	tetrachloroethane
PID	photoionization detector
ppbv	parts per billion by volume
ppm	parts per million
QC	quality control
RAWP	Remedial Action Work Plan
RA SAP	Remedial Action Sampling and Analysis Plan
RD	Remedial Design
RG	remediation goals

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

RL	reporting limit
scfm	standard cubic feet per minute
SVE	soil vapor extraction
TA	treatment area
TCE	trichloroethene
TDEC	Tennessee Department of Environmental Conservation
TeCA	1,1,2,2 tetrachloroethane
TO	Task Order
TSVE	Thermal Soil Vapor Extraction
USEPA	United States Environmental Protection Agency
VMP	vapor monitoring point
VOC	volatile organic compound
ZVI	zero valent iron

1.0 INTRODUCTION

HDR|e^{2}M has prepared this Annual Operations Report for the Fluvial Soil Vapor Extraction (FSVE) System under Contract FA8903-08-D-8771, Task Order (TO) 19 to the Air Force Center for Engineering and the Environment (AFCEE). This report summarizes the operations and maintenance (O&M) activities and the results of system monitoring for the third year of FSVE operations on Dunn Field at Defense Depot Memphis, Tennessee (DDMT). The report covers operations from 1 August 2009 through 31 July 2010 (Year Three).

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 642 acres and includes the Main Installation (MI) and Dunn Field. The MI contains approximately 578 acres used for open storage areas, warehouses, military family housing, and outdoor recreational areas. Dunn Field contains approximately 64 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 lead agency for environmental restoration activities at DDMT is the Defense Logistics Agency and the facility identification number is TN4210020570. The regulatory oversight agencies are the U.S. Environmental Protection Agency (USEPA) Region 4 and the Tennessee Department of Environmental 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, 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 2007 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 of over a total area of about 1.25 acres from May to December 2008. Based on measurements of 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.

ET&D was completed on 12 June 2009 with 240 tons of soil and waste material from treatment area (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*, dated 3 June 2009, was approved by USEPA on 21 October 2009 allowing the final property transfer at Dunn Field to proceed.

1.4 FLUVIAL SVE SYSTEM DESCRIPTION

The FSVE system was installed to remove CVOCs from the fluvial sands at Dunn Field. The system was constructed from April through July 2007 and consists of two 13.1 horsepower regenerative blowers connected to seven wells screened at depths of 32 to 66 feet bgs. The blowers provide a vacuum to the subsurface and remove soil vapor containing CVOCs from the seven SVE wells. The vapor travels through individual conveyance lines to the system compound. When required, the extracted air flows through two 2,000-pound granular activated carbon (GAC) vessels prior to discharge to the atmosphere. There are 20 vapor monitoring points (VMPs) located 15 to 80 feet from the SVE wells to monitor vacuum influence from the SVE wells and CVOC concentrations in the subsurface vapor.

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 AWS's to a 535-gallon tank and is currently pumped to a 20,000 gallon storage tank prior to discharge. Condensate is sampled prior to discharge to the City of Memphis sewer system.

FSVE operations began on 25 July 2007. The system is currently operated with all SVE wells in the 100% open position. GAC treatment was discontinued in October 2007 due to low VOC concentrations in the influent vapor; extracted vapor is being emitted directly to the atmosphere. The FSVE system layout is shown on Figure 1.

1.5 PREVIOUS FSVE OPERATIONS AND MONITORING RESULTS

1.5.1 Year One

System uptime was 92.8% 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 1,503 ppbv and 1,003 ppbv, respectively. Results for samples collected after three months of operation generally declined by a factor of 100 or more. CVOC 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.

VOC concentrations in the influent sample (based on TCE, the primary constituent), system operating hours, and flow rates were used to calculate the VOC mass removed from the fluvial soils. Approximately 2,725 pounds of VOCs were removed during Year One operations. Influent emission rates were estimated at 17 pounds per hour (lb/hr) during system startup, but declined to 0.2 lb/hr in July 2008. The Memphis/Shelby County Health Department (MSCHD) Operations Permit for the SVE system has a maximum VOC emission limit of 5.71 lb/hr. The emission rate discharged to the atmosphere did not exceed 2.35 lb/hr during Year One.

No changes were recommended to FSVE operations for Year Two.

1.5.2 Year Two

System uptime was 96.5% 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 continuously 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.

PID readings at the FSVE system influent gradually increased following the start of TSVE operations in May 2008 and peaked in early October 2008. Total VOCs in the influent vapor samples increased to 28 parts per million (ppm) in October 2008 during TSVE operations and then decreased to 2 ppm in January 2009 and 0.6 ppm in June 2009. The individual CVOC with the highest concentration in the influent stream was TCE in the initial Year Two sample event (October 2008), while CF was the prevalent CVOC 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.

Increased moisture in the soil vapor appeared to affect the VOC concentrations at the SVE wells. The total VOC concentrations in the SVE wells were much lower than concentrations in the system influent and the results may not be representative of in situ vapor concentrations.

VOC concentrations in the influent sample (based on TCE or CF as the primary constituent), system operating hours, and flow rates were used to calculate the VOC mass removed from the fluvial soils. Approximately 1,230 pounds of VOCs were removed during Year Two operations, with 3,955 pounds removed since start up. Influent emission rates declined from 0.2 lb/hr in July 2008 to 0.01 lb/hr in June 2009, well below the MSCHD VOC emission limit of 5.71 lb/hr.

1.6 SCOPE OF WORK

HDR|e^{2}M 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^{2}M, 2008).

The scope for 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 in accordance with the City of Memphis industrial discharge permit;
- 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 ACTIVITIES

System O&M requirements were evaluated during weekly monitoring of the FSVE system throughout Year Three operations.

2.1 SYSTEM PERFORMANCE

The FSVE system operated throughout Year Three with both blowers in operation and system uptime at 92%. VOC concentrations remained low in the system influent and vapor was discharged to the atmosphere without GAC treatment. Operating percentage and downtime are summarized by month below.

- August 2009 – 99% uptime. Downtime for routine maintenance and shutdown due to malfunctioning temperature monitor.
- September 2009 – 100% uptime.
- October 2009 – 90% uptime. Downtime due to routine maintenance and shutdown of Blower 1 due to high amperage.
- November 2009 – 86% uptime. Downtime due to routine maintenance, 4Q09 sampling event and shutdown of Blower 1 due to high amperage.
- December 2009 – 92% uptime. Downtime for routine maintenance and shutdown due to high temperature alarm; malfunctioning temperature monitor was replaced.
- January 2010 – 89% uptime. Downtime for routine maintenance, 1Q10 sampling even, and heat exchanger 1 motor replacement.
- February 2010 – 97% uptime. Downtime for routine maintenance.
- March 2010 – 100% uptime.
- April 2010 – 78% uptime. Downtime for routine maintenance, 2Q10 sampling event and heat exchanger repair; heat exchanger 1 electrical components failed and were replaced.
- May 2010 – 88% uptime. Downtime for routine maintenance and installation/programming of new system computer.
- June 2010 – 99% uptime. Downtime for routine maintenance
- July 2010 – 85% uptime. Downtime for routine maintenance, malfunction in heat exchanger 1, performance testing of SVE-G and 3Q10 sampling event.

2.2 SYSTEM FLOW RATES AND VACUUMS

System flow rates and vacuum measurements are shown on Table 1. A spare SVE inlet is open at times to decrease amperage load on the blowers. 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 and a spare SVE inlet open to decrease amperage load on the blowers. Individual flow rates at SVE wells were 0 to 200 actual cubic feet per minute (acfm) with both blowers in operation. The flow rates remained fairly constant over Year Three except at SVE-G where the flow rate was near 0 acfm after October 2009. The low average flow rates at SVE-A (66 acfm) and SVE-G (7 acfm) are attributed to these wells being screened in tighter formations than other SVE wells and to condensate in the conveyance lines. The average flow rates at the five other wells were 106 to 184 acfm. During Year Three, combined flow from all SVE wells with both blowers operating averaged 788 scfm at 5.3 in. Hg.

A knock out tank was ordered to drain condensate from the conveyance line from SVE-G. During the week of 24 May 2010, the SVE-G conveyance line was excavated at low points to inspect the line and install the knock out tank; the field crew found no water in the line and flow rates while the conveyance line was open indicated there was not a blockage in the line. Upon further inspection, the airflow gauge at the manifold was found to be mis-aligned reducing air flow and/or interfering with the flow rate measurement; the gauge was repaired and the flow rate increased to near 50 acfm. The conveyance line was repaired and the excavations backfilled. However, the air flow rate still varies and decreases to 0 acfm at times. The airflow gauge was checked again on 29 July, but no problems were found.

Vacuum measurements collected monthly at VMPs are shown on Table 2. The measurements indicate a vacuum influence at distances greater than 80 feet at all SVE wells.

2.3 SYSTEM MAINTENANCE

Regular system maintenance includes inspection of all major components and piping for leaks, tears and/or signs of deterioration; cleaning system components, as necessary; and general housekeeping of the SVE compound. Routine maintenance activities were generally 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 the site glass for flow meters.
- Remove dirt and debris from SVE building louvers.
- Clean heat exchanger coil and cooling fins with water and degreasing agent.

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

There were occasional automatic shutdowns due to high amperage at Blower #1. The high vacuum draws power at or near the maximum amperage rating of the blower motors and either trips the circuit at the panel or shorts out the blower motor wiring. The system was restarted with both blowers after each shut-down; there were no significant repairs that required operation with a single blower. A broken bearing housing on a heat exchanger fan was repaired in January 2010 and electrical components for heat exchanger #1 were replaced in April 2010. The system was run with heat exchangers offline during the winter to prevent water freezing in the control building pipes. The system computer was replaced in May 2010 because of problems with automatic notification of the operator following shut-downs.

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. The initial condensate collection system consisted of a 140-gallon AWS vessel, transfer pump, 535-gallon free-standing tank, 1,635-gallon trailer mounted transfer tank, and associated piping and valves. A second 240-gallon AWS and transfer pump were installed downstream of the system blowers in December 2008. 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.

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. The water is pumped from the 535-gallon tank to the 20,000-gallon tank as necessary. As the 20,000-gallon tank reaches capacity, a grab sample of the condensate is collected and submitted for laboratory analysis. Results are reviewed and submitted to the City of Memphis with a request for a one-time discharge under Industrial Wastewater Discharge Permit #S-NN3-097. Following approval, the

water is pumped to the city sewer system through the discharge line utilized for the Interim Remedial Action (IRA) system at Dunn Field.

Condensate generation from the FSVE system during Year Three decreased from approximately 200 gallons per day (gpd) in the second half of 2009 to 0 gpd in July 2010. The reduction is partly due to warmer air temperatures and is expected to increase in the winter months. Condensate was generated at approximately 25 gpd prior to thermal SVE operations. Approximately 52,000 gallons were discharged in November 2009 (17,336 gallons), February 2010 (17,613 gallons) and June 2010 (16,818 gallons) following approval from the City of Memphis. Discharge requests and approvals are included in Appendix A.

3.0 SYSTEM MONITORING ACTIVITIES

System monitoring activities consist of PID field measurements and analysis of vapor samples from SVE wells, the treatment system and VMPs. The monitoring activities are performed in accordance with the FSVE RAWP and follow procedures outlined in the FSVE O&M Manual. Sampling activities are performed in accordance with past practice and the *Remedial Action Sampling and Analysis Plan* (RA SAP) (MACTEC, 2005).

3.1 FIELD MEASUREMENTS

VOC concentrations were monitored through weekly field measurements at individual SVE wells and the system influent, and quarterly at VMPs using a MiniRae 2000 (10.6 eV lamp) PID. The PID monitors VOCs in real time and is calibrated with a 100 ppm concentration of isobutylene prior to each use. At each location, vapor is collected in a tedlar bag and the PID meter is connected to the tedlar bag for the measurement. Measurements are recorded on field sheets.

For measurements at the SVE wells and VMPs, a 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. PID readings collected at the SVE wells and system influent are shown on Table 3.

The SVE system is shutdown for a minimum of four 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 dedicated a Tedlar bag until three consecutive readings are within 10%. The final PID readings from VMPs are shown on Table 4.

3.2 VAPOR SAMPLING

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

Laboratory samples were collected in 6-liter Summa canisters, with or without a flow regulator set at 200 milliliters per minute (ml/min) as noted below. 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.

3.2.1 Quarterly Events

During Year Three, laboratory samples were collected quarterly from the SVE wells and system influent in November 2009, January-February 2010, April 2010, and July 2010.

The residual heat from TSVE operations and increased moisture content of the influent soil vapor decreased during Year Three. During Year Two, some vapor samples from SVE wells were collected using stainless steel piping immersed in an ice bath to condense the excess moisture; this modified sampling technique was not used during Year Three. Although a spare SVE inlet was generally open during operations to decrease amperage load on the blowers, the inlet was closed before collecting PID measurements and vapor samples for laboratory analysis.

Laboratory samples were collected from all SVE wells and the system influent on 11 November 2009 (4Q09 event). Samples were collected in 6-liter Summa canisters with a flow regulator at 200 ml/min.

Laboratory samples were collected from all SVE wells and the system influent on 27 January 2010 (1Q10 event). Samples were collected in 6-liter Summa canisters with a flow regulator at 200 ml/min. SVE-A and SVE-D were re-sampled on 5 February 2010 due to insufficient volume in the initial sample; this was attributed to moisture blocking the filter/flow regulator. The February samples were collected in 6-liter Summa canisters with the flow regulator removed.

Laboratory samples were collected from all SVE wells and the system influent on 28 April 2010 (2Q10 event) and 13 July 2010 (3Q10 event). Samples were collected in 6-liter Summa canisters with the flow regulators removed.

3.2.2 VMP Samples

Annual vapor samples were collected from all VMPs for the 3Q10 sample event on 14-15 July 2010. After the VMPs had been purged and PID measurements collected, samples were collected from the sample port at the well heads in 6-liter Summa canisters with the flow regulators removed. The SVE system was shutdown overnight prior to and during sampling.

3.2.3 Quality Assurance/Quality Control Samples

Field quality control (QC) samples were collected during each 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 for laboratory analysis in Year Three were collected during the following sample events:

Event	Date	Samples
4Q09	10 November 2009	SVE wells; System Influent
1Q10	27 January, 5 February 2010	SVE wells; System Influent
2Q10	28 April 2010	SVE wells; System Influent
3Q10	13-15 July 2010	SVE wells; System Influent; VMPs

Complete analytical results for vapor samples are presented by event in Appendix B. Analytical results summaries are presented by event on Tables 5 to 8 for the SVE wells and system influent samples and on Table 9 for the VMP samples. The summary tables list the results for the primary CVOCs and for other VOCs detected above the reporting limit (RL) in one or more samples; the total for primary CVOCs and all VOCs detected 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|e^{2}M performed data quality evaluation (DQE) of the laboratory data packages for the vapor samples collected during Year Three 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 November 2009 through July 2010 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 Three samples is provided in Appendix C.

4.2 QUARTERLY EVENTS

4.2.1 4Q09

Analytical results for SVE well and system samples collected on 10 November 2009 are summarized on Table 5. Total CVOCs in the SVE wells ranged from approximately 0.3 ppbv in SVE-B, -D, -E and -F to 240 ppbv in SVE-A. As noted above, the moisture content in the vapor is believed to have affected the

sample results in SVE wells. Total CVOCs in the system influent sample was 690 ppbv. The primary CVOCs in the system influent were CF (44%), TCE (35%) and cis-1,2-dichloroethene (cDCE) (8%).

4.2.2 1Q10

Analytical results for SVE well and system samples collected on 27 January and 5 February 2010 are summarized on Table 6. Total CVOCs in the SVE wells ranged from 1.2 ppbv (SVE-F) to 183 ppbv (SVE-D). Total CVOCs in the system influent sample was 443 ppbv. The primary CVOCs in the system influent were CF (47%), TCE (29%), and cDCE (7%).

4.2.3 2Q10

Analytical results for SVE well and system samples collected on 28 April 2010 are summarized on Table 7. Total CVOCs in the SVE wells ranged from 48 ppbv (SVE-C) to 1287 ppbv (SVE-G). Total CVOCs in the system influent sample was 424 ppbv. The primary CVOCs in the system influent were CF (47%), TCE (26%), and cDCE (12%).

4.2.4 3Q10

Analytical results for SVE well and system samples collected on 13 July 2010 are summarized on Table 8. Total CVOCs in the SVE wells ranged from 82.6 ppbv (SVE-D) to 2604 ppbv (SVE-G). Total CVOC concentration in the system influent sample was 343 ppbv. The primary CVOCs in the system influent were CF (38%), TCE (29%), and cDCE (15%).

Analytical results for VMP samples collected on 14-15 July 2010 are summarized on Table 9. During preparation of the annual report, it was determined that sample results for three VMPs were mis-identified in the quarterly summary report dated 14 September 2010; the results for VMP-3A and VMP-3B were switched and the results for VMP-7A/B and VMP-8A/B were switched. The results are correctly identified in Table 9. Total CVOCs ranged from 1.4 ppbv (VMP-1B) to 10,594 ppbv (VMP-8B) in the shallow ‘B’ VMPs and from 25.5 ppbv (VMP-2A) to 563 ppbv (VMP-3A) in the deep ‘A’ VMPs.

The primary CVOCs at the highest concentration in VMP-8B were CF at 8,400 ppbv and TCE at 1,200 ppbv. After VMP-8B, the next highest total CVOC concentration was 2,826 ppbv in VMP-5B (TCE and TeCA).

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SYSTEM OPERATIONS

System uptime during Year Three (1 August 2009 through 31 July 2010) was 92% with two blowers in use approximately 100% of the time. Scheduled shutdowns were made to collect PID measurements and to perform general system maintenance.

Electrical problems were the primary cause of downtime in Year Three due to the high vacuum demand forcing blowers to operate near their peak performance. The condensate generated due to residual heat from TSVE operations decreased significantly.

SVE wells were generally operated in the 100% open position. Average operating conditions with both blowers in operation were:

Location	Flow Rate (acfm)	Vacuum (inches H_2O)
SVE-A	66	99
SVE-B	157	91
SVE-C	184	79
SVE-D	172	74
SVE-E	119	85
SVE-F	106	88
SVE-G	7	>100
Influent	788 (scfm)	5.3 (inches Hg.)

Weekly system readings (flow rates, vacuums, temperatures, etc.) were fairly consistent throughout Year Three, except at SVE-G where the flow rate was near 0 acfm after October 2009. Vacuum measurements at VMPs indicate vacuum influence at distances greater than 80 feet from all SVE wells.

5.2 FIELD MEASUREMENTS AND LABORATORY RESULTS

5.2.1 SVE Wells and System

The trend in PID measurements at SVE wells is shown on Figure 2. PID readings were at low levels throughout Year Three and were generally below 3 ppm in all SVE wells and system influent. Slightly higher PID readings, 10 to 20 ppm, were observed at all locations on June 24 and July 27 2010. PID readings in SVE-G increased in the latter part of Year Three (Table 3), possibly due to the lower vapor extraction flow rate at the well allowing VOC concentrations to build up in the soil.

The trend in the system influent concentrations for PID measurements and analytical results (total VOCs and TCE) is shown on Figure 3. The quarterly analytical results for total VOCs are similar to the PID measurements. Total VOCs in the influent samples were below 1 ppm throughout the year.

The primary CVOC concentrations and total VOCs in each SVE well and the system influent samples are shown on Table 10. The individual CVOC with the highest concentration in the influent stream was TCE from system startup through the 4Q08 event (October 2008), while CF has had higher concentrations since 2009.

The trend in total VOC concentrations at all SVE wells and system influent is shown on Figure 4. Reported CVOC concentrations were low (less than 100 ppbv) at most SVE wells during 2009. The lower concentrations were not consistent with the influent concentrations, which remained relatively stable with a decreasing trend. The lower concentrations at SVE wells are assumed to be related to increased moisture in the vapor. Most SVE wells had increased total VOC concentrations during Year Three as residual heat and moisture content in vapor decreased. The SVE well concentrations for the 3Q10 sample event are clustered above and below the influent concentration, which is appropriate since the influent concentration should be a flow weighted average of the concentrations at individual SVE well.

5.2.2 Vapor Monitoring Points

The trend in total VOC concentrations in VMPs is shown on Figure 5 for -A VMPs and Figure 6 for -B VMPs; the latest analytical results (3Q10) are shown on Table 9. The July 2010 (3Q10) total VOC concentrations in the -A VMPs (32 to 594 ppbv) were similar and generally lower than the concentrations reported in the June 2009 samples. The July 2010 total VOC concentrations in the -B VMPs (50.9 to 10,914 ppbv) were also generally similar and lower than the June 2009 results.

5.2.3 Results by Treatment Area

The most recent analytical results (3Q10), shown on Tables 8 and 9, are briefly discussed for each TA in the following paragraphs. The results are compared to the remediation goals (RGs) for the fluvial deposits.

TA-1B contains SVE-A, VMP-1A and VMP-1B. The 3Q10 total CVOC concentrations were:

Location	SVE-A	VMP-1A	VMP-1B
Total CVOCs (ppbv)	83.7	60.4	1.4

CVOC concentrations were above RGs for TeCA, TCE and tetrachloroethene (PCE) in SVE-A and for TCE and PCE in VMP-1A. The trend in total VOC concentrations at these locations is shown on Figure 7. The concentrations and trends are similar for SVE-A and VMP-1A/B; the VMPs are located about 15 feet from the SVE well.

TA-1C contains SVE-B, VMP-2A and VMP-2B. The 3Q10 total CVOC concentrations were:

Location	SVE-B	VMP-2A	VMP-2B
Total CVOCs (ppbv)	428	25.5	114

CVOC concentrations were above RGs for several analytes in SVE-B and for TCE and cDCE in VMP-2A/B. The trend in total VOC concentrations at these locations is shown on Figure 8. Total VOC concentrations at SVE-B have increased in Year Three, while concentrations in VMP-2A/B have had a decreasing trend since late 2008. The VMPs are located about 30 feet from the SVE well.

TA-1E contains SVE-C, VMP-3A, VMP-3B, VMP-4A and VMP-4B. The 3Q10 total CVOC concentrations were:

Location	SVE-C	VMP-3A	VMP-3B	VMP-4A	VMP-4B
Total CVOCs (ppbv)	105	563	6.54	65.8	14.4

CVOC concentrations were above RGs for PCE and TCE in SVE-C and for PCE, TCE and/or cDCE in the VMPs. The trend in total VOC concentrations at these locations is shown on Figure 9. The concentrations in SVE-C increased during Year Three while concentration in the VMPs decreased. The VMPs are located about 28 feet (VMP-3A/B) and 60 feet (VMP-4A/B) from the SVE well.

TA-2 contains SVE-D, SVE-E, VMP-5A, VMP-5B, VMP-6A and VMP-6B. The 3Q10 total CVOC concentrations were:

Location	SVE-D	SVE-E	VMP-5A	VMP-5B	VMP-6A	VMP-6B
Total CVOCs (ppbv)	82.6	194	27.2	2826	46.8	1266

CVOC concentrations were above RGs for TeCA, TCE and PCE in SVE-D, SVE-E and the VMPs. CF was also above the RG in VMP-5B. The trend in total VOC concentrations at these locations is shown on Figure 10. SVE-E has generally had lower total VOC concentrations than SVE-D. Concentrations in VMP-5A and VMP-6A have been roughly similar to SVE-D while concentrations in VMP-5B and VMP-6B have been at least an order of magnitude higher. The VMPs are located about 31 feet (VMP-4A/B) and 45 feet (VMP-5A/B) from SVE-D.

TA-3 contains SVE-F, VMP-7A, VMP-7B, VMP-8A and VMP-8B. The 3Q10 total CVOC concentrations were:

Location	SVE-F	VMP-7A	VMP-7B	VMP-8A	VMP-8B
Total CVOCs (ppbv)	857	222	17.6	37.4	10594

CVOC concentrations were above RGs for most analytes in SVE-F and VMP-8B. Concentrations were lower but still above RGs in VMP-7A and VMP-8A; no RGs were exceeded in VMP-7B. The trend in total VOC concentrations at these locations is shown on Figure 11. Total VOC concentrations in SVE-F increased in Year Three and are close to baseline concentrations near 1,000 ppbv. Concentrations in VMPs were relatively stable. The VMPs are located about 15 feet (VMP-7A/B) and 80 feet (VMP-8A/B) from the SVE well.

TA-4 contains SVE-G, VMP-9A, VMP-9B, VMP-10A and VMP-10B. The 3Q10 total CVOC concentrations were:

Location	SVE-G	VMP-9A	VMP-9B	VMP-10A	VMP-10B
Total CVOCs (ppbv)	2604	235	74.9	81.2	731

CVOC concentrations were above RGs for most analytes in SVE-G and for several analytes in the VMPs. The trend in total VOC concentrations at these locations is shown on Figure 12. Total VOC concentrations in SVE-G increased by two orders of magnitude in Year Three; this increase is attributed to the decreased vapor extraction rate and to the lower moisture content in the vapor. The VMPs are located about 45 feet (VMP-9A/B) and 60 feet (VMP-10A/B) from the SVE well.

5.3 FLUVIAL SVE MASS ESTIMATES

VOC concentrations in the influent sample (based on TCE or CF as the primary constituent), system operating hours, and flow rates were used to calculate the VOC mass removed from the fluvial soils. VOC concentrations used for mass calculations are shown in Table 11. Mass emission calculations are shown on Table 12. Approximately 74 pounds of VOCs were removed during Year Three operations and 4,029 pounds removed since start up.

Influent emission rates declined by half, from 0.012 lb/hr in June 2009 to 0.006 lb/hr in July 2010. The MSCHD Operations Permit for the SVE system has a VOC emission limit of 5.71 lb/hr.

5.4 PERFORMANCE REVIEW

The FSVE system performance was initially reviewed in the Year Two annual report in accordance with guidance documents referenced in the Source Areas RD, the *Soil Vapor Extraction Performance Checklist*, (USACE, 2002) and *Guidance on Soil Vapor Extraction Optimization* (AFCEE, 2001). The review has been updated for this report.

Operating results for the FSVE system indicate that site characterization was sufficient and monitoring results do not indicate data gaps. Although soil sampling in the fluvial deposits was limited, soil sampling to determine the lateral and vertical extent of CVOCs in the loess was extensive. The lateral extent of CVOCs in the fluvial deposits is assumed to be the same as in the loess; the fluvial deposits are primarily sands and gravels without extensive silt and clay layers that would spread contaminants laterally. CVOCs migrated through the fluvial deposits to the water table based on the groundwater plumes. The latest groundwater monitoring results in the *March 2010 Off Depot Long Term Monitoring Report* (HDR|e^{2}M, 2010a) document continued reduction in groundwater concentrations throughout the Source Areas on Dunn Field indicating capture zones of the SVE wells encompass the contaminated areas and the vacuum is sufficient to draw contaminants to the wells and prevent groundwater impacts. The reduction in groundwater concentrations throughout the Source Areas also indicates the groundwater plumes resulted from continuing vertical migration of CVOCs from the vadose zone and that there is not a continuing source of contamination, such as pockets of free product, below the water table. CVOC concentrations in soil vapor and groundwater near TA-4 (SVE-G) increased during Year Three; this is attributed to reduced vapor extraction in this area. Additional SVE wells will be installed to increase the extraction rate.

The system operations have met the guideline for 90% or better uptime since start-up. VOC concentrations in the system influent have decreased from over 1,000,000 ppbv to 350 ppbv, and the mass extraction rate has decreased from 17 lb/hr at start-up to 0.006 lb/hr in July 2010. However, CVOC concentrations still exceed the soil vapor RGs in all SVE wells and most VMPs.

5.5 RECOMMENDATIONS

The Year Two report recommended several actions: clarify requirements for confirmation soil sampling; perform rebound test to evaluate progress and identify areas needing additional treatment; and test operational changes to improve mass removal and cost-effectiveness of operations. Recommended soil confirmation sample locations were provided in the Year Two report. The *Work Plan for Fluvial Soil Vapor Extraction Confirmation Sampling* (HDR|e^{2}M, 2010b), submitted to USEPA and TDEC on 22

September 2010, provides detailed procedures for the rebound test and soil sampling. Additional SVE wells to be used for passive venting or alternate vapor extraction locations will be installed at selected locations as described in the work plan.

The rebound test and sampling is scheduled to begin in October 2010. Operational changes will be recommended and implemented based on the results.

6.0 REFERENCES

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TABLES

TABLE 1
SYSTEM FLOW RATE AND VACUUM READINGS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	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.)
7/30/2009 07:30	2	80	>100	170	92	180	80	190	73	120	86	130	86	20	>100	807	5.53
8/7/2009 09:20	2	70	100	170	90	160	82	170	72	120	86	120	88	20	>100	785	5.48
8/13/2009 12:30	2	80	>100	160	90	170	82	180	74	120	84	120	84	20	>100	800	5.50
8/21/2009 12:30	2	70	100	160	90	170	80	170	72	120	84	120	84	20	>100	756	5.39
8/28/2009 08:15	2	80	>100	170	90	190	80	180	72	120	84	120	86	20	>100	900	5.26
9/4/2009 11:20	2	80	>100	170	90	180	80	170	72	120	86	130	86	20	>100	800	5.55
9/11/2009 14:52	2	90	98	160	89	190	80	180	72	120	84	110	86	20	>100	800	5.21
9/18/2009 10:00	2	80	>100	160	92	190	84	190	76	120	88	120	90	20	>100	775	5.63
9/24/2009 08:30	2	60	>100	170	92	190	84	180	76	130	88	120	90	20	>100	804	5.65
10/2/2009 07:58	2	70	>100	170	92	170	82	180	76	130	88	120	90	20	>100	802	5.71
10/9/2009 07:12	2	50	94	150	86	N/R	74	170	68	110	78	100	80	20	>100	805	4.83
10/16/2009 09:51	2	70	98	160	88	160	79	170	72	120	82	100	86	0	>100	870	5.14
10/23/2009 14:00	2	60	96	160	88	160	76	170	72	110	82	100	86	0	>100	834	5.21
11/2/2009 08:09	2	50	100	160	90	N/R	78	160	84	120	84	100	88	20	>100	852	5.24
11/5/2009 06:45	2	50	100	150	90	180	78	170	74	120	82	110	88	0	>100	847	5.29
11/13/2009 14:36	2	60	100	160	92	N/R	84	180	78	130	88	110	90	0	>100	800	5.86
11/20/2009 09:41	2	70	100	170	96	N/R	84	150	78	130	90	110	92	20	>100	740	5.91
11/24/2009 06:24	2	90	100	160	90	N/R	82	180	74	120	86	110	88	0	>100	800	5.61
12/4/2009 09:35	2	60	100	160	94	N/R	82	170	78	130	90	110	94	0	>100	782	5.81
12/11/2009 06:00	2	60	100	150	94	170	54	160	76	110	86	100	90	0	>100	770	5.70
12/18/2009 06:15	2	50	100	150	90	170	78	160	74	120	82	100	86	0	>100	764	5.33
12/24/2009 07:13	2	60	100	150	92	170	78	170	74	110	84	100	86	0	>100	754	5.22
12/30/2009 13:30	2	50	100	150	92	180	80	170	74	120	84	100	86	0	>100	760	5.32
1/7/2010 10:15	2	60	100	150	96	180	78	170	76	120	84	100	90	0	>100	763	5.54
1/15/2010 12:47	2	50	100	150	92	180	80	170	74	110	82	100	88	0	>100	770	5.26
1/22/2010 09:11	2	60	100	150	96	180	82	170	78	120	87	100	94	0	>100	750	5.50
1/27/2010 08:55	2	50	100	150	94	180	80	170	76	120	85	90	90	0	>100	750	5.47
2/5/2010 09:10	2	60	>100	150	94	180	78	170	78	120	86	100	90	0	>100	770	5.37
2/12/2010 09:10	2	50	>100	150	94	180	82	160	76	120	86	90	90	0	>100	765	5.50
2/19/2010 14:25	2	60	100	150	92	180	80	160	86	120	84	100	90	20	>100	800	5.31
2/262010 10:25	2	70	>100	140	94	190	76	170	76	120	86	100	90	0	>100	780	5.40
3/4/2010 08:38	2	60	>100	150	96	190	67	170	76	120	86	100	92	0	>100	780	5.47
3/18/2010 09:50	2	70	>100	150	94	190	82	170	76	120	86	100	90	0	>100	779	5.42
3/25/2010 14:30	2	70	>100	150	94	190	80	170	76	120	86	100	92	0	>100	756	5.51
4/2/2010 07:58	2	80	>100	160	96	200	82	180	82	120	86	100	92	0	>100	766	5.37
4/9/2010 06:50	2	90	>100	150	96	200	82	170	78	120	86	90	94	0	>100	773	5.44
4/16/2010 14:00	2	60	100	150	90	190	80	170	72	120	82	90	88	0	>100	796	5.15
4/22/2010 10:47	2	60	100	150	92	180	78	170	72	110	84	90	88	0	>100	780	5.12
4/28/2010 08:21	2	60	>100	160	92	190	80	170	76	120	84	90	92	0	>100	800	5.34
4/30/2010 10:05	2	70	100	150	90	190	78	170	72	110	82	100	86	0	>100	780	5.20

TABLE 1
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ANNUAL OPERATIONS REPORT - 2009/10
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Dunn Field - Defense Depot Memphis, Tennessee

Date/Time of Recording	Number of Blowers in Operation	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.)
5/7/2010 1120	2	70	100	160	90	190	78	170	74	120	82	100	90	0	>100	768	5.17
5/14/2010 13:20	2	60	100	150	92	190	80	170	74	110	84	90	90	0	>100	784	5.20
5/21/2010 14:31	2	N/R	97	150	90	180	80	165	74	110	84	100	90	0	>100	780	5.03
5/28/2010 09:30	2	70	98	150	88	190	80	170	74	120	84	100	88	0	>100	780	5.15
6/4/2010 14:30	2	60	100	160	90	190	78	170	72	120	84	100	88	30	>100	771	5.08
6/10/2010 13:39	1	40	62	130	58	150	46	120	44	90	52	70	54	0	88	500	2.54
6/18/2010 07:13	2	70	98	160	90	190	78	170	70	120	84	100	88	20	>100	789	5.04
6/24/2010 09:15	2	70	98	160	88	190	78	180	68	120	82	100	86	0	>100	794	4.96
7/2/2010 15:04	2	N/R	96	170	80	190	76	180	68	110	80	120	84	0	>100	782	4.84
7/9/2010 13:25	2	60	94	160	80	200	74	180	66	110	80	120	82	20	>100	800	4.80
7/13/2010 11:00	2	50	96	160	82	200	78	180	68	110	84	120	84	0	>100	799	4.94
7/16/2010 11:11	2	70	98	160	80	200	74	170	70	120	80	120	82	0	>100	800	4.87
7/22/2010 09:20	2	60	98	170	82	200	76	180	72	120	82	120	84	0	>100	794	4.98
7/30/2010 16:08	2	80	>100	170	88	200	72	190	76	120	90	120	90	20	>100	729	5.44

Notes:
(1) - SVE well flow rate and vacuum measured at well manifold.
(2) - System flow rate and vacuum measured at blower manifold.

acfm: actual cubic feet per minute
in. Hg. = inches of mercury
in. H_2O = inches of water
0.07353 x in. H_2O = in. Hg.
N/R: not recorded
scfm: standard cubic feet per minute
SVE: soil vapor extraction

TABLE 2
VACUUM READINGS AT VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

			7/30/09	8/7/09	9/24/09	10/30/09	11/11/09	12/16/2009	1/27/2010	2/26/2010	3/18/2010	4/28/10	5/28/10	6/18/10	7/13/10
Number of Blowers Online			2	2	2	2	2	2	2	2	2	2	2	2	2
VMP[(1)]	Closest SVE Well and Distance (ft)		Vacuum (in. H_2O)												
VMP-1A	SVE-A	15.1	12.2	13.6	12.8	12.2	13.1	10.1	11.0	10.2	10.7	11.7	11.9	12.0	11.9
VMP-1B	SVE-A	21.0	13.0	13.8	13.2	12.4	13.6	10.1	10.9	10.2	10.6	11.6	12.0	12.2	12.0
VMP-2A	SVE-B	30.7	13.4	14.6	14.1	13.6	14.4	12.1	13.0	11.9	12.7	13.8	14.1	14.4	13.7
VMP-2B	SVE-B	37.5	12.9	14.2	13.8	13.6	14.2	11.6	12.6	11.6	12.4	13.4	13.8	13.8	13.1
VMP-3A	SVE-C	30.7	12.7	13.5	13.2	12.6	13.0	11.5	12.2	10.9	11.5	12.5	12.6	12.7	11.9
VMP-3B	SVE-C	25.5	12.9	14.6	14.2	13.8	14.2	12.2	12.8	11.5	12.6	13.1	12.4	13.3	12.5
VMP-4A	SVE-C	60.0	11.2	11.2	11.2	10.6	10.4	9.7	10.0	8.7	9.8	10.3	10.4	10.5	9.9
VMP-4B	SVE-C	59.5	8.9	9.9	10.0	9.6	9.0	8.7	8.6	7.6	8.8	9.3	9.4	9.4	8.9
VMP-5A	SVE-D	31.0	10.4	12.1	12.4	11.8	11.6	10.1	10.5	9.1	10.1	10.8	10.0	10.5	10.6
VMP-5B	SVE-D	31.0	11.7	12.0	12.7	12.2	12.0	10.3	10.5	9.3	10.4	11.0	10.3	10.7	10.6
VMP-6A	SVE-E	45.0	10.9	12.0	12.4	11.8	11.4	9.2	10.3	9.5	10.1	10.7	10.1	10.5	10.6
VMP-6B	SVE-E	45.0	10.8	11.8	12.3	11.8	11.3	9.2	10.2	9.4	9.9	10.6	10.0	10.4	10.6
VMP-7A	SVE-F	15.3	14.8	<15.0	<15.0	13.2	15.0	11.4	12.2	11.1	12.0	12.6	11.7	12.3	13.1
VMP-7B	SVE-F	15.2	14.2	<15.0	<15.0	12.6	13.8	10.5	11.4	10.4	11.1	11.8	10.9	11.3	12.4
VMP-8A	SVE-F	80.4	10.5	11.4	11.0	8.4	9.4	8.2	9.0	7.7	8.4	9.2	8.8	8.6	8.8
VMP-8B	SVE-F	80.2	10.2	10.6	10.4	8.0	9.0	3.7	2.8	7.1	7.8	8.0	7.4	8.0	8.3
VMP-9A	SVE-G	45.2	5.9	7.4	7.0	4.8	5.2	5.7	7.1	4.5	5.4	7.0	4.9	5.0	4.4
VMP-9B	SVE-G	45.2	6.2	7.3	6.7	4.2	5.2	5.8	7.3	4.8	5.5	7.0	4.9	4.8	4.2
VMP-10A	SVE-G	60.1	7.8	7.4	6.5	3.8	4.7	5.9	7.3	4.7	5.3	6.6	4.4	4.4	4.0
VMP-10B	SVE-G	60.5	7.2	7.0	6.5	3.6	4.6	5.8	7.1	4.6	5.2	6.5	4.4	4.4	4.0

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 of the associated SVE well screen.
VMP "B" wells (e.g., VMP-1B) were constructed with a screen located near the top 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
SVE - soil vapor extraction
VMP - vapor monitoring point

TABLE 3
PID MEASUREMENTS AT SVE WELLS AND SYSTEM INFLUENT
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
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)							
7/30/2009	0.2	1.6	0.6	0.2	0.3	0.1	0.0	0.6
8/7/2009	2.3	2.6	0.7	1.0	0.7	0.3	2.9	0.8
8/14/2009	2.6	3.4	0.8	0.9	0.7	0.8	2.8	1.0
8/21/2009	1.3	3.6	1.6	1.2	0.9	0.6	2.4	1.4
8/28/2009	1.6	2.5	1.0	0.9	1.0	0.9	2.3	1.2
9/4/2009	1.2	3.7	1.6	1.1	0.9	0.7	N/R	N/R
9/11/2009	1.4	3.6	1.4	1.3	0.9	0.6	2.4	1.4
9/18/2009	1.1	2.1	1.1	1.0	1.1	1.0	3.1	1.4
9/24/2009	0.4	0.6	0.2	0.5	0.4	0.5	N/R	1.4
10/2/2009	1.1	1.8	0.9	0.6	0.5	1.1	3.0	0.7
10/9/2009	0.6	1.5	0.7	0.7	0.7	0.5	2.8	0.8
10/16/2009	0.7	1.5	0.4	0.5	0.4	0.7	N/R	1.0
10/23/2009	0.5	1.4	0.9	0.7	0.5	0.6	2.5	1.0
11/2/2009	0.3	0.8	0.3	0.2	0.2	0.3	1.8	0.5
11/5/2009	0.4	1.5	0.7	0.6	0.4	0.6	4.4	0.7
11/13/2009	0.6	1.4	0.5	0.5	0.4	0.6	N/R	1.0
11/20/2009	0.3	0.7	0.3	0.2	0.0	0.2	2.5	0.6
11/24/2009	0.2	0.8	0.3	0.2	0.1	0.2	2.6	0.7
12/4/2009	0.2	0.8	0.4	0.2	0.2	0.4	2.5	0.7
12/11/2009	0.7	0.8	0.4	0.2	0.1	0.4	N/R	0.5
12/18/2009	4.2	9.0	18.0	15.1	11.9	11.3	N/R	1.2
12/24/2009	0.9	3.2	8.3	N/R	N/R	N/R	N/R	0.4
12/30/2009	0.9	0.7	0.5	0.6	0.7	0.7	1.2	0.5
1/7/2010	0.6	0.6	0.4	0.4	0.2	0.5	N/R	0.6
1/15/2010	0.3	0.5	0.3	0.2	0.1	0.3	3.6	0.4
1/22/2010	0.2	0.4	0.3	0.2	0.1	0.3	N/R	0.4
1/27/2010	0.4	0.9	2.2	2.4	1.4	3.2	N/R	0.5
2/5/2010	0.1	0.3	0.2	0.1	0.0	0.1	N/R	0.4
2/12/2010	0.1	6.3	7.6	8.0	9.0	N/R	N/R	0.3
2/19/2010	0.1	0.4	0.2	0.2	0.1	0.1	N/R	0.3
2/26/2010	0.2	0.5	0.3	0.3	0.1	0.4	N/R	0.4
3/4/2010	0.1	0.4	0.2	0.2	0.1	0.2	N/R	0.4
3/18/2010	0.1	0.3	0.3	0.2	0.1	0.4	N/R	0.4
3/25/2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4/2/2010	0.3	0.4	0.3	0.3	0.3	0.3	3.5	0.4
4/9/2010	0.0	0.3	0.1	0.1	0.0	0.3	N/R	0.3
4/16/2010	0.1	0.3	0.1	0.1	0.1	0.2	N/R	0.3
4/22/2010	0.2	0.6	0.4	0.4	0.3	0.4	N/R	0.5
4/28/2010	5.0	4.6	2.3	2.4	1.8	2.6	N/R	0.6
4/30/2010	0.3	0.6	0.4	0.3	0.3	0.4	N/R	0.5
5/7/2010	0.3	0.1	0.3	0.4	0.3	0.6	N/R	0.3
5/14/2010	1.4	1.2	1.3	1.4	1.5	1.7	N/R	1.8
5/21/2010	4.4	5.1	5.2	1.5	1.8	2.0	N/R	0.5
5/28/2010	2.2	3.0	2.1	1.8	2.9	1.6	4.3	1.0
6/4/2010	2.6	1.3	0.7	0.8	0.9	0.7	N/R	0.4
6/10/2010	1.1	1.3	1.4	1.0	1.2	1.5	3.6	0.4
6/18/2010	1.2	1.2	1.5	1.0	1.1	1.5	N/R	0.4
6/24/2010	12.9	14.9	18.0	15.8	14.8	11.7	N/R	10.3
7/2/2010	1.4	1.9	1.5	1.6	1.2	1.4	4.7	0.8
7/9/2010	1.3	1.9	1.6	1.6	1.1	1.4	4.8	0.8
7/13/2010	13.5	16.2	16.3	15.1	13.9	13.8	16.1	1.2
7/16/2010	1.2	1.8	1.8	1.5	0.9	1.3	5.1	0.7
7/22/2010	1.3	1.7	1.8	1.4	0.9	1.1	4.7	0.7
7/30/2010	1.2	1.4	1.5	1.2	1.0	1.0	4.3	0.6

Notes:

(1) Photo Ionization Detector (PID) manufactured by RAE System (Model: MiniRAE 2000) with a 10.6 eV lamp.

(2) PID readings not made in SVE-G on several dates due to excess water in manifold piping.

(3) PID Readings made 12/18/09 and 12/24/09 considered inaccurate due to moisture trap on PID.

(4) No PID Readings on 3/25/09 due to malfunctioniong meter.

N/R: not recorded

ppm: parts per million

PID: photoionization detector

SVE: soil vapor extraction

TABLE 4
PID MEASUREMENTS AT VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Closest SVE Well	Distance from Closest SVE Well (ft)	PID Measurement (ppm)				
			7/1/2009	11/11/2009	1/28/2010	4/28/2010	7/13/2010
VMP-1A	SVE-A	15.1	110	2.5	2.8	1.3	7.6
VMP-1B	SVE-A	21.0	79.0	0.7	2.8	0.3	6.7
VMP-2A	SVE-B	30.7	77.6	0.6	3.7	0.3	1.6
VMP-2B	SVE-B	37.5	70.2	2.7	3.5	3.5	0
VMP-3A	SVE-C	30.7	104	1.0	3.4	0.5	1.7
VMP-3B	SVE-C	25.5	77.4	1.9	3.2	0.7	1.2
VMP-4A	SVE-C	60.0	57.5	1.0	3.0	0.2	9.1
VMP-4B	SVE-C	59.5	72.3	1.6	2.7	0.5	14.3
VMP-5A	SVE-D	31.0	56.0	1.0	2.9	0.3	0.9
VMP-5B	SVE-D	31.0	52.4	5.2	2.9	3.1	5.9
VMP-6A	SVE-E	45.0	161	0.8	3.1	0.6	0
VMP-6B	SVE-E	45.0	62.4	2.9	3.0	1.1	0
VMP-7A	SVE-F	15.3	410	1.2	3.9	0.4	2.3
VMP-7B	SVE-F	15.2	285	1.3	3.8	0.5	1.8
VMP-8A	SVE-F	80.4	1128	1.0	3.7	0.2	2.6
VMP-8B	SVE-F	80.2	543	29.0	1.2	0.4	3.9
VMP-9A	SVE-G	45.2	214	1.8	4.0	0.4	1.4
VMP-9B	SVE-G	45.2	165	1.7	4.3	1.3	2.4
VMP-10A	SVE-G	60.1	146	1.0	4.4	0.6	4.9
VMP-10B	SVE-G	60.5	112	1.1	4.4	0.5	3.5

Notes:
(1) Photo Ionization Detector (PID) manufactured by RAE Systems (Model: MiniRAE 2000) with a 10.6 eV lamp.
(2) All VMP wells contain 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 at least two hours prior to collection of PID readings.
ft: feet
PID: photoionization detector
ppm: parts per million
SVE: soil vapor extraction
VMP: vapor monitoring point

TABLE 5
ANALYTICAL RESULTS SUMMARY – SVE WELLS AND SYSTEM INFLUENT (4Q09 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
	Date	Fluvial Soil	11/10/2009	11/10/2009	11/10/2009	11/10/2009	11/10/2009	11/10/2009	11/10/2009	11/10/2009
	Lab ID	Vapor	P0903878-001	P0903878-002	P0903878-003	P0903878-004	P0903878-005	P0903878-006	P0903878-007	P0903878-008
Primary VOCs	Units	RG								
1,1,2,2-Tetrachloroethane	ppb (v/v)	0.55	**58**	0.05 J	**0.61**	<0.22	<0.22	<0.22	**0.62**	**27**
1,1,2-Trichloroethane	ppb (v/v)	2.03	0.66	<0.28	<0.67	<0.27	<0.28	<0.28	<0.29	**2.2 J**
1,1-Dichloroethene	ppb (v/v)	29.03	1.4	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	9.1
1,2-Dichloroethane	ppb (v/v)	0.64	0.15 J	<0.38	<0.9	<0.37	<0.38	<0.37	<0.39	<3.7
Carbon tetrachloride	ppb (v/v)	14.22	1.9	0.057 J	0.22 J	0.063 J	0.062 J	0.061 J	0.062 J	9.1
Chloroform	ppb (v/v)	32.63	**41**	0.14 J	1	0.15 J	0.14 J	0.16 J	0.54	**300**
cis-1,2-Dichloroethene	ppb (v/v)	39.52	6.4	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	**54**
Methylene chloride	ppb (v/v)	2.85	0.14 J	<0.44	<1	<0.43	<0.44	0.077 J	0.071 J	**9.7**
Tetrachloroethene	ppb (v/v)	0.99	**53**	<0.23	<0.54	<0.22	<0.22	<0.22	<0.23	**27**
trans-1,2-Dichloroethene	ppb (v/v)	133.5	2.2	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	11
Trichloroethene	ppb (v/v)	2.06	**75**	0.13 J	0.93	0.1 J	0.11 J	0.089 J	0.29	**240**
Vinyl chloride	ppb (v/v)	14.77	<0.62	<0.6	<1.4	<0.58	<0.59	<0.59	<0.61	1.3 J
Total CVOCs			**240**	**0.377**	**2.76**	**0.313**	**0.312**	**0.387**	**1.58**	**690.4**
Additional VOCs²										
1,1,2-Trichlorotrifluoroethane	ppb(v/v)		0.053 J	0.059 J	<0.48	0.067 J	0.06 J	0.059 J	0.062 J	11
1,4-Dichlorobenzene	ppb(v/v)		0.4	0.27	1.2	0.26	0.38	0.35	0.49	<2.5
2-Butanone (MEK)	ppb(v/v)		10	<0.52	2.3	0.37 J	0.32 J	0.44 J	0.92	3.7 J
Acetone	ppb(v/v)		13 J	5.4	51	3.6 J	3.1 J	5.2 J	6.9	32
Carbon Disulfide	ppb(v/v)		0.41 J	0.28 J	0.39 J	0.13 J	2.5	1.4	3.2	2.1 J
Dichlorodifluoromethane(CFC12	ppb(v/v)		0.38	0.38	0.32 J	0.39	0.37	0.39	0.39	2.2 J
Ethyl Acetate	ppb(v/v)		0.39 J	<0.43	<1	<0.41	<0.42	<0.42	1.4	<4.1
m,p-Xylenes	ppb(v/v)		0.26 J	0.26 J	0.85	0.23 J	0.28 J	0.27 J	0.4	<3.4
Propene	ppb(v/v)		0.97 J	0.29 J	<2.1	<0.87	<0.88	<0.87	<0.91	6.4 J
Toluene	ppb(v/v)		0.45	0.54	1.4	0.53	0.49	0.49	1.1	<4
Total VOCs**			**265**	**6.97**	**59.5**	**5.09**	**4.05**	**8.22**	**16.4**	**733**

Notes:
<: Result is less than laboratory detection limit.
--: Not Analyzed
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
CVOC: chlorinated volatile organic compound
J: Estimate
RG: remediation goal
SVE: soil vapor extraction
VOC: volatile organic compound
Units: ppb v/v: parts per billion volume per volume
Individual CVOCs above RGs shown in **bold type**.

TABLE 6
ANALYTICAL RESULTS SUMMARY – SVE WELLS AND SYSTEM INFLUENT (1Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
	Date	Fluvial Soil	2/5/2010	1/27/2010	1/27/2010	2/5/2010	1/27/2010	1/27/2010	1/27/2010	1/27/2010
	Lab ID	Vapor	P1000459-001	P1000306-002	P1000306-009	P1000459-002	P1000306-005	P1000306-006	P1000306-007	P1000306-008
Primary VOCs	Units	RG								
1,1,2,2-Tetrachloroethane	ppb(v/v)	0.55	**31**	0.23	0.3	**30**	0.053 J	0.11 J	0.4	**17**
1,1,2-Trichloroethane	ppb(v/v)	2.03	0.12 J	<0.28	<0.32	0.99	<0.28	<0.28	<0.29	1.7
1,1-Dichloroethene	ppb(v/v)	29.03	<0.36	<0.39	<0.45	0.91	<0.39	<0.39	<0.4	1.8
1,2-Dichloroethane	ppb(v/v)	0.64	<0.35	<0.38	<0.44	0.18 J	<0.38	<0.38	<0.39	0.32
Carbon tetrachloride	ppb(v/v)	14.22	0.06 J	0.063 J	<0.28	1.4	0.073 J	0.06 J	0.069 J	9.4
Chloroform	ppb(v/v)	32.63	3.1	0.56	0.64	31	0.52	0.51	1	**210**
cis-1,2-Dichloroethene	ppb(v/v)	39.52	6	0.11 J	0.17 J	8.4	0.1 J	<0.39	0.1 J	30
Methylene chloride	ppb(v/v)	2.85	<0.41	0.13 J	0.16 J	0.2 J	0.12 J	0.13 J	0.13 J	**11**
Tetrachloroethene	ppb(v/v)	0.99	**74**	0.089 J	0.11 J	**42**	0.96	0.075 J	0.12 J	**24**
trans-1,2-Dichloroethene	ppb(v/v)	133.5	1.2	<0.39	<0.45	2.2	<0.39	<0.39	<0.4	6.4
Trichloroethene	ppb(v/v)	2.06	**54**	0.4	0.88	**66**	0.36	0.32	0.75	**130**
Vinyl chloride	ppb(v/v)	14.77	<0.56	<0.6	<0.69	<0.6	<0.6	<0.6	<0.61	1.1
Total CVOCs			**169**	**1.58**	**2.26**	**183**	**2.19**	**1.21**	**2.57**	**443**
Additional VOCs*										
1,1,2-Trichlorotrifluoroethane	ppb(v/v)		0.088 J	0.095 J	0.1 J	0.086 J	0.09 J	0.076 J	0.13 J	0.3
1,2,4-Trichlorobenzene	ppb(v/v)		<0.19	<0.21	<0.24	0.1 J	<0.21	<0.21	0.096 J	0.17
1,2,4-Trimethylbenzene	ppb(v/v)		<0.29	0.38	0.38	<0.31	0.45	0.24 J	0.35	0.085 J
1,4-Dichlorobenzene	ppb(v/v)		0.085 J	0.46	0.57	<0.25	0.6	0.36	0.54	0.13 J
2-Butanone (MEK)	ppb(v/v)		0.24 J	3.8	1.9 J	1.5 J	1.6 J	1.4 J	1.7 J	2.7
2-Propanol (Isopropyl Alcohol)	ppb(v/v)		<0.58	0.68	0.47 J	<0.62	4.9	<0.62	1.1	<0.52
Acetone	ppb(v/v)		1.1 J	58	20	110	7 J	7.7	47	19
Acetonitrile	ppb(v/v)		<0.85	2.2	0.53 J	<0.91	<0.91	<0.91	0.56 J	<0.76
Benzene	ppb(v/v)		0.22 J	0.36 J	0.3 J	0.25 J	1.3	0.3 J	0.33 J	0.44
Bromoform	ppb(v/v)		<0.14	<0.15	<0.17	0.2	<0.15	<0.15	<0.15	<0.12
Carbon Disulfide	ppb(v/v)		<2.3	0.9 J	0.49 J	0.21 J	0.89 J	<2.5	9.1	0.63 J
Dichlorodifluoromethane(CFC12)	ppb(v/v)		0.57	0.52	0.54	0.52	0.56	0.48	0.55	2
d-Limonene	ppb(v/v)		0.2 J	0.83	0.93	0.11 J	1.6	0.56	0.84	0.16 J
Ethanol	ppb(v/v)		<3.8	<4.1	2.4 J	<4.1	4.9	2.8 J	<4.2	<3.4
Ethyl Acetate	ppb(v/v)		<0.4	<0.43	<0.49	<0.42	0.76	<0.42	<0.44	<0.36
Ethylbenzene	ppb(v/v)		<0.33	0.14 J	0.16 J	<0.35	0.4	0.12 J	0.14 J	0.089 J
m,p-Xylenes	ppb(v/v)		0.13 J	0.58	0.58	<0.35	1.4	0.46	0.56	0.19 J
n-Hexane	ppb(v/v)		0.23 J	0.29 J	0.15 J	0.19 J	0.98	0.29 J	0.31 J	0.24 J
o-Xylene	ppb(v/v)		<0.33	0.26 J	0.25 J	<0.35	0.54	0.2 J	0.24 J	0.1 J
Propene	ppb(v/v)		0.79 J	<0.9	<1	0.68 J	1.5	0.51 J	2.1 J	4.1
Tetrahydrofuran (THF)	ppb(v/v)		<0.49	0.16 J	0.29 J	<0.52	1.1	0.15 J	0.16 J	0.13 J
Toluene	ppb(v/v)		0.28 J	1.1	0.47	0.24 J	3.4	1	1.1	0.47
Trichlorofluoromethane	ppb(v/v)		0.32	0.24 J	0.25 J	0.21 J	0.25 J	0.21 J	0.23 J	0.35
Vinyl Acetate	ppb(v/v)		<2	2.7	<2.5	<2.2	<2.2	0.77 J	3.6	1.2 J
Total VOCs**			**170**	**72.8**	**25.7**	**294**	**33.6**	**11.8**	**69.4**	**472**

Notes:
<: Result is less than laboratory detection limit.
--: Not Analyzed
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
CVOC: chlorinated volatile organic compound
J: Estimate
RG: remediation goal
SVE: soil vapor extraction
VOC: volatile organic compound
Units: ppb v/v: parts per billion volume per volume
Individual CVOCs above RGs shown in **bold type**.

TABLE 7
ANALYTICAL RESULTS SUMMARY – SVE WELLS AND SYSTEM INFLUENT (2Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
	Date	Fluvial Soil	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010
	Lab ID	Vapor	P1001509-001	P1001509-002	P1001509-003	P1001509-004	P1001509-005	P1001509-006	P1001509-007	P1001509-008
Primary VOCs	Units	RG								
1,1,2,2-Tetrachloroethane	ppb(v/v)	0.55	**2.1**	**33**	**0.98**	**19**	**5.3**	**8.6**	**140**	**24**
1,1,2-Trichloroethane	ppb(v/v)	2.03	0.4	0.35	0.12 J	0.12 J	0.24 J	**3.5**	**9.7**	1.3
1,1-Dichloroethene	ppb(v/v)	29.03	0.45	0.87	0.15 J	<0.36	1.1	1.6	4.2	1.1
1,2-Dichloroethane	ppb(v/v)	0.64	<0.38	<0.36	<0.36	<0.35	<0.36	0.6	**3.3 J**	0.3 J
Carbon tetrachloride	ppb(v/v)	14.22	0.6	0.14 J	0.11 J	0.061 J	1.7	**24**	**23**	7
Chloroform	ppb(v/v)	32.63	11	20	5.4	3.5	2.7	**430**	**690**	**200**
cis-1,2-Dichloroethene	ppb(v/v)	39.52	3.3	23	8	5.5	8.8	**120**	26	**51**
Methylene chloride	ppb(v/v)	2.85	<0.44	<0.42	<0.41	<0.41	0.086 J	22	16	5.3
Tetrachloroethene	ppb(v/v)	0.99	**20**	**5.3**	**11**	**46**	**3**	**19**	**17**	**19**
trans-1,2-Dichloroethene	ppb(v/v)	133.5	0.61	7.1	2.7	1.2	3.7	3.5	7.4	4.6
Trichloroethene	ppb(v/v)	2.06	**20**	**86**	**20**	**53**	**78**	**71**	**350**	**110**
Vinyl chloride	ppb(v/v)	14.77	<0.59	0.62	<0.56	<0.56	<0.56	2.6	<5.8	0.76
Total CVOCs			**58.5**	**176**	**48**	**128**	**105**	**706**	**1287**	**424**
Additional VOCs'										
1,1,2-Trichlorotrifluoroethane	ppb(v/v)		0.062 J	0.068 J	0.071 J	0.066 J	0.076 J	0.64	0.81 J	0.23
1,1-Dichloroethane	ppb(v/v)		<0.38	<0.36	<0.36	<0.35	<0.36	0.55	<3.7	0.15 J
1,2,4-Trichlorobenzene	ppb(v/v)		<0.2	<0.2	<0.19	<0.19	<0.19	<0.2	3.2	0.15 J
1,2-Dichloropropane	ppb(v/v)		<0.33	<0.32	<0.31	<0.31	<0.31	0.43	<3.2	0.11 J
Acetone	ppb(v/v)		3.1 J	2.4 J	24	0.83 J	2.2 J	2.6 J	40	2.3 J
Benzene	ppb(v/v)		<0.48	0.18 J	0.14 J	<0.44	0.19 J	0.58	1.3 J	0.23 J
Carbon Disulfide	ppb(v/v)		<2.4	<2.4	17	0.53 J	1.4 J	0.57 J	<24	0.26 J
Dichlorodifluoromethane(CFC12	ppb(v/v)		0.49	0.54	1.4	0.43	0.84	5.2	<3	1.7
Naphthalene	ppb(v/v)		0.18 J	<0.28	<0.27	0.54	<0.27	<0.28	<2.8	<0.24
Propene	ppb(v/v)		0.35 J	1.1	1.5	0.35 J	0.68 J	0.63 J	2.4 J	1.1
Trichlorofluoromethane	ppb(v/v)		0.2 J	0.29	0.25 J	0.27	0.3	0.26	<2.6	0.26
Total VOCs**			**59.0**	**178**	**92.4**	**130**	**106**	**714**	**1330**	**428**

Notes:
<: Result is less than laboratory detection limit.
--: Not Analyzed
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above R
CVOC: chlorinated volatile organic compounc
J: Estimate
RG: remediation goal
SVE: soil vapor extractior
VOC: volatile organic compounc
Units: ppb v/v: parts per billion volume per volume
Individual CVOCs above RGs shown in **bold type**.

TABLE 8
ANALYTICAL RESULTS SUMMARY – SVE WELLS AND SYSTEM INFLUENT (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location		SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-EFF
	Date	Fluvial Soil	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010
	Lab ID	Vapor	P1002467-001	P1002467-002	P1002467-003	P1002467-004	P1002467-005	P1002467-006	P1002467-007	P1002467-009
Primary VOCs	Units	RG								
1,1,2,2-Tetrachloroethane	ppb(v/v)	0.55	**4.5 J**	**66 J**	0.48 J	**20 J**	**3.2 J**	**11 J**	**280 J**	**22**
1,1,2-Trichloroethane	ppb(v/v)	2.03	0.59 J	0.95 J	0.099 J	0.23 J	0.26 J	**4.9 J**	**30 J**	1.5
1,1-Dichloroethene	ppb(v/v)	29.03	0.29 J	1.7 J	0.16 J	<0.37	0.29 J	1.7 J	14 J	0.85
1,2-Dichloroethane	ppb(v/v)	0.64	<0.38	0.099 J	<0.37	<0.36	<0.38	**0.75 J**	**11 J**	0.25 J
Carbon tetrachloride	ppb(v/v)	14.22	0.98 J	0.31 J	0.13 J	0.048 J	0.29 J	**25 J**	**68 J**	6.5
Chloroform	ppb(v/v)	32.63	9.1 J	24 J	2.3 J	3 J	4.7 J	**530 J**	**1100 J**	**130**
cis-1,2-Dichloroethene	ppb(v/v)	39.52	3.2 J	**59 J**	5.1 J	5.1 J	14 J	**160 J**	**55 J**	**50**
Methylene chloride	ppb(v/v)	2.85	0.12 J	0.49 J	<0.43	0.18 J	0.22 J	**20 J**	**24 J**	**4**
Tetrachloroethene	ppb(v/v)	0.99	**35 J**	**14 J**	**65 J**	**11 J**	**4 J**	18 J	**57 J**	**21**
trans-1,2-Dichloroethene	ppb(v/v)	133.5	0.94 J	20 J	3.5 J	1 J	6.9 J	3.7 J	15 J	6
Trichloroethene	ppb(v/v)	2.06	**29 J**	**240 J**	**28 J**	**42 J**	**160 J**	**80 J**	**950 J**	**100**
Vinyl chloride	ppb(v/v)	14.77	<0.6	1.8 J	<0.58	<0.57	<0.6	2.1 J	<10	0.74
Total CVOCs			**83.7**	**428**	**105**	**82.6**	**194**	**857**	**2604**	**343**
Additional VOCs'										
1,1,2-Trichlorotrifluoroethane	ppb(v/v)		0.063 J	0.09 J	0.067 J	0.067 J	0.065 J	1.3 J	1.6 J	0.35
1,1-Dichloroethane	ppb(v/v)		<0.38	<0.37	<0.37	<0.36	<0.38	0.6 J	<6.3	0.13 J
1,2,4-Trichlorobenzene	ppb(v/v)		<0.21	<0.2	<0.2	<0.2	<0.21	<0.2	6 J	0.066 J
1,2-Dichloropropane	ppb(v/v)		<0.33	<0.32	<0.32	<0.32	<0.33	0.49 J	<5.6	0.1 J
1,3-Dichlorobenzene	ppb(v/v)		<0.26	<0.25	<0.25	<0.24	<0.25	<0.24	6.5 J	0.062 J
2-Butanone (MEK)	ppb(v/v)		1.7 J	1.7 J	1.1 J	4.2 J	2 J	1.8 J	5.5 J	0.65 J
2-Propanol (Isopropyl Alcohol	ppb(v/v)		0.35 J	0.42 J	<0.61	0.65 J	<0.62	0.41 J	<10	<0.51
Acetone	ppb(v/v)		6.7 J	6.1 J	7 J	12 J	14 J	7.5 J	34 J	3.7
Benzene	ppb(v/v)		<0.48	0.28 J	0.11 J	<0.46	0.55 J	0.54 J	<8	0.24 J
Carbon Disulfide	ppb(v/v)		5.9 J	2.5 J	3.2 J	20 J	4.1 J	10 J	4 J	2.9
Cyclohexane	ppb(v/v)		<0.45	<0.43	<0.43	<0.42	<0.44	0.52 J	<7.5	<0.36
Dichlorodifluoromethane(CFC12	ppb(v/v)		0.43 J	0.72 J	1.3 J	0.41 J	0.43 J	6.1 J	<5.2	1.7
n-Hexane	ppb(v/v)		0.21 J	0.18 J	0.13 J	0.097 J	0.34 J	0.7 J	2.5 J	0.25 J
Propene	ppb(v/v)		<0.9	1.8 J	1.4 J	1.5 J	2.5 J	1.1 J	6.1 J	1.1
Toluene	ppb(v/v)		<0.41	1.8 J	<0.4	0.57 J	0.63 J	0.17 J	<6.8	0.084 J
Trichlorofluoromethane	ppb(v/v)		0.21 J	0.36 J	0.23 J	0.25 J	0.22 J	0.28 J	1.3 J	0.27
Vinyl Acetate	ppb(v/v)		1.9 J	1.1 J	<2.1	1.8 J	<2.2	2.1 J	<36	0.58 J
Total VOCs**			**96.8**	**442**	**118**	**122**	**216**	**888**	**2617**	**353**

Notes:
<: Result is less than laboratory detection limit.
--: Not Analyzed
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
CVOC: chlorinated volatile organic compound
J: Estimate
RG: remediation goal
SVE: soil vapor extraction
VOC: volatile organic compound
Units: ppb v/v: parts per billion volume per volume
Individual CVOCs above RGs shown in **bold type**.

TABLE 9
ANALYTICAL RESULTS SUMMARY – VMPs INFLUENT (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location		VMP-1A	VMP-1B	VMP-2A	VMP-2B	VMP-3A	VMP-3B	VMP-4A	VMP-4B	VMP-5A	VMP-5B
	Date	Fluvial Soil	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/15/2010	7/15/2010
	Lab ID	Vapor	P1002467-010	P1002467-011	P1002467-012	P1002467-013	P1002467-014	P1002468-001	P1002468-003	P1002468-004	P1002468-005	P1002468-006
Primary VOCs	Units	RG										
1,1,2,2-Tetrachloroethane	ppb(v/v)	0.55	<0.22	0.12 J	<0.23	<0.43	<3.4	0.44	<0.22	<0.22	**5.2**	**620**
1,1,2-Trichloroethane	ppb(v/v)	2.03	<0.28	<0.25	<0.29	<0.54	<4.2	<0.27	<0.27	<0.27	<0.28	<25
1,1-Dichloroethene	ppb(v/v)	29.03	<0.39	<0.34	1.9	1.2	28 J	<0.38	<0.37	<0.37	<0.38	<34
1,2-Dichloroethane	ppb(v/v)	0.64	<0.38	<0.34	<0.39	<0.73	<5.7	<0.37	<0.37	<0.37	<0.38	<33
Carbon tetrachloride	ppb(v/v)	14.22	0.24 J	0.075 J	<0.25	<0.47	<3.7	0.053 J	0.051 J	0.047 J	0.047 J	<21
Chloroform	ppb(v/v)	32.63	4.9	0.3	8.8	0.44 J	3.5 J	0.22 J	0.29 J	0.29 J	0.27 J	12 J
cis-1,2-Dichloroethene	ppb(v/v)	39.52	1.8	<0.34	2.5	**55**	**89**	0.82	26	1.8	0.73	**280**
Methylene chloride	ppb(v/v)	2.85	0.22 J	0.086 J	0.11 J	0.2 J	<6.6	0.087 J	0.14 J	0.15 J	0.15 J	<38
Tetrachloroethene	ppb(v/v)	0.99	**38**	0.6	0.29	**1.1**	**8 J**	0.89	0.36	0.34	**1.5**	**14 J**
trans-1,2-Dichloroethene	ppb(v/v)	133.5	1.2	<0.34	0.64	1.1	41 J	0.43	15	5.3	0.3 J	100
Trichloroethene	ppb(v/v)	2.06	**14**	0.22 J	**11**	**50**	**390 J**	**3.6**	**24**	**6.5**	**19**	**1800**
Vinyl chloride	ppb(v/v)	14.77	<0.6	<0.53	0.26 J	4.6	3.8 J	<0.58	<0.58	<0.58	<0.59	<52
Total CVOCs			**60.4**	**1.40**	**25.5**	**114**	**563**	**6.54**	**65.8**	**14.4**	**27.2**	**2826**
Additional VOCs*												
1,1,2-Trichlorotrifluoroethane	ppb(v/v)		0.074 J	0.071 J	0.077 J	<0.39	<3	0.068 J	0.067 J	0.095 J	0.064 J	<17
1,2,4-Trimethylbenzene	ppb(v/v)		<0.31	1.9	<0.32	0.14 J	<4.7	0.34	0.15 J	0.12 J	<0.31	<27
1,2-Dichloropropane	ppb(v/v)		0.59	<0.29	<0.34	<0.64	<5	<0.32	<0.32	<0.32	<0.33	<29
1,3,5-Trimethylbenzene	ppb(v/v)		<0.31	0.43	<0.32	<0.6	<4.7	0.14 J	<0.3	<0.3	<0.31	<27
1,3-Butadiene	ppb(v/v)		0.3 J	<0.62	<0.71	0.55 J	<10	<0.67	0.35 J	0.64 J	0.76	<60
1,4-Dichlorobenzene	ppb(v/v)		0.11 J	16	0.16 J	0.31 J	<3.8	0.29	0.49	0.27	0.36	<22
2-Butanone (MEK)	ppb(v/v)		2 J	85	0.74 J	3.7 J	<39	3.2	4.6	4.6	1.4 J	<230
2-Hexanone	ppb(v/v)		0.18 J	78	0.13 J	<0.72	<5.6	0.29 J	0.18 J	0.16 J	0.22 J	<33
2-Propanol (Isopropyl Alcohol)	ppb(v/v)		<0.62	0.61	<0.63	0.81 J	<9.4	0.86	0.85	1.1	2.9	<54
4-Ethyltoluene	ppb(v/v)		<0.31	0.32	<0.32	<0.6	<4.7	0.075 J	<0.3	<0.3	<0.31	<27
Acetone	ppb(v/v)		9.9 J	24	4.8 J	11	<48	24	30	55	10	<280
Acetonitrile	ppb(v/v)		0.37 J	0.52 J	<0.93	<1.8	<14	0.46 J	0.65 J	0.78 J	5.3	<80
Acrolein	ppb(v/v)		0.77 J	2.7	1.4 J	0.69 J	<20	0.56 J	1 J	0.87 J	1.7	<120
alpha-Pinene	ppb(v/v)		0.21 J	0.13 J	0.068 J	9.4	<4.1	0.051 J	0.11 J	0.18 J	0.049 J	<24
Benzene	ppb(v/v)		0.75	0.45	0.11 J	6.1	2.1 J	0.26 J	0.24 J	0.26 J	0.27 J	<42
Bromodichloromethane	ppb(v/v)		<0.23	<0.2	0.32	<0.44	<3.4	<0.22	<0.22	<0.22	<0.23	<20
Carbon Disulfide	ppb(v/v)		2.5	170	2.3 J	2.2 J	10 J	3.5	51	84	3.2	<210
Dichlorodifluoromethane(CFC12)	ppb(v/v)		0.42	0.4	0.43	0.45 J	<4.7	0.43	1	1.1	0.42	<27
d-Limonene	ppb(v/v)		0.15 J	0.091 J	0.1 J	0.63	<4.1	<0.27	0.2 J	<0.27	<0.27	<24
Ethanol	ppb(v/v)		2 J	22	2 J	12	<61	9.6	6.2	13	3.9 J	<350
Ethyl Acetate	ppb(v/v)		1	0.21 J	<0.43	<0.82	<6.4	<0.41	<0.41	<0.41	<0.42	<37
Ethylbenzene	ppb(v/v)		0.16 J	0.34	0.088 J	0.21 J	<5.3	0.12 J	0.12 J	0.11 J	<0.35	<31
m,p-Xylenes	ppb(v/v)		0.24 J	1.8	0.19 J	0.39 J	<5.3	0.33 J	0.31 J	0.27 J	0.16 J	<31
Naphthalene	ppb(v/v)		<0.29	1.3	<0.3	2.5	<4.4	0.15 J	1.6	0.55	0.22 J	<26
n-Butyl Acetate	ppb(v/v)		0.39	0.55	0.28 J	<0.62	<4.8	0.1 J	0.09 J	<0.31	<0.32	<28
n-Heptane	ppb(v/v)		<0.37	0.96	<0.38	0.27 J	<5.6	<0.36	<0.36	0.1 J	0.24 J	<33
n-Hexane	ppb(v/v)		0.47	0.78	0.26 J	2.3	3.5 J	0.64	0.095 J	0.2 J	3.3	<38
n-Nonane	ppb(v/v)		0.11 J	1.8	0.065 J	0.12 J	<4.4	0.067 J	0.074 J	0.071 J	<0.29	<25
n-Octane	ppb(v/v)		<0.33	2	0.12 J	<0.63	<4.9	<0.32	<0.32	<0.32	<0.33	<29
o-Xylene	ppb(v/v)		0.095 J	0.84	0.075 J	0.17 J	<5.3	0.14 J	0.12 J	0.11 J	<0.35	<31
Propene	ppb(v/v)		11	1.8 J	0.71 J	22	31 J	0.76 J	1.5 J	4.5	39	21 J
Styrene	ppb(v/v)		0.26 J	0.17 J	0.19 J	0.23 J	<5.4	0.21 J	0.29 J	0.19 J	0.1 J	<31
Tetrahydrofuran (THF)	ppb(v/v)		0.65	0.54	0.41 J	0.58 J	2.3 J	0.99	1.2	0.78	0.44 J	<45
Toluene	ppb(v/v)		0.9	0.76	1	8.6	<6.1	0.5	0.41	0.44	0.44	<35
Trichlorofluoromethane	ppb(v/v)		0.24 J	0.2 J	0.2 J	0.12 J	<4.1	0.2 J	0.2 J	0.2 J	0.21 J	<24
Vinyl Acetate	ppb(v/v)		0.75 J	1.9 J	0.95 J	<4.2	<33	<2.1	2.9	0.76 J	<2.2	<190
Total VOCs**			**88.9**	**417**	**32.1**	**188**	**594**	**50.9**	**168**	**180**	**94.6**	**2826**

Notes:
<: Result is less than laboratory detection limit.
--: Not Analyzed
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
CVOC: chlorinate volatile organic compound
J: Estimate
RG: remediation goal
SVE: soil vapor extraction
VOC: volatile organic compound
Units: ppb v/v: parts per billion volume per volume
Individual CVOCs above RGs shown in **bold type**

TABLE 9
ANALYTICAL RESULTS SUMMARY – VMPs INFLUENT (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location		VMP-6A	VMP-6B	VMP-7A	VMP-7B	VMP-8A	VMP-8B	VMP-9A	VMP-9B	VMP-10A	VMP-10B
	Date	Fluvial Soil	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010
	Lab ID	Vapor	P1002468-007	P1002468-008	P1002468-011	P1002468-012	P1002468-009	P1002468-010	P1002468-013	P1002468-014	P1002468-015	P1002468-016
Primary VOCs	Units	RG										
1,1,2,2-Tetrachloroethane	ppb(v/v)	0.55	**1.1**	**710**	**0.57 J**	<0.19	0.083 J	<14	0.34 J	<1.2	<0.69	<2.6
1,1,2-Trichloroethane	ppb(v/v)	2.03	0.16 J	<4.3	<1.4	<0.24	<0.28	**30**	<1.3	<1.5	<0.87	<3.2
1,1-Dichloroethene	ppb(v/v)	29.03	<0.87	<6	<1.9	<0.33	0.25 J	13 J	24	<2.1	1.5	<4.4
1,2-Dichloroethane	ppb(v/v)	0.64	<0.85	<5.8	<1.9	<0.32	<0.37	<24	**0.67 J**	<2.1	<1.2	<4.3
Carbon tetrachloride	ppb(v/v)	14.22	<0.55	<3.8	0.51 J	0.057 J	**31**	4.6 J	**91**	5.3	**70**	11
Chloroform	ppb(v/v)	32.63	12	1.8 J	**56**	15	2.1	**8400**	**39**	**36**	1.6	**350**
cis-1,2-Dichloroethene	ppb(v/v)	39.52	0.5 J	7.3	**150**	0.16 J	<0.38	**480**	1.4 J	1.3 J	<1.2	<4.4
Methylene chloride	ppb(v/v)	2.85	0.26 J	2.4 J	<2.2	0.46	0.18 J	**320**	0.47 J	0.64 J	<1.4	<5.1
Tetrachloroethene	ppb(v/v)	0.99	0.79	**8.3**	**1 J**	0.73	**3.2**	**93**	**14**	**25**	**6.8**	**230**
trans-1,2-Dichloroethene	ppb(v/v)	133.5	<0.87	6	<1.9	0.11 J	<0.38	53	<1.9	1.4 J	<1.2	9.5
Trichloroethene	ppb(v/v)	2.06	**32**	**530**	**14**	1.1	0.6	**1200**	**64**	**5.3**	1.3	**130**
Vinyl chloride	ppb(v/v)	14.77	<1.3	<9.3	<3	<0.51	<0.59	<39	<2.9	<3.3	<1.9	<6.9
Total CVOCs			**46.8**	**1266**	**222**	**17.6**	**37.4**	**10594**	**235**	**74.9**	**81.2**	**731**
Additional VOCs*												
1,1,2-Trichlorotrifluoroethane	ppb(v/v)		<0.45	<3.1	<1	0.066 J	0.9	<13	0.32 J	<1.1	4.8	<2.3
1,2,4-Trimethylbenzene	ppb(v/v)		0.22 J	<4.8	<1.6	0.16 J	0.14 J	<20	<1.5	1.7 J	<0.96	<3.6
1,2-Dichloropropane	ppb(v/v)		<0.74	<5.1	<1.7	<0.28	<0.32	<21	<1.6	<1.8	<1	<3.8
1,3,5-Trimethylbenzene	ppb(v/v)		<0.7	<4.8	<1.6	<0.27	<0.31	<20	<1.5	<1.7	<0.96	<3.6
1,3-Butadiene	ppb(v/v)		<1.6	<11	<3.5	<0.59	<0.68	<45	<3.3	<3.8	<2.1	<7.9
1,4-Dichlorobenzene	ppb(v/v)		0.5 J	<3.9	<1.3	0.061 J	0.22 J	<16	0.79 J	<1.4	0.55 J	<2.9
2-Butanone (MEK)	ppb(v/v)		26	4.9 J	1 J	1.5 J	3.8	<170	3.4 J	6.5 J	9.8	<30
2-Hexanone	ppb(v/v)		0.66 J	<5.8	<1.9	<0.32	0.52	<24	<1.8	0.65 J	0.63 J	<4.3
2-Propanol (Isopropyl Alcohol)	ppb(v/v)		<1.4	<9.6	<3.1	0.47 J	<0.61	<40	<3	11	1.4 J	<7.1
4-Ethyltoluene	ppb(v/v)		<0.7	<4.8	<1.6	0.051 J	<0.31	<20	<1.5	<1.7	<0.96	<3.6
Acetone	ppb(v/v)		9.9	<50	5.7 J	17	5.6	<210	14 J	23	33	23 J
Acetonitrile	ppb(v/v)		1 J	<14	<4.6	0.32 J	<0.89	<59	2.5 J	1.7 J	4	<10
Acrolein	ppb(v/v)		0.47 J	<21	<6.7	0.88 J	0.87 J	<86	1.3 J	1.6 J	<4.1	<15
alpha-Pinene	ppb(v/v)		<0.62	<4.2	<1.4	<0.24	<0.27	<18	<1.3	1.2 J	<0.85	<3.2
Benzene	ppb(v/v)		<1.1	<7.4	0.61 J	0.46	0.25 J	<31	<2.3	0.6 J	<1.5	<5.5
Bromodichloromethane	ppb(v/v)		0.29 J	<3.5	<1.1	<0.2	<0.22	<15	<1.1	<1.3	<0.71	<2.6
Carbon Disulfide	ppb(v/v)		0.6 J	17 J	7.2 J	18	1.1 J	20 J	1.6 J	6.3 J	1.8 J	16 J
Dichlorodifluoromethane(CFC12)	ppb(v/v)		0.41 J	<4.8	0.49 J	0.42	46	<20	0.62 J	0.41 J	0.42 J	<3.6
d-Limonene	ppb(v/v)		<0.62	<4.2	<1.4	<0.24	<0.27	<18	<1.3	2.7	<0.85	<3.2
Ethanol	ppb(v/v)		11	<63	150	5.7	2.2 J	<260	<20	<22	<13	<47
Ethyl Acetate	ppb(v/v)		<0.96	4.8 J	<2.1	<0.36	<0.42	<27	<2	<2.3	<1.3	<4.9
Ethylbenzene	ppb(v/v)		<0.79	<5.5	<1.8	0.14 J	<0.35	<23	<1.7	<1.9	<1.1	<4
m,p-Xylenes	ppb(v/v)		<0.79	<5.5	<1.8	0.48	<0.35	<23	<1.7	2.4	<1.1	<4
Naphthalene	ppb(v/v)		<0.66	4.6	<1.5	0.17 J	<0.29	<19	<1.4	<1.6	<0.9	<3.4
n-Butyl Acetate	ppb(v/v)		0.31 J	<5	<1.6	<0.28	0.19 J	<21	<1.5	<1.8	<1	<3.7
n-Heptane	ppb(v/v)		<0.84	<5.8	<1.9	0.15 J	<0.37	<24	<1.8	<2.1	<1.2	<4.3
n-Hexane	ppb(v/v)		<0.98	3.6 J	<2.2	0.55	<0.43	<28	<2.1	<2.4	<1.3	<5
n-Nonane	ppb(v/v)		<0.66	<4.5	<1.5	<0.25	<0.29	<19	<1.4	0.44 J	<0.9	<3.3
n-Octane	ppb(v/v)		<0.74	<5.1	<1.6	0.061 J	<0.32	<21	<1.6	<1.8	<1	<3.8
o-Xylene	ppb(v/v)		<0.79	<5.5	<1.8	0.17 J	<0.35	<23	<1.7	1.2 J	<1.1	<4
Propene	ppb(v/v)		<2	4.9 J	2.1 J	0.96 J	0.77 J	<57	<4.3	7.5	2.3 J	6.4 J
Styrene	ppb(v/v)		<0.81	<5.6	<1.8	<0.31	0.11 J	<23	<1.7	0.97 J	<1.1	<4.1
Tetrahydrofuran (THF)	ppb(v/v)		3.6	2.7 J	0.62 J	0.29 J	1.3	<33	4.7	3.1	1.2 J	2.4 J
Toluene	ppb(v/v)		0.26 J	7	0.45 J	0.87	0.13 J	<26	0.63 J	2.6	0.27 J	<4.7
Trichlorofluoromethane	ppb(v/v)		0.22 J	<4.2	<1.4	0.2 J	0.33	<18	0.44 J	<1.5	1.3	<3.1
Vinyl Acetate	ppb(v/v)		<4.9	<34	<11	1 J	0.69 J	<140	<10	<12	4.8 J	<25
Total VOCs**			**97.3**	**1277**	**372**	**62.5**	**95.9**	**10914**	**240**	**127**	**134**	**731**

Notes:
<: Result is less than laboratory detection limit.
--: Not Analyzed
* Detected above RL
** Sum of CVOCs and Additional VOCs detected above RL
CVOC: chlorinate volatile organic compound
J: Estimate
RG: remediation goal
SVE: soil vapor extraction
VOC: volatile organic compound
Units: ppb v/v: parts per billion volume per volume
Individual CVOCs above RGs shown in **bold type**

TABLE 10
HISTORICAL RESULTS FOR PRIMARY CVOCs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
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

TABLE 10
HISTORICAL RESULTS FOR PRIMARY CVOCs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
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)							
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	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	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	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	36.4	64.7	61899	84956	114	140	116	28214
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	0.11	0.1	0.08	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	<0.2	<0.2	0.05	<0.2	32
	Trichloroethene	0.18	0.19	0.14	0.14	0.09	0.14	0.16	330
	Total VOCs	4	2.71	4.4	2.3	2.21	9.03	2.3	1291

TABLE 10
HISTORICAL RESULTS FOR PRIMARY CVOCs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
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)							
6/29/2009	1,1,2,2-Tetrachloroethane	69	0.08	2.1	58	0.07	0.09	1.6	47
3Q09	Chloroform	43	0.12	0.88	4.4	0.08	0.44	3.7	220
	cis-1,2-Dichloroethene	15	0.10	0.34	11	<0.3	<0.3	0.14	110
	Tetrachloroethene	33	0.06	0.10	51	0.41	0.05	0.08	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	0.09	0.29	240
	Total VOCs	265	7.0	59.5	5.1	4.1	8.2	16.4	733
1/27/2010	1,1,2,2-Tetrachloroethane	31	0.23	0.3	30	0.05	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	0.09	0.11	42	0.96	0.08	0.12	24
	Trichloroethene	54	0.4	0.88	66	0.36	0.32	0.75	130
	Total VOCs	170	72.8	25.7	294	33.6	11.8	69.4	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	58.5	178	92.4	130	106	714	1330	428
7/13/2010	1,1,2,2-Tetrachloroethane	4.5	66	0.5	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

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

TABLE 11
AVERAGE VOC CONCENTRATIONS USED FOR MASS CALCULATIONS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	System Influent		
Sample Date	PID Reading (ppm)	Laboratory Total VOC Influent Concentration (ppbv)	VOC Concentration Used for Mass 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	28,214	28,214
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	733	733
1/27/2010	0.5	472	472
4/28/2010	0.6	428	428
7/13/2010	1.2	353	353

Notes:
(1) Laboratory total VOC concentration used for calculation. If sample not collected, calculation based on PID reading or as noted.
(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. No sample. Concentration is 96.2% of 1/17/08 concentration based on online SVE wells.
(6) End of Rebound Event #1. No sample Concentration from PID readings.

NR: PID reading not collected

NS: Sample not collected
PID: photoionization detector
ppbv: parts per billion by volume
ppm: parts per million
VOC: volatile organic compound

TABLE 12
MASS EMISSIONS CALCULATIONS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
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	16.995	68.0	68.0	
7/26/2007	7/26/2007	4	755	724,375	11.377	45.5	113.5	
7/27/2007	7/27/2007	24	785	407,250	6.650	159.6	273.1	
7/28/2007	7/28/2007	24	746	256,000	3.973	95.3	368.4	
7/29/2007	7/29/2007	24	741	191,250	2.948	70.8	439.2	
7/30/2007	8/2/2007	66	739	129,600	1.992	131.5	570.7	
8/3/2007	8/12/2007	20	740	114,723	1.766	35.3	606.0	
8/13/2007	8/15/2007	39	602	104,768	1.312	51.2	657.2	
8/16/2007	8/22/2007	167	596	65,675	0.814	136.0	793.1	
8/23/2007	9/19/2007	640	758	23,180	0.366	233.9	1,027.1	
9/19/2007	10/18/2007	699	795	15,365	0.254	177.6	1,204.7	
10/18/2007	1/17/2008	2,077	748	17,880	0.278	577.6	1,782.3	
1/17/2008	3/20/2008	1413	738	17,517	0.269	380.0	2,162.3	
3/20/2008	4/17/2008	626	385 (2)	19,076	0.153	95.6	2,257.9	
4/17/2008	4/24/2008	145	784	24,852	0.405	58.8	2,316.7	
4/24/2008	7/16/2008	1981	741	13,381	0.206	408.8	**2,725.5**	**Year 1**
7/16/2008	10/17/2008	2118	752	19,886	0.311	658.6	3,384.0	
10/17/2008	1/19/2009	2162	737	15,191	0.233	503.6	3,887.6	
1/19/2009	4/24/2009	2252	655	1,730	0.021	48.3	3,935.9	
4/24/2009	6/29/2009	1560	675	970	0.012	19.3	**3,955.2**	**Year 2**
6/29/2009	11/5/2009	2945	811	691	0.011	31.2	3,986.5	
11/5/2009	1/27/2010	1763	774	603	0.009	15.6	4,002.0	
1/27/2010	4/28/2010	2187	779	450	0.007	14.5	4,016.5	
4/28/2010	7/31/2010	2177	763	390	0.006	12.3	**4,028.8**	**Year 3**

Notes:
(1) Calculation based on primary constituent.
(2) Rebound Event #1 occurred 03/20/08 and 04/17/08. SVE-B, SVE-E, and SVE-F were offline.
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

N

W E S

Figure 1

FLUVIAL SVE SYSTEM

DUNN FIELD SOURCE AREAS
REMEDIAL ACTION

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 2010
Edition:

G:\121842\004\Fluvial SVE Cont Sample Work Plan\Figure 1 Fluvial SVE System .mxd

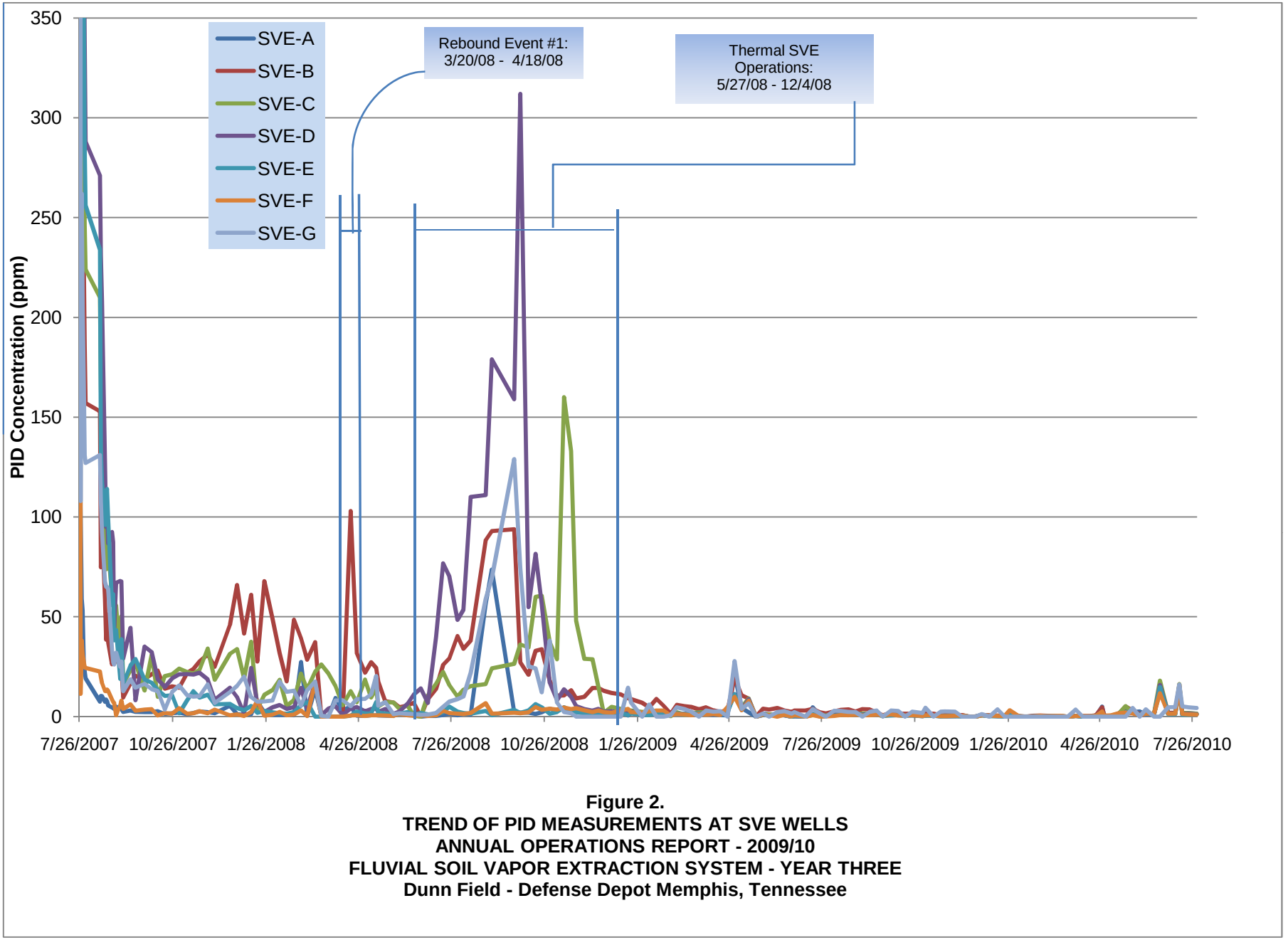

Figure 2.
TREND OF PID MEASUREMENTS AT SVE WELLS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

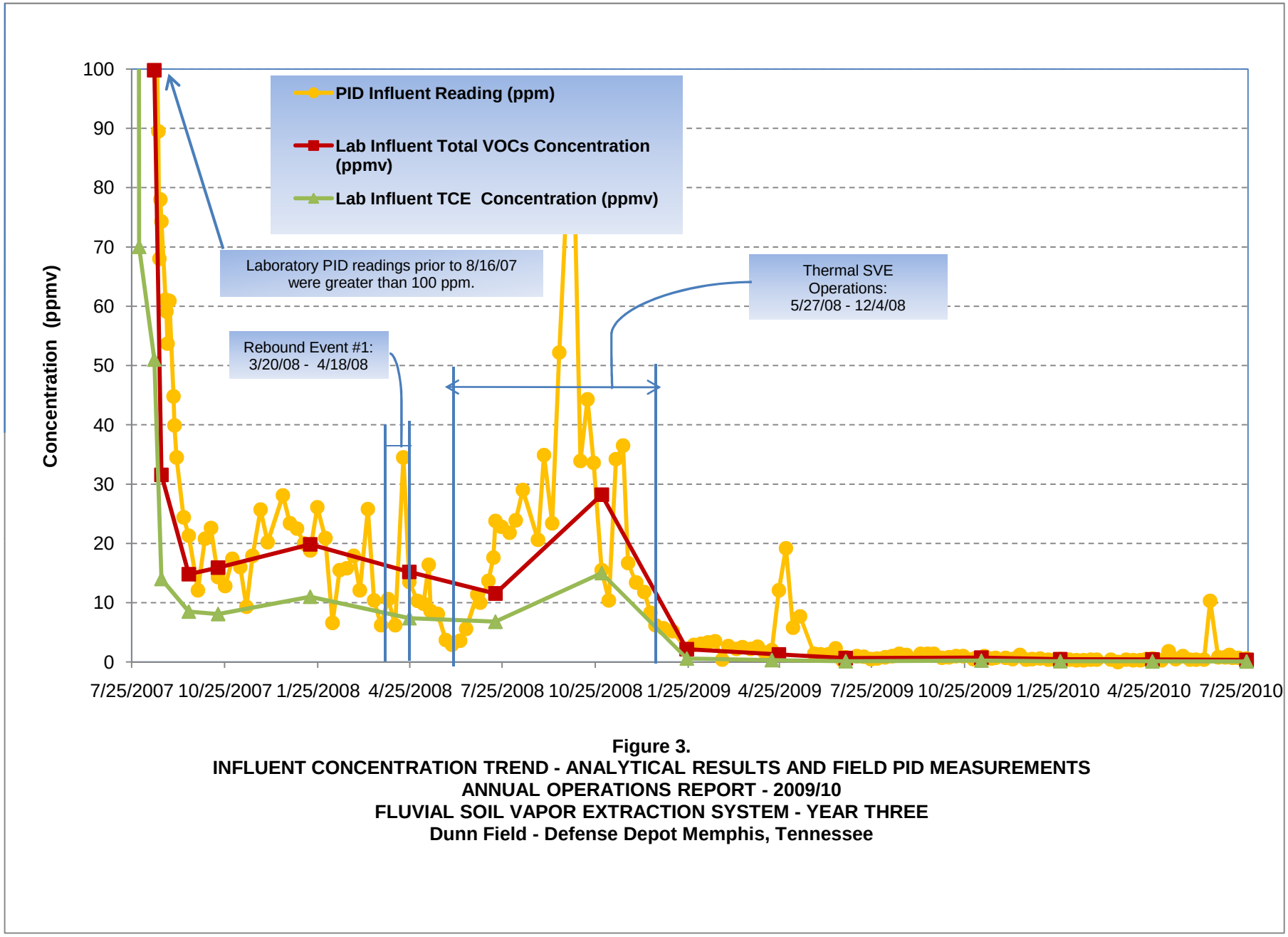

Figure 3.
INFLUENT CONCENTRATION TREND - ANALYTICAL RESULTS AND FIELD PID MEASUREMENTS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

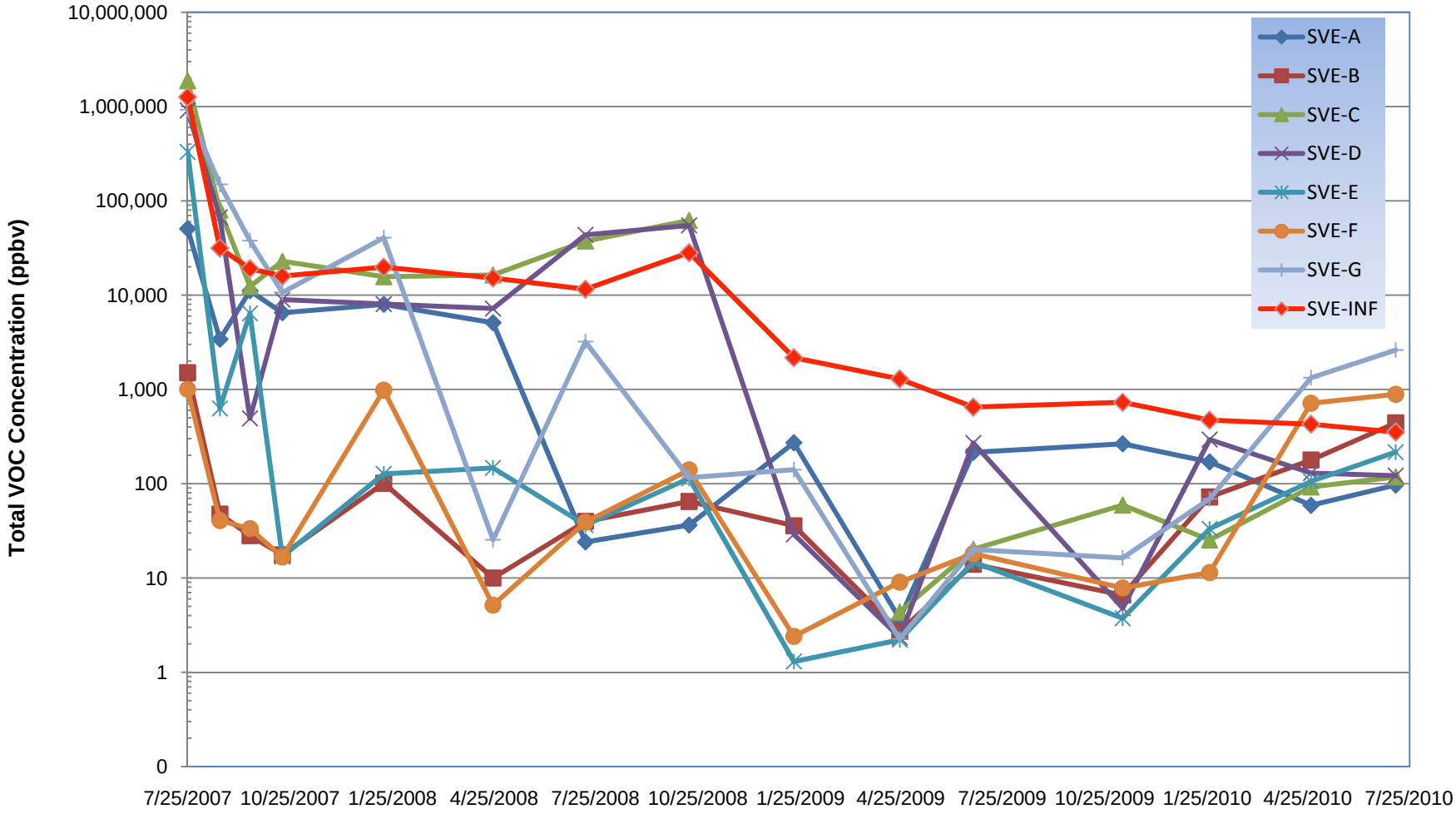

Figure 4.
TREND OF TOTAL VOC CONCENTRATIONS AT SVE WELLS AND INFLUENT
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

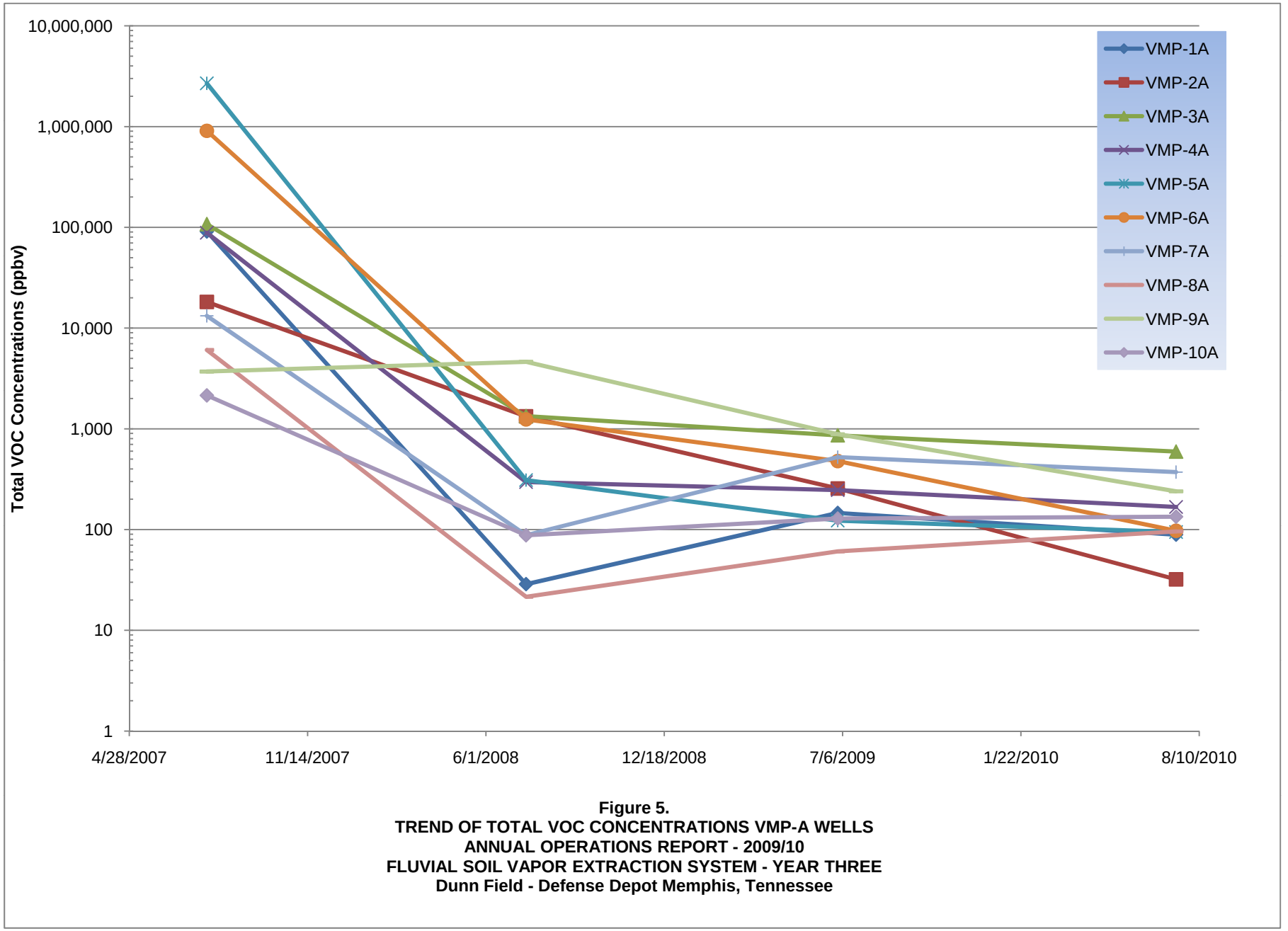

Figure 5.
TREND OF TOTAL VOC CONCENTRATIONS VMP-A WELLS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

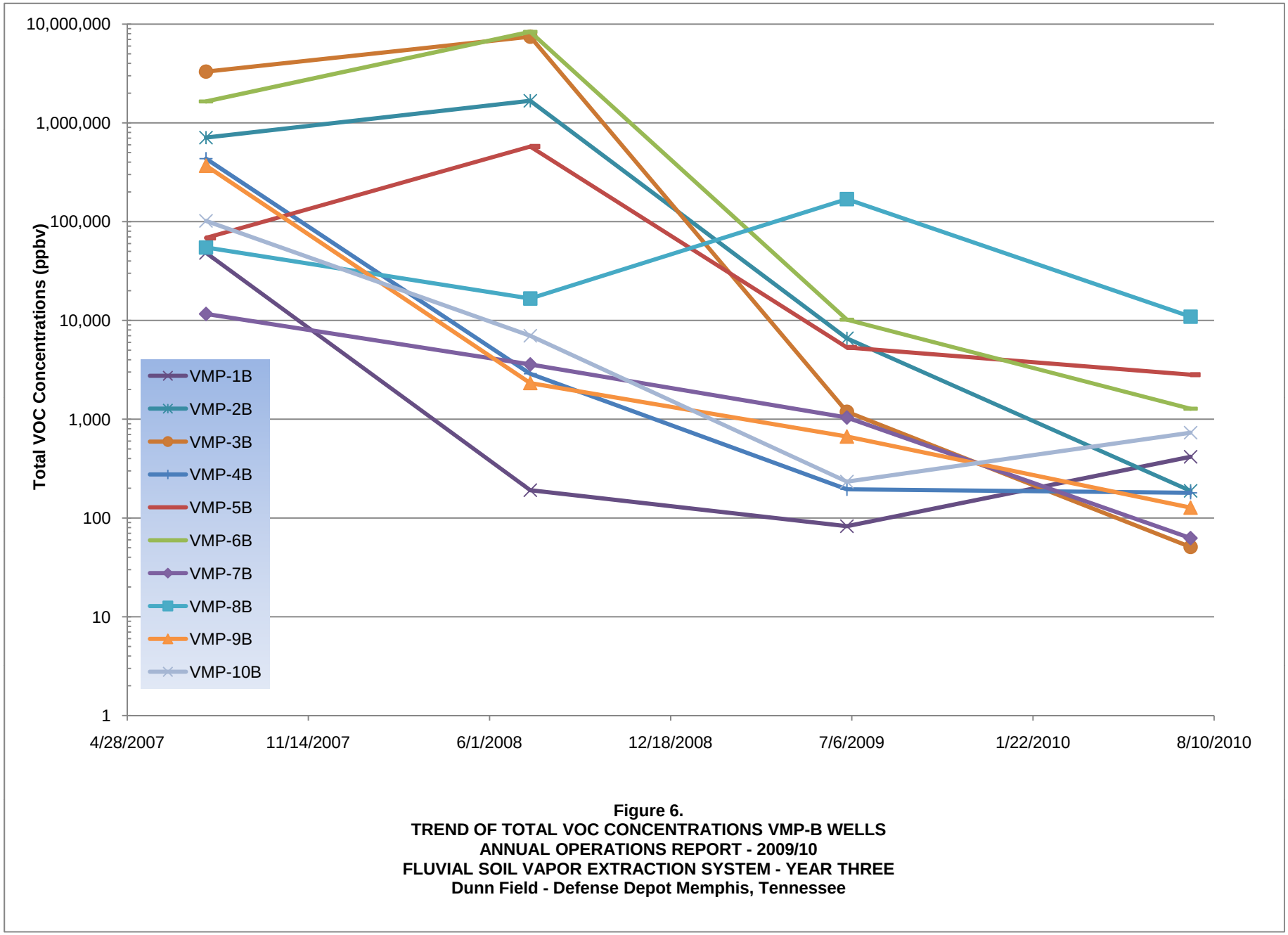

Figure 6.
TREND OF TOTAL VOC CONCENTRATIONS VMP-B WELLS
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Figure 7 .
TREND OF TOTAL VOC CONCENTRATIONS AT TA-1B SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Figure 8.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-1C SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Figure 9.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-1E SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Figure 10.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-2 SVE WELLS AND VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

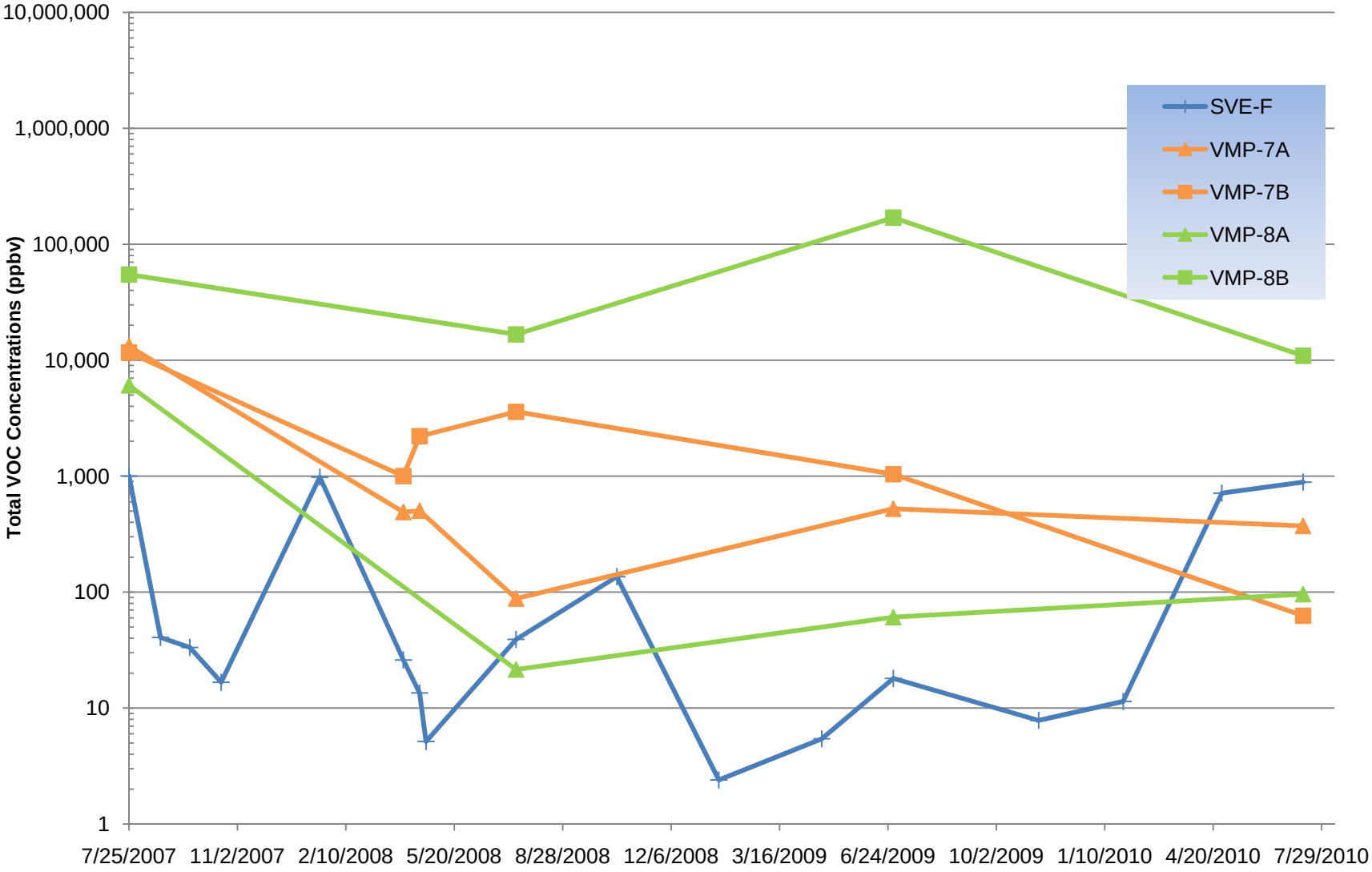

Figure 11.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-3 SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

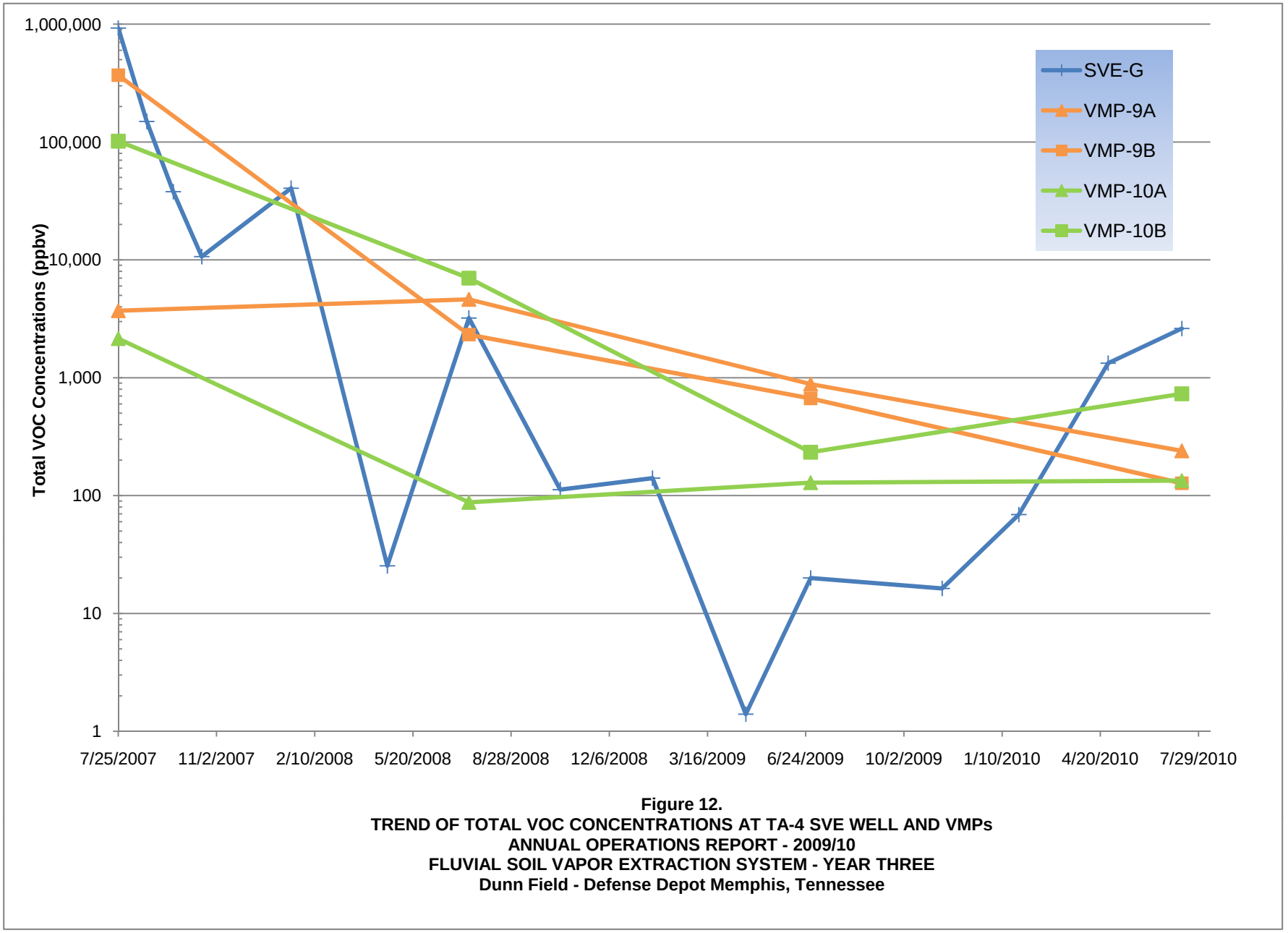

Figure 12.
TREND OF TOTAL VOC CONCENTRATIONS AT TA-4 SVE WELL AND VMPs
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

APPENDIX A

CONDENSATE DISCHARGES

November 11, 2009

Mr. Akil AL-Chokhachi
City of Memphis
2303 North Second Avenue
Memphis, Tennessee 38127-7500

Reference: Wastewater Discharge Request – Fluvial SVE Condensate
Industrial Wastewater Discharge Agreement S-NN3-097
Defense Depot Memphis, Tennessee

Dear Mr. AL-Chokhachi:

In accordance with Section F – Self-Monitoring Schedule of the referenced Agreement, HDR|e^{2}M, on behalf of the Defense Logistics Agency, requests permission to discharge wastewater to the City of Memphis Sewer System. The wastewater was generated at Defense Depot Memphis, Tennessee during recent site restoration activities and includes condensate from Fluvial Soil Vapor Extraction (FSVE) operations and groundwater from sampling of monitoring wells.

A grab sample of the wastewater was collected from the holding tank on 3 November 2009. The sample was submitted to Microbac Laboratories, Inc., in Marietta, Ohio for analysis of metals, volatile and semi-volatile organic compounds, and pH in accordance with the Agreement. The analytical results are compared to the concentration limits from the Agreement on the attached table; the laboratory report is also attached. All constituents except Manganese were below the one-day maximum concentration limits applicable to the discharge. If approved, the wastewater volume of approximately 20,000 gallons will be discharged to the sewer system through the existing discharge line for the groundwater recovery system at Dunn Field.

If you need additional information, please contact the undersigned at (916) 852-7792 or steven.herrera@e2m.net. Correspondence can also be sent to e^{2}M's Memphis field office at 2241 Truitt St., Memphis, TN 38114.

Sincerely,
engineering-environmental Management, Inc.

Steven Herrera, P.E.
FSVE Task Manager

cc: Michael A. Dobbs, DES-DDC-EE
John Hill, AFCEE/EXA
Thomas Holmes, e^{2}M

Sample Identification Date Sample Collected	IDW-11-03-09 11/3/2009	City of Memphis Industrial Permit Discharge Limits Monthly Average Maximum	 One Day Maximum
pH(1)			
pH	7.05	5.5 to 10.0	5.5 to 10.0
Total Metals(2)	*ug/L*	*ug/L*	*ug/L*
Aluminum	ND	5000	10000
Antimony	0.393 F	6	12
Arsenic	0.633 F	40	100
Barium	61.3	2000	4000
Cadmium	ND	10	20
Calcium	34600	40000	80000
Chromium	ND	200	400
Copper	82.3	600	1200
Iron	753 B	15000	30000
Lead	3.35 F	150	300
Magnesium	18000	20000	40000
Manganese	389	50	100
Mercury	0.2	1	2
Nickel	14 F	100	300
Potassium	585 F	2000	4000
Selenium	2.68	50	100
Sodium	20600	40000	80000
Thallium	ND	2	4
Zinc	70.4	300	1000
Volatile Organic Compounds (3)	*µg/L*	*µg/L*	*µg/L*
1,1,2,2-Tetrachloroethane	1.61	500	1000
1,1,1-Trichloroethane	ND	10	20
1,1,2-Trichloroethane	ND	50	100
1,1-Dichloroethane	ND	10	20
1,1-Dichloroethene	ND	50	100
Acetone	21.5	2000	4000
Carbon tetrachloride	ND	20	40
Chloroform	0.957	100	200
Chloromethane	ND	10	20
cis-1,2-Dichloroethene	ND	80	100
Methylene chloride	ND	10	20
Tetrachloroethene	ND	60	120
Toluene	ND	20	40
trans-1,2-Dichloroethene	ND	50	100
Trichloroethene	0.354 F	400	800
MEK (2-Butanone)	4.83 F	NS	NS
Semi-volatile Organic Compounds(4)	*µg/L*	*µg/L*	*µg/L*
Bis (2-ethylhexyl) Phthalate	5.7	35	70
Di-n-butyl Phthalate	ND	30	60
Fluoranthene	ND	10	20
Naphthalene	ND	10	20
Phenanthrene	ND	10	20
Phenol	ND	10	20
Pyrene	ND	10	20

Notes

(1) pH analysis performed by EPA Method 9040C

(2) Metals analyses performed by EPA Method 6010B except for Mercury (EPA Method 7470A) and Arsenic, Antimony, Thallium and Selenium (EPA Method 6020)

(3) TCL Volatile Organic analyses performed by EPA Method 8260B

(4) TCL Semi-Volatile Organic Analyses performed by EPA Method 8270C

NS = No standard listed in the Industrial Wastewater Discharge Permit

ND = Analyte not detected; Reporting Limit shown

F = Found, the analyte was positively identified with concentration above MDL but below the reporting limit

B = The analyte was found in an associated blank, as well as in the sample.

LABORATORY REPORT

L09110074

11/09/09 16:02

Submitted By

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

For

Account Name: Engineering-Environmental Management
627 Spacious Sky
San Antonio, TX 78260
Attention: Lance Hines

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

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
IDW-11-3-09	L09110074-01	11/03/2009 12:55	11/04/2009
TB-11-3-09	L09110074-02	11/03/2009 11:00	11/04/2009

Report Number: **L09110074**
Report Date : **November 9, 2009**

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316713**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **7470A**
Analytical Method: **7470A**
Analyst: **PDM**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **11/05/2009 08:48**
Cal Date:
Run Date: **11/06/2009 10:10**
File ID: **HY.110609.101047**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6	0.000200		0.000200	0.000100

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316607**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

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

Instrument: **ICP-THERMO2**
Prep Date: **11/05/2009 07:03**
Cal Date: **11/05/2009 11:52**
Run Date: **11/05/2009 15:03**
File ID: **T2.110509.150326**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5		B	0.100	0.0500
Barium, Total	7440-39-3	0.0613		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000500
Cadmium, Total	7440-43-9		U	0.0100	0.00250
Calcium, Total	7440-70-2	34.6		0.200	0.100
Chromium, Total	7440-47-3		U	0.0200	0.00250
Cobalt, Total	7440-48-4		U	0.0200	0.00250
Copper, Total	7440-50-8	0.0823		0.0200	0.00500
Iron, Total	7439-89-6	0.753	B	0.100	0.0250
Lead, Total	7439-92-1	0.00335	F	0.00500	0.00250
Magnesium, Total	7439-95-4	18.0		0.500	0.250
Manganese, Total	7439-96-5	0.389		0.0100	0.00500
Nickel, Total	7440-02-0	0.0140	F	0.0400	0.00500
Potassium, Total	7440-09-7	0.585	F	1.00	0.250
Silver, Total	7440-22-4		U	0.0100	0.00500
Sodium, Total	7440-23-5	20.6		0.500	0.250
Vanadium, Total	7440-62-2		U	0.0100	0.00500
Zinc, Total	7440-66-6	0.0704		0.0200	0.00500

U Undetected; the analyte was analyzed for, but not detected.
B The analyte was found in an associated blank, as well as in the sample.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316700**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **11/05/2009 06:23**
Cal Date: **11/06/2009 12:28**
Run Date: **11/06/2009 14:05**
File ID: **EL.110609.140517**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0	0.000393	F	0.00100	0.000250
Arsenic, Total	7440-38-2	0.000633	F	0.00100	0.000250
Thallium, Total	7440-28-0		U	0.000200	0.0000500

U Undetected; the analyte was analyzed for, but not detected.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Report Number: **L09110074**
Report Date : **November 9, 2009**

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316700**
Collect Date: **11/03/2009 12:55**
Sample Tag: **02**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **11/05/2009 06:23**
Cal Date: **11/07/2009 13:42**
Run Date: **11/07/2009 19:35**
File ID: **EL.110709.193550**

Analyte	CAS. Number	Result	Qual	RL	MDL
Selenium, Total	7782-49-2	0.00268		0.00100	0.000500

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316704**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3510C**
Analytical Method: **8270C**
Analyst: **CAA**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS4**
Prep Date: **11/05/2009 08:30**
Cal Date: **11/03/2009 14:19**
Run Date: **11/06/2009 14:14**
File ID: **4M48869**

Analyte	CAS. Number	Result	Qual	RL	MDL
1,2,4-Trichlorobenzene	120-82-1		U	10.5	2.63
1,2-Dichlorobenzene	95-50-1		U	10.5	2.63
1,3-Dichlorobenzene	541-73-1		U	10.5	2.63
1,4-Dichlorobenzene	106-46-7		U	10.5	2.63
2,4-Dinitrotoluene	121-14-2		U	10.5	2.63
2,6-Dinitrotoluene	606-20-2		U	10.5	2.63
2-Chloronaphthalene	91-58-7		U	10.5	2.63
2-Methylnaphthalene	91-57-6		U	10.5	2.63
2-Nitroaniline	88-74-4		U	52.6	13.2
3-Nitroaniline	99-09-2		U	52.6	13.2
3,3'-Dichlorobenzidine	91-94-1		U	21.1	2.63
4-Bromophenyl-phenylether	101-55-3		U	10.5	2.63
4-Chloroaniline	106-47-8		U	10.5	5.26
4-Chlorophenyl-phenyl ether	7005-72-3		U	10.5	2.63
4-Nitroaniline	100-01-6		U	52.6	13.2
Acenaphthylene	208-96-8		U	10.5	2.63
Acenaphthene	83-32-9		U	10.5	2.63
Anthracene	120-12-7		U	10.5	2.63
Benzo(a)anthracene	56-55-3		U	10.5	2.63
Benzo(a)pyrene	50-32-8		U	10.5	2.63
Benzo(k)fluoranthene	207-08-9		U	10.5	2.63
Benzo(b)fluoranthene	205-99-2		U	10.5	2.63
Benzo(g,h,i)Perylene	191-24-2		U	10.5	2.63
Benzyl alcohol	100-51-6		U	10.5	2.63
Bis(2-Chloroethoxy)Methane	111-91-1		U	10.5	2.63
Bis(2-Chloroethyl)ether	111-44-4		U	10.5	2.63
bis(2-Chloroisopropyl)ether	108-60-1		U	10.5	2.63
bis(2-Ethylhexyl)phthalate	117-81-7	5.70	F	10.5	2.63
Butylbenzylphthalate	85-68-7		U	10.5	2.63
Chrysene	218-01-9		U	10.5	2.63
Di-N-Butylphthalate	84-74-2		U	10.5	2.63
Di-n-octylphthalate	117-84-0		U	10.5	2.63
Dibenzo(a,h)Anthracene	53-70-3		U	10.5	2.63
Dibenzofuran	132-64-9		U	10.5	2.63
Diethylphthalate	84-66-2		U	10.5	2.63
Dimethylphthalate	131-11-3		U	10.5	2.63
Fluoranthene	206-44-0		U	10.5	2.63
Fluorene	86-73-7		U	10.5	2.63
Hexachlorobenzene	118-74-1		U	10.5	2.63
Hexachlorobutadiene	87-68-3		U	10.5	2.63
Hexachlorocyclopentadiene	77-47-4		U	10.5	2.63
Hexachloroethane	67-72-1		U	10.5	2.63

Report Number: **L09110074**
Report Date : **November 9, 2009**

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316704**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3510C**
Analytical Method: **8270C**
Analyst: **CAA**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS4**
Prep Date: **11/05/2009 08:30**
Cal Date: **11/03/2009 14:19**
Run Date: **11/06/2009 14:14**
File ID: **4M48869**

Analyte	CAS. Number	Result	Qual	RL	MDL
Indeno(1,2,3-cd)pyrene	193-39-5		U	10.5	2.63
Isophorone	78-59-1		U	10.5	2.63
N-Nitrosodiphenylamine	86-30-6		U	10.5	2.63
N-Nitroso-di-n-propylamine	621-64-7		U	10.5	2.63
Naphthalene	91-20-3		U	10.5	2.63
Nitrobenzene	98-95-3		U	10.5	2.63
Phenanthrene	85-01-8		U	10.5	2.63
Pyrene	129-00-0		U	10.5	2.63
2,4,5-Trichlorophenol	95-95-4		U	10.5	2.63
2,4,6-Trichlorophenol	88-06-2		U	10.5	2.63
2,4-Dichlorophenol	120-83-2		U	10.5	2.63
2,4-Dimethylphenol	105-67-9		U	10.5	2.63
2,4-Dinitrophenol	51-28-5		Q	52.6	13.2
2-Chlorophenol	95-57-8		U	10.5	2.63
2-Methylphenol	95-48-7		U	10.5	2.63
2-Nitrophenol	88-75-5		U	10.5	2.63
4,6-Dinitro-2-methylphenol	534-52-1		U	52.6	13.2
4-Chloro-3-methylphenol	59-50-7		U	10.5	2.63
3-,4-Methylphenol	106-44-5		U	10.5	2.63
4-Nitrophenol	100-02-7		U	52.6	13.2
Benzoic acid	65-85-0		U	52.6	13.2
Pentachlorophenol	87-86-5		U	52.6	13.2
Phenol	108-95-2		U	10.5	2.63

Surrogate	% Recovery	Lower	Upper	Qual
2-Fluorophenol	28.9	20	120	
Phenol-d5	20.1	20	120	
Nitrobenzene-d5	49.1	41	120	
2-Fluorobiphenyl	49.3	48	120	
2,4,6-Tribromophenol	72.5	42	124	
p-Terphenyl-d14	65.6	51	135	

U Undetected; the analyte was analyzed for, but not detected.
Q One or more quality control criteria failed. See narrative.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316584**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

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

Instrument: **HPMS6**
Prep Date: **11/05/2009 14:32**
Cal Date: **10/16/2009 20:56**
Run Date: **11/05/2009 14:32**
File ID: **6M87113**

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	1.61		0.500	0.125
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

Report Number: **L09110074**
Report Date : **November 9, 2009**

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316584**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

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

Instrument: **HPMS6**
Prep Date: **11/05/2009 14:32**
Cal Date: **10/16/2009 20:56**
Run Date: **11/05/2009 14:32**
File ID: **6M87113**

Analyte	CAS. Number	Result	Qual	RL	MDL
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	21.5		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	0.957		0.300	0.125
Chloromethane	74-87-3		U	1.00	0.250
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	4.83	F	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	136777-61-2		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	0.354	F	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 acetate	108-05-4		Q	5.00	2.50
Vinyl chloride	75-01-4		U	1.00	0.250

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Report Number: **L09110074**
Report Date : **November 9, 2009**

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316584**
Collect Date: **11/03/2009 12:55**
Sample Tag: **01**

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

Instrument: **HPMS6**
Prep Date: **11/05/2009 14:32**
Cal Date: **10/16/2009 20:56**
Run Date: **11/05/2009 14:32**
File ID: **6M87113**

Surrogate	% Recovery	Lower	Upper	Qual
Dibromofluoromethane	113	85	115	
1,2-Dichloroethane-d4	105	72	119	
Toluene-d8	103	81	120	
4-Bromofluorobenzene	98.2	76	119	

U Undetected; the analyte was analyzed for, but not detected.
Q One or more quality control criteria failed. See narrative.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Sample Number: **L09110074-01**
Client ID: **IDW-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316495**
Collect Date: **11/03/2009 12:55**

PrePrep Method: **NONE**
Prep Method: **9040C**
Analytical Method: **9040C**
Analyst: **TMM**
Dilution: **1**
Units: **UNITS**

Instrument: **ORION-4STA**
Prep Date: **11/04/2009 14:10**
Cal Date:
Run Date: **11/04/2009 14:10**
File ID: **OS09110614273001**

Analyte	CAS. Number	Result	Qual	RL	MDL
Corrosivity pH	10-29-7	7.05			

Sample Number: **L09110074-02**
Client ID: **TB-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316584**
Collect Date: **11/03/2009 11:00**
Sample Tag: **01**

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

Instrument: **HPMS6**
Prep Date: **11/05/2009 14:00**
Cal Date: **10/16/2009 20:56**
Run Date: **11/05/2009 14:00**
File ID: **6M87112**

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	0.125
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

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Report Number: **L09110074**
Report Date : **November 9, 2009**

Sample Number: **L09110074-02**
Client ID: **TB-11-3-09**
Matrix: **Water**
Workgroup Number: **WG316584**
Collect Date: **11/03/2009 11:00**
Sample Tag: **01**

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

Instrument: **HPMS6**
Prep Date: **11/05/2009 14:00**
Cal Date: **10/16/2009 20:56**
Run Date: **11/05/2009 14:00**
File ID: **6M87112**

Analyte	CAS. Number	Result	Qual	RL	MDL
4-Chlorotoluene	106-43-4		U	1.00	0.250
Acetone	67-64-1	2.60	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
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	0.250
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	0.487	F	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	136777-61-2		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 acetate	108-05-4		Q	5.00	2.50
Vinyl chloride	75-01-4		U	1.00	0.250

Surrogate	% Recovery	Lower	Upper	Qual
Dibromofluoromethane	112	85	115	
1,2-Dichloroethane-d4	107	72	119	
Toluene-d8	104	81	120	
4-Bromofluorobenzene	97.4	76	119	

U Undetected; the analyte was analyzed for, but not detected.
Q One or more quality control criteria failed. See narrative.
F Found; the analyte was positively identified with concentration above MDL but below RL.

City of Memphis
TENNESSEE

DR. WILLIE W. HERENTON - Mayor
KEITH L. McGEE - Chief Administrative Officer
DIVISION OF PUBLIC WORKS
DWAN GILLIOM - Director
Maynard C. Stiles Wastewater Treatment Plant

Thursday, November 12, 2009

Mr. Thomas Holmes
Project Manage
e^2M Memphis Field office
2241 Truitt Street
Memphis, TN 38114

RE: Request to dispose of groundwater
Industrial Wastewater Discharge Agreement Permit # S-NN3-097
DES-DDC-EE (Memphis) @ 2163 Airways Blvd., Memphis, Tennessee

Dear Mr. Holmes:

We have received and approve your request to discharge of 20,000 gallons of groundwater from monitoring wells into the sanitary sewer system at the above referenced location. The discharge point is the sewer system through the existing discharge line for the ground water recovery system (IRA System) at the Dunn Field. The discharge flow rate should not exceed 30 gallon per minute.

This approval is for this batch of treated groundwater only.

If you should have any questions, please feel free to contact me at (901) 576-4337.

Sincerely,

Akil AL-Chokhachi
Environmental Engineer

5 February 2010

Mr. Akil AL-Chokhachi
City of Memphis
2303 North Second Avenue
Memphis, Tennessee 38127-7500

Reference: Wastewater Discharge Request – Fluvial SVE Condensate
Industrial Wastewater Discharge Agreement S-NN3-097
Defense Depot Memphis, Tennessee

Dear Mr. AL-Chokhachi:

In accordance with Section F – Self-Monitoring Schedule of the referenced Agreement, HDR|e^{2}M, on behalf of the Defense Logistics Agency, requests permission to discharge wastewater to the City of Memphis Sewer System. The wastewater was generated at Defense Depot Memphis, Tennessee during recent site restoration activities and includes condensate from Fluvial Soil Vapor Extraction (FSVE) operations, groundwater from sampling monitoring wells, and condensate water from Air Sparging Soil Vapor Extraction (AS/SVE) operations.

A grab sample of the wastewater was collected from the holding tank on 21 January 2010. The sample was submitted to Microbac Laboratories, Inc., in Marietta, Ohio for analysis of metals, volatile and semi-volatile organic compounds, and pH in accordance with the Agreement. The analytical results are compared to the concentration limits from the Agreement on the attached table; the laboratory report is also attached. All constituents were below the one-day maximum concentration limits applicable to the discharge, except Copper, Iron, Manganese, and Mercury which slightly exceeded the limits. If approved, the wastewater volume of approximately 20,000 gallons will be discharged to the sewer system through the existing discharge line for the groundwater recovery system at Dunn Field.

If you need additional information, please contact the undersigned at (916) 817-4964 or steven.herrera@hdrinc.com. Correspondence can also be sent to HDR|e^{2}M's Memphis field office at 2241 Truitt St., Memphis, TN 38114.

Sincerely,
engineering-environmental Management, Inc.

Steven Herrera, P.E.
FSVE Task Manager

cc: Michael A. Dobbs, DES-DDC-EE
John Hill, AFCEE/EXA
Thomas Holmes, HDR|e^{2}M

Sample Identification Date Sample Collected	IDW-01-21-10 1/21/2010	City of Memphis Industrial Permit Discharge Monthly Average Maximum	 One Day Maximum
pH(1)			
pH	6.8	5.5 to 10.0	5.5 to 10.0
Total Metals(2)	*ug/L*	*ug/L*	*ug/L*
Aluminum	882	5000	10000
Antimony	6.4	6	12
Arsenic	93.4	40	100
Barium	80.9	2000	4000
Cadmium	ND	10	20
Calcium	24400	40000	80000
Chromium	4.06F	200	400
Cobalt	2.59F	NS	NS
Copper	1620	600	1200
Iron	47100	15000	30000
Lead	4.73F	150	300
Magnesium	10600	20000	40000
Manganese	480	50	100
Mercury	2.37	1	2
Nickel	24.6F	100	300
Potassium	912F	2000	4000
Selenium	3.54	50	100
Sodium	13300	40000	80000
Thallium	ND	2	4
Zinc	413	300	1000
Volatile Organic Compounds (3)	*µg/L*	*µg/L*	*µg/L*
1,1,2,2-Tetrachloroethane	8.36	500	1000
1,1,1-Trichloroethane	ND	10	20
1,1,2-Trichloroethane	ND	50	100
1,1-Dichloroethane	ND	10	20
1,1-Dichloroethene	ND	50	100
Acetone	10.4	2000	4000
Carbon tetrachloride	ND	20	40
Chloroform	2.6	100	200
Chloromethane	ND	10	20
cis-1,2-Dichloroethene	0.306F	80	100
Methylene chloride	ND	10	20
Tetrachloroethene	ND	60	120
Toluene	ND	20	40
trans-1,2-Dichloroethene	ND	50	100
Trichloroethene	0.647F	400	800
1,4-Dichlorobenzene	0.304F	NS	NS
Semi-volatile Organic Compounds(4)	*µg/L*	*µg/L*	*µg/L*
Bis (2-ethylhexyl) Phthalate	ND	35	70
Di-n-butyl Phthalate	ND	30	60
Fluoranthene	ND	10	20
Naphthalene	ND	10	20
Phenanthrene	ND	10	20
Phenol	ND	10	20
Pyrene	ND	10	20

Notes

(1) pH analysis performed by EPA Method 9040C

(2) Metals analyses performed by EPA Method 6010B except for Mercury (EPA Method 7470A) and Arsenic, Antimony, Thallium and Selenium (EPA Method 6020)

(3) TCL Volatile Organic analyses performed by EPA Method 8260B

(4) TCL Semi-Volatile Organic Analyses performed by EPA Method 8270C

NS = No standard listed in the Industrial Wastewater Discharge Permit

ND = Analyte not detected above Reporting Limit

F = Found, analyte positively identified with concentration above MDL but below reporting limit

B = Analyte was found in an associated blank, as well as the sample.

LABORATORY REPORT

L10010378

01/29/10 15:35

Submitted By

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

For

Account Name: Engineering-Environmental Management
627 Spacious Sky
San Antonio, TX 78260
Attention: Lance Hines

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

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
IDW-1-21-10	L10010378-01	01/21/2010 09:30	01/22/2010
TB-1-21-10	L10010378-02	01/21/2010 09:30	01/22/2010

Report Number: **L10010378**
Report Date : **January 29, 2010**

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322130**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **7470A**
Analytical Method: **7470A**
Analyst: **PDM**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **01/26/2010 12:41**
Cal Date: **01/26/2010 14:20**
Run Date: **01/26/2010 15:02**
File ID: **HY.012610.150257**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6	0.00237		0.000200	0.000100

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322029**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

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

Instrument: **PE-ICP2**
Prep Date: **01/25/2010 08:13**
Cal Date: **01/25/2010 14:17**
Run Date: **01/26/2010 00:40**
File ID: **P2.012610.004045**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	0.882		0.100	0.0500
Barium, Total	7440-39-3	0.0809		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000500
Cadmium, Total	7440-43-9		U	0.0100	0.00250
Calcium, Total	7440-70-2	24.4		0.200	0.100
Chromium, Total	7440-47-3	0.00406	F	0.0200	0.00250
Cobalt, Total	7440-48-4	0.00259	F	0.0200	0.00250
Copper, Total	7440-50-8	1.62		0.0200	0.00500
Iron, Total	7439-89-6	47.1		0.100	0.0250
Lead, Total	7439-92-1	0.00473	F	0.00500	0.00250
Magnesium, Total	7439-95-4	10.6		0.500	0.250
Manganese, Total	7439-96-5	0.480		0.0100	0.00500
Nickel, Total	7440-02-0	0.0246	F	0.0400	0.00500
Potassium, Total	7440-09-7	0.912	F	1.00	0.250
Silver, Total	7440-22-4		U	0.0100	0.00500
Sodium, Total	7440-23-5	13.3		0.500	0.250
Vanadium, Total	7440-62-2		U	0.0100	0.00500
Zinc, Total	7440-66-6	0.413		0.0200	0.00500

U Undetected; the analyte was analyzed for, but not detected.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322066**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **01/25/2010 09:19**
Cal Date: **01/26/2010 11:15**
Run Date: **01/26/2010 13:36**
File ID: **EL.012610.133614**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0	0.00640		0.00100	0.000250
Arsenic, Total	7440-38-2	0.0934		0.00100	0.000250
Selenium, Total	7782-49-2	0.00354		0.00100	0.000500
Thallium, Total	7440-28-0		U	0.000200	0.0000500

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

Report Number: **L10010378**
Report Date : **January 29, 2010**

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322253**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3510C**
Analytical Method: **8270C**
Analyst: **CAA**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS4**
Prep Date: **01/27/2010 08:00**
Cal Date: **12/02/2009 13:36**
Run Date: **01/28/2010 20:37**
File ID: **4M49794**

Analyte	CAS. Number	Result	Qual	RL	MDL
1,2,4-Trichlorobenzene	120-82-1		UJ	10.4	2.60
1,2-Dichlorobenzene	95-50-1		UJ	10.4	2.60
1,3-Dichlorobenzene	541-73-1		UJ	10.4	2.60
1,4-Dichlorobenzene	106-46-7		UJ	10.4	2.60
2,4-Dinitrotoluene	121-14-2		UJ	10.4	2.60
2,6-Dinitrotoluene	606-20-2		UJ	10.4	2.60
2-Chloronaphthalene	91-58-7		UJ	10.4	2.60
2-Methylnaphthalene	91-57-6		UJ	10.4	2.60
2-Nitroaniline	88-74-4		UJ	52.1	13.0
3-Nitroaniline	99-09-2		UJ	52.1	13.0
3,3'-Dichlorobenzidine	91-94-1		Q	20.8	2.60
4-Bromophenyl-phenylether	101-55-3		UJ	10.4	2.60
4-Chloroaniline	106-47-8		UJ	10.4	5.21
4-Chlorophenyl-phenyl ether	7005-72-3		UJ	10.4	2.60
4-Nitroaniline	100-01-6		UJ	52.1	13.0
Acenaphthylene	208-96-8		U	10.4	2.60
Acenaphthene	83-32-9		U	10.4	2.60
Anthracene	120-12-7		U	10.4	2.60
Benzo(a)anthracene	56-55-3		Q	10.4	2.60
Benzo(a)pyrene	50-32-8		Q	10.4	2.60
Benzo(k)fluoranthene	207-08-9		Q	10.4	2.60
Benzo(b)fluoranthene	205-99-2		Q	10.4	2.60
Benzo(g,h,i)Perylene	191-24-2		U	10.4	2.60
Benzyl alcohol	100-51-6		UJ	10.4	2.60
Bis(2-Chloroethoxy)Methane	111-91-1		UJ	10.4	2.60
Bis(2-Chloroethyl)ether	111-44-4		UJ	10.4	2.60
bis(2-Chloroisopropyl)ether	108-60-1		Q	10.4	2.60
bis(2-Ethylhexyl)phthalate	117-81-7		Q	10.4	2.60
Butylbenzylphthalate	85-68-7		Q	10.4	2.60
Chrysene	218-01-9		Q	10.4	2.60
Di-N-Butylphthalate	84-74-2		UJ	10.4	2.60
Di-n-octylphthalate	117-84-0		Q	10.4	2.60
Dibenzo(a,h)Anthracene	53-70-3		UJ	10.4	2.60
Dibenzofuran	132-64-9		UJ	10.4	2.60
Diethylphthalate	84-66-2		UJ	10.4	2.60
Dimethylphthalate	131-11-3		UJ	10.4	2.60
Fluoranthene	206-44-0		Q	10.4	2.60
Fluorene	86-73-7		U	10.4	2.60
Hexachlorobenzene	118-74-1		UJ	10.4	2.60
Hexachlorobutadiene	87-68-3		UJ	10.4	2.60
Hexachlorocyclopentadiene	77-47-4		Q	10.4	2.60
Hexachloroethane	67-72-1		UJ	10.4	2.60
Indeno(1,2,3-cd)pyrene	193-39-5		U	10.4	2.60
Isophorone	78-59-1		UJ	10.4	2.60
N-Nitrosodiphenylamine	86-30-6		UJ	10.4	2.60
N-Nitroso-di-n-propylamine	621-64-7		UJ	10.4	2.60
Naphthalene	91-20-3		U	10.4	2.60
Nitrobenzene	98-95-3		UJ	10.4	2.60
Phenanthrene	85-01-8		U	10.4	2.60
Pyrene	129-00-0		U	10.4	2.60
2,4,5-Trichlorophenol	95-95-4		U	10.4	2.60
2,4,6-Trichlorophenol	88-06-2		U	10.4	2.60
2,4-Dichlorophenol	120-83-2		UJ	10.4	2.60
2,4-Dimethylphenol	105-67-9		UJ	10.4	2.60
2,4-Dinitrophenol	51-28-5		U	52.1	13.0
2-Chlorophenol	95-57-8		UJ	10.4	2.60
2-Methylphenol	95-48-7		UJ	10.4	2.60
2-Nitrophenol	88-75-5		UJ	10.4	2.60
4,6-Dinitro-2-methylphenol	534-52-1		U	52.1	13.0

Report Number: **L10010378**
Report Date : **January 29, 2010**

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322253**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3510C**
Analytical Method: **8270C**
Analyst: **CAA**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS4**
Prep Date: **01/27/2010 08:00**
Cal Date: **12/02/2009 13:36**
Run Date: **01/28/2010 20:37**
File ID: **4M49794**

Analyte	CAS. Number	Result	Qual	RL	MDL
4-Chloro-3-methylphenol	59-50-7		U	10.4	2.60
3-,4-Methylphenol	106-44-5		Q	10.4	2.60
4-Nitrophenol	100-02-7		U	52.1	13.0
Benzoic acid	65-85-0		Q	52.1	13.0
Pentachlorophenol	87-86-5		U	52.1	13.0
Phenol	108-95-2		UJ	10.4	2.60

Surrogate	% Recovery	Lower	Upper	Qual
2-Fluorophenol	17.6	20	120	*
Phenol-d5	10.9	20	120	*
Nitrobenzene-d5	31.3	41	120	*
2-Fluorobiphenyl	30.4	48	120	*
2,4,6-Tribromophenol	54.9	42	124	
p-Terphenyl-d14	54.9	51	135	

U Undetected; the analyte was analyzed for, but not detected.
Q One or more quality control criteria failed. See narrative.
*** Surrogate or spike compound out of range
UJ Undetected; the MDL and RL are estimated due to quality control discrepancies.

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322000**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

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

Instrument: **HPMS11**
Prep Date: **01/25/2010 17:48**
Cal Date: **01/22/2010 20:38**
Run Date: **01/25/2010 17:48**
File ID: **11M63596**

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	8.36		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	0.304	F	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	10.4		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

Report Number: **L10010378**
Report Date : **January 29, 2010**

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322000**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

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

Instrument: **HPMS11**
Prep Date: **01/25/2010 17:48**
Cal Date: **01/22/2010 20:38**
Run Date: **01/25/2010 17:48**
File ID: **11M63596**

Analyte	CAS. Number	Result	Qual	RL	MDL
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	2.60		0.300	0.125
Chloromethane	74-87-3		U	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.306	F	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	0.647	F	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	109	85	115	
1,2-Dichloroethane-d4	103	72	119	
Toluene-d8	107	81	120	
4-Bromofluorobenzene	105	76	119	

U Undetected; the analyte was analyzed for, but not detected.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Report Number: **L10010378**
Report Date : **January 29, 2010**

Sample Number: **L10010378-01**
Client ID: **IDW-1-21-10**
Matrix: **Water**
Workgroup Number: **WG321958**
Collect Date: **01/21/2010 09:30**

PrePrep Method: **NONE**
Prep Method: **9040C**
Analytical Method: **9040C**
Analyst: **HJR**
Dilution: **1**
Units: **UNITS**

Instrument: **ORION-4STA**
Prep Date: **01/22/2010 15:45**
Cal Date:
Run Date: **01/22/2010 15:45**
File ID: **OS10012610243001**

Analyte	CAS. Number	Result	Qual	RL	MDL
Corrosivity pH	10-29-7	6.80			

Sample Number: **L10010378-02**
Client ID: **TB-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322000**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

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

Instrument: **HPMS11**
Prep Date: **01/25/2010 14:09**
Cal Date: **01/22/2010 20:38**
Run Date: **01/25/2010 14:09**
File ID: **11M63589**

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	0.701		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	2.63	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
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: **L10010378**
Report Date : **January 29, 2010**

Sample Number: **L10010378-02**
Client ID: **TB-1-21-10**
Matrix: **Water**
Workgroup Number: **WG322000**
Collect Date: **01/21/2010 09:30**
Sample Tag: **01**

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

Instrument: **HPMS11**
Prep Date: **01/25/2010 14:09**
Cal Date: **01/22/2010 20:38**
Run Date: **01/25/2010 14:09**
File ID: **11M63589**

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	0.317	F	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	104	85	115	
1,2-Dichloroethane-d4	97.3	72	119	
Toluene-d8	106	81	120	
4-Bromofluorobenzene	104	76	119	

U Undetected; the analyte was analyzed for, but not detected.
F Found; the analyte was positively identified with concentration above MDL but below RL.

City of Memphis
TENNESSEE

A C WHARTON, JR. - Mayor
JACK SAMMONS - Chief Administrative Officer
DIVISION OF PUBLIC WORKS
DWAN GILLIOM - Director
Maynard C. Stiles Wastewater Treatment Plant

Tuesday, February 09, 2010

Mr. Thomas Holmes
Project Manage
e^{2}M Memphis Field office
2241 Truitt Street
Memphis, TN 38114

RE: Request to dispose of groundwater
Industrial Wastewater Discharge Agreement Permit # S-NN3-097
DES-DDC-EE (Memphis) @ 2163 Airways Blvd., Memphis, Tennessee

Dear Mr. Holmes:

We have received and approve your request to discharge of 20,000 gallons of groundwater from monitoring wells into the sanitary sewer system at the above referenced location. The discharge point is the sewer system through the existing discharge line for the ground water recovery system (IRA System) at the Dunn Field. The discharge flow rate should not exceed 30 gallon per minute.

This approval is for this batch of treated groundwater only.

If you should have any questions, please feel free to contact me at (901) 576-4337.

Sincerely,

Akil AL-Chokhachi
Environmental Engineer

15 June 2010

Mr. Akil AL-Chokhachi
City of Memphis
2303 North Second Avenue
Memphis, Tennessee 38127-7500

Reference: Wastewater Discharge Request – Fluvial SVE Condensate
Industrial Wastewater Discharge Agreement S-NN3-097
Defense Depot Memphis, Tennessee

Dear Mr. AL-Chokhachi:

In accordance with Section F – Self-Monitoring Schedule of the referenced Agreement, HDR|e^{2}M, on behalf of the Defense Logistics Agency, requests permission to discharge wastewater to the City of Memphis Sewer System. The wastewater was generated at Defense Depot Memphis, Tennessee during recent site restoration activities and includes condensate from Fluvial Soil Vapor Extraction (FSVE) operations, groundwater from sampling monitoring wells, and condensate water from Air Sparging Soil Vapor Extraction (AS/SVE) operations.

A grab sample of the wastewater was collected from the holding tank on 1 June 2010. The sample was submitted to Microbac Laboratories, Inc., in Marietta, Ohio for analysis of metals, volatile and semi-volatile organic compounds, and pH in accordance with the Agreement. The analytical results are compared to the concentration limits from the Agreement on the attached table; the laboratory report is also attached. All constituents were below the one-day maximum concentration limits applicable to the discharge, except Manganese. If approved, the wastewater volume of approximately 17,000 gallons will be discharged to the sewer system through the existing discharge line for the groundwater recovery system at Dunn Field.

If you need additional information, please contact the undersigned at (402) 237-3982 or thomas.holmes@hdrinc.com. You may also contact HDR|e^{2}M's Memphis field office by phone at 901-776-6717 or mail at 2241 Truitt St., Memphis, TN 38114.

Sincerely,
HDR|e^{2}M

Thomas C Holmes

Thomas Holmes.
Project Manager

cc: Michael A. Dobbs, DES-DDC-EE
John Hill, AFCEE/EXA

Sample Identification Date Sample Collected	IDW-6-1-10 6/1/2010	City of Memphis Industrial Permit Discharge Monthly Average Maximum	 One Day Maximum
pH(1)			
pH	7.35	5.5 to 10.0	5.5 to 10.0
Total Metals(2)	*ug/L*	*ug/L*	*ug/L*
Aluminum	45.6	5000	10000
Antimony	ND	6	12
Arsenic	1.14	40	100
Barium	68	2000	4000
Cadmium	ND	10	20
Calcium	28800	40000	80000
Chromium	ND	200	400
Copper	288	600	1200
Iron	16900	15000	30000
Lead	ND	150	300
Magnesium	14700	20000	40000
Manganese	558	50	100
Mercury	0.58	1	2
Nickel	10.6	100	300
Potassium	830	2000	4000
Selenium	2.35	50	100
Sodium	17300	40000	80000
Thallium	ND	2	4
Zinc	265	300	1000
Volatile Organic Compounds (3)	*µg/L*	*µg/L*	*µg/L*
1,1,2,2-Tetrachloroethane	0.243 F	500	1000
1,1,1-Trichloroethane	ND	10	20
1,1,2-Trichloroethane	ND	50	100
1,1-Dichloroethane	ND	10	20
1,1-Dichloroethene	ND	50	100
Acetone	4.29 F	2000	4000
Carbon tetrachloride	ND	20	40
Chloroform	0.187 F	100	200
Chloromethane	ND	10	20
cis-1,2-Dichloroethene	ND	80	100
Methylene chloride	ND	10	20
Tetrachloroethene	ND	60	120
Toluene	0.303 F	20	40
trans-1,2-Dichloroethene	ND	50	100
Trichloroethene	0.3 F	400	800
1,4-Dichlorobenzene	0.25 F	NS	NS
Semi-volatile Organic Compounds(4)	*µg/L*	*µg/L*	*µg/L*
Bis (2-ethylhexyl) Phthalate	ND	35	70
Di-n-butyl Phthalate	ND	30	60
Fluoranthene	ND	10	20
Naphthalene	ND	10	20
Phenanthrene	ND	10	20
Phenol	ND	10	20
Pyrene	ND	10	20

Notes

(1) pH analysis performed by EPA Method 9040C

(2) Metals analyses performed by EPA Method 6010B except for Mercury (EPA Method 7470A) and Arsenic, Antimony, Thallium and Selenium (EPA Method 6020)

(3) TCL Volatile Organic analyses performed by EPA Method 8260B

(4) TCL Semi-Volatile Organic Analyses performed by EPA Method 8270C

NS = No standard listed in the Industrial Wastewater Discharge Permit

ND = Analyte not detected above Reporting Limit

F = Found, analyte positively identified with concentration above MDL but below reporting limit

LABORATORY REPORT

L10060055

06/14/10 12:57

Submitted By

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

For

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

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

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
IDW-6-1-10	L10060055-01	06/01/2010 10:00	06/02/2010
TB-6-1-10	L10060055-02	06/01/2010 09:00	06/02/2010

Report Number: **L10060055**
Report Date : **June 14, 2010**

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333471**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **7470A**
Analytical Method: **7470A**
Analyst: **EDA**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **06/04/2010 08:55**
Cal Date: **06/04/2010 11:57**
Run Date: **06/04/2010 12:28**
File ID: **HY.060410.122845**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6	0.000580		0.000200	0.000100

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333482**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

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

Instrument: **PE-ICP2**
Prep Date: **06/03/2010 06:35**
Cal Date: **06/04/2010 09:48**
Run Date: **06/04/2010 20:24**
File ID: **P2.060410.202444**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	0.456		0.100	0.0500
Barium, Total	7440-39-3	0.0680		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000500
Cadmium, Total	7440-43-9		U	0.0100	0.00250
Calcium, Total	7440-70-2	28.8		0.200	0.100
Chromium, Total	7440-47-3		U	0.0200	0.00250
Cobalt, Total	7440-48-4		U	0.0200	0.00250
Copper, Total	7440-50-8	0.288		0.0200	0.00500
Lead, Total	7439-92-1		U	0.00500	0.00250
Magnesium, Total	7439-95-4	14.7		0.500	0.250
Manganese, Total	7439-96-5	0.558		0.0100	0.00500
Nickel, Total	7440-02-0	0.0106	F	0.0400	0.00500
Potassium, Total	7440-09-7	0.830	F	1.00	0.250
Silver, Total	7440-22-4		U	0.0100	0.00500
Vanadium, Total	7440-62-2		U	0.0100	0.00500
Zinc, Total	7440-66-6	0.265		0.0200	0.00500

U Undetected; the analyte was analyzed for, but not detected.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333482**
Collect Date: **06/01/2010 10:00**
Sample Tag: **02**

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

Instrument: **PE-ICP2**
Prep Date: **06/03/2010 06:35**
Cal Date: **06/07/2010 12:59**
Run Date: **06/07/2010 21:28**
File ID: **P2.060710.212847**

Analyte	CAS. Number	Result	Qual	RL	MDL
Iron, Total	7439-89-6	16.9		0.100	0.0250
Sodium, Total	7440-23-5	17.3		0.500	0.250

Report Number: **L10060055**
Report Date : **June 14, 2010**

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333306**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020A**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **06/03/2010 06:03**
Cal Date: **06/03/2010 10:52**
Run Date: **06/03/2010 14:31**
File ID: **EL.060310.143151**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0		U	0.00100	0.000500
Arsenic, Total	7440-38-2	0.00114		0.00100	0.000500
Selenium, Total	7782-49-2	0.00235		0.00100	0.000500
Thallium, Total	7440-28-0		U	0.000200	0.000100

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

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333415**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3510C**
Analytical Method: **8270C**
Analyst: **CAA**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS4**
Prep Date: **06/03/2010 11:30**
Cal Date: **05/27/2010 23:41**
Run Date: **06/09/2010 15:16**
File ID: **4M51505**

Analyte	CAS. Number	Result	Qual	RL	MDL
1,2,4-Trichlorobenzene	120-82-1		U	9.63	2.41
1,2-Dichlorobenzene	95-50-1		U	9.63	2.41
1,3-Dichlorobenzene	541-73-1		U	9.63	2.41
1,4-Dichlorobenzene	106-46-7		U	9.63	2.41
2,4-Dinitrotoluene	121-14-2		U	9.63	2.41
2,6-Dinitrotoluene	606-20-2		U	9.63	2.41
2-Chloronaphthalene	91-58-7		U	9.63	2.41
2-Methylnaphthalene	91-57-6		U	9.63	2.41
2-Nitroaniline	88-74-4		U	48.2	12.0
3-Nitroaniline	99-09-2		U	48.2	12.0
3,3'-Dichlorobenzidine	91-94-1		U	19.3	2.41
4-Bromophenyl-phenylether	101-55-3		U	9.63	2.41
4-Chloroaniline	106-47-8		U	9.63	4.82
4-Chlorophenyl-phenyl ether	7005-72-3		U	9.63	2.41
4-Nitroaniline	100-01-6		U	48.2	12.0
Acenaphthylene	208-96-8		U	9.63	2.41
Acenaphthene	83-32-9		U	9.63	2.41
Anthracene	120-12-7		U	9.63	2.41
Benzo(a)anthracene	56-55-3		U	9.63	2.41
Benzo(a)pyrene	50-32-8		U	9.63	2.41
Benzo(k)fluoranthene	207-08-9		U	9.63	2.41
Benzo(b)fluoranthene	205-99-2		U	9.63	2.41
Benzo(g,h,i)Perylene	191-24-2		U	9.63	2.41
Benzyl alcohol	100-51-6		U	9.63	2.41
Bis(2-Chloroethoxy)Methane	111-91-1		U	9.63	2.41
Bis(2-Chloroethyl)ether	111-44-4		U	9.63	2.41
bis(2-Chloroisopropyl)ether	108-60-1		Q	9.63	2.41
bis(2-Ethylhexyl)phthalate	117-81-7		U	9.63	2.41
Butylbenzylphthalate	85-68-7		U	9.63	2.41
Chrysene	218-01-9		U	9.63	2.41
Di-N-Butylphthalate	84-74-2		U	9.63	2.41
Di-n-octylphthalate	117-84-0		U	9.63	2.41
Dibenzo(a,h)Anthracene	53-70-3		U	9.63	2.41
Dibenzofuran	132-64-9		U	9.63	2.41
Diethylphthalate	84-66-2		U	9.63	2.41
Dimethylphthalate	131-11-3		U	9.63	2.41
Fluoranthene	206-44-0		U	9.63	2.41
Fluorene	86-73-7		U	9.63	2.41
Hexachlorobenzene	118-74-1		U	9.63	2.41
Hexachlorobutadiene	87-68-3		U	9.63	2.41
Hexachlorocyclopentadiene	77-47-4		U	9.63	2.41
Hexachloroethane	67-72-1		U	9.63	2.41

Report Number: **L10060055**
Report Date : **June 14, 2010**

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333415**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3510C**
Analytical Method: **8270C**
Analyst: **CAA**
Dilution: **1**
Units: **ug/L**

Instrument: **HPMS4**
Prep Date: **06/03/2010 11:30**
Cal Date: **05/27/2010 23:41**
Run Date: **06/09/2010 15:16**
File ID: **4M51505**

Analyte	CAS. Number	Result	Qual	RL	MDL
Indeno(1,2,3-cd)pyrene	193-39-5		U	9.63	2.41
Isophorone	78-59-1		U	9.63	2.41
N-Nitrosodiphenylamine	86-30-6		U	9.63	2.41
N-Nitroso-di-n-propylamine	621-64-7		U	9.63	2.41
Naphthalene	91-20-3		U	9.63	2.41
Nitrobenzene	98-95-3		U	9.63	2.41
Phenanthrene	85-01-8		U	9.63	2.41
Pyrene	129-00-0		U	9.63	2.41
2,4,5-Trichlorophenol	95-95-4		U	9.63	2.41
2,4,6-Trichlorophenol	88-06-2		U	9.63	2.41
2,4-Dichlorophenol	120-83-2		U	9.63	2.41
2,4-Dimethylphenol	105-67-9		U	9.63	2.41
2,4-Dinitrophenol	51-28-5		U	48.2	12.0
2-Chlorophenol	95-57-8		U	9.63	2.41
2-Methylphenol	95-48-7		U	9.63	2.41
2-Nitrophenol	88-75-5		U	9.63	2.41
4,6-Dinitro-2-methylphenol	534-52-1		U	48.2	12.0
4-Chloro-3-methylphenol	59-50-7		U	9.63	2.41
3-,4-Methylphenol	106-44-5		U	9.63	2.41
4-Nitrophenol	100-02-7		U	48.2	12.0
Benzoic acid	65-85-0		Q	48.2	12.0
Pentachlorophenol	87-86-5		U	48.2	12.0
Phenol	108-95-2		U	9.63	2.41

Surrogate	% Recovery	Lower	Upper	Qual
2-Fluorophenol	40.4	20	120	
Phenol-d5	26.0	20	120	
Nitrobenzene-d5	77.6	41	120	
2-Fluorobiphenyl	65.7	48	120	
2,4,6-Tribromophenol	83.2	42	124	
p-Terphenyl-d14	60.3	51	135	

U Undetected; the analyte was analyzed for, but not detected.
Q One or more quality control criteria failed. See narrative.

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333299**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

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

Instrument: **HPMS10**
Prep Date: **06/03/2010 19:34**
Cal Date: **05/07/2010 15:36**
Run Date: **06/03/2010 19:34**
File ID: **10M79942**

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	0.243	F	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

Report Number: **L10060055**
Report Date : **June 14, 2010**

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333299**
Collect Date: **06/01/2010 10:00**
Sample Tag: **01**

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

Instrument: **HPMS10**
Prep Date: **06/03/2010 19:34**
Cal Date: **05/07/2010 15:36**
Run Date: **06/03/2010 19:34**
File ID: **10M79942**

Analyte	CAS. Number	Result	Qual	RL	MDL
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	0.250	F	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	4.29	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
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	0.187	F	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	0.300	F	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	0.303	F	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	101	85	115	
1,2-Dichloroethane-d4	98.1	72	119	
Toluene-d8	107	81	120	
4-Bromofluorobenzene	105	76	119	

U Undetected; the analyte was analyzed for, but not detected.
F Found; the analyte was positively identified with concentration above MDL but below RL.

Report Number: **L10060055**
Report Date : **June 14, 2010**

Sample Number: **L10060055-01**
Client ID: **IDW-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333260**
Collect Date: **06/01/2010 10:00**

PrePrep Method: **NONE**
Prep Method: **9040C**
Analytical Method: **9040C**
Analyst: **DLP**
Dilution: **1**
Units: **UNITS**

Instrument: **ORION-4STA**
Prep Date: **06/02/2010 16:30**
Cal Date:
Run Date: **06/02/2010 16:30**
File ID: **OS10060808271401**

Analyte	CAS. Number	Result	Qual	RL	MDL
Corrosivity pH	10-29-7	7.35			

Sample Number: **L10060055-02**
Client ID: **TB-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333299**
Collect Date: **06/01/2010 09:00**
Sample Tag: **01**

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

Instrument: **HPMS10**
Prep Date: **06/03/2010 14:48**
Cal Date: **05/07/2010 15:36**
Run Date: **06/03/2010 14:48**
File ID: **10M79933**

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: **L10060055**
Report Date : **June 14, 2010**

Sample Number: **L10060055-02**
Client ID: **TB-6-1-10**
Matrix: **Water**
Workgroup Number: **WG333299**
Collect Date: **06/01/2010 09:00**
Sample Tag: **01**

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

Instrument: **HPMS10**
Prep Date: **06/03/2010 14:48**
Cal Date: **05/07/2010 15:36**
Run Date: **06/03/2010 14:48**
File ID: **10M79933**

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	98.1	85	115	
1,2-Dichloroethane-d4	96.1	72	119	
Toluene-d8	105	81	120	
4-Bromofluorobenzene	106	76	119	

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

City of Memphis
TENNESSEE

A C WHARTON, JR. - Mayor
GEORGE M. LITTLE - Chief Administrative Officer
DIVISION OF PUBLIC WORKS
DWAN L. GILLIOM - Director
Maynard C. Stiles Wastewater Treatment Plant

June 17, 2010

Mr. Thomas Holmes
Project Manager
Memphis Field Office
HDR Engineering-Environmental Management, Inc.
2241 Truitt Street
Memphis, TN 38114

RE: Approval to Batch Discharge SVE Condensate to Sewer
Industrial Wastewater Discharge Agreement-Permit S-NN3-097
Defense Depot Memphis, Tennessee

Dear Mr. Holmes:

We have received and approve your request to discharge of 17,000 gallons of SVE condensate into the sanitary sewer from the Defense Depot Memphis site. The batch discharge flow rate should not exceed 30 gallon per minute. This approval is for a one-time event, which expires on July 2, 2010.

If you have any questions or comments, please contact me at (901) 636-4337.

Sincerely,

Henry Nakayama, P.E.
Environmental Engineer
Industrial Monitoring & Pretreatment Program

Cc: Program files.

APPENDIX B

RESULTS OF LABORATORY ANALYSES

TABLE B-1
ANALYTICAL RESULTS – SVE WELLS AND SYSTEM INFLUENT (4Q09 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location / Date / Event / Lab ID	Units	SVE-A 11/10/2009 SVE_4Q09 P0903878-001	SVE-B 11/10/2009 SVE_4Q09 P0903878-002	SVE-C 11/10/2009 SVE_4Q09 P0903878-003	SVE-D 11/10/2009 SVE_4Q09 P0903878-004	SVE-E 11/10/2009 SVE_4Q09 P0903878-005	SVE-F 11/10/2009 SVE_4Q09 P0903878-006	SVE-G 11/10/2009 SVE_4Q09 P0903878-007	SVE-INF 11/10/2009 SVE_4Q09 P0903878-008	SVE-INF-DUP 11/10/2009 SVE_4Q09 P0903878-009
1,1,1-Trichloroethane		ppb(v/v)	0.042 J	<0.28	<0.67	<0.27	<0.28	<0.28	<0.29	1.6 J	1.5 J
1,1,2,2-Tetrachloroethane		ppb(v/v)	58	0.05 J	0.61	<0.22	<0.22	<0.22	0.62	27	25
1,1,2-Trichloroethane		ppb(v/v)	0.66	<0.28	<0.67	<0.27	<0.28	<0.28	<0.29	2.2 J	2 J
1,1,2-Trichlorotrifluoroethane		ppb(v/v)	0.053 J	0.059 J	<0.48	0.067 J	0.06 J	0.059 J	0.062 J	11	10
1,1-Dichloroethane		ppb(v/v)	0.063 J	<0.38	<0.9	<0.37	<0.38	<0.37	<0.39	1.4 J	1.3 J
1,1-Dichloroethene		ppb(v/v)	1.4	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	9.1	8.5
1,2,4-Trichlorobenzene		ppb(v/v)	0.073 J	<0.21	<0.49	<0.2	<0.2	<0.2	0.08 J	<2	<1.7
1,2,4-Trimethylbenzene		ppb(v/v)	0.05 J	0.044 J	0.15 J	<0.3	0.05 J	0.052 J	0.071 J	<3	<2.6
1,2-Dibromo-3-chloropropane		ppb(v/v)	<0.16	<0.16	<0.38	<0.15	<0.16	<0.16	<0.16	<1.5	<1.3
1,2-Dibromoethane		ppb(v/v)	<0.21	<0.2	<0.47	<0.19	<0.2	<0.2	<0.2	<1.9	<1.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)		ppb(v/v)	<0.23	<0.22	<0.52	<0.21	<0.22	<0.21	<0.22	<2.1	<1.8
1,2-Dichlorobenzene		ppb(v/v)	<0.26	<0.26	<0.61	0.1 J	<0.25	<0.25	<0.26	<2.5	<2.1
1,2-Dichloroethane		ppb(v/v)	0.15 J	<0.38	<0.9	<0.37	<0.38	<0.37	<0.39	<3.7	<3.2
1,2-Dichloropropane		ppb(v/v)	<0.34	<0.33	<0.79	<0.32	<0.33	<0.32	<0.34	<3.2	<2.8
1,3,5-Trimethylbenzene		ppb(v/v)	<0.32	<0.31	<0.74	<0.3	<0.31	<0.31	<0.32	<3	<2.6
1,3-Butadiene		ppb(v/v)	<0.71	<0.7	<1.6	<0.67	<0.69	<0.68	<0.71	<6.7	<5.8
1,3-Dichlorobenzene		ppb(v/v)	0.068 J	<0.26	<0.61	<0.25	<0.25	<0.25	<0.26	<2.5	<2.1
1,4-Dichlorobenzene		ppb(v/v)	0.4	0.27	1.2	0.26	0.38	0.35	0.49	<2.5	<2.1
1,4-Dioxane		ppb(v/v)	<0.44	<0.43	0.37 J	0.067 J	<0.42	<0.42	<0.44	<4.1	<3.6
2-Butanone (MEK)		ppb(v/v)	10	<0.52	2.3	0.37 J	0.32 J	0.44 J	0.92	3.7 J	3.4 J
2-Hexanone		ppb(v/v)	0.26 J	0.054 J	0.34 J	0.064 J	0.056 J	0.11 J	0.094 J	<3.6	<3.1
2-Propanol (Isopropyl Alcohol)		ppb(v/v)	0.39 J	0.24 J	<1.5	0.21 J	0.18 J	0.2 J	0.4 J	<6.1	<5.2
3-Chloro-1-propene (Allyl Chloride)		ppb(v/v)	<0.5	<0.49	<1.2	<0.48	<0.49	<0.48	<0.5	<4.8	<4.1
4-Ethyltoluene		ppb(v/v)	<0.32	<0.31	<0.74	<0.3	<0.31	<0.31	<0.32	<3	<2.6
4-Methyl-2-pentanone		ppb(v/v)	0.15 J	<0.38	<0.89	<0.36	<0.37	<0.37	<0.38	<3.6	<3.1
Acetone		ppb(v/v)	13 J	5.4	51	3.6 J	3.1 J	5.2 J	6.9	32	29
Acetonitrile		ppb(v/v)	0.14 J	0.28 J	1.7 J	0.17 J	0.23 J	0.21 J	0.42 J	<8.9	<7.6
Acrolein		ppb(v/v)	0.48 J	0.36 J	0.42 J	0.23 J	0.4 J	0.43 J	0.49 J	<6.5	<5.6
Acrylonitrile		ppb(v/v)	<0.73	<0.71	<1.7	<0.69	<0.7	<0.69	<0.72	<6.9	<5.9
alpha-Pinene		ppb(v/v)	<0.28	<0.28	<0.65	<0.27	<0.27	<0.27	<0.28	<2.7	<2.3
Benzene		ppb(v/v)	0.2 J	0.18 J	0.37 J	0.19 J	0.17 J	0.17 J	0.3 J	<4.7	<4
Benzyl Chloride		ppb(v/v)	<0.31	<0.3	<0.7	<0.29	<0.29	<0.29	<0.3	<2.9	<2.5
Bromodichloromethane		ppb(v/v)	<0.24	<0.23	<0.54	<0.22	<0.23	<0.22	<0.23	<2.2	<1.9
Bromoform		ppb(v/v)	0.083 J	<0.15	<0.35	<0.14	<0.15	<0.15	<0.15	<1.4	<1.2
Bromomethane		ppb(v/v)	<0.41	<0.4	<0.94	<0.38	<0.39	<0.39	<0.4	<3.8	<3.3
Carbon Disulfide		ppb(v/v)	0.41 J	0.28 J	0.39 J	0.13 J	2.5	1.4	3.2	2.1 J	1.5 J
Carbon Tetrachloride		ppb(v/v)	1.9	0.057 J	0.22 J	0.063 J	0.062 J	0.061 J	0.062 J	9.1	8.5
Chlorobenzene		ppb(v/v)	0.052 J	<0.33	<0.79	<0.32	<0.33	<0.33	<0.34	<3.2	<2.8
Chloroethane		ppb(v/v)	<0.6	<0.58	<1.4	<0.56	<0.58	<0.57	<0.6	<5.6	<4.9
Chloroform		ppb(v/v)	41	0.14 J	1	0.15 J	0.14 J	0.16 J	0.54	300	300
Chloromethane		ppb(v/v)	0.13 J	0.16 J	<1.8	0.19 J	0.14 J	0.15 J	0.14 J	<7.2	<6.2
cis-1,2-Dichloroethene		ppb(v/v)	6.4	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	54	51
cis-1,3-Dichloropropene		ppb(v/v)	<0.35	<0.34	<0.8	<0.33	<0.33	<0.33	<0.35	<3.3	<2.8
Cumene		ppb(v/v)	<0.32	<0.31	<0.74	<0.3	<0.31	<0.31	<0.32	<3	<2.6
Cyclohexane		ppb(v/v)	<0.46	<0.45	<1.1	<0.43	<0.44	<0.44	<0.46	<4.3	<3.7
Dibromochloromethane		ppb(v/v)	<0.19	<0.18	<0.43	<0.17	<0.18	<0.18	<0.18	<1.7	<1.5
Dichlorodifluoromethane (CFC 12)		ppb(v/v)	0.38	0.38	0.32 J	0.39	0.37	0.39	0.39	2.2 J	2.1 J
d-Limonene		ppb(v/v)	<0.28	<0.28	<0.65	<0.27	<0.27	<0.27	<0.28	<2.7	<2.3
Ethanol		ppb(v/v)	1.2 J	0.93 J	<9.7	2.1 J	1.5 J	0.92 J	3.3 J	<40	<34
Ethyl Acetate		ppb(v/v)	0.39 J	<0.43	<1	<0.41	<0.42	<0.42	1.4	<4.1	<3.6
Ethylbenzene		ppb(v/v)	0.071 J	0.075 J	0.22 J	0.069 J	0.076 J	0.075 J	0.11 J	<3.4	<2.9
Hexachlorobutadiene		ppb(v/v)	0.042 J	<0.14	<0.34	<0.14	<0.14	<0.14	<0.15	<1.4	<1.2
m,p-Xylenes		ppb(v/v)	0.26 J	0.26 J	0.85	0.23 J	0.28 J	0.27 J	0.4	<3.4	<2.9
Methyl Methacrylate		ppb(v/v)	<0.39	<0.38	<0.89	<0.36	<0.37	<0.37	<0.38	<3.6	<3.1
Methyl tert-Butyl Ether		ppb(v/v)	<0.44	<0.43	<1	<0.41	<0.42	<0.42	<0.44	<4.1	<3.6
Methylene Chloride		ppb(v/v)	0.14 J	<0.44	<1	<0.43	<0.44	0.077 J	0.071 J	9.7	9.1
Naphthalene		ppb(v/v)	<0.3	<0.29	<0.69	<0.28	<0.29	<0.29	<0.3	<2.8	<2.4
n-Butyl Acetate		ppb(v/v)	<0.33	<0.32	<0.77	<0.31	<0.32	<0.32	<0.33	<3.1	<2.7
n-Heptane		ppb(v/v)	0.057 J	<0.38	<0.89	<0.36	<0.37	<0.37	0.13 J	<3.6	<3.1
n-Hexane		ppb(v/v)	0.14 J	0.096 J	<1	0.094 J	0.08 J	0.089 J	0.19 J	0.98 J	0.96 J
n-Nonane		ppb(v/v)	<0.3	<0.29	<0.69	<0.28	<0.29	<0.29	<0.3	<2.8	<2.4
n-Octane		ppb(v/v)	0.051 J	<0.33	<0.78	<0.32	<0.33	<0.32	0.048 J	<3.2	<2.7
n-Propylbenzene		ppb(v/v)	<0.32	<0.31	<0.74	<0.3	<0.31	<0.31	<0.32	<3	<2.6
o-Xylene		ppb(v/v)	0.11 J	0.096 J	0.3 J	0.084 J	0.1 J	0.1 J	0.14 J	<3.4	<2.9
Propene		ppb(v/v)	0.97 J	0.29 J	<2.1	<0.87	<0.88	<0.87	<0.91	6.4 J	6.2 J
Styrene		ppb(v/v)	<0.37	<0.36	<0.86	<0.35	<0.36	<0.35	<0.37	<3.5	<3
Tetrachloroethene		ppb(v/v)	53	<0.23	<0.54	<0.22	<0.22	<0.22	<0.23	27	24
Tetrahydrofuran (THF)		ppb(v/v)	<0.54	0.097 J	0.3 J	<0.51	<0.52	<0.51	0.1 J	<5.1	<4.3
Toluene		ppb(v/v)	0.45	0.54	1.4	0.53	0.49	0.49	1.1	<4	<3.4
trans-1,2-Dichloroethene		ppb(v/v)	2.2	<0.39	<0.92	<0.38	<0.38	<0.38	<0.4	11	10
trans-1,3-Dichloropropene		ppb(v/v)	<0.35	<0.34	<0.8	<0.33	<0.33	<0.33	<0.35	<3.3	<2.8
Trichloroethene		ppb(v/v)	75	0.13 J	0.93	0.1 J	0.11 J	0.089 J	0.29	240	220
Trichlorofluoromethane		ppb(v/v)	0.16 J	0.16 J	0.14 J	0.17 J	0.16 J	0.17 J	0.17 J	0.44 J	0.42 J
Vinyl Acetate		ppb(v/v)	0.56 J	0.54 J	<5.2	<2.1	<2.2	0.49 J	0.6 J	<21	<18
Vinyl Chloride		ppb(v/v)	<0.62	<0.6	<1.4	<0.58	<0.59	<0.59	<0.61	1.3 J	1.2 J

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume

TABLE B-2
ANALYTICAL RESULTS – SVE WELLS AND SYSTEM INFLUENT (1Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	SVE-A	SVE-B	FSVE-SVEC-1Q10-DUP	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF
	Date	2/5/2010	1/27/2010	1/27/2010	2/5/2010	1/27/2010	1/27/2010	1/27/2010	1/27/2010
	Event	SVE_1Q10	SVE_1Q10	SVE_1Q10	SVE_1Q10	SVE_1Q10	SVE_1Q10	SVE_1Q10	SVE_1Q10
	Lab ID	P1000459-001	P1000306-002	P1000306-009	P1000459-002	P1000306-005	P1000306-006	P1000306-007	P1000306-008
	Units								
1,1,1-Trichloroethane	ppb(v/v)	<0.26	<0.28	<0.32	<0.28	<0.28	<0.28	<0.29	0.16 J
1,1,2,2-Tetrachloroethane	ppb(v/v)	31	0.23	0.3	30	0.053 J	0.11 J	0.4	17
1,1,2-Trichloroethane	ppb(v/v)	0.12 J	<0.28	<0.32	0.99	<0.28	<0.28	<0.29	1.7
1,1,2-Trichlorotrifluoroethane	ppb(v/v)	0.088 J	0.095 J	0.1 J	0.086 J	0.09 J	0.076 J	0.13 J	0.3
1,1-Dichloroethane	ppb(v/v)	<0.35	<0.38	<0.44	<0.38	<0.38	<0.38	<0.39	0.25 J
1,1-Dichloroethene	ppb(v/v)	<0.36	<0.39	<0.45	0.91	<0.39	<0.39	<0.4	1.8
1,2,4-Trichlorobenzene	ppb(v/v)	<0.19	<0.21	<0.24	0.1 J	<0.21	<0.21	0.096 J	0.17
1,2,4-Trimethylbenzene	ppb(v/v)	<0.29	0.38	0.38	<0.31	0.45	0.24 J	0.35	0.085 J
1,2-Dibromo-3-chloropropane	ppb(v/v)	<0.15	<0.16	<0.18	<0.16	<0.16	<0.16	<0.16	<0.13
1,2-Dibromoethane	ppb(v/v)	<0.19	<0.2	<0.23	<0.2	<0.2	<0.2	<0.2	<0.17
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppb(v/v)	<0.2	<0.22	<0.25	<0.22	<0.22	<0.22	<0.22	<0.18
1,2-Dichlorobenzene	ppb(v/v)	<0.24	<0.26	<0.29	<0.25	<0.25	<0.25	<0.26	<0.21
1,2-Dichloroethane	ppb(v/v)	<0.35	<0.38	<0.44	0.18 J	<0.38	<0.38	<0.39	0.32
1,2-Dichloropropane	ppb(v/v)	<0.31	<0.33	<0.38	<0.33	<0.33	<0.33	<0.34	0.17 J
1,3,5-Trimethylbenzene	ppb(v/v)	<0.29	0.11 J	0.11 J	<0.31	0.12 J	<0.31	0.075 J	<0.26
1,3-Butadiene	ppb(v/v)	<0.65	<0.7	<0.8	<0.69	<0.69	<0.69	<0.71	<0.58
1,3-Dichlorobenzene	ppb(v/v)	<0.24	<0.26	<0.29	0.1 J	<0.25	<0.25	<0.26	0.16 J
1,4-Dichlorobenzene	ppb(v/v)	0.085 J	0.46	0.57	<0.25	0.6	0.36	0.54	0.13 J
1,4-Dioxane	ppb(v/v)	0.39 J	<0.43	<0.49	0.34 J	<0.42	<0.42	<0.44	<0.36
2-Butanone (MEK)	ppb(v/v)	0.24 J	3.8	1.9 J	1.5 J	1.6 J	1.4 J	1.7 J	2.7
2-Hexanone	ppb(v/v)	<0.35	0.15 J	0.37 J	0.19 J	0.12 J	0.14 J	<0.38	<0.31
2-Propanol (Isopropyl Alcohol)	ppb(v/v)	<0.58	0.68	0.47 J	<0.62	4.9	<0.62	1.1	<0.52
3-Chloro-1-propene (Allyl Chloride)	ppb(v/v)	<0.46	<0.49	<0.57	<0.49	<0.49	<0.49	<0.5	<0.41
4-Ethyltoluene	ppb(v/v)	<0.29	0.1 J	0.12 J	<0.31	0.13 J	0.068 J	0.094 J	<0.26
4-Methyl-2-pentanone	ppb(v/v)	<0.35	0.097 J	0.18 J	0.085 J	0.08 J	<0.37	0.11 J	0.14 J
Acetone	ppb(v/v)	1.1 J	58	20	110	7 J	7.7	47	19
Acetonitrile	ppb(v/v)	<0.85	2.2	0.53 J	<0.91	<0.91	<0.91	0.56 J	<0.76
Acrolein	ppb(v/v)	<1.2	0.99 J	0.3 J	<1.3	0.34 J	0.85 J	0.65 J	0.19 J
Acrylonitrile	ppb(v/v)	<0.66	<0.71	<0.82	<0.71	<0.71	<0.71	<0.72	<0.59
alpha-Pinene	ppb(v/v)	<0.26	0.053 J	0.076 J	0.052 J	0.089 J	<0.27	0.11 J	0.058 J
Benzene	ppb(v/v)	0.22 J	0.36 J	0.3 J	0.25 J	1.3	0.3 J	0.33 J	0.44
Benzyl Chloride	ppb(v/v)	<0.28	<0.3	<0.34	<0.3	<0.3	<0.3	<0.3	<0.25
Bromodichloromethane	ppb(v/v)	<0.21	<0.23	<0.26	0.057 J	<0.23	<0.23	<0.23	0.087 J
Bromoform	ppb(v/v)	<0.14	<0.15	<0.17	0.2	<0.15	<0.15	<0.15	<0.12
Bromomethane	ppb(v/v)	0.15 J	<0.4	<0.46	0.12 J	<0.39	<0.39	<0.4	<0.33
Carbon Disulfide	ppb(v/v)	<2.3	0.9 J	0.49 J	0.21 J	0.89 J	<2.5	9.1	0.63 J
Carbon Tetrachloride	ppb(v/v)	0.06 J	0.063 J	<0.28	1.4	0.073 J	0.06 J	0.069 J	9.4
Chlorobenzene	ppb(v/v)	<0.31	<0.33	<0.38	<0.33	<0.33	<0.33	<0.34	0.07 J
Chloroethane	ppb(v/v)	<0.54	<0.58	<0.67	<0.58	<0.58	<0.58	<0.6	<0.49
Chloroform	ppb(v/v)	3.1	0.56	0.64	31	0.52	0.51	1	210
Chloromethane	ppb(v/v)	<0.69	0.15 J	<0.86	<0.74	0.18 J	<0.74	<0.76	0.15 J
cis-1,2-Dichloroethene	ppb(v/v)	6	0.11 J	0.17 J	8.4	0.1 J	<0.39	0.1 J	30
cis-1,3-Dichloropropene	ppb(v/v)	<0.32	<0.34	<0.39	<0.34	<0.34	<0.34	<0.35	<0.28
Cumene	ppb(v/v)	<0.29	<0.31	<0.36	<0.31	0.3 J	<0.31	<0.32	<0.26
Cyclohexane	ppb(v/v)	<0.42	<0.45	<0.51	<0.44	<0.44	<0.44	<0.46	<0.37
Dibromochloromethane	ppb(v/v)	<0.17	<0.18	<0.21	<0.18	<0.18	<0.18	<0.18	<0.15
Dichlorodifluoromethane (CFC 12)	ppb(v/v)	0.57	0.52	0.54	0.52	0.56	0.48	0.55	2
d-Limonene	ppb(v/v)	0.2 J	0.83	0.93	0.11 J	1.6	0.56	0.84	0.16 J
Ethanol	ppb(v/v)	<3.8	<4.1	2.4 J	<4.1	4.9	2.8 J	<4.2	<3.4
Ethyl Acetate	ppb(v/v)	<0.4	<0.43	<0.49	<0.42	0.76	<0.42	<0.44	<0.36
Ethylbenzene	ppb(v/v)	<0.33	0.14 J	0.16 J	<0.35	0.4	0.12 J	0.14 J	0.089 J
Hexachlorobutadiene	ppb(v/v)	<0.13	<0.14	<0.17	0.087 J	<0.14	<0.14	<0.15	<0.12
m,p-Xylenes	ppb(v/v)	0.13 J	0.58	0.58	<0.35	1.4	0.46	0.56	0.19 J
Methyl Methacrylate	ppb(v/v)	<0.35	<0.38	<0.43	<0.37	<0.37	<0.37	<0.38	<0.31
Methyl tert-Butyl Ether	ppb(v/v)	<0.4	<0.43	<0.49	<0.42	<0.42	<0.42	<0.44	<0.36
Methylene Chloride	ppb(v/v)	<0.41	0.13 J	0.16 J	0.2 J	0.12 J	0.13 J	0.13 J	11
Naphthalene	ppb(v/v)	0.14 J	0.21 J	0.18 J	<0.29	<0.29	<0.29	<0.3	<0.24
n-Butyl Acetate	ppb(v/v)	<0.3	<0.32	<0.37	<0.32	<0.32	<0.32	<0.33	<0.27
n-Heptane	ppb(v/v)	<0.35	0.079 J	<0.43	<0.37	0.26 J	<0.37	<0.38	0.082 J
n-Hexane	ppb(v/v)	0.23 J	0.29 J	0.15 J	0.19 J	0.98	0.29 J	0.31 J	0.24 J
n-Nonane	ppb(v/v)	<0.27	0.1 J	0.17 J	<0.29	0.11 J	0.066 J	0.072 J	<0.24
n-Octane	ppb(v/v)	<0.31	0.075 J	<0.38	<0.33	0.11 J	<0.33	<0.34	<0.27
n-Propylbenzene	ppb(v/v)	<0.29	<0.31	0.079 J	<0.31	0.079 J	<0.31	<0.32	<0.26
o-Xylene	ppb(v/v)	<0.33	0.26 J	0.25 J	<0.35	0.54	0.2 J	0.24 J	0.1 J
Propene	ppb(v/v)	0.79 J	<0.9	<1	0.68 J	1.5	0.51 J	2.1 J	4.1
Styrene	ppb(v/v)	<0.34	<0.36	<0.42	<0.36	0.11 J	<0.36	<0.37	<0.3
Tetrachloroethene	ppb(v/v)	74	0.089 J	0.11 J	42	0.96	0.075 J	0.12 J	24
Tetrahydrofuran (THF)	ppb(v/v)	<0.49	0.16 J	0.29 J	<0.52	1.1	0.15 J	0.16 J	0.13 J
Toluene	ppb(v/v)	0.28 J	1.1	0.47	0.24 J	3.4	1	1.1	0.47
trans-1,2-Dichloroethene	ppb(v/v)	1.2	<0.39	<0.45	2.2	<0.39	<0.39	<0.4	6.4
trans-1,3-Dichloropropene	ppb(v/v)	<0.32	<0.34	<0.39	<0.34	<0.34	<0.34	<0.35	<0.28
Trichloroethene	ppb(v/v)	54	0.4	0.88	66	0.36	0.32	0.75	130
Trichlorofluoromethane	ppb(v/v)	0.32	0.24 J	0.25 J	0.21 J	0.25 J	0.21 J	0.23 J	0.35
Vinyl Acetate	ppb(v/v)	<2	2.7	<2.5	<2.2	<2.2	0.77 J	3.6	1.2 J
Vinyl Chloride	ppb(v/v)	<0.56	<0.6	<0.69	<0.6	<0.6	<0.6	<0.61	1.1

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
FSVE: fluvial soil vapor extraction
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume

TABLE B-3
ANALYTICAL RESULTS SUMMARY – SVE WELLS AND SYSTEM INFLUENT (2Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVE-INF	SVE-INF-2Q10-DUP
	Date	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010	4/28/2010
	Event	SVE_2Q10	SVE_2Q10	SVE_2Q10	SVE_2Q10	SVE_2Q10	SVE_2Q10	SVE_2Q10	SVE_2Q10	SVE_2Q10
	Lab ID	P1001509-001	P1001509-002	P1001509-003	P1001509-004	P1001509-005	P1001509-006	P1001509-007	P1001509-008	P1001509-009
	Units									
1,1,1-Trichloroethane	ppb(v/v)	<0.28	<0.27	<0.26	<0.26	0.082 J	0.075 J	<2.7	<0.23	0.044 J
1,1,2,2-Tetrachloroethane	ppb(v/v)	2.1	33	0.98	19	5.3	8.6	140	24	24
1,1,2-Trichloroethane	ppb(v/v)	0.4	0.35	0.12 J	0.12 J	0.24 J	3.5	9.7	1.3	1.4
1,1,2-Trichlorotrifluoroethane	ppb(v/v)	0.062 J	0.068 J	0.071 J	0.066 J	0.076 J	0.64	0.81 J	0.23	0.24
1,1-Dichloroethane	ppb(v/v)	<0.38	<0.36	<0.36	<0.35	<0.36	0.55	<3.7	0.15 J	0.15 J
1,1-Dichloroethene	ppb(v/v)	0.45	0.87	0.15 J	<0.36	1.1	1.6	4.2	1.1	1.1
1,2,4-Trichlorobenzene	ppb(v/v)	<0.2	<0.2	<0.19	<0.19	<0.19	<0.2	3.2	0.15 J	0.16 J
1,2,4-Trimethylbenzene	ppb(v/v)	<0.31	<0.3	<0.29	<0.29	<0.29	<0.3	<3	<0.26	<0.25
1,2-Dibromo-3-chloropropane	ppb(v/v)	<0.16	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5	<0.13	<0.13
1,2-Dibromoethane	ppb(v/v)	<0.2	<0.19	<0.19	<0.18	<0.19	<0.19	<1.9	<0.16	<0.16
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppb(v/v)	<0.22	<0.21	<0.21	<0.2	<0.21	<0.21	<2.1	<0.18	<0.18
1,2-Dichlorobenzene	ppb(v/v)	<0.25	<0.24	<0.24	<0.24	<0.24	<0.24	<2.5	<0.21	<0.2
1,2-Dichloroethane	ppb(v/v)	<0.38	<0.36	<0.36	<0.35	<0.36	0.6	3.3 J	0.3 J	0.29 J
1,2-Dichloropropane	ppb(v/v)	<0.33	<0.32	<0.31	<0.31	<0.31	0.43	<3.2	0.11 J	0.12 J
1,3,5-Trimethylbenzene	ppb(v/v)	<0.31	<0.3	<0.29	<0.29	<0.29	<0.3	<3	<0.26	<0.25
1,3-Butadiene	ppb(v/v)	<0.69	<0.66	<0.65	<0.64	<0.65	<0.66	<6.7	<0.57	<0.56
1,3-Dichlorobenzene	ppb(v/v)	<0.25	<0.24	<0.24	<0.24	<0.24	<0.24	2.2 J	0.13 J	0.12 J
1,4-Dichlorobenzene	ppb(v/v)	<0.25	<0.24	<0.24	<0.24	0.096 J	<0.24	<2.5	<0.21	<0.2
1,4-Dioxane	ppb(v/v)	<0.42	<0.41	<0.4	<0.39	<0.4	<0.41	<4.1	<0.35	<0.34
2-Butanone (MEK)	ppb(v/v)	0.59 J	0.32 J	0.46 J	0.25 J	0.45 J	0.24 J	7.1 J	0.31 J	0.54 J
2-Hexanone	ppb(v/v)	<0.37	<0.36	<0.35	<0.35	<0.35	<0.36	<3.6	<0.31	<0.3
2-Propanol (Isopropyl Alcohol)	ppb(v/v)	<0.62	<0.6	<0.59	<0.58	<0.59	<0.59	<6	<0.51	<0.5
3-Chloro-1-propene (Allyl Chloride)	ppb(v/v)	<0.49	<0.47	<0.46	<0.45	<0.46	<0.47	<4.7	<0.4	<0.39
4-Ethyltoluene	ppb(v/v)	<0.31	<0.3	<0.29	<0.29	<0.29	<0.3	<3	<0.26	<0.25
4-Methyl-2-pentanone	ppb(v/v)	0.082 J	<0.36	<0.35	<0.35	<0.35	<0.36	<3.6	<0.31	<0.3
Acetone	ppb(v/v)	3.1 J	2.4 J	24	0.83 J	2.2 J	2.6 J	40	2.3 J	4.2 J
Acetonitrile	ppb(v/v)	<0.91	<0.88	<0.86	<0.85	<0.86	<0.87	3.1 J	<0.75	<0.73
Acrolein	ppb(v/v)	0.28 J	<1.3	<1.3	<1.2	<1.3	<1.3	<13	0.17 J	0.37 J
Acrylonitrile	ppb(v/v)	<0.7	<0.68	<0.66	<0.65	<0.66	<0.67	<6.8	<0.58	<0.57
alpha-Pinene	ppb(v/v)	<0.27	<0.26	<0.26	<0.25	<0.26	<0.26	<2.7	<0.23	<0.22
Benzene	ppb(v/v)	<0.48	0.18 J	0.14 J	<0.44	0.19 J	0.58	1.3 J	0.23 J	0.24 J
Benzyl Chloride	ppb(v/v)	<0.29	<0.28	<0.28	<0.27	<0.28	<0.28	<2.9	<0.24	<0.24
Bromodichloromethane	ppb(v/v)	<0.23	0.044 J	<0.22	0.044 J	0.04 J	0.13 J	<2.2	0.073 J	0.074 J
Bromoform	ppb(v/v)	0.067 J	<0.14	<0.14	<0.14	<0.14	<0.14	<1.4	<0.12	<0.12
Bromomethane	ppb(v/v)	<0.39	0.079 J	0.088 J	0.094 J	0.076 J	<0.38	<3.8	0.079 J	<0.32
Carbon Disulfide	ppb(v/v)	<2.4	<2.4	17	0.53 J	1.4 J	0.57 J	<24	0.26 J	0.18 J
Carbon Tetrachloride	ppb(v/v)	0.6	0.14 J	0.11 J	0.061 J	1.7	24	23	7	7.1
Chlorobenzene	ppb(v/v)	<0.33	<0.32	<0.31	<0.31	<0.31	0.078 J	<3.2	<0.27	<0.27
Chloroethane	ppb(v/v)	<0.58	<0.56	<0.55	<0.54	<0.55	<0.55	<5.6	<0.48	<0.47
Chloroform	ppb(v/v)	11	20	5.4	3.5	2.7	430	690	200	200
Chloromethane	ppb(v/v)	<0.74	<0.71	<0.7	<0.69	<0.7	0.21 J	<7.2	<0.61	<0.6
cis-1,2-Dichloroethene	ppb(v/v)	3.3	23	8	5.5	8.8	120	26	51	51
cis-1,3-Dichloropropene	ppb(v/v)	<0.33	<0.32	<0.32	<0.31	<0.32	<0.32	<3.3	<0.28	<0.27
Cumene	ppb(v/v)	<0.31	<0.3	<0.29	<0.29	<0.29	<0.3	<3	<0.26	<0.25
Cyclohexane	ppb(v/v)	<0.44	<0.43	<0.42	<0.41	<0.42	<0.42	<4.3	<0.37	<0.36
Dibromochloromethane	ppb(v/v)	<0.18	<0.17	<0.17	<0.17	<0.17	<0.17	<1.7	<0.15	<0.14
Dichlorodifluoromethane (CFC 12)	ppb(v/v)	0.49	0.54	1.4	0.43	0.84	5.2	<3	1.7	1.7
d-Limonene	ppb(v/v)	<0.27	<0.26	<0.26	<0.25	<0.26	<0.26	<2.7	<0.23	<0.22
Ethanol	ppb(v/v)	<4	<3.9	<3.8	<3.8	<3.8	<3.9	<39	<3.3	<3.3
Ethyl Acetate	ppb(v/v)	0.3 J	<0.41	<0.4	<0.39	0.31 J	<0.41	<4.1	<0.35	<0.34
Ethylbenzene	ppb(v/v)	<0.35	<0.34	<0.33	<0.33	<0.33	<0.34	<3.4	<0.29	<0.28
Hexachlorobutadiene	ppb(v/v)	0.053 J	<0.14	<0.14	<0.13	<0.14	<0.14	<1.4	<0.12	<0.12
m,p-Xylenes	ppb(v/v)	<0.35	<0.34	<0.33	<0.33	<0.33	<0.34	<3.4	<0.29	<0.28
Methyl Methacrylate	ppb(v/v)	<0.37	<0.36	<0.35	<0.35	<0.35	<0.36	<3.6	<0.31	<0.3
Methyl tert-Butyl Ether	ppb(v/v)	<0.42	<0.41	<0.4	<0.39	<0.4	<0.41	<4.1	<0.35	<0.34
Methylene Chloride	ppb(v/v)	<0.44	<0.42	<0.41	<0.41	0.086 J	22	16	5.3	5.8
Naphthalene	ppb(v/v)	0.18 J	<0.28	<0.27	0.54	<0.27	<0.28	<2.8	<0.24	<0.23
n-Butyl Acetate	ppb(v/v)	<0.32	<0.31	<0.3	<0.3	<0.3	<0.31	<3.1	<0.27	<0.26
n-Heptane	ppb(v/v)	<0.37	<0.36	<0.35	<0.35	<0.35	<0.36	<3.6	<0.31	<0.3
n-Hexane	ppb(v/v)	<0.43	0.12 J	0.12 J	<0.4	0.17 J	0.14 J	<4.2	0.093 J	0.1 J
n-Nonane	ppb(v/v)	<0.29	<0.28	<0.27	<0.27	<0.27	<0.28	<2.8	0.061 J	<0.23
n-Octane	ppb(v/v)	<0.33	<0.31	<0.31	<0.3	<0.31	<0.31	<3.2	<0.27	<0.26
n-Propylbenzene	ppb(v/v)	<0.31	<0.3	<0.29	<0.29	<0.29	<0.3	<3	<0.26	<0.25
o-Xylene	ppb(v/v)	<0.35	<0.34	<0.33	<0.33	<0.33	<0.34	<3.4	<0.29	<0.28
Propene	ppb(v/v)	0.35 J	1.1	1.5	0.35 J	0.68 J	0.63 J	2.4 J	1.1	0.97
Styrene	ppb(v/v)	<0.36	<0.35	<0.34	<0.33	<0.34	<0.34	<3.5	<0.3	<0.29
Tetrachloroethene	ppb(v/v)	20	5.3	11	46	3	19	17	19	22
Tetrahydrofuran (THF)	ppb(v/v)	<0.52	<0.5	0.11 U	<0.48	0.11 J	<0.5	<5	0.1 J	0.1 J
Toluene	ppb(v/v)	<0.4	0.17 J	0.1 J	<0.38	0.22 J	0.25 J	<3.9	0.12 J	0.096 J
trans-1,2-Dichloroethene	ppb(v/v)	0.61	7.1	2.7	1.2	3.7	3.5	7.4	4.6	4.7
trans-1,3-Dichloropropene	ppb(v/v)	<0.33	<0.32	<0.32	<0.31	<0.32	<0.32	<3.3	<0.28	<0.27
Trichloroethene	ppb(v/v)	20	86	20	53	78	71	350	110	110
Trichlorofluoromethane	ppb(v/v)	0.2 J	0.29	0.25 J	0.27	0.3	0.26	<2.6	0.26	0.28
Vinyl Acetate	ppb(v/v)	<2.2	<2.1	<2	<2	<2	<2.1	<21	<1.8	<1.7
Vinyl Chloride	ppb(v/v)	<0.59	0.62	<0.56	<0.56	<0.56	2.6	<5.8	0.76	0.75

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume

TABLE B-4
ANALYTICAL RESULTS – SVE WELLS AND SYSTEM INFLUENT (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	SVE-A	SVE-B	SVE-C	SVE-D	SVE-E	SVE-F	SVE-G	SVEG-DUP	SVE-EFF
	Date	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010	7/13/2010
	Event	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10
	Lab ID	P1002467-001	P1002467-002	P1002467-003	P1002467-004	P1002467-005	P1002467-006	P1002467-007	P1002467-008	P1002467-009
	Units									
1,1,1-Trichloroethane	ppb(v/v)	<0.28	<0.27	<0.27	<0.27	<0.28	0.074 J	<4.7	<9.4	0.072 J
1,1,2,2-Tetrachloroethane	ppb(v/v)	4.5 J	66 J	0.48 J	20 J	3.2 J	11 J	280 J	210	22
1,1,2-Trichloroethane	ppb(v/v)	0.59 J	0.95 J	0.099 J	0.23 J	0.26 J	4.9 J	30 J	20	1.5
1,1,2-Trichlorotrifluoroethane	ppb(v/v)	0.063 J	0.09 J	0.067 J	0.067 J	0.065 J	1.3 J	1.6 J	<6.7	0.35
1,1-Dichloroethane	ppb(v/v)	<0.38	<0.37	<0.37	<0.36	<0.38	0.6 J	<6.3	<13	0.13 J
1,1-Dichloroethene	ppb(v/v)	0.29 J	1.7 J	0.16 J	<0.37	0.29 J	1.7 J	14 J	9.5 J	0.85
1,2,4-Trichlorobenzene	ppb(v/v)	<0.21	<0.2	<0.2	<0.2	<0.21	<0.2	6 J	5.2 J	0.066 J
1,2,4-Trimethylbenzene	ppb(v/v)	<0.31	<0.3	<0.3	<0.3	<0.31	<0.3	<5.2	<10	<0.25
1,2-Dibromo-3-chloropropane	ppb(v/v)	<0.16	<0.15	<0.15	<0.15	<0.16	<0.15	<2.7	<5.3	<0.13
1,2-Dibromoethane	ppb(v/v)	<0.2	<0.19	<0.19	<0.19	<0.2	<0.19	<3.3	<6.7	<0.16
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ppb(v/v)	<0.22	<0.21	<0.21	<0.21	<0.22	<0.21	<3.7	<7.3	<0.18
1,2-Dichlorobenzene	ppb(v/v)	<0.26	<0.25	<0.25	<0.24	<0.25	<0.24	<4.3	<8.5	<0.21
1,2-Dichloroethane	ppb(v/v)	<0.38	0.099 J	<0.37	<0.36	<0.38	0.75 J	11 J	7.5 J	0.25 J
1,2-Dichloropropane	ppb(v/v)	<0.33	<0.32	<0.32	<0.32	<0.33	0.49 J	<5.6	<11	0.1 J
1,3,5-Trimethylbenzene	ppb(v/v)	<0.31	<0.3	<0.3	<0.3	<0.31	<0.3	<5.2	<10	<0.25
1,3-Butadiene	ppb(v/v)	<0.7	<0.67	<0.67	<0.66	<0.69	<0.66	<12	<23	<0.57
1,3-Dichlorobenzene	ppb(v/v)	<0.26	<0.25	<0.25	<0.24	<0.25	<0.24	6.5 J	4.8 J	0.062 J
1,4-Dichlorobenzene	ppb(v/v)	<0.26	<0.25	<0.25	<0.24	0.16 J	<0.24	<4.3	<8.5	<0.21
1,4-Dioxane	ppb(v/v)	<0.43	<0.41	<0.41	<0.41	<0.42	<0.41	<7.1	<14	<0.35
2-Butanone (MEK)	ppb(v/v)	1.7 J	1.7 J	1.1 J	4.2 J	2 J	1.8 J	5.5 J	<87	0.65 J
2-Hexanone	ppb(v/v)	0.14 J	0.16 J	0.24 J	0.22 J	0.13 J	0.11 J	<6.3	<13	<0.31
2-Propanol (Isopropyl Alcohol)	ppb(v/v)	0.35 J	0.42 J	<0.61	0.65 J	<0.62	0.41 J	<10	<21	<0.51
3-Chloro-1-propene (Allyl Chloride)	ppb(v/v)	<0.49	<0.48	<0.48	<0.47	<0.49	<0.47	<8.2	<16	<0.4
4-Ethyltoluene	ppb(v/v)	<0.31	<0.3	<0.3	<0.3	<0.31	<0.3	<5.2	<10	<0.25
4-Methyl-2-pentanone	ppb(v/v)	<0.38	0.076 J	<0.36	0.087 J	<0.37	0.096 J	<6.3	<13	<0.31
Acetone	ppb(v/v)	6.7 J	6.1 J	7 J	12 J	14 J	7.5 J	34 J	<110	3.7
Acetonitrile	ppb(v/v)	0.51 J	<0.89	<0.89	<0.87	0.29 J	<0.88	<15	<31	<0.74
Acrolein	ppb(v/v)	0.71 J	0.5 J	<1.3	1 J	<1.3	0.75 J	<22	<45	0.5 J
Acrylonitrile	ppb(v/v)	<0.71	<0.69	<0.69	<0.67	<0.71	<0.68	<12	<24	<0.58
alpha-Pinene	ppb(v/v)	<0.28	0.053 J	<0.27	<0.26	<0.27	<0.26	<4.6	<9.2	<0.22
Benzene	ppb(v/v)	<0.48	0.28 J	0.11 J	<0.46	0.55 J	0.54 J	<8	<16	0.24 J
Benzyl Chloride	ppb(v/v)	<0.3	<0.29	<0.29	<0.28	<0.3	<0.28	<5	<9.9	<0.24
Bromodichloromethane	ppb(v/v)	<0.23	0.099 J	<0.22	0.045 J	<0.23	0.19 J	<3.8	<7.7	0.078 J
Bromoform	ppb(v/v)	0.041 J	<0.14	<0.14	<0.14	<0.15	<0.14	<2.5	<5	<0.12
Bromomethane	ppb(v/v)	<0.4	0.12 J	<0.38	0.08 J	<0.39	<0.38	<6.6	<13	0.067 J
Carbon Disulfide	ppb(v/v)	5.9 J	2.5 J	3.2 J	20 J	4.1 J	10 J	4 J	<82	2.9
Carbon Tetrachloride	ppb(v/v)	0.98 J	0.31 J	0.13 J	0.048 J	0.29 J	25 J	68 J	47	6.5
Chlorobenzene	ppb(v/v)	<0.33	<0.32	<0.32	<0.32	<0.33	0.082 J	<5.6	<11	<0.27
Chloroethane	ppb(v/v)	<0.58	<0.56	<0.56	<0.55	<0.58	<0.56	<9.7	<19	0.16 J
Chloroform	ppb(v/v)	9.1 J	24 J	2.3 J	3 J	4.7 J	530 J	1100 J	880	130
Chloromethane	ppb(v/v)	<0.75	<0.72	<0.72	<0.71	<0.74	<0.71	9.8 J	6.9 J	0.14 J
cis-1,2-Dichloroethene	ppb(v/v)	3.2 J	59 J	5.1 J	5.1 J	14 J	160 J	55 J	40	50
cis-1,3-Dichloropropene	ppb(v/v)	<0.34	<0.33	<0.33	<0.32	<0.34	<0.32	<5.7	<11	<0.28
Cumene	ppb(v/v)	<0.31	<0.3	<0.3	<0.3	<0.31	<0.3	<5.2	<10	<0.25
Cyclohexane	ppb(v/v)	<0.45	<0.43	<0.43	<0.42	<0.44	0.52 J	<7.5	<15	<0.36
Dibromochloromethane	ppb(v/v)	<0.18	<0.17	<0.17	<0.17	<0.18	<0.17	<3	<6	<0.15
Dichlorodifluoromethane (CFC 12)	ppb(v/v)	0.43 J	0.72 J	1.3 J	0.41 J	0.43 J	6.1 J	<5.2	<10	1.7
d-Limonene	ppb(v/v)	<0.28	<0.27	<0.27	<0.26	<0.27	<0.26	<4.6	<9.2	<0.22
Ethanol	ppb(v/v)	<4.1	2.4 J	<4	3.3 J	<4.1	3 J	<68	<140	<3.3
Ethyl Acetate	ppb(v/v)	<0.43	<0.41	<0.41	0.15 J	<0.42	<0.41	<7.1	<14	<0.35
Ethylbenzene	ppb(v/v)	<0.35	0.097 J	<0.34	<0.34	<0.35	<0.34	<5.9	<12	<0.29
Hexachlorobutadiene	ppb(v/v)	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<2.4	<4.8	<0.12
m,p-Xylenes	ppb(v/v)	<0.35	<0.34	<0.34	<0.34	<0.35	<0.34	<5.9	<12	<0.29
Methyl Methacrylate	ppb(v/v)	<0.38	<0.36	<0.36	<0.36	<0.37	<0.36	<6.3	<13	<0.31
Methyl tert-Butyl Ether	ppb(v/v)	<0.43	<0.41	<0.41	<0.41	<0.42	<0.41	<7.1	<14	<0.35
Methylene Chloride	ppb(v/v)	0.12 J	0.49 J	<0.43	0.18 J	0.22 J	20 J	24 J	19	4
Naphthalene	ppb(v/v)	<0.29	<0.28	<0.28	<0.28	<0.29	<0.28	<4.9	<9.8	<0.24
n-Butyl Acetate	ppb(v/v)	<0.32	<0.31	<0.31	<0.31	<0.32	<0.31	<5.4	<11	<0.26
n-Heptane	ppb(v/v)	0.08 J	<0.36	<0.36	<0.36	<0.37	0.13 J	<6.3	<13	<0.31
n-Hexane	ppb(v/v)	0.21 J	0.18 J	0.13 J	0.097 J	0.34 J	0.7 J	2.5 J	<15	0.25 J
n-Nonane	ppb(v/v)	<0.29	<0.28	<0.28	<0.28	<0.29	<0.28	<4.9	<9.8	<0.24
n-Octane	ppb(v/v)	0.11 J	<0.32	<0.32	<0.31	<0.33	<0.31	<5.5	<11	<0.27
n-Propylbenzene	ppb(v/v)	<0.31	<0.3	<0.3	<0.3	<0.31	<0.3	<5.2	<10	<0.25
o-Xylene	ppb(v/v)	<0.35	<0.34	<0.34	<0.34	<0.35	<0.34	<5.9	<12	<0.29
Propene	ppb(v/v)	<0.9	1.8 J	1.4 J	1.5 J	2.5 J	1.1 J	6.1 J	<30	1.1
Styrene	ppb(v/v)	<0.36	<0.35	<0.35	<0.34	<0.36	<0.35	<6	<12	<0.29
Tetrachloroethene	ppb(v/v)	35 J	14 J	65 J	11 J	4 J	18 J	57 J	42	21
Tetrahydrofuran (THF)	ppb(v/v)	0.21 J	0.48 J	0.25 J	0.3 J	0.37 J	0.26 J	3.3 J	<17	0.25 J
Toluene	ppb(v/v)	<0.41	1.8 J	<0.4	0.57 J	0.63 J	0.17 J	<6.8	<14	0.084 J
trans-1,2-Dichloroethene	ppb(v/v)	0.94 J	20 J	3.5 J	1 J	6.9 J	3.7 J	15 J	11 J	6
trans-1,3-Dichloropropene	ppb(v/v)	<0.34	<0.33	<0.33	<0.32	<0.34	<0.32	<5.7	<11	<0.28
Trichloroethene	ppb(v/v)	29 J	240 J	28 J	42 J	160 J	80 J	950 J	800	100
Trichlorofluoromethane	ppb(v/v)	0.21 J	0.36 J	0.23 J	0.25 J	0.22 J	0.28 J	1.3 J	<9.1	0.27
Vinyl Acetate	ppb(v/v)	1.9 J	1.1 J	<2.1	1.8 J	<2.2	2.1 J	<36	<73	0.58 J
Vinyl Chloride	ppb(v/v)	<0.6	1.8 J	<0.58	<0.57	<0.6	2.1 J	<10	<20	0.74

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume

TABLE B-5
ANALYTICAL RESULTS – VMPs (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	VMP-1A	VMP-1B	VMP-2A	VMP-2B	VMP-3A	VMP-3B-DUP	VMP-3B	VMP-4A	VMP-4B
	Date	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010	7/14/2010
	Event	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10
	Lab ID	P1002467-010	P1002467-011	P1002467-012	P1002467-013	P1002467-014	P1002468-002	P1002468-001	P1002468-003	P1002468-004
	Units									
1,1,1-Trichloroethane	ppb(v/v)	<0.28	<0.25	<0.29	<0.54	<4.2	<0.28	<0.27	<0.27	<0.27
1,1,2,2-Tetrachloroethane	ppb(v/v)	<0.22	0.12 J	<0.23	<0.43	<3.4	0.76	0.44	<0.22	<0.22
1,1,2-Trichloroethane	ppb(v/v)	<0.28	<0.25	<0.29	<0.54	<4.2	<0.28	<0.27	<0.27	<0.27
1,1,2-Trichlorotrifluoroethane	ppb(v/v)	0.074 J	0.071 J	0.077 J	<0.39	<3	0.063 J	0.068 J	0.067 J	0.095 J
1,1-Dichloroethane	ppb(v/v)	<0.38	<0.34	<0.39	<0.73	<5.7	<0.37	<0.37	<0.37	<0.37
1,1-Dichloroethene	ppb(v/v)	<0.39	<0.34	1.9	1.2	28 J	<0.38 UJ	<0.38	<0.37	<0.37
1,2,4-Trichlorobenzene	ppb(v/v)	<0.21	<0.18	<0.21	<0.4	<3.1	<0.2	<0.2	<0.2	<0.2
1,2,4-Trimethylbenzene	ppb(v/v)	<0.31	1.9	<0.32	0.14 J	<4.7	0.22 J	0.34	0.15 J	0.12 J
chloropropane	ppb(v/v)	<0.16	<0.14	<0.16	<0.31	<2.4	<0.16	<0.15	<0.15	<0.15
1,2-Dibromoethane	ppb(v/v)	<0.2	<0.18	<0.2	<0.39	<3	<0.2	<0.19	<0.19	<0.19
tetrafluoroethane (CFC 114)	ppb(v/v)	<0.22	<0.19	<0.22	<0.42	<3.3	<0.21	<0.21	<0.21	<0.21
1,2-Dichlorobenzene	ppb(v/v)	<0.25	<0.23	<0.26	<0.49	<3.8	<0.25	<0.25	<0.25	<0.25
1,2-Dichloroethane	ppb(v/v)	<0.38	<0.34	<0.39	<0.73	<5.7	<0.37	<0.37	<0.37	<0.37
1,2-Dichloropropane	ppb(v/v)	0.59	<0.29	<0.34	<0.64	<5	<0.32	<0.32	<0.32	<0.32
1,3,5-Trimethylbenzene	ppb(v/v)	<0.31	0.43	<0.32	<0.6	<4.7	0.081 J	0.14 J	<0.3	<0.3
1,3-Butadiene	ppb(v/v)	0.3 J	<0.62	<0.71	0.55 J	<10	<0.68	<0.67	0.35 J	0.64 J
1,3-Dichlorobenzene	ppb(v/v)	<0.25	<0.23	<0.26	<0.49	<3.8	<0.25	<0.25	<0.25	<0.25
1,4-Dichlorobenzene	ppb(v/v)	0.11 J	16	0.16 J	0.31 J	<3.8	0.18 J	0.29	0.49	0.27
1,4-Dioxane	ppb(v/v)	<0.42	<0.38	<0.43	<0.82	<6.4	0.81	<0.41	<0.41	<0.41
2-Butanone (MEK)	ppb(v/v)	2 J	85	0.74 J	3.7 J	<39	1.8 J	3.2	4.6	4.6
2-Hexanone	ppb(v/v)	0.18 J	78	0.13 J	<0.72	<5.6	0.3 J	0.29 J	0.18 J	0.16 J
Alcohol)	ppb(v/v)	<0.62	0.61	<0.63	0.81 J	<9.4	0.63	0.86	0.85	1.1
Chloride)	ppb(v/v)	<0.49	<0.43	<0.5	<0.95	<7.4	<0.48	<0.48	<0.47	<0.47
4-Ethyltoluene	ppb(v/v)	<0.31	0.32	<0.32	<0.6	<4.7	<0.31	0.075 J	<0.3	<0.3
4-Methyl-2-pentanone	ppb(v/v)	0.11 J	0.31 J	0.091 J	0.31 J	<5.6	0.18 J	<0.36	0.17 J	0.15 J
Acetone	ppb(v/v)	9.9 J	24	4.8 J	11	<48	18 J	24	30	55
Acetonitrile	ppb(v/v)	0.37 J	0.52 J	<0.93	<1.8	<14	3.1	0.46 J	0.65 J	0.78 J
Acrolein	ppb(v/v)	0.77 J	2.7	1.4 J	0.69 J	<20	1.7	0.56 J	1 J	0.87 J
Acrylonitrile	ppb(v/v)	<0.71	<0.63	<0.72	<1.4	<11	<0.69	<0.69	<0.68	0.17 J
alpha-Pinene	ppb(v/v)	0.21 J	0.13 J	0.068 J	9.4	<4.1	0.068 J	0.051 J	0.11 J	0.18 J
Benzene	ppb(v/v)	0.75	0.45	0.11 J	6.1	2.1 J	0.14 J	0.26 J	0.24 J	0.26 J
Benzyl Chloride	ppb(v/v)	<0.3	<0.26	<0.3	<0.57	<4.4	<0.29	<0.29	<0.29	<0.29
Bromodichloromethane	ppb(v/v)	<0.23	<0.2	0.32	<0.44	<3.4	<0.22	<0.22	<0.22	<0.22
Bromoform	ppb(v/v)	<0.15	<0.13	<0.15	<0.29	<2.2	<0.15	<0.14	<0.14	<0.14
Bromomethane	ppb(v/v)	0.16 J	<0.35	<0.4	0.41 J	<5.9	<0.39	<0.38	<0.38	0.13 J
Carbon Disulfide	ppb(v/v)	2.5	170	2.3 J	2.2 J	10 J	0.61 J	3.5	51	84
Carbon Tetrachloride	ppb(v/v)	0.24 J	0.075 J	<0.25	<0.47	<3.7	0.062 J	0.053 J	0.051 J	0.047 J
Chlorobenzene	ppb(v/v)	<0.33	<0.3	<0.34	<0.64	<5	<0.33	<0.32	<0.32	<0.32
Chloroethane	ppb(v/v)	<0.58	0.15 J	<0.59	<1.1	<8.7	0.22 J	<0.56	<0.56	<0.56
Chloroform	ppb(v/v)	4.9	0.3	8.8	0.44 J	3.5 J	0.23 J	0.22 J	0.29 J	0.29 J
Chloromethane	ppb(v/v)	<0.74	<0.66	<0.76	<1.4	<11	0.26 J	<0.72	0.19 J	0.16 J
cis-1,2-Dichloroethene	ppb(v/v)	1.8	<0.34	2.5	55	89	1	0.82	26	1.8
cis-1,3-Dichloropropene	ppb(v/v)	<0.34	<0.3	<0.34	<0.65	<5.1	<0.33	<0.33	<0.33	<0.33
Cumene	ppb(v/v)	<0.31	0.06 J	<0.32	<0.6	<4.7	<0.31	<0.3	<0.3	<0.3
Cyclohexane	ppb(v/v)	<0.44	<0.4	<0.45	0.63 J	<6.7	<0.44	<0.43	<0.43	<0.43
Dibromochloromethane	ppb(v/v)	<0.18	<0.16	<0.18	<0.35	<2.7	<0.18	<0.17	<0.17	<0.17
(CFC 12)	ppb(v/v)	0.42	0.4	0.43	0.45 J	<4.7	0.42	0.43	1	1.1
d-Limonene	ppb(v/v)	0.15 J	0.091 J	0.1 J	0.63	<4.1	<0.27	<0.27	0.2 J	<0.27
Ethanol	ppb(v/v)	2 J	22	2 J	12	<61	5	9.6	6.2	13
Ethyl Acetate	ppb(v/v)	1	0.21 J	<0.43	<0.82	<6.4	<0.42	<0.41	<0.41	<0.41
Ethylbenzene	ppb(v/v)	0.16 J	0.34	0.088 J	0.21 J	<5.3	0.18 J	0.12 J	0.12 J	0.11 J
Hexachlorobutadiene	ppb(v/v)	<0.14	<0.13	<0.15	<0.28	<2.2	<0.14	<0.14	<0.14	<0.14
m,p-Xylenes	ppb(v/v)	0.24 J	1.8	0.19 J	0.39 J	<5.3	0.37	0.33 J	0.31 J	0.27 J
Methyl Methacrylate	ppb(v/v)	<0.37	<0.33	<0.38	<0.72	<5.6	<0.37	<0.36	<0.36	<0.36
Methyl tert-Butyl Ether	ppb(v/v)	<0.42	<0.38	<0.43	<0.82	<6.4	<0.42	<0.41	<0.41	<0.41
Methylene Chloride	ppb(v/v)	0.22 J	0.086 J	0.11 J	0.2 J	<6.6	<0.43	0.087 J	0.14 J	0.15 J
Naphthalene	ppb(v/v)	<0.29	1.3	<0.3	2.5	<4.4	0.16 J	0.15 J	1.6	0.55
n-Butyl Acetate	ppb(v/v)	0.39	0.55	0.28 J	<0.62	<4.8	0.093 J	0.1 J	0.09 J	<0.31
n-Heptane	ppb(v/v)	<0.37	0.96	<0.38	0.27 J	<5.6	<0.37	<0.36	<0.36	0.1 J
n-Hexane	ppb(v/v)	0.47	0.78	0.26 J	2.3	3.5 J	0.47	0.64	0.095 J	0.2 J
n-Nonane	ppb(v/v)	0.11 J	1.8	0.065 J	0.12 J	<4.4	0.088 J	0.067 J	0.074 J	0.071 J
n-Octane	ppb(v/v)	<0.33	2	0.12 J	<0.63	<4.9	<0.32	<0.32	<0.32	<0.32
n-Propylbenzene	ppb(v/v)	<0.31	0.2 J	<0.32	<0.6	<4.7	<0.31	<0.3	<0.3	<0.3
o-Xylene	ppb(v/v)	0.095 J	0.84	0.075 J	0.17 J	<5.3	0.14 J	0.14 J	0.12 J	0.11 J
Propene	ppb(v/v)	11	1.8 J	0.71 J	22	31 J	1.1 J	0.76 J	1.5 J	4.5
Styrene	ppb(v/v)	0.26 J	0.17 J	0.19 J	0.23 J	<5.4	0.41	0.21 J	0.29 J	0.19 J
Tetrachloroethene	ppb(v/v)	38	0.6	0.29	1.1	8 J	1.1 J	0.89	0.36	0.34
Tetrahydrofuran (THF)	ppb(v/v)	0.65	0.54	0.41 J	0.58 J	2.3 J	0.39 J	0.99	1.2	0.78
Toluene	ppb(v/v)	0.9	0.76	1	8.6	<6.1	0.46	0.5	0.41	0.44
trans-1,2-Dichloroethene	ppb(v/v)	1.2	<0.34	0.64	1.1	41 J	0.53 J	0.43	15	5.3
trans-1,3-Dichloropropene	ppb(v/v)	<0.34	<0.3	<0.34	<0.65	<5.1	<0.33	<0.33	<0.33	<0.33
Trichloroethene	ppb(v/v)	14	0.22 J	11	50	390 J	4.3 J	3.6	24	6.5
Trichlorofluoromethane	ppb(v/v)	0.24 J	0.2 J	0.2 J	0.12 J	<4.1	0.19 J	0.2 J	0.2 J	0.2 J
Vinyl Acetate	ppb(v/v)	0.75 J	1.9 J	0.95 J	<4.2	<33	3.6	<2.1	2.9	0.76 J
Vinyl Chloride	ppb(v/v)	<0.6	<0.53	0.26 J	4.6	3.8 J	<0.59	<0.58	<0.58	<0.58

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume
VMP: vapor monitoring point

TABLE B-5
ANALYTICAL RESULTS – VMPs (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

Analyte	Location	VMP-5A	VMP-5B	VMP-6A	VMP-6B	VMP-7A	VMP-7B	VMP-8A	VMP-8B	VMP-9A
	Date	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010	7/15/2010
	Event	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10
	Lab ID	P1002468-005	P1002468-006	P1002468-007	P1002468-008	P1002468-011	P1002468-012	P1002468-009	P1002468-010	P1002468-013
	Units									
1,1,1-Trichloroethane	ppb(v/v)	<0.28	<25	<0.63	<4.3	<1.4	<0.24	<0.28	<18	<1.3
1,1,2,2-Tetrachloroethane	ppb(v/v)	5.2	620	1.1	710	0.57 J	<0.19	0.083 J	<14	0.34 J
1,1,2-Trichloroethane	ppb(v/v)	<0.28	<25	0.16 J	<4.3	<1.4	<0.24	<0.28	30	<1.3
1,1,2-Trichlorotrifluoroethane	ppb(v/v)	0.064 J	<17	<0.45	<3.1	<1	0.066 J	0.9	<13	0.32 J
1,1-Dichloroethane	ppb(v/v)	<0.38	<33	<0.85	<5.8	<1.9	<0.32	<0.37	10 J	<1.8
1,1-Dichloroethene	ppb(v/v)	<0.38	<34	<0.87	<6	<1.9	<0.33	0.25 J	13 J	24
1,2,4-Trichlorobenzene	ppb(v/v)	<0.2	<18	<0.46	<3.2	<1	<0.18	<0.2	<13	0.77 J
1,2,4-Trimethylbenzene	ppb(v/v)	<0.31	<27	0.22 J	<4.8	<1.6	0.16 J	0.14 J	<20	<1.5
chloropropane	ppb(v/v)	<0.16	<14	<0.36	<2.4	<0.8	<0.14	<0.16	<10	<0.76
1,2-Dibromoethane	ppb(v/v)	<0.2	<17	<0.45	<3.1	<1	<0.17	<0.2	<13	<0.96
tetrafluoroethane (CFC 114)	ppb(v/v)	<0.22	<19	<0.49	<3.4	<1.1	<0.19	<0.21	<14	<1.1
1,2-Dichlorobenzene	ppb(v/v)	<0.25	<22	<0.57	<3.9	<1.3	<0.22	<0.25	<16	<1.2
1,2-Dichloroethane	ppb(v/v)	<0.38	<33	<0.85	<5.8	<1.9	<0.32	<0.37	<24	0.67 J
1,2-Dichloropropane	ppb(v/v)	<0.33	<29	<0.74	<5.1	<1.7	<0.28	<0.32	<21	<1.6
1,3,5-Trimethylbenzene	ppb(v/v)	<0.31	<27	<0.7	<4.8	<1.6	<0.27	<0.31	<20	<1.5
1,3-Butadiene	ppb(v/v)	0.76	<60	<1.6	<11	<3.5	<0.59	<0.68	<45	<3.3
1,3-Dichlorobenzene	ppb(v/v)	<0.25	<22	<0.57	<3.9	<1.3	<0.22	<0.25	<16	0.63 J
1,4-Dichlorobenzene	ppb(v/v)	0.36	<22	0.5 J	<3.9	<1.3	0.061 J	0.22 J	<16	0.79 J
1,4-Dioxane	ppb(v/v)	<0.42	<37	<0.95	<6.6	<2.1	<0.36	<0.42	<27	<2
2-Butanone (MEK)	ppb(v/v)	1.4 J	<230	26	4.9 J	1 J	1.5 J	3.8	<170	3.4 J
2-Hexanone	ppb(v/v)	0.22 J	<33	0.66 J	<5.8	<1.9	<0.32	0.52	<24	<1.8
Alcohol)	ppb(v/v)	2.9	<54	<1.4	<9.6	<3.1	0.47 J	<0.61	<40	<3
Chloride)	ppb(v/v)	<0.49	<43	<1.1	<7.6	<2.5	<0.42	<0.48	<32	<2.3
4-Ethyltoluene	ppb(v/v)	<0.31	<27	<0.7	<4.8	<1.6	0.051 J	<0.31	<20	<1.5
4-Methyl-2-pentanone	ppb(v/v)	0.081 J	<33	<0.84	<5.8	<1.9	<0.32	<0.37	<24	<1.8
Acetone	ppb(v/v)	10	<280	9.9	<50	5.7 J	17	5.6	<210	14 J
Acetonitrile	ppb(v/v)	5.3	<80	1 J	<14	<4.6	0.32 J	<0.89	<59	2.5 J
Acrolein	ppb(v/v)	1.7	<120	0.47 J	<21	<6.7	0.88 J	0.87 J	<86	1.3 J
Acrylonitrile	ppb(v/v)	<0.7	<62	<1.6	<11	<3.5	<0.6	<0.69	<45	<3.4
alpha-Pinene	ppb(v/v)	0.049 J	<24	<0.62	<4.2	<1.4	<0.24	<0.27	<18	<1.3
Benzene	ppb(v/v)	0.27 J	<42	<1.1	<7.4	0.61 J	0.46	0.25 J	<31	<2.3
Benzyl Chloride	ppb(v/v)	<0.29	<26	<0.66	<4.6	<1.5	<0.25	<0.29	<19	<1.4
Bromodichloromethane	ppb(v/v)	<0.23	<20	0.29 J	<3.5	<1.1	<0.2	<0.22	<15	<1.1
Bromoform	ppb(v/v)	<0.15	<13	<0.33	<2.3	<0.75	<0.13	<0.15	<9.5	<0.71
Bromomethane	ppb(v/v)	<0.39	<34	<0.89	<6.1	<2	<0.34	<0.39	<25	<1.9
Carbon Disulfide	ppb(v/v)	3.2	<210	0.6 J	17 J	7.2 J	18	1.1 J	20 J	1.6 J
Carbon Tetrachloride	ppb(v/v)	0.047 J	<21	<0.55	<3.8	0.51 J	0.057 J	31	4.6 J	91
Chlorobenzene	ppb(v/v)	<0.33	<29	<0.75	<5.1	<1.7	<0.28	<0.33	<21	<1.6
Chloroethane	ppb(v/v)	<0.58	<51	<1.3	<9	<2.9	<0.5	<0.57	<37	<2.8
Chloroform	ppb(v/v)	0.27 J	12 J	12	1.8 J	56	15	2.1	8400	39
Chloromethane	ppb(v/v)	<0.74	<65	<1.7	2.8 J	<3.7	0.2 J	<0.73	<48	<3.6
cis-1,2-Dichloroethene	ppb(v/v)	0.73	280	0.5 J	7.3	150	0.16 J	<0.38	480	1.4 J
cis-1,3-Dichloropropene	ppb(v/v)	<0.33	<29	<0.76	<5.2	<1.7	<0.29	<0.33	<22	<1.6
Cumene	ppb(v/v)	<0.31	<27	<0.7	<4.8	<1.6	<0.27	<0.31	<20	<1.5
Cyclohexane	ppb(v/v)	<0.44	<39	<1	<6.9	<2.2	<0.38	<0.44	<29	<2.1
Dibromochloromethane	ppb(v/v)	<0.18	<16	<0.4	<2.8	<0.9	<0.15	<0.18	<12	<0.86
(CFC 12)	ppb(v/v)	0.42	<27	0.41 J	<4.8	0.49 J	0.42	46	<20	0.62 J
d-Limonene	ppb(v/v)	<0.27	<24	<0.62	<4.2	<1.4	<0.24	<0.27	<18	<1.3
Ethanol	ppb(v/v)	3.9 J	<350	11	<63	150	5.7	2.2 J	<260	<20
Ethyl Acetate	ppb(v/v)	<0.42	<37	<0.96	4.8 J	<2.1	<0.36	<0.42	<27	<2
Ethylbenzene	ppb(v/v)	<0.35	<31	<0.79	<5.5	<1.8	0.14 J	<0.35	<23	<1.7
Hexachlorobutadiene	ppb(v/v)	<0.14	<13	<0.32	0.65 J	<0.72	<0.12	<0.14	<9.3	<0.69
m,p-Xylenes	ppb(v/v)	0.16 J	<31	<0.79	<5.5	<1.8	0.48	<0.35	<23	<1.7
Methyl Methacrylate	ppb(v/v)	<0.37	<33	<0.84	<5.8	<1.9	<0.32	<0.37	<24	<1.8
Methyl tert-Butyl Ether	ppb(v/v)	<0.42	<37	<0.95	<6.6	<2.1	<0.36	<0.42	<27	<2
Methylene Chloride	ppb(v/v)	0.15 J	<38	0.26 J	2.4 J	<2.2	0.46	0.18 J	320	0.47 J
Naphthalene	ppb(v/v)	0.22 J	<26	<0.66	4.6	<1.5	0.17 J	<0.29	<19	<1.4
n-Butyl Acetate	ppb(v/v)	<0.32	<28	0.31 J	<5	<1.6	<0.28	0.19 J	<21	<1.5
n-Heptane	ppb(v/v)	0.24 J	<33	<0.84	<5.8	<1.9	0.15 J	<0.37	<24	<1.8
n-Hexane	ppb(v/v)	3.3	<38	<0.98	3.6 J	<2.2	0.55	<0.43	<28	<2.1
n-Nonane	ppb(v/v)	<0.29	<25	<0.66	<4.5	<1.5	<0.25	<0.29	<19	<1.4
n-Octane	ppb(v/v)	<0.33	<29	<0.74	<5.1	<1.6	0.061 J	<0.32	<21	<1.6
n-Propylbenzene	ppb(v/v)	<0.31	<27	<0.7	<4.8	<1.6	<0.27	<0.31	<20	<1.5
o-Xylene	ppb(v/v)	<0.35	<31	<0.79	<5.5	<1.8	0.17 J	<0.35	<23	<1.7
Propene	ppb(v/v)	39	21 J	<2	4.9 J	2.1 J	0.96 J	0.77 J	<57	<4.3
Styrene	ppb(v/v)	0.1 J	<31	<0.81	<5.6	<1.8	<0.31	0.11 J	<23	<1.7
Tetrachloroethene	ppb(v/v)	1.5	14 J	0.79	8.3	1 J	0.73	3.2	93	14
Tetrahydrofuran (THF)	ppb(v/v)	0.44 J	<45	3.6	2.7 J	0.62 J	0.29 J	1.3	<33	4.7
Toluene	ppb(v/v)	0.44	<35	0.26 J	7	0.45 J	0.87	0.13 J	<26	0.63 J
trans-1,2-Dichloroethene	ppb(v/v)	0.3 J	100	<0.87	6	<1.9	0.11 J	<0.38	53	<1.9
trans-1,3-Dichloropropene	ppb(v/v)	<0.33	<29	<0.76	<5.2	<1.7	<0.29	<0.33	<22	<1.6
Trichloroethene	ppb(v/v)	19	1800	32	530	14	1.1	0.6	1200	64
Trichlorofluoromethane	ppb(v/v)	0.21 J	<24	0.22 J	<4.2	<1.4	0.2 J	0.33	<18	0.44 J
Vinyl Acetate	ppb(v/v)	<2.2	<190	<4.9	<34	<11	1 J	0.69 J	<140	<10
Vinyl Chloride	ppb(v/v)	<0.59	<52	<1.3	<9.3	<3	<0.51	<0.59	<39	<2.9

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume
VMP: vapor monitoring point

TABLE B-5
ANALYTICAL RESULTS – VMPs (3Q10 EVENT)
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

	Location	VMP-9B	VMP-10A	VMP-10B	VMP-10B-DUP
	Date	7/15/2010	7/15/2010	7/15/2010	7/15/2010
	Event	SVE_3Q10	SVE_3Q10	SVE_3Q10	SVE_3Q10
	Lab ID	P1002468-014	P1002468-015	P1002468-016	P1002468-017
Analyte	Units				
1,1,1-Trichloroethane	ppb(v/v)	<1.5	<0.87	<3.2	<3.5
1,1,2,2-Tetrachloroethane	ppb(v/v)	<1.2	<0.69	<2.6	<2.8
1,1,2-Trichloroethane	ppb(v/v)	<1.5	<0.87	<3.2	<3.5
1,1,2-Trichlorotrifluoroethane	ppb(v/v)	<1.1	4.8	<2.3	<2.5
1,1-Dichloroethane	ppb(v/v)	<2.1	<1.2	<4.3	<4.7
1,1-Dichloroethene	ppb(v/v)	<2.1	1.5	<4.4	<4.8
1,2,4-Trichlorobenzene	ppb(v/v)	<1.1	<0.64	<2.4	<2.6
1,2,4-Trimethylbenzene	ppb(v/v)	1.7 J	<0.96	<3.6	<3.9
chloropropane	ppb(v/v)	<0.87	<0.49	<1.8	<2
1,2-Dibromoethane	ppb(v/v)	<1.1	<0.62	<2.3	<2.5
tetrafluoroethane (CFC 114)	ppb(v/v)	<1.2	<0.68	<2.5	<2.7
1,2-Dichlorobenzene	ppb(v/v)	<1.4	<0.79	<2.9	<3.2
1,2-Dichloroethane	ppb(v/v)	<2.1	<1.2	<4.3	<4.7
1,2-Dichloropropane	ppb(v/v)	<1.8	<1	<3.8	<4.1
1,3,5-Trimethylbenzene	ppb(v/v)	<1.7	<0.96	<3.6	<3.9
1,3-Butadiene	ppb(v/v)	<3.8	<2.1	<7.9	<8.6
1,3-Dichlorobenzene	ppb(v/v)	<1.4	<0.79	<2.9	<3.2
1,4-Dichlorobenzene	ppb(v/v)	<1.4	0.55 J	<2.9	<3.2
1,4-Dioxane	ppb(v/v)	<2.3	<1.3	<4.9	<5.3
2-Butanone (MEK)	ppb(v/v)	6.5 J	9.8	<30	<32
2-Hexanone	ppb(v/v)	0.65 J	0.63 J	<4.3	<4.7
Alcohol)	ppb(v/v)	11	1.4 J	<7.1	<7.8
Chloride)	ppb(v/v)	<2.7	<1.5	<5.6	<6.1
4-Ethyltoluene	ppb(v/v)	<1.7	<0.96	<3.6	<3.9
4-Methyl-2-pentanone	ppb(v/v)	1.2 J	<1.2	<4.3	<4.7
Acetone	ppb(v/v)	23	33	23 J	<40
Acetonitrile	ppb(v/v)	1.7 J	4	<10	<11
Acrolein	ppb(v/v)	1.6 J	<4.1	<15	<17
Acrylonitrile	ppb(v/v)	<3.9	<2.2	<8.1	<8.8
alpha-Pinene	ppb(v/v)	1.2 J	<0.85	<3.2	<3.4
Benzene	ppb(v/v)	0.6 J	<1.5	<5.5	<6
Benzyl Chloride	ppb(v/v)	<1.6	<0.91	<3.4	<3.7
Bromodichloromethane	ppb(v/v)	<1.3	<0.71	<2.6	<2.9
Bromoform	ppb(v/v)	<0.82	<0.46	<1.7	<1.9
Bromomethane	ppb(v/v)	<2.2	<1.2	<4.5	<4.9
Carbon Disulfide	ppb(v/v)	6.3 J	1.8 J	16 J	9.5 J
Carbon Tetrachloride	ppb(v/v)	5.3	70	11	16
Chlorobenzene	ppb(v/v)	<1.8	<1	<3.8	<4.2
Chloroethane	ppb(v/v)	<3.2	<1.8	<6.7	<7.3
Chloroform	ppb(v/v)	36	1.6	350	360
Chloromethane	ppb(v/v)	<4.1	<2.3	<8.5	<9.3
cis-1,2-Dichloroethene	ppb(v/v)	1.3 J	<1.2	<4.4	<4.8
cis-1,3-Dichloropropene	ppb(v/v)	<1.9	<1	<3.9	<4.2
Cumene	ppb(v/v)	<1.7	<0.96	<3.6	<3.9
Cyclohexane	ppb(v/v)	<2.5	<1.4	<5.1	<5.6
Dibromochloromethane	ppb(v/v)	<0.99	<0.56	<2.1	<2.2
(CFC 12)	ppb(v/v)	0.41 J	0.42 J	<3.6	<3.9
d-Limonene	ppb(v/v)	2.7	<0.85	<3.2	<3.4
Ethanol	ppb(v/v)	<22	<13	<47	<51
Ethyl Acetate	ppb(v/v)	<2.3	<1.3	<4.9	<5.3
Ethylbenzene	ppb(v/v)	<1.9	<1.1	<4	<4.4
Hexachlorobutadiene	ppb(v/v)	<0.79	<0.44	<1.6	<1.8
m,p-Xylenes	ppb(v/v)	2.4	<1.1	<4	<4.4
Methyl Methacrylate	ppb(v/v)	<2.1	<1.2	<4.3	<4.7
Methyl tert-Butyl Ether	ppb(v/v)	<2.3	<1.3	<4.9	<5.3
Methylene Chloride	ppb(v/v)	0.64 J	<1.4	<5.1	<5.5
Naphthalene	ppb(v/v)	<1.6	<0.9	<3.4	<3.6
n-Butyl Acetate	ppb(v/v)	<1.8	<1	<3.7	<4
n-Heptane	ppb(v/v)	<2.1	<1.2	<4.3	<4.7
n-Hexane	ppb(v/v)	<2.4	<1.3	<5	<5.4
n-Nonane	ppb(v/v)	0.44 J	<0.9	<3.3	<3.6
n-Octane	ppb(v/v)	<1.8	<1	<3.8	<4.1
n-Propylbenzene	ppb(v/v)	<1.7	<0.96	<3.6	<3.9
o-Xylene	ppb(v/v)	1.2 J	<1.1	<4	<4.4
Propene	ppb(v/v)	7.5	2.3 J	6.4 J	6 J
Styrene	ppb(v/v)	0.97 J	<1.1	<4.1	<4.5
Tetrachloroethene	ppb(v/v)	25	6.8	230	230
Tetrahydrofuran (THF)	ppb(v/v)	3.1	1.2 J	2.4 J	2.2 J
Toluene	ppb(v/v)	2.6	0.27 J	<4.7	<5.1
trans-1,2-Dichloroethene	ppb(v/v)	1.4 J	<1.2	9.5	9.5
trans-1,3-Dichloropropene	ppb(v/v)	<1.9	<1	<3.9	<4.2
Trichloroethene	ppb(v/v)	5.3	1.3	130	130
Trichlorofluoromethane	ppb(v/v)	<1.5	1.3	<3.1	<3.4
Vinyl Acetate	ppb(v/v)	<12	4.8 J	<25	<27
Vinyl Chloride	ppb(v/v)	<3.3	<1.9	<6.9	<7.5

Notes:
<: Result is less than the reporting limit
--: Not Analyzed
J: Estimated
SVE: soil vapor extraction
Units: ppb v/v: parts per billion volume per volume
VMP: vapor monitoring point

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 treatment system, SVE wells and vapor monitoring points. Sampling was conducted quarterly and procedures were in accordance with the field and laboratory procedures specified in the *Remedial Action Sampling and Analysis Plan, Revisions 0 and 1* (RA SAP) (MACTEC, 2005). 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. The Summa canisters were equipped with flow regulators pre-set at 200 milliliters per minute (mL/min) for collection of all samples in November 2009. Sampling personnel noted that water or water vapor from the SVE wells seemed to be clogging the filters in the regulators and the full sample volume could not be collected (the final Summa canister vacuum pressure remained relatively high). Samples from SVE-A and SVE-D in February 2010 and all SVE samples (SVE-A through SVE-G) in April 2010 and July 2010 were collected without the regulators and filters. Field duplicate samples were collected at a rate of approximately ten percent to evaluate sampling technique. 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. Summa canisters met EPA requirements for environmentally clean containers. Custody seals were not placed on sealed boxes before shipment by common carrier for samples collected in the first three quarters; this situation was addressed and the samples collected in the final quarter had custody seals on the shipping boxes.

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) and LCS duplicates, 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 Extraction and Analysis (Calibration)
- Method Accuracy and Precision (Surrogates, Laboratory and Field Duplicate Recoveries)
- 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 air 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, matrix spike/matrix spike duplicate (MS/MSD) recoveries, LCSs, and field duplicate

precision. These DQIs are expressed in terms of precision, accuracy (bias), representativeness, completeness, comparability, and sensitivity. The results of the DQE are summarized below.

Precision

Five 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). All field duplicates compared very well except the field duplicate for sample FSVE-VMP3A-3Q10, collected in July 2010 in the third quarter of 2010; for this pair, the parent sample was analyzed at a dilution while the field duplicate was analyzed without dilution, and results for cis-1,2-dichloroethene, propene, tetrachloroethene, trichloroethene, and trans-1,2-dichloroethene had widely different concentrations and high RPDs (152% to 196%). Results for these analytes in these two samples have been 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. All laboratory 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 and were considered representative. Laboratory preparation and analysis followed method guidelines.

Comparability

The selection of standardized methods and consistent field and laboratory practices facilitates the comparison of data between SVE vapor sampling events. Although some early SVE samples were

collected using filters and flow regulators and later SVE samples were collected without filters and flow regulators as described earlier, the decision to stop using regulators due to clogging of the filters was made with the consideration that the change in sampling protocol would not adversely affect comparability between events. Previous event data are comparable to later event data.

Completeness

Completeness is determined for both field and analytical objectives. Field completeness is calculated from the number of samples planned verses the actual number of samples collected. 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. Analysis of three samples in the 27 January 2010 first quarter 2010 sampling event was canceled due to unacceptable final field pressures. Two of these samples were recollected on 5 February 2010. The third sample, FSVE-SVEC, was not recollected; the sample collected as its field duplicate on 27 January 2010 was analyzed and reported. Therefore, all planned field samples were collected and analyzed, and the only sample not analyzed was a field QC sample (the planned field duplicate of FSVE-SVEC).

Sensitivity

Analytical sensitivity is the concentration at which the measurement system can quantitate target analytes in the environmental matrices of concern. Analytical sensitivity is expressed in terms of the reporting limit (RL), which is provided by the respective laboratories as their reasonable and defensible quantitation limit for environmental samples above the method detection limit (MDL), which is established by each laboratory using pure water or clean matrix. The 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. Dilutions were necessary in some cases to achieve the proper quantification of high-level targets, which raises the RLs for all other targets in the run. In such cases, one result is provided in hardcopy with an indication of which results were reported from a diluted analysis. Any elevated RLs due to dilution or other QC issues are discussed in the attached narratives.

The following sections discuss only those deficiencies encountered during the evaluation that resulted in qualified and/or unusable data.

SVE SAMPLING EVENTS – 10 NOVEMBER 2009 TO 15 JULY 2010

A total of 57 summa canister air samples, including field duplicates, were collected during four quarterly events from 10 November 2009 through 15 July 2010. Analysis of three samples in the 27 January 2010 first quarter 2010 sampling event was canceled due to unacceptable final field pressures. Two of these samples were recollected on 5 February 2010. The third sample, FSVE-SVEC, was not recollected; the sample collected as its field duplicate on 27 January 2010 was analyzed and reported.

The validator noted that initial and final field pressures were not recorded on some chain of custody forms. The field pressure measurements are not required for the laboratory analyses but are used as an indicator of air leakage during shipment and a field check that sufficient vapor has been collected. Laboratory samples were collected without a flow regulator in February, April and July 2010. When the flow regulator is removed, the pressure in the canisters changes rapidly and the field pressure measurements are not considered to reflect the true initial canister pressures. Results for affected samples were not qualified.

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

There were some slight discrepancies noted concerning the COCs. The validator noted that there were gaps on the COC from time of relinquishment until time of sample receipt at the laboratory. This was not the case, and this comment may have been applicable to other reports. Custody seals were not placed on sealed boxes before shipment by common carrier for samples collected in the first three quarters; this situation was addressed and the samples collected in the final quarter had custody seals on the shipping boxes. These issues have been determined not to have impacted use of the data for its intended purpose.

Method Blanks

Tetrahydrofuran was detected in one method blank from April 2010 (SDG P1001509), between the MDL and RL. This analyte was detected at a similar concentration in sample FSVE-SVEC-2Q10, also between the MDL and RL and was qualified as estimated (J). 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. No qualifications were required based on calibration.

Laboratory Control or Laboratory Duplicate Samples:

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

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 quarterly vapor sample data collected from 10 November 2009 through 15 July 2010 from the SVE wells and the VMPs have met the data quality objectives and are deemed sufficient to support decisions regarding the effectiveness of the SVE system performance.

TABLE C-1
SDG SUMMARY TABLE
ANNUAL OPERATIONS REPORT - 2009/10
FLUVIAL SOIL VAPOR EXTRACTION SYSTEM - YEAR THREE
Dunn Field - Defense Depot Memphis, Tennessee

SDG	6-Liter Summa Air Canister Samples			Quality Control Samples
November 10 2009				
P0903878	FSVE-SVEA-4Q09	FSVE-SVED-4Q09	FSVE-SVEG-4Q09	FSVE-SVEINF-4Q09-DUP
	FSVE-SVEB-4Q09	FSVE-SVEE-4Q09	FSVE-SVEINF-4Q09	
	FSVE-SVEC-4Q09	FSVE-SVEF-4Q09		
January 27 2010				
P1000306	FSVE-SVEB-1Q10	FSVE-SVEE-1Q10	FSVE-SVEG-1Q10	
	FSVE-SVEC-1Q10-DUP	FSVE-SVEF-1Q10	FSVE-SVEINF-1Q10	
February 5 2010				
P1000459	FSVE-SVEA-1Q10	FSVE-SVED-1Q10		
April 28 2010				
P1001509	FSVE-SVEA-2Q10	FSVE-SVED-2Q10	FSVE-SVEG-2Q10	FSVE-SVEINF-2Q10-DUP
	FSVE-SVEB-2Q10	FSVE-SVEE-2Q10	FSVE-SVEINF-2Q10	
	FSVE-SVEC-2Q10	FSVE-SVEF-2Q10		
July 13-15 2010				
P1002467 P1002468	FSVE-SVE-A-3Q10	FSVE-VMP2B-3Q10	FSVE-VMP7A-3Q10	FSVE-SVE-G-3Q10-DUP
	FSVE-SVE-B-3Q10	FSVE-VMP3A-3Q10	FSVE-VMP7B-3Q10	FSVE-VMP3A-3Q10-DUP
	FSVE-SVE-C-3Q10	FSVE-VMP3B-3Q10	FSVE-VMP8A-3Q10	FSVE-VMP10B-3Q10-DUP
	FSVE-SVE-D-3Q10	FSVE-VMP4A-3Q10	FSVE-VMP8B-3Q10	
	FSVE-SVE-E-3Q10	FSVE-VMP4B-3Q10	FSVE-VMP9A-3Q10	
	FSVE-SVE-F-3Q10	FSVE-VMP5A-3Q10	FSVE-VMP9B-3Q10	
	FSVE-SVE-G-3Q10	FSVE-VMP5B-3Q10	FSVE-VMP10A-3Q10	
	FSVE-VMP1A-3Q10	FSVE-VMP6A-3Q10	FSVE-VMP10B-3Q10	
	FSVE-VMP1B-3Q10	FSVE-VMP6B-3Q10	FSVE-EFF-3Q10	
	FSVE-VMP2A-3Q10			

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: P0903878

PROJECT: Memphis Defense Depot Soil Vapor for HDR Inc. (formerly e2m), Texas

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

SAMPLE MATRIX: Air

SAMPLING DATE (Month/Year): November, 2009

NUMBER OF SAMPLES: 9 air samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: FSVE-INF-4Q09-DUP, FSVE-INF-4Q09-NS, FSVE-SVE-A-4Q09-NS, FSVE-SVE-B-4Q09-NS, FSVE-SVE-C-4Q09-NS, FSVE-SVE-D-4Q09-NS, FSVE-SVE-E-4Q09-NS, FSVE-SVE-F-4Q09-NS, FSVE-SVE-G-4Q09-NS

DATA REVIEWER: Diane Short

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

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note an extended list of volatile compounds was reported.

II. ANALYTICAL REPORT FORMS
A. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes __X__ No___

B. Holding Times
The contract holding times were met for all analyses (Time of sample receipt to time of analysis (VOA) or extraction and from extraction to analysis). Contract holding times for TO-15 canisters is 30 days from date of collection.
Yes ___X__ No____

C. Chains of Custody
Chains of Custody were present and were complete with signatures, sign-offs and complete entry of data. Canisters were properly sampled and received.
Yes __X___ No ____
The project manager is informed of the following and the project record is being updated. The chain of custody has a gap from sample relinquishment to sample receipt. There is no courier identified nor an airbill number reported.
Note that the 'Laboratory ID' field has been used to record the initial pressures as there is not a specific field on the chain for this required item.

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 _____
All pressures were reported and were acceptable. One sample FSVE-SVE-G reported a lower value than the rest at -19.6 inches of Hg. Other readings were in the range of – 5 to -6. As the final readings were acceptable, not further action is required.

All readings met the limits or exceptions were noted and pressure corrected
Yes _____ No ____ NA __X__
Not part of this review level.

III. INSTRUMENT CALIBRATION

A. Initial Calibration – GC/MS
1. The Relative Response Factors (RRF) and average RRF for all compounds for all analyses met the required criteria.
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.

2. The percent difference (%D) limits of 30% were met.
Yes ____ No __X__
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met with the exception of 1,3,5-trimethylbenzene at 25.5 %. No data were qualified as all data were non-detect. The response factor was acceptable to verify the non-detect.

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 ____
There were numerous peaks reported in the BFB window for the tune on 11/16/09 for the daily calibration. The BFB itself was acceptable for the tune.

V. INTERNAL STANDARDS
A. Area Limits
The Internal Standards met the 100% upper and -50% lower limits criteria and the Retention times were within the required windows.
Yes __X___ No____ NA ____

B. Retention Times
The relative retention times of the internal standards and sample compounds met the $\pm$ 0.06 RRT units limit.
Yes __ X ___ No____ NA ____

VI. SURROGATE
Surrogate spikes were analyzed with every sample.
Yes __X___ No ____

And met the recovery limits defined in the current contract
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. 2 duplicates are present.

B. The laboratory duplicate relative percent differences (RPD) were within the defined contract limits. Method requirements are 25% maximum RPD.
Yes __X__ No ____ NA____
For validation purposes, only results > 5x PQL are qualified for RPD outliers. For results < 5x PQL, results are qualified if the absolute difference is greater than 2x PQL. The qualifier added is JD#, where # is the RPD or the absolute difference observed, as appropriate.
The duplicate was acceptable.

VIII. DUPLICATE CONTROL SAMPLES
A. Duplicate Control and Duplicate Control Sample Duplicates similar to Laboratory Control Samples (LCS) were performed for every set.
Yes _X_ No ___
The laboratory does analyze laboratory control samples (LCS), but does not analyze laboratory control sample duplicates (LCSD). Neither are required by the method.

B. And percent recoveries were acceptable at 70 – 130%.
Yes __X__ No ___

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__
The laboratory does not perform LCS duplicates, and they 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 _____
The laboratory reports the method blank to the MRL (method reporting limit). Data are reported to the MDL (method detection limit). Low level 'J' data could be false positives as there is no laboratory, nor field blank.

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes ____ No____ NA ____X___
Not part of this review level.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes _X__ No ____ NA___
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.

1 field duplicate was identified, as shown in the table below, in control.

Client Sample Id	Field Duplicate	Observations
FSVE-INF-4Q09-NS	FSVE-INF-4Q09-DUP	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:
For this project, ten percent of the data are fully review for chromatograms and spectra.
Yes ___ No____ NA__X_
Not part of this review level. It is noted, however, that several compounds are reported with a laboratory flag of 'M1' to indicate matrix interference and the possibility of high bias to the data.

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

Yes___ No ____ NA___X__
Not part of this review level. It is noted that several compounds were diluted to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution.

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

Chain of Custody:
The project manager is informed of the following and the project record is being updated. The chain of custody has a gap from sample relinquishment to sample receipt. There is no courier identified nor an airbill number reported.
Note that the 'Laboratory ID' field has been used to record the initial pressures as there is not a specific field on the chain for this required item.

Continuing Calibration:
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met with the exception of 1,3,5-trimethylbenzene at 25.5 %. No data were qualified as all data were non-detect. The response factor was acceptable to verify the non-detect.

Method Blanks:
The laboratory reports the method blank to the MRL (method reporting limit). Data are reported to the MDL (method detection limit). Low level 'J' data could be false positives as there is no laboratory, nor field blank.

Field Duplicates:
1 field duplicate was identified, in control.

Compound Identification:
It is noted that several compounds are reported with a laboratory flag of 'M1' to indicate matrix interference and the possibility of high bias to the data.
It is noted that several compounds were diluted to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: L10030646/ P1000306 ; P100459, L10050797/ P1001509

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): January, February, April 2010

NUMBER OF SAMPLES: 6, 2 and 9 air samples

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: FSVE-SVE-*-1Q10-NS, where * = B, E, F, G; FSVE-SVEC-1Q10-DUP1, FSVE-INF-1Q10-NS ;
FSVE-SVE-*-1Q10-NS, where * = A, D;
FSVE-SVE-*-2Q10-NS , where * = A, B,C, D, E, F, G; FSVE-INF-2Q10-DUP, FSVE-INF-2Q10-NS

DATA REVIEWER: Diane Short

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

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note an extended list of volatile compounds was reported. 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. There is no courier identified and there is no airbill number on any of the chains. There are no custody seals noted.

SDGP100459 has no field initial and final pressures. The only pressures recorded are on the laboratory log in forms and that is for pressure upon arrival and for analysis. The received date is 2/5/10 at 9:30, the relinquishment data and time is 2/5/10 15:30 and the log-in forms and analysis sheets received date is 2/8/10. The form needs to be completed and corrected.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes _____ No __X____ NA _____
SDG P1001509 Pressures were reported for the field initial and final pressures.
SDG P100306 Only final field pressures were on the chains. The laboratory has a table of canister pressures upon receipt in the packages. There is no record of the initial field pressure.
SDGP100459 has no field initial and final pressures. The only pressures recorded are on the laboratory log in forms and that is for pressure upon arrival and for analysis.

All readings met the limits or exceptions were noted and pressure corrected
Yes _____ No __X__ NA ____
SDG P100306: Not part of this review level, but is performed to ensure sample integrity. The following samples reported unacceptable final field pressure (from -24 to -28 in. Hg) and were accurately cancelled by the client.
FSVE-SVE-*-1Q10-NS, where * is A, C, D.

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.

2. The percent difference (%D) limits of 30% were met.
Yes __X__ No ____
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met with the following exceptions CCAL 2/9/10 reported vinyl acetate at 27%D. The TO-15 limits are met and no data were qualified. The response factor was acceptable to verify the non-detect. Detected data are not qualified as they meet the TO-15 %D and the QAPP does not specifically address air limits. All other data were reviewed and reported per the 30% limit.

IV. GC/MS INSTRUMENT PERFORMANCE CHECK
A. The BFB performance check was injected once at the beginning of each 12-hour period and relative abundance criteria for the ions were met.
Yes __X___ No____ NA ____
The BFB was acceptable for the tune.

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. For SDG P1001509, there was only one list of surrogate recoveries reported with a summary date of 4/30 – 5/5 2010. It may be assumed that the surrogates were diluted out for the 5/3 and 5/5 analyses, but this is not noted.

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 not 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 laboratory duplicates were 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 ___
The laboratory does analyze laboratory control samples (LCS), but no laboratory control sample duplicates (LCSD). Neither is required by the method, but are recommended to verify laboratory precision.

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

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__

IX. SHIFT CHECKS
Shift checks were performed and were within time limits.
Yes __X__ No____

X. BLANKS
A. Method Blanks were analyzed at the required frequency and for each matrix and analysis.
Yes __X___ No____
This is a nitrogen blank run with each set.

B. The method blank was free of contamination.
Yes _____ No __X___
The laboratory reports the method blank to the MDL (method detection limit) as required. Client data are reported to the MDL. There could be low level false detected data reported. As noted below, results below the RL and > MDL seem to be reported, so it may just be that the reporting form does not indicate the check to the MDL.
SDG P1001509 for the 5/5/10 analysis of sample SVEC only tetrahydrofuran (THF) was reported at a diluted level of 0.24. Data for THF for the one sample are qualified UMB.24 and are fully usable as undetected values.

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 _X__ No ____ NA___

Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility.
SDG P100306: There was a field duplicate of FSVE-SVEC, but the parent was cancelled due to unacceptable pressure.
SDG P1001509, the field duplicates were taken from the INF-2Q10-NS and INF-2Q10-DUP samples. All results met precision criteria. The few cases where a compound was detected in one sample, but not the other, the reported value was low, near the MDL.

XII. TCL COMPOUNDS
A. The identification is accurate and all retention times, library spectra and reconstructed ion chromatograms (RIC) were evaluated for all detected compounds:
Yes ___ No____ NA__X_
P100306: Not part of this level of review, but it is noted that the laboratory has noted a potential high bias due to matrix interferences of sample FSVE-SVEE-1Q10 for acetone, FSVE-SVEF -1Q-10 for vinyl acetate and for FSVE-SVEG – 1Q10 for propene. Data are qualified 'JQ' to indicate a potential high bias.
P1001509, for FSVE: SVEB and INF – 2Q10, data for acetone are noted as being impacted with a potential high bias due to matrix effects from non-client compounds. Data are qualified JQ to indicate this bias.

B. Quantitation was checked to determine the accuracy of calculations for representative compounds in each internal standard set
Yes___ No ____ NA___X__
Not part of this review level. It is noted that several compounds were diluted (x10, 20 and 50) to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution and both sets of results are on the same report form. The dilution was derived from the MRL associated with the reported results as no dilution value is reported. The dates of the dilutions and associated QC and calibrations were derived from the batch lists as these dates are also not on the result forms.

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.

Chain of Custody:
The project manager is informed of the following and the project record is being updated.
There are gaps from relinquishment to sample receipt. There is no courier identified and there is no airbill number on any of the chains. There are no custody seals noted.

SDGP100459 has no field initial and final pressures. The only pressures recorded are on the laboratory log in forms and that is for pressure upon arrival and for analysis. The received date is 2/5/10 at 9:30, the relinquishment data and time is 2/5/10 15:30 and the log-in forms and analysis sheets received date is 2/8/10. The form needs to be completed and corrected.

Sample Integrity
SDG P1001509 Pressures were reported for the field initial and final pressures.
SDG P100306 Only final field pressures were on the chains. The laboratory has a table of canister pressures upon receipt in the packages. There is no record of the initial field pressure.
SDGP100459 has no field initial and final pressures. The only pressures recorded are on the laboratory log in forms and that is for pressure upon arrival and for analysis.

SDG P100306: Not part of this review level, but is performed to ensure sample integrity. The following samples reported unacceptable final field pressure (from -24 to -28 in. Hg) and were accurately cancelled by the client.
FSVE-SVE-*-1Q10-NS, where * is A, C, D.

Calibrations
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met.

Surrogates
Note that three surrogates are used. Method 8260 requires 3 surrogates, but one is acceptable for TO-15. For SDG P1001509, there was only one list of surrogate recoveries reported with a summary date of 4/30 – 5/5 2010. It may be assumed that the surrogates were diluted out for the 5/3 and 5/5 analyses, but this is not noted.

Laboratory duplicates
No laboratory duplicates were reported.

Laboratory Control Samples
The laboratory does analyze laboratory control samples (LCS), but no laboratory control sample duplicates (LCSD). Neither are required by the method, but are recommended to verify laboratory precision.

Method Blanks
The laboratory reports the method blank to the MDL (method detection limit) as required. Client data are reported to the MDL. There could be low level false detected data reported. As noted below, results below the RL and > MDL seem to be reported, so it may just be that the reporting form does not indicate the check to the MDL.
SDG P1001509 for the 5/5/10 analysis of sample SVEC only tetrahydrofuran (THF) was reported at a diluted level of 0.24. Data for THF for the one sample are qualified UMB.24 and are fully usable as undetected values.

Field Duplicates
SDG P100306: There was a field duplicate of FSVE-SVEC, but the parent was cancelled due to unacceptable pressure.
SDG P1001509, the field duplicates were taken from the INF-2Q10-NS and INF-2Q10-DUP samples. All results met precision criteria. The few cases where a compound was detected in one sample, but not the other, the reported value was low, near the MDL.

Compound Identification and Reporting Limits
P100306: Not part of this level of review, but it is noted that the laboratory has noted a potential high bias due to matrix interferences of sample FSVE-SVEE-1Q10 for acetone, FSVE-SVEF -1Q-10 for vinyl acetate and for FSVE-SVEG – 1Q10 for propene. Data are qualified 'JQ' to indicate a potential high bias.

P1001509, for FSVE: SVEB and INF – 2Q10, data for acetone are noted as being impacted with a potential high bias due to matrix effects from non-client compounds. Data are qualified JQ to indicate this bias.

Reporting Limits
It is noted that several compounds were diluted (x10, 20 and 50) to bring the results into the linear range of the instrument. All other compounds were reported at their lowest dilution and both sets of results are on the same report form. The dilution was derived from the MRL associated with the reported results as no dilution value is reported. The dates of the dilutions and associated QC and calibrations were derived from the batch lists as these dates are also not on the result forms.

ORGANIC AIR QUALITY REPORT
METHOD TO-15

SDG: P1002467, P1002468

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): July, 2010

NUMBER OF SAMPLES: 33 samples including 2 field duplicates, sets of 15 and 18

ANALYSES REQUESTED: Summa Canister VOA TO-15

SAMPLE NO.: See attached list

DATA REVIEWER: Diane Short

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

Telephone Logs included Yes____ No __X__

Contractual Violations Yes____ No __X_

The EPA CLP National Functional Guidelines for Organic Data Review, 2001 (SOP), EPA Method TO-15 current updates have been referenced by the reviewer to perform this data validation review. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the HDR/e2m Project Manager. Per the Scope of Work, the review of these samples includes validation of all QC forms and submitted calibrations referencing the QC limits in the above documents.

DELIVERABLES
All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes _X__ No ____
Note an extended list of volatile compounds was reported. 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. There is no courier identified and there is no airbill number on any of the chains.

D. Canister Pressure
Canister pressures were measured and recorded for initial vacuum check, initial field vacuum, final field reading, lab initial pressure and final pressure.
Yes _____ No __X____ NA _____
Pressures were reported for the field initial and final pressures.

SDG P1002467: The following samples had initial pressures of -15 to -17 inches Hg recorded on the chain of custody:
FSVE-SVEA-3Q10-NS, FSVE-SVEB-3Q10-NS, FSVE-SVEC-3Q10-NS, FSVE-SVED-3Q10-NS, FSVE-SVEE-3Q10-NS, FSVE-SVEF-3Q10-NS, FSVE-SVEG-3Q10-NS, and FSVE-SVEG-3Q10-NS-DUP.

We received the following comment from the sampler on this matter:

"I looked back over the COCs. All the ones that were low were the ones I did not use a flow controller on (just the pressure gauge). When I turned on the canister they never had a chance to get up to 30in Hg (or at least dropped extremely quick if it did). They filled up a lot while I was still opening the knobs and the readings I wrote down were what the canisters read when I finally got to look at them."

The validator has interpreted this to mean that the sample consists of an initial grab sample taken to about 50% of the canister volume and then the rest of the sample was taken over time. Because of the way this occurred, there is no initial pressure reading and so there is some uncertainty about whether any of the samples could have leaked prior to sampling and whether they are to have been grab samples or time-controlled samples. For this reason the results for these samples are qualified as JQ to indicate estimated data with a possible low bias.

All readings met the limits or exceptions were noted and pressure corrected
Yes _____ No __X__ NA ____
Initial field pressure should normally be 25-35 inches Hg. According to the chain of custody, the samples above are outside that range and may contain air that is not from the site.

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.

2. The percent difference (%D) limits of 30% were met.
Yes __X__ No ____
The routine Method 8260 limits of 25% and the TO-15 limits of 30% were met.

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__
Not part of this level of data review. Tunes were not provided.

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. One laboratory duplicate is provided in each data package and data are 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 ___

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

C. And Relative Percent Differences were within lab limits.
Yes ___ No____ NA__X__
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 _____
It is not entirely clear if the laboratory reports the method blank to the MDL (method detection limit) as required, or to the MRL. The forms indicate that the results are reported to the "Laboratory Detection Limit" but an MRL and an MDL are both shown on the form and it is not clear which is considered the laboratory detection limit. Since the same comment appears on the sample report forms, the validator has assumed that the reporting convention is the same in both cases. No detected analytes are reported.

C. If Field Blanks were identified, they were free of contamination.
Yes _____ No ____ NA ___X___
There were no field blanks identified.

D. Contamination level was less than 0.03 mg/cubic meter before samples were analyzed per the method.
Yes __X__ No____ NA _____
Reporting units include both ppbv and ug/m3.

XI. FIELD QC
A. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project.
Yes ___ No __X__ NA___
Qualifiers are not added for field duplicate differences. When results are > 5x the reporting limit, a 35% RPD is used to identify potential deviations. When results are < 5x the reporting limit, an absolute difference between the results that is < 2x PQL is considered to be acceptable reproducibility. (The laboratory uses MRL not PQL for these reports)

There are three field duplicates. Two are within normal acceptance limits; the other is out of limits as shown in the tables below. The difference in MRLs in the outlier pair indicates that the parent was diluted and reporting limits are elevated. The duplicate did not require dilution. With variances this large, it is suggested that the identification of the field duplicate pair association be checked.

RPD Outliers

ParentClientID	FDClientID	Analyte	Parent	FD	Parent MRL	FD MRL	units	RPD
FSVE-VMP3A-3Q10-NS	FSVE-VMP3A-3Q10-DUP	trans-1,2-Dichloroethene	41	0.53	5.8	0.38	ppbV	97
		cis-1,2-Dichloroethene	89	1	5.8	0.38	ppbV	98
		Trichloroethene	390	4.3	4.3	0.28	ppbV	98
FSVE-VMP10B-3Q10-NS	FSVE-VMP10B-3Q10-DUP	All OK						
FSVE-SVEG-3Q10-NS	FSVE-SVEG-3Q10-DUP	All OK						

Absolute Difference Outliers

ParentClientID	FDClientID	Analyte	Parent	FD	Parent MRL	FD MRL	units	Diff
FSVE-VMP3A-3Q10-NS	FSVE-VMP3A-3Q10-DUP	Propene	31	1.1	13	0.87	ppbV	29.9
		Tetrachloroethene	8	1.1	3.4	0.22	ppbV	6.9
FSVE-VMP10B-3Q10-NS	FSVE-VMP10B-3Q10-DUP	All OK						
FSVE-SVEG-3Q10-NS	FSVE-SVEG-3Q10-DUP	All 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 ___ No____ NA__X_

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

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.

Method Blanks

It is not entirely clear if the laboratory reports the method blank to the MDL (method detection limit) as required, or to the MRL. The forms indicate that the results are reported to the "Laboratory Detection Limit" but an MRL and an MDL are both shown on the form and it is not clear which is considered the laboratory detection limit. Since the same comment appears on the sample report forms, the validator has assumed that the reporting convention is the same in both cases. No detected analytes are reported.

Field Duplicates

There are three field duplicates. Two are within normal acceptance limits; the other is out of limits as shown in the tables within the report body. The difference in MRLs in the outlier pair indicates that the parent was diluted and reporting limits are elevated. The duplicate did not require dilution. With variances this large, it is suggested that the identification of the field duplicate pair association be checked.

Canister Pressures

Pressures were reported for the field initial and final pressures.

SDG P1002467: The following samples had initial pressures of -15 to -17 inches Hg: FSVE-SVEA-3Q10-NS, FSVE-SVEB-3Q10-NS, FSVE-SVEC-3Q10-NS, FSVE-SVED-3Q10-NS, FSVE-SVEE-3Q10-NS, FSVE-SVEF-3Q10-NS, FSVE-SVEG-3Q10-NS, and FSVE-SVEG-3Q10-NS-DUP.

We received the following comment from the sampler on this matter:

"I looked back over the COC's. All the ones that were low were the ones I did not use a flow controller on (just the pressure gauge). When I turned on the canister they never had a chance to get up to 30inHg (or at least dropped extremely quick if it did). They filled up a lot while I was still opening the knobs and the readings I wrote down were what the canisters read when I finally got to look at them."

The validator has interpreted this to mean that the sample consists of an initial grab sample taken to about 50% of the canister volume and then the rest of the sample was taken over time. Because of the way this occurred, there is no initial pressure reading and so there is some uncertainty about whether any of the samples could have leaked prior to sampling and whether they are to have been grab samples or time-controlled samples. For this reason the results for these samples are qualified as JQ to indicate estimated data with a possible low bias.