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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 969

Memorandum

To: Brian Renaghan, CIV AFCEE/EXA
Mike Dobbs, DES-DDC-EE

From: Kevin Sedlak
Tom Holmes

Date: 1 December 2008

Re: **Thermal SVE Final Soil Sampling Event**
Source Areas Loess/Groundwater Remedial Action
Dunn Field- Defense Depot Memphis, Tennessee
FA8903-04-D-8722-0043

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engineering-environmental Management, Inc (e^2M) has prepared this report to present the results of the Thermal Soil Vapor Extraction (TSVE) final soil sampling event on Dunn Field at Defense Depot Memphis, Tennessee (DDMT). This work was performed for the Defense Logistics Agency under Contract FA8903-04-D-8722, Task Order 0043 to the Air Force Center for Engineering and the Environment.

INTRODUCTION

Subsurface Soil Treatment

The loess and underlying sandy clay is being treated with thermal-enhanced SVE using in situ thermal desorption (ISTD), which involves heating the subsurface to accelerate the mobilization of chlorinated volatile organic compounds (CVOCs), and SVE to remove the CVOCs from the formation. The treatment interval is from 5 feet to 30 feet below ground surface (bgs) in most areas. The ISTD technology heats subsurface soils via radiation and conductive heat transfer. Soil temperatures throughout the treatment area are raised to near the boiling point of water, 90 to100 degrees Celsius (°C), by heating elements inside the vertical heater wells; steam is generated; contaminants are volatilized; and vapors are removed by SVE. The TSVE system began operations on 27 May 2008. As of 23 November, 12,306 pounds of CVOCs are estimated to have been removed from the loess.

Loess Soil Confirmation Sampling

Soil confirmation sampling was described in the *Dunn Field Source Areas Loess/ Groundwater Remedial Action Work Plan* (RAWP). The interim confirmation soil sampling was to be performed when monitoring indicated soil temperatures in the treatment areas at 90 °C and vapor concentrations at asymptotic levels below 100 ppm on photoionization detector (PID) measurements. The interim sample event was tentatively scheduled for Day 80 to 90 of TSVE operations. Round 2 soil samples were to be collected at the completion of the planned treatment period after Day 105 (9

September). If necessary, a final round of confirmation soil samples was to be performed following additional TSVE operations and cool-down.

The remedial action objective (RAO) for the loess will be met if the average concentration in a treatment area (defined as TA-1, TA-2, TA-3 and TA-4) for each CVOC is below the remediation goal (RG), and no individual sample result exceeds the RG by a factor of 10 or more. For samples that are non-detect, the average will be calculated using one-half the sample quantitation limit (laboratory reporting limit [RL]).

Following the Round 2 sampling event and discussions at the October 2008 BCT meeting, the soil confirmation sampling program as described in the RAWP was revised to include additional soil samples prior to system shut-down. Since the majority of the Round 2 samples were below RGs, it was estimated that the RGs could be met through extended treatment with verification through additional confirmation samples prior to the cool-down period.

Confirmation Sample Results

Interim soil samples were collected 18 to 20 August. Because the interim sampling criteria for soil temperature and PID measurements were not met, only 30 soil samples were collected from 22 locations. The interim sample results were presented in a memorandum dated 29 August 2008. Ten samples had no CVOCs detected above standard RLs and three samples had CVOCs reported at less than 10% of the applicable RG. Nine samples exceeded the RG for one or more CVOCs by a factor of 10 or more.

Round 2 soil samples were collected 10 to 12 September; 34 soil samples were collected from 27 soil borings. Samples were collected at all locations and depths specified in the RAWP, except at the 13 interim soil samples that were well below RGs. The Round 2 sample results were presented in a memorandum dated 22 September 2008. Thirteen samples had no CVOCs detected above standard RLs and seven samples had no CVOCs reported above the RGs. Eight Round 2 samples exceeded the RG for one or more CVOCs by a factor of 10 or more.

Round 3 soil samples were collected 2 October; 12 soil samples were collected from 8 soil borings. The Round 3 sample results were presented in a memorandum dated 15 October 2008. Three samples had no CVOCs detected above standard RLs and two samples had no CVOCs reported above the RGs. Six Round 3 samples exceeded the RG for one or more CVOCs by a factor of 10 or more.

Round 4 soil samples were collected 20 October; 7 soil samples were collected from 5 soil borings. The Round 4 sample results were presented in a memorandum dated 30 October 2008. One sample had no CVOCs detected above standard RLs and two samples had no CVOCs reported above the RGs. Three Round 4 samples exceeded the RG for one or more CVOCs by a factor of 10 or more.

System Operations

The RGs were met in TA-1D in the Interim samples and the heater wells in that area were shut-down on 19 September 2008.

The RGs were met in TA-1A, TA-1B and TA-3 in the Round 2 samples. However, TSVE treatment was continued based on vapor sample results and PID readings.

The RGs were met in TA-2 in the Round 3 samples. The heater wells were shut down in TA-1A, TA-1B and TA-2 and TA-3 on 9 October.

The RGs were met in TA-1E in the Round 4 samples, but TSVE treatment was continued based on vapor sample results and PID readings. The vapor extraction system was re-balanced on 29 October; vapor extraction was shutdown in TA-1A and reduced in TA-1B, TA-2 and TA-3 in order to increase vapor extraction in TA-1C, TA-1E and TA-4.

Additional VEWs

The Round 2 sample from LSB-14 at 29 to 30 feet bgs had a strong odor and a PID reading of 1000 ppm. Following sample collection, Terratherm installed a 1.5-inch diameter vapor extraction well with the screen at 28 to 30 feet bgs. Sand was placed around and above the screen and high temperature grout was used to seal the VEW.

During Round 3, VEWs were installed in each of the borings where Round 2 soil samples exceeded the RGs by a factor of 10 or more (LSB-4, LSB-5, LSB-14, LSB-23, LSB-25 and LSB-30). Following Round 3 sampling, the selected borings were drilled to a depth of 30 feet bgs and reamed to 3.5-inch diameter (LSB-4 hit refusal at 20 feet). e^2M installed a 2-inch diameter VEW with a 5-foot screen at varying depths based on sample results. Filter sand was placed from boring termination to a depth of 5 feet bgs and high temperature grout was used to seal the VEW from 0 to 5 feet bgs.

Based on the high CVOC concentrations in Round 4 samples at LSB-4-10-11, LSB-23-28-29 and LSB-30-11-12, VEWs were installed approximately 5 feet north and south of each of these borings. An additional VEW was also installed in the area of TA-4 where steam venting has been a problem (10 to 15 feet east of LSB-23). High temperature grout was used to seal the VEWs above the sand pack.

VEW	Sand Pack Interval (feet, bgs)	Screen Interval (feet, bgs)
LSB-4 N/S	8-13	10-11
LSB-30 N/S	9-14	11-12
LSB-23 N/S	25-30	27-29
TA-4	5-23	18-23

FIELD ACTIVITIES

The final round confirmation samples were collected 11 November (Round 5) and 17 November (Round 6). The field activities consisted of the collection of four soil samples from three borings during Round 5 and one soil sample during Round 6. The sample locations are listed on Table 1 and the locations are shown on Figures 1, 2 and 3.

Soil Sampling

Confirmation sample borings were drilled 1 to 3 feet from the Round 4 borings. Samples were collected at the depths specified in Table 1. Samples were collected in accordance with the "Hot Soil Sampling Procedure" from the RAWP using direct-push sampling technique with a Geoprobe 6620DT. Soil cores were collected in a Teflon disposable sleeve, capped at both ends, cooled in ice and sampled using En Core® samplers. At each sample depth, three En Core®'s were collected for VOC analysis. An additional 4-ounce soil jar was collected to allow the laboratory to screen the soil samples prior to

VOC analysis and one 2-ounce glass jar was collected for soil moisture. Samples were sent to Microbac Laboratories in Marietta, Ohio, for expedited analysis. The samples were analyzed for volatile organic compounds (VOCs) by EPA Method 8260.

Vapor Monitoring

PID readings are collected daily, except Sunday, at the thermal SVE system vapor treatment area. Measurements are made at four locations: the well field influent prior to any treatment; the influent to the granular activated carbon (GAC) treatment vessels; between the two operating carbon treatment vessels; and at the vapor discharge.PID readings have been collected biweekly at the vapor extraction header pipe from each treatment area; the readings frequency was increased to every other day on 12 September.

SUMMARY OF FINDINGS

Soil Analytical Results

The analytical results for the final soil samples are summarized on Table 2, which lists the results for the primary CVOCs and for other VOC analytes detected above the reporting limit (RL) in one or more samples. CVOCs detected above the RG are shown in bold type and are also underlined where detected above 10 times the RG. Non-detect results with an RL above the RG are shaded.

Comparison of the analytical results against the RGs is summarized below. During Round 5, three samples had CVOCs detected at concentrations below RGs; and one sample had CVOCs detected above 10 times an RG. That location (LSB-4-10-11) was re-sampled in Round 6 and the results were below RGs. One Round 5 sample (LSB-23-28-29) had a laboratory RL for 1,1,2,2 tetrachloroethane slightly above the RG.

CVOC Not Detected above RL	RG not Exceeded	RG Exceeded	RG x 10 Exceeded
–	LSB-4-10-11 (Rnd 6)	–	LSB-4-10-11 (Rnd 5)
–	LSB-23-28-29	–	–
–	LSB-30-11-12	–	–
–	LSB-30-25-26	–	–

Vapor Monitoring Results

The daily PID measurements for the well field influent and the GAC influent are shown on Figure A-1 and the PID measurements for the treatments areas and the well field influent are shown on Figure A-2. The system PID readings decreased to below 50 ppm in November. PID measurements in the treatment areas also decreased in November, with all areas below 50 ppm, except in TA-4 where November PID readings have been as high as 120 ppm.

CONCLUSIONS

The analytical results for all soil confirmation samples are summarized on Table B-1, which lists the results for the primary CVOCs. None of the final samples at any of the 47 sample locations identified in the RAWP exceed an RG by a factor of 10 or more, and

the average concentration for each of the primary CVOCs in TA-1, TA-2, TA-3 and TA-4 is below the RG. Therefore, the RAO for the thermal SVE treatment areas has been met.

The heater wells were shut down in TA-1E on 6 November and in TA-1C and TA-4 on 20 November. The vapor extraction system was shutdown in TA-1B, TA-1D, TA-2 and TA-4 on 7 November, but will continue to operate in TA-1C, TA-1E and TA-4 through 4 December.

TABLES

TABLE 1
SOIL SAMPLE LOCATIONS
FINAL THERMAL SVE SAMPLING EVENT
SOURCE AREAS LOESS/GROUNDWATER RA WORK PLAN
Dunn Field - Defense Depot Memphis, Tennessee

Treatment Area	MIP Location ID	Soil Boring ID	Northing (ft)	Easting (ft)	Sample Depth (ft)	Pre-Treatment Analytical Results (µg/kg)
TA1C	38C	LSB-4	281631.85	802164.24	10-11	1,1,2,2-PCA - 950,000; TCE - 541,000; cDCE - 174,000
TA4	3E	LSB-23	280229.64	802146.71	28-29	ECD Response at 15V from 1 to 29 feet
TA1C	na	LSB-30	281611.11	802180.77	11-12	DS RD Sample DS10_8_T1:1,1,2,2-PCA - 2,850,000; TCE - 671,000; cDCE - 199,000 (at 6 to 8 feet bgs)
TA1C	na	LSB-30	281611.11	802180.77	25-26	No sample data

TABLE 2
SOIL ANALYTICAL RESULTS SUMMARY
FINAL THERMAL SVE SAMPLING EVENT
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

	Sample	LSB-4-10-11	LSB-4-10-11	LSB-23-28-29	LSB-30-11-12	LSB-30-25-26
	Date	11/11/2008	11/17/2008	11/11/2008	11/11/2008	11/11/2008
	Event	Round 5	Round 6	Round 5	Round 5	Round 5
	Area	TA-1C	TA-1C	TA-4	TA-1C	TA-1C
Primary CVOCs (mg/Kg)	**Loess RG**					
1,1,2,2-Tetrachloroethane	0.0112	**0.229 J**	0.0049 J	<0.0164	<0.00275	<0.00319
1,1,2-Trichloroethane	0.0627	<0.0059	<0.00855	<0.0273	<0.00459	<0.00532
1,1-Dichloroethene	0.1500	<0.00708	<0.0103	<0.0327	<0.00551	<0.00639
1,2-Dichloroethane	0.0329	<0.00354	<0.00513	<0.0164	<0.00275	<0.00319
Carbon tetrachloride	0.2150	<0.0059	<0.00855	<0.0273	<0.00459	<0.00532
Chloroform	0.9170	<0.00236	<0.00342	0.0226 J	<0.00184	<0.00213
cis-1,2-Dichloroethene	0.7550	0.00556 F	0.00562 F	<0.0273	0.00561 J	0.00108 F
Methylene chloride	0.0305	<0.0059	<0.00855	<0.0273	<0.00459	<0.00532
Tetrachloroethene	0.1806	<0.0059	<0.00855	<0.0273	<0.00459	<0.00532
trans-1,2-Dichloroethene	1.5200	0.00155 F	<0.00855	<0.0273	<0.00459	0.0016 F
Trichloroethene	0.1820	0.0336 J	0.00898 J	<0.0273	0.00727 J	0.00923 J
Vinyl chloride	0.0294	<0.0059	<0.00855	<0.0273	<0.00459	<0.00532
Other CVOCs (mg/Kg)						
Acetone	16	0.448 Q	0.451	**17.6 Q**	0.958 Q	0.165 Q
MEK (2-Butanone)	8.55	0.199 Q	0.189 J	<0.109	0.0538 Q	0.0147 Q

Bold: Exceeds RG
Underline: 10X RG
Shaded: RL > RG
<: Not detected above Reporting Limit (RL)
F: Concentration estimated below RL and above the MDL
J: Estimated
Q: Quality control criteria failed; review required

Figures

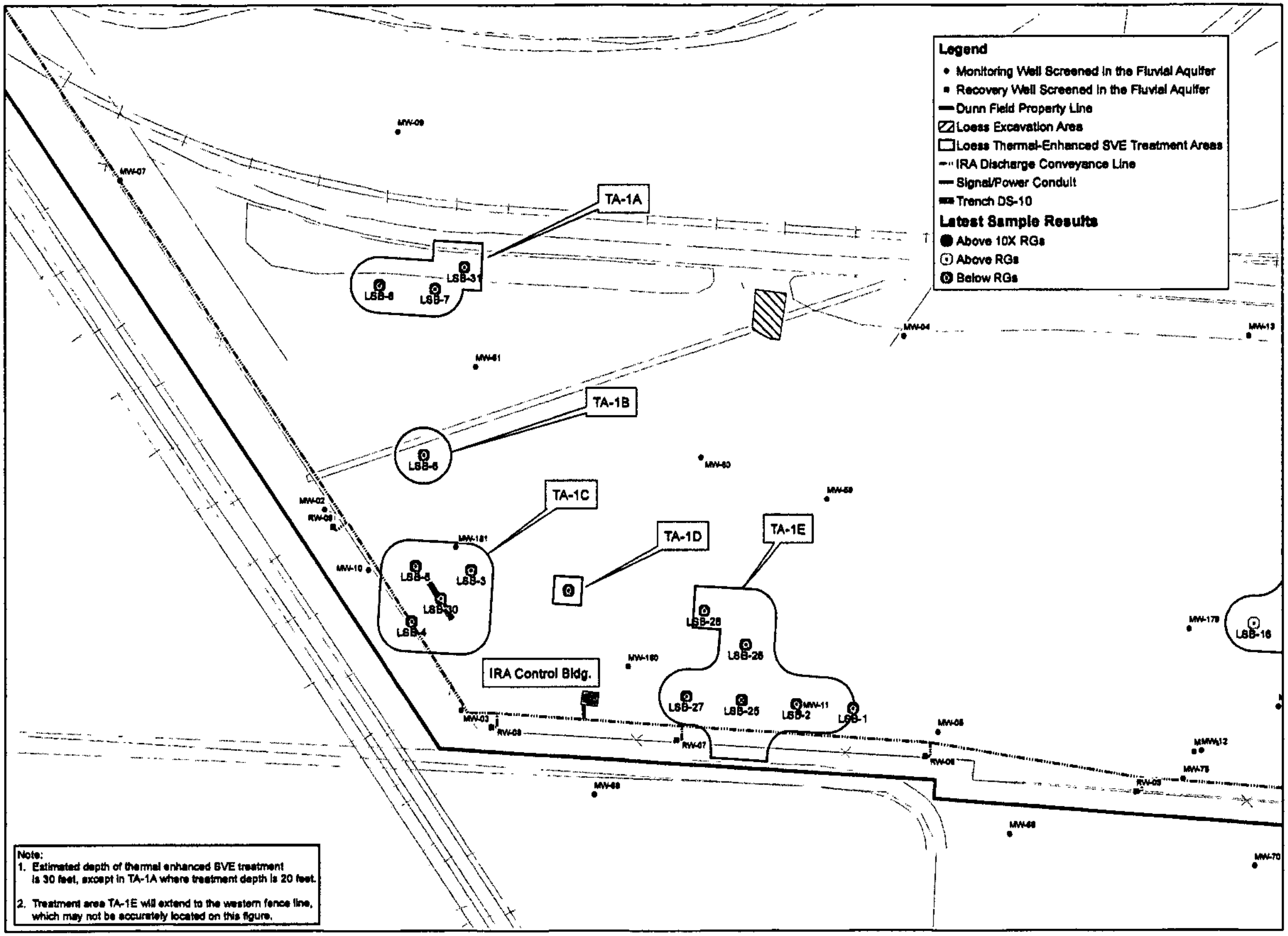


Figure 1

FINAL SOIL SAMPLE LOCATIONS - TREATMENT AREA 1

THERMAL SVE

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

963 10

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 25 50 100
Feet

Installation Location
Memphis, Tennessee

Date: November 2006
Edition: Rev 0

Note:
1. Estimated depth of thermal enhanced SVE treatment is 30 feet, except in TA-1A where treatment depth is 20 feet.
2. Treatment area TA-1E will extend to the western fence line, which may not be accurately located on this figure.

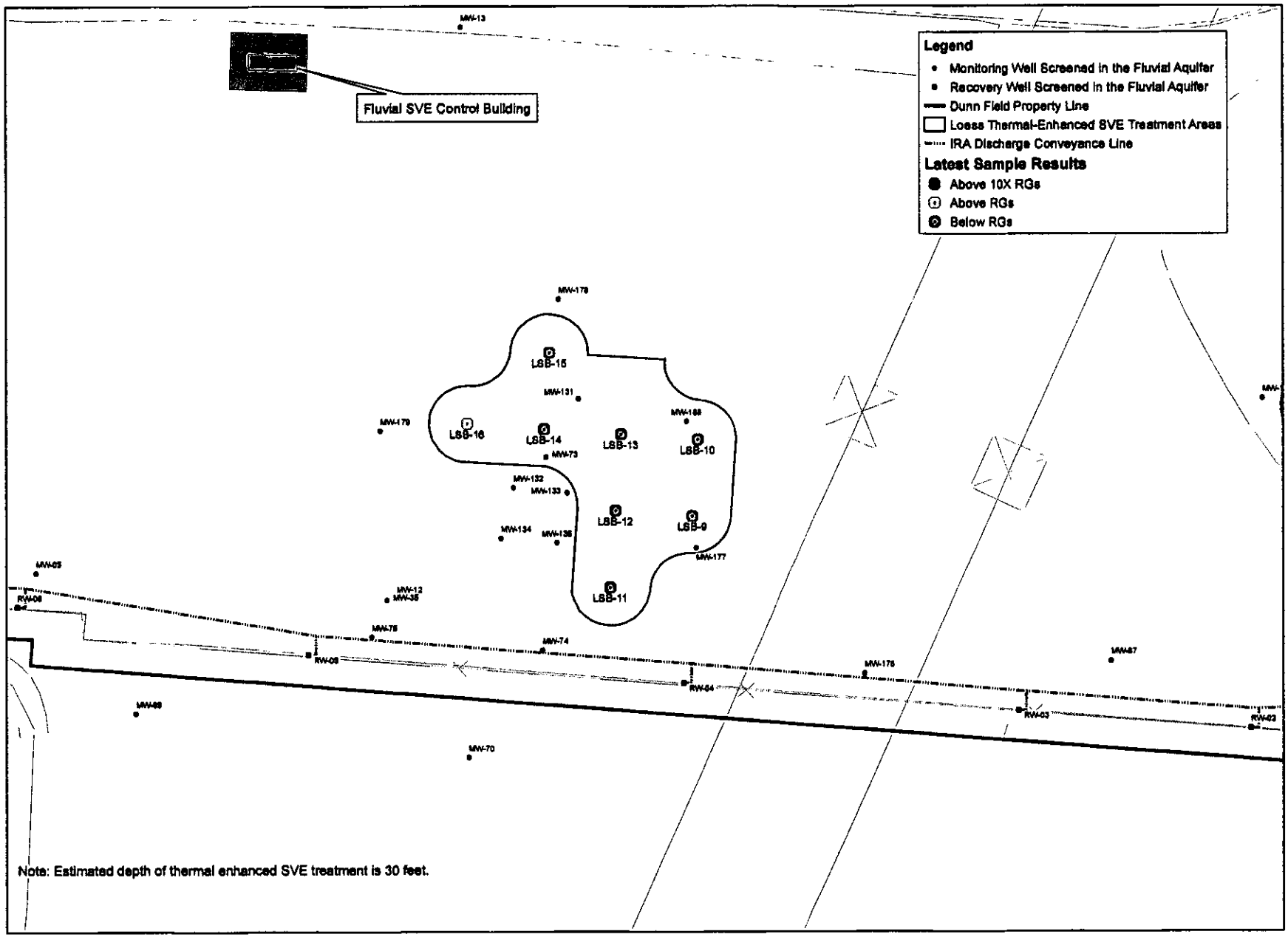


Figure 2

FINAL SOIL SAMPLE LOCATIONS - TREATMENT AREA 2

THERMAL SVE

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

563 11

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 25 50 100
Feet

Installation Location
Memphis, Tennessee

Date: November 2008
Edition: Rev 0

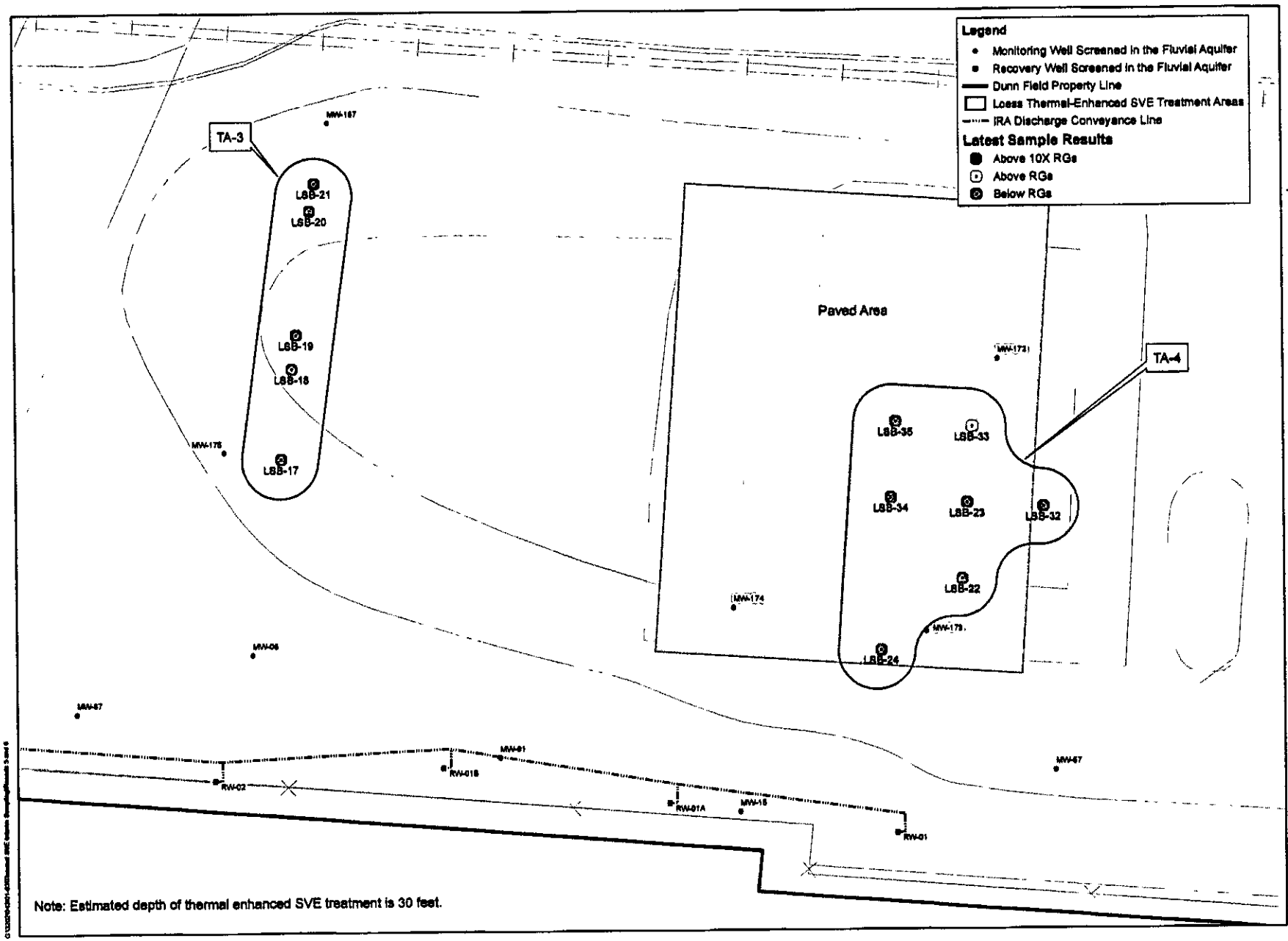


Figure 3

FINALSOIL SAMPLE LOCATIONS - TREATMENT AREAS 3 and 4

THERMAL SVE

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

693 12

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 25 50 100
Feet

Installation Location
Memphis, Tennessee

Appendix A

PID Measurements

FIGURE A-1
VAPOR SYSTEM PID READINGS
THERMAL SVE FINAL SAMPLING EVENT
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field – Defense Depot Memphis, Tennessee

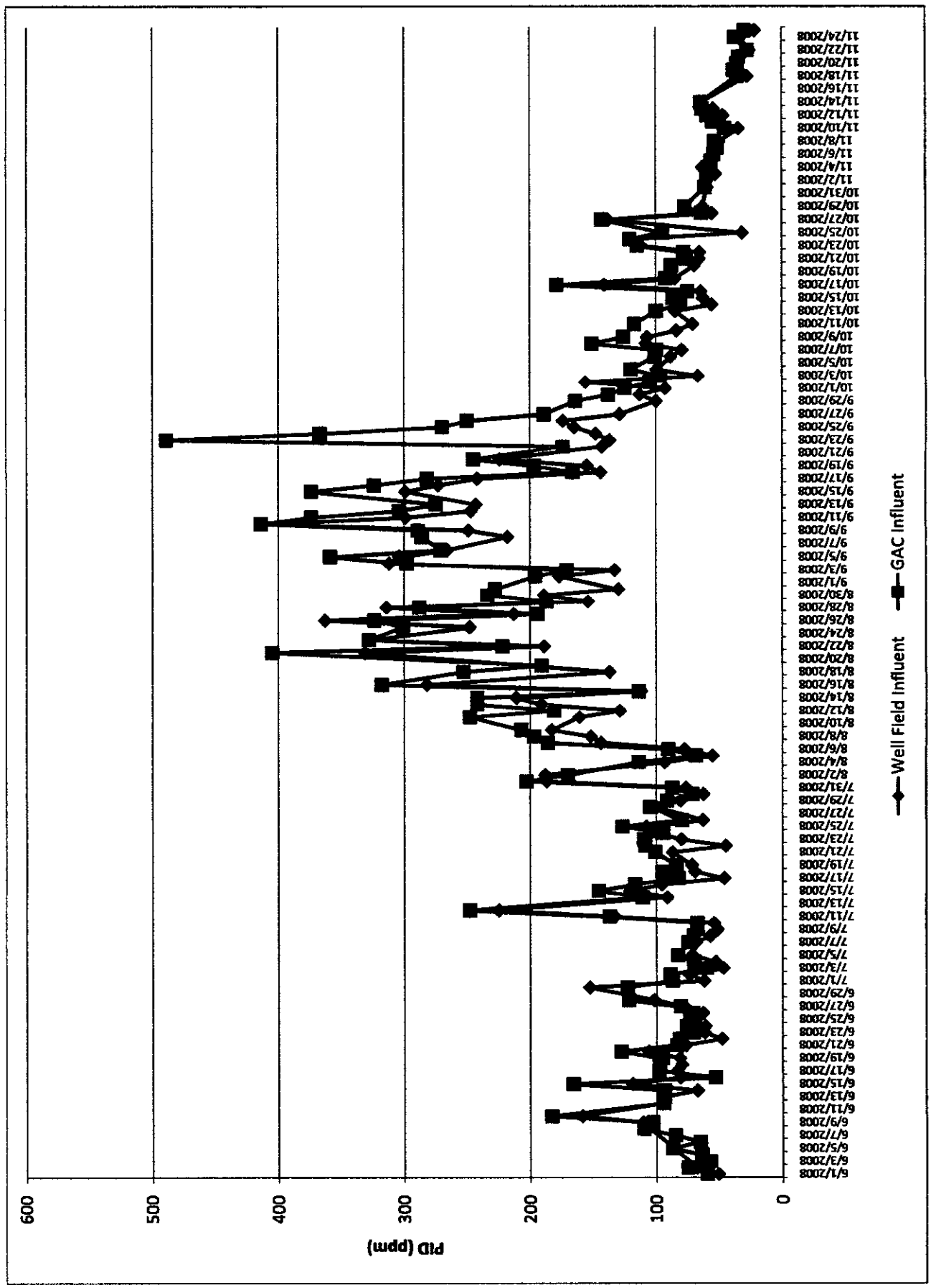
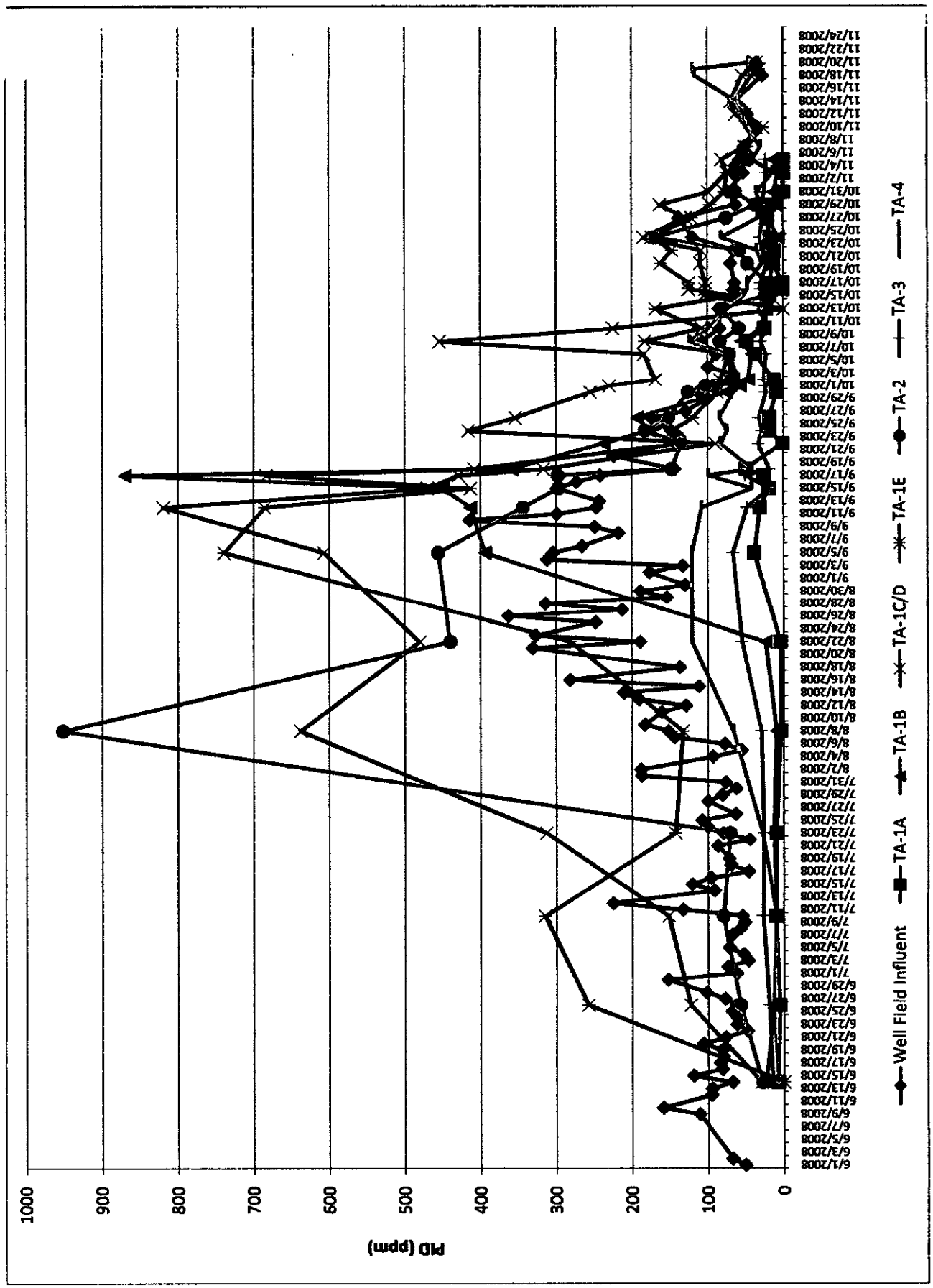


FIGURE A-2
TREATMENT AREA PID READINGS
THERMAL SVE FINAL SAMPLING EVENT
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field – Defense Depot Memphis, Tennessee



Appendix B

Soil Confirmation Samples
CVOC Analytical Results

TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-1-29-30 8/19/2008 TA-1E Rnd 1	LSB-2-21-22 8/18/2008 TA-1E Rnd 1	LSB-2-29-30 8/18/2008 TA-1E Rnd 1	LSB-2-29-30 9/10/2008 TA-1E Rnd 2	LSB-3-26-27 9/10/2008 TA-1C Rnd 2	LSB-4-10-11 8/18/2008 TA-1C Rnd 1	LSB-4-10-11 9/10/2008 TA-1C Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.00254	<0.00311	<0.00255	<0.00251	<0.00295	**0.226 F**	**4.1**
1,1,2-Trichloroethane	0.0627	<0.00424	<0.00518	0.0069	<0.00419	0.000508 F	<0.474	0.0189
1,1-Dichloroethene	0.1500	<0.00509	<0.00622	0.00324 F	<0.00503	<0.00591	<0.569	0.0237
1,2-Dichloroethane	0.0329	<0.00254	<0.00311	0.00138 F	<0.00251	<0.00295	<0.284	<0.00274
Carbon tetrachloride	0.2150	<0.00424	<0.00518	<0.00426	<0.00419	<0.00492	<0.474	<0.00456
Chloroform	0.9170	<0.0017	<0.00207	0.00644	<0.00168	<0.00197	<0.19	<0.00182
cis-1,2-Dichloroethene	0.7550	<0.00424	<0.00518	0.286 F	<0.00419	0.132 F	**4.79**	**25.1**
Methylene chloride	0.0305	<0.00424	<0.00518	<0.00426	<0.00419	<0.00492	<0.474	0.00391 F
Tetrachloroethene	0.1806	<0.00424	<0.00518	0.00122 F	<0.00419	<0.00492	<0.474	0.0105
trans-1,2-Dichloroethene	1.5200	<0.00424	<0.00518	0.0229	<0.00419	0.00604	0.435 F	**5.17**
Trichloroethene	0.1820	<0.00424	<0.00518	**0.225 F**	<0.00419	0.0169	**4.35**	**85.8**
Vinyl chloride	0.0294	<0.00424	<0.00518	<0.00426	<0.00419	<0.00492	<0.474	0.0283

Bold: Exceeds RG
Underline: 10X RG
Shaded: RL > RG
<: Not detected above Reporting Limit (RL)
F: Concentration estimated < RL and > MDL
J: Estimated
Q: Quality control criteria failed; review required

TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-4-10-11 10/2/2008 TA-1C Rnd 3	LSB-4-10-11 10/20/2008 TA-1C Rnd 4	LSB-4-10-11 11/11/2008 TA-1C Rnd 5	LSB-4-10-11 11/17/2008 TA-1C Rnd 6	LSB-4-23-24 8/18/2008 TA-1C Rnd 1	LSB-4-23-24 9/10/2008 TA-1C Rnd 2	LSB-4-23-24 10/2/2008 TA-1C Rnd 3
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.016	<3.44	**0.229 J**	0.0049 J	**0.0568**	**1.93**	**3.35**
1,1,2-Trichloroethane	0.0627	0.00269 F	<5.73	<0.0059	<0.00855	<0.00473	0.00765	0.0171 F
1,1-Dichloroethene	0.1500	0.00641 F	<6.87	<0.00708	<0.0103	<0.00568	<0.00583	<0.0351
1,2-Dichloroethane	0.0329	<0.016	<3.44	<0.00354	<0.00513	<0.00284	<0.00291	<0.0176
Carbon tetrachloride	0.2150	<0.0266	<5.73	<0.0059	<0.00855	<0.00473	<0.00486	<0.0293
Chloroform	0.9170	<0.0107	<2.29	<0.00236	<0.00342	<0.00189	<0.00194	<0.0117
cis-1,2-Dichloroethene	0.7550	**19.8**	**29.9**	0.00556 F	0.00562 F	0.00203 F	0.0502	0.0383
Methylene chloride	0.0305	<0.0266	<5.73	<0.0059	<0.00855	<0.00473	<0.00486	<0.0293
Tetrachloroethene	0.1806	0.022 F	<5.73	<0.0059	<0.00855	<0.00473	0.000807 F	<0.0293
trans-1,2-Dichloroethene	1.5200	0.515	**4.2 F**	0.00155 F	<0.00855	<0.00473	0.00562	<0.0293
Trichloroethene	0.1820	**154**	**145**	0.0336 J	0.00898 J	0.00426 F	0.098	**0.229**
Vinyl chloride	0.0294	<0.0266	<5.73	<0.0059	<0.00855	<0.00473	<0.00486	<0.0293

Bold: Exceeds RG
Underline: 10X RG
Shaded: RL > RG
<: Not detected above Reporting Limit (RL)
F: Concentration estimated < RL and > MDL
J: Estimated
Q: Quality control criteria failed; review require

TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-4-23-24 10/20/2008 TA-1C Rnd 4	LSB-5-13-14 9/10/2008 TA-1C Rnd 2	LSB-5-13-14 10/2/2008 TA-1C Rnd 3	LSB-5-13-14 10/20/2008 TA-1C Rnd 4	LSB-5-18-19 9/10/2008 TA-1C Rnd 2	LSB-6-6-7 8/18/2008 TA-1B Rnd 1	LSB-6-6-7 9/10/2008 TA-1B Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.00352	0.00341	<0.0178	<0.00327	<0.00277	<0.345	0.00267 J
1,1,2-Trichloroethane	0.0627	<0.00586	<0.00426	<0.0296	<0.00545	<0.00462	<0.575	<0.00566
1,1-Dichloroethene	0.1500	<0.00703	0.00111 F	<0.0356	<0.00654	<0.00554	<0.69	<0.00679
1,2-Dichloroethane	0.0329	<0.00352	<0.00256	<0.0178	<0.00327	<0.00277	<0.345	<0.00339
Carbon tetrachloride	0.2150	<0.00586	<0.00426	<0.0296	<0.00545	<0.00462	<0.575	<0.00566
Chloroform	0.9170	<0.00234	<0.0017	<0.0119	<0.00218	<0.00185	<0.23	<0.00226
cis-1,2-Dichloroethene	0.7550	0.00519 F	**1.78**	**9.76**	0.0875	<0.00462	0.0741 F	0.00546 J
Methylene chloride	0.0305	<0.00586	<0.00426	<0.0296	0.00279 F	<0.00462	<0.575	<0.00566
Tetrachloroethene	0.1806	<0.00586	0.0204	0.00761 F	<0.00545	<0.00462	**0.37 F**	0.00971 J
trans-1,2-Dichloroethene	1.5200	0.00111 F	0.0783	0.313	0.00591	<0.00462	<0.575	0.0006 J
Trichloroethene	0.1820	0.0336	**13.4**	**33.2**	0.0443	<0.00462	**0.236 F**	0.00862 J
Vinyl chloride	0.0294	<0.00586	0.00153 F	<0.0296	<0.00545	<0.00462	<0.575	<0.00566

Bold: Exceeds RG
Underline: 10X RG
Shaded: RL > RG
<: Not detected above Reporting Limit (RL)
F: Concentration estimated < RL and > MDL
J: Estimated
Q: Quality control criteria failed; review require

TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-7-11-12 9/10/2008 TA-1A Rnd 2	LSB-8-7-8 9/10/2008 TA-1A Rnd 2	LSB-9-28-29 9/11/2008 TA-2 Rnd 2	LSB-10-19-20 9/11/2008 TA-2 Rnd 2	LSB-11-29-30 9/11/2008 TA-2 Rnd 2	LSB-12-29-30 8/19/2008 TA-2 Rnd 1	LSB-13-29-30 9/11/2008 TA-2 Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.00313	<0.00328	<0.00283	<0.00315	<0.00266	<0.0029	<0.00298
1,1,2-Trichloroethane	0.0627	<0.00522	<0.00547	<0.00471	<0.00525	<0.00443	<0.00484	<0.00496
1,1-Dichloroethene	0.1500	<0.00627	<0.00657	<0.00565	<0.0063	<0.00531	<0.0058	<0.00596
1,2-Dichloroethane	0.0329	<0.00313	<0.00328	<0.00283	<0.00315	<0.00266	<0.0029	<0.00298
Carbon tetrachloride	0.2150	<0.00522	<0.00547	<0.00471	<0.00525	<0.00443	<0.00484	<0.00496
Chloroform	0.9170	<0.00209	0.00859	<0.00188	<0.0021	<0.00177	<0.00193	<0.00199
cis-1,2-Dichloroethene	0.7550	0.00064 F	<0.00547	<0.00471	<0.00525	<0.00443	0.00247 F	<0.00496
Methylene chloride	0.0305	<0.00522	<0.00547	<0.00471	<0.00525	<0.00443	<0.00484	<0.00496
Tetrachloroethene	0.1806	<0.00522	<0.00547	<0.00471	<0.00525	<0.00443	<0.00484	<0.00496
trans-1,2-Dichloroethene	1.5200	<0.00522	<0.00547	<0.00471	<0.00525	<0.00443	<0.00484	<0.00496
Trichloroethene	0.1820	0.00182 F	0.00131 F	<0.00471	<0.00525	<0.00443	0.00773	<0.00496
Vinyl chloride	0.0294	<0.00522	<0.00547	<0.00471	<0.00525	<0.00443	<0.00484	<0.00496

Bold: Exceeds RG
Underline: 10X RG
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TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-14-13-14 8/19/2008 TA-2 Rnd 1	LSB-14-29-30 8/19/2008 TA-2 Rnd 1	LSB-14-29-30 9/11/2008 TA-2 Rnd 2	LSB-14-29-30 10/2/2008 TA-2 Rnd 3	LSB-15-29-30 9/11/2008 TA-2 Rnd 2	LSB-16-15-16 8/19/2008 TA-2 Rnd 1	LSB-16-15-16 9/11/2008 TA-2 Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.003	<14.3	**364**	<0.00251	<0.00303	**0.0167**	<0.00313
1,1,2-Trichloroethane	0.0627	<0.005	<23.8	<9.28	<0.00419	<0.00506	<0.00472	<0.00522
1,1-Dichloroethene	0.1500	<0.00599	<28.5	<11.1	<0.00502	<0.00607	<0.00566	<0.00627
1,2-Dichloroethane	0.0329	<0.003	<14.3	<5.57	<0.00251	<0.00303	<0.00283	<0.00313
Carbon tetrachloride	0.2150	<0.005	<23.8	<9.28	<0.00419	<0.00506	<0.00472	<0.00522
Chloroform	0.9170	<0.002	<9.51	<3.71	<0.00167	<0.00202	<0.00189	<0.00209
cis-1,2-Dichloroethene	0.7550	<0.005	<23.8	<9.28	<0.00419	<0.00506	<0.00472	<0.00522
Methylene chloride	0.0305	<0.005	<23.8	<9.28	<0.00419	<0.00506	<0.00472	<0.00522
Tetrachloroethene	0.1806	<0.005	<23.8	**1.95 F**	<0.00419	<0.00506	<0.00472	<0.00522
trans-1,2-Dichloroethene	1.5200	<0.005	<23.8	<9.28	<0.00419	<0.00506	<0.00472	<0.00522
Trichloroethene	0.1820	<0.005	<23.8	**115**	<0.00419	<0.00506	0.00335 F	<0.00522
Vinyl chloride	0.0294	<0.005	<23.8	<9.28	<0.00419	<0.00506	<0.00472	<0.00522

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TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-16-25-26	LSB-16-25-26	LSB-17-28-29	LSB-18-27-28	LSB-19-12-13	LSB-19-27-28	LSB-19-27-28
		8/19/2008	9/11/2008	8/19/2008	9/12/2008	8/20/2008	8/20/2008	9/12/2008
		TA-2	TA-2	TA-3	TA-3	TA-3	TA-3	TA-3
		Rnd 1	Rnd 2	Rnd 1	Rnd 2	Rnd 1	Rnd 1	Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.28	<0.00289	<0.00286	<0.00271	<0.00313	0.00164 F	<0.00269
1,1,2-Trichloroethane	0.0627	<0.466	0.000765 F	<0.00477	0.0011 F	<0.00522	0.00139 F	0.00147 F
1,1-Dichloroethene	0.1500	<0.56	<0.00579	<0.00573	<0.00542	<0.00626	<0.0054	<0.00539
1,2-Dichloroethane	0.0329	<0.28	<0.00289	<0.00286	<0.00271	<0.00313	<0.0027	<0.00269
Carbon tetrachloride	0.2150	<0.466	<0.00482	<0.00477	0.00135 J	<0.00522	0.00396 F	<0.00449
Chloroform	0.9170	<0.187	<0.00193	<0.00191	0.0037	0.00351	0.00904	0.00864
cis-1,2-Dichloroethene	0.7550	<0.466	0.0028 F	<0.00477	0.00612	<0.00522	0.00299 F	0.00351 F
Methylene chloride	0.0305	<0.466	<0.00482	<0.00477	<0.00452	<0.00522	<0.0045	<0.00449
Tetrachloroethene	0.1806	<0.466	0.00182 F	<0.00477	<0.00452	<0.00522	<0.0045	<0.00449
trans-1,2-Dichloroethene	1.5200	<0.466	0.00056 F	<0.00477	0.00161 F	<0.00522	<0.0045	0.000681 F
Trichloroethene	0.1820	**2.32**	**0.417 F**	<0.00477	0.041	<0.00522	0.0277	0.0239
Vinyl chloride	0.0294	<0.466	<0.00482	<0.00477	0.00363 J	<0.00522	<0.0045	0.00207 J

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SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-20-12-13 9/12/2008 TA-3 Rnd 2	LSB-21-27-28 8/20/2008 TA-3 Rnd 1	LSB-22-2-3 9/12/2008 TA-4 Rnd 2	LSB-22-22-23 9/12/2008 TA-4 Rnd 2	LSB-23-14-15 8/19/2008 TA-4 Rnd 1	LSB-23-2-3 8/19/2008 TA-4 Rnd 1	LSB-23-28-29 8/19/2008 TA-4 Rnd 1
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.003	<0.00274	0.00429	<0.00314	<0.00314	<0.00306	**0.319**
1,1,2-Trichloroethane	0.0627	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437
1,1-Dichloroethene	0.1500	<0.00599	<0.00548	<0.00625	<0.00627	<0.00628	<0.00612	<0.524
1,2-Dichloroethane	0.0329	<0.003	<0.00274	<0.00313	<0.00314	<0.00314	<0.00306	<0.262
Carbon tetrachloride	0.2150	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437
Chloroform	0.9170	0.000521 F	<0.00183	0.0132	0.00538	<0.00209	0.000513 F	<0.175
cis-1,2-Dichloroethene	0.7550	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437
Methylene chloride	0.0305	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437
Tetrachloroethene	0.1806	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437
trans-1,2-Dichloroethene	1.5200	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437
Trichloroethene	0.1820	<0.005	<0.00456	0.00093 F	<0.00523	<0.00523	<0.0051	**2.02**
Vinyl chloride	0.0294	<0.005	<0.00456	<0.00521	<0.00523	<0.00523	<0.0051	<0.437

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THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-23-28-29 9/12/2008 TA-4 Rnd 2	LSB-23-28-29 10/2/2008 TA-4 Rnd 3	LSB-23-28-29 10/20/2008 TA-4 Rnd 4	LSB-23-28-29 11/11/2008 TA-4 Rnd 5	LSB-24-12-13 8/19/2008 TA-4 Rnd 1	LSB-25-2-3 8/18/2008 TA-1E Rnd 1	LSB-25-2-3 9/10/2008 TA-1E Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	**0.264 F**	<0.0168	<0.309	<0.0164	<0.00339	**1.07**	**0.0729**
1,1,2-Trichloroethane	0.0627	**0.108 F**	0.0222 F	<0.515	<0.0273	<0.00564	**0.0749 J**	0.0228
1,1-Dichloroethene	0.1500	<0.625	<0.0336	<0.618	<0.0327	<0.00677	<0.615	0.0019 F
1,2-Dichloroethane	0.0329	<0.312	<0.0168	<0.309	<0.0164	<0.00339	<0.308	0.000803 F
Carbon tetrachloride	0.2150	<0.521	<0.028	<0.515	<0.0273	<0.00564	<0.513	<0.00509
Chloroform	0.9170	**30**	**25.3**	**11.5**	0.0226 J	<0.00226	<0.205	0.00299
cis-1,2-Dichloroethene	0.7550	0.0552 F	0.00488 F	<0.515	<0.0273	<0.00564	0.137 F	0.085 F
Methylene chloride	0.0305	**0.136 F**	0.0228 F	<0.515	<0.0273	<0.00564	<0.513	<0.00509
Tetrachloroethene	0.1806	**0.234 F**	0.00353 F	<0.515	<0.0273	<0.00564	**0.508 F**	0.0577
trans-1,2-Dichloroethene	1.5200	<0.521	<0.028	<0.515	<0.0273	<0.00564	<0.513	0.0539
Trichloroethene	0.1820	**3.68**	0.127	**0.615**	<0.0273	<0.00564	**12.4**	**1.32**
Vinyl chloride	0.0294	<0.521	<0.028	<0.515	<0.0273	<0.00564	<0.513	<0.00509

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SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-25-2-3 10/2/2008 TA-1E Rnd 3	LSB-25-10-11 8/18/2008 TA-1E Rnd 1	LSB-25-10-11 9/10/2008 TA-1E Rnd 2	LSB-25-10-11 10/2/2008 TA-1E Rnd 3	LSB-25-10-11 10/20/2008 TA-1E Rnd 4	LSB-25-20-21 8/18/2008 TA-1E Rnd 1	LSB-25-20-21 9/10/2008 TA-1E Rnd 2
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.0029	**3.84**	**3.61**	**0.254**	<0.00374	<1.42	**0.0207**
1,1,2-Trichloroethane	0.0627	<0.00483	<0.531	**0.151**	0.0065	<0.00624	<2.37	0.000811 F
1,1-Dichloroethene	0.1500	<0.00579	<0.638	0.018	0.000521 F	<0.00749	<2.85	0.000576 F
1,2-Dichloroethane	0.0329	<0.0029	<0.319	<0.00323	<0.00308	<0.00374	<1.42	<0.00287
Carbon tetrachloride	0.2150	<0.00483	<0.531	<0.00539	<0.00514	<0.00624	<2.37	<0.00478
Chloroform	0.9170	<0.00193	<0.213	0.025	0.000903 F	<0.0025	<0.95	<0.00191
cis-1,2-Dichloroethene	0.7550	0.00285 F	0.145 F	**1.77**	0.0739	<0.00624	**2.58**	0.0364
Methylene chloride	0.0305	0.00133 F	<0.531	<0.00539	<0.00514	0.00269 F	<2.37	<0.00478
Tetrachloroethene	0.1806	0.000666 F	<0.531	0.118	0.000591 F	<0.00624	<2.37	0.004 F
trans-1,2-Dichloroethene	1.5200	<0.00483	<0.531	0.168 F	0.00419 F	<0.00624	0.334 F	0.0055
Trichloroethene	0.1820	0.0306	**0.703**	**19.1**	**0.307**	<0.00624	**12.8**	**0.795**
Vinyl chloride	0.0294	<0.00483	<0.531	<0.00539	<0.00514	<0.00624	<2.37	<0.00478

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SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-25-20-21 10/2/2008 TA-1E Rnd 3	LSB-26-24-25 8/18/2008 TA-1E Rnd 1	LSB-26-24-25 9/10/2008 TA-1E Rnd 2	LSB-26-24-25 10/2/2008 TA-1E Rnd 3	LSB-27-27-28 8/18/2008 TA-1E Rnd 1	LSB-27-27-28 9/10/2008 TA-1E Rnd 2	LSB-27-27-28 10/2/2008 TA-1E Rnd 3
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	<0.00292	<0.00302	<0.003	<0.00295	0.00153 F	<0.00283	<0.00295
1,1,2-Trichloroethane	0.0627	<0.00487	0.0624	0.0408	<0.00492	0.00104 F	0.00551	0.000583 F
1,1-Dichloroethene	0.1500	<0.00584	0.00124 F	0.00108 F	<0.00591	<0.00552	0.00052 F	<0.0059
1,2-Dichloroethane	0.0329	<0.00292	<0.00302	<0.003	<0.00295	<0.00276	<0.00283	<0.00295
Carbon tetrachloride	0.2150	<0.00487	<0.00503	<0.005	<0.00492	<0.0046	<0.00471	<0.00492
Chloroform	0.9170	<0.00195	0.000991 F	0.000856 F	<0.00197	0.00068 F	0.00327	<0.00197
cis-1,2-Dichloroethene	0.7550	0.00238 F	0.558	0.63	<0.00492	0.117	0.476 F	0.017
Methylene chloride	0.0305	0.00105 F	<0.00503	<0.005	0.00111 F	<0.0046	<0.00471	0.00106 F
Tetrachloroethene	0.1806	<0.00487	<0.00503	0.000669 F	<0.00492	<0.0046	0.00381 F	<0.00492
trans-1,2-Dichloroethene	1.5200	<0.00487	0.0292	0.0363	<0.00492	0.00541	0.0418	<0.00492
Trichloroethene	0.1820	0.00306 F	**0.749**	**0.691**	<0.00492	0.106	**0.749**	0.00408 F
Vinyl chloride	0.0294	<0.00487	<0.00503	<0.005	<0.00492	<0.0046	<0.00471	<0.00492

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SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-28-9-10 8/18/2008 TA-1E Rnd 1	LSB-29-15-16 8/18/2008 TA-1D Rnd 1	LSB-30-11-12 8/18/2008 TA-1C Rnd 1	LSB-30-11-12 9/10/2008 TA-1C Rnd 2	LSB-30-11-12 10/2/2008 TA-1C Rnd 3	LSB-30-11-12 10/20/2008 TA-1C Rnd 4	LSB-30-11-12 11/11/2008 TA-1C Rnd 5
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	0.000771 F	<0.0027	**11.3**	**6.07**	**1.43 J**	**0.351**	<0.00275
1,1,2-Trichloroethane	0.0627	<0.00458	<0.00451	<8.71	**2.49 F**	**0.48**	<0.499	<0.00459
1,1-Dichloroethene	0.1500	<0.00549	<0.00541	<10.5	<5.39	0.0913	<0.599	<0.00551
1,2-Dichloroethane	0.0329	<0.00275	<0.0027	<5.23	<2.7	0.00553 F	<0.299	<0.00275
Carbon tetrachloride	0.2150	<0.00458	<0.00451	<8.71	<4.49	<0.0274	<0.499	<0.00459
Chloroform	0.9170	<0.00183	<0.0018	<3.48	<1.8	<0.011	<0.2	<0.00184
cis-1,2-Dichloroethene	0.7550	<0.00458	<0.00451	**23.6**	**29.9**	**259**	**1.13**	0.00561 J
Methylene chloride	0.0305	<0.00458	<0.00451	<8.71	<4.49	0.00764 F	<0.499	<0.00459
Tetrachloroethene	0.1806	<0.00458	<0.00451	<8.71	**5.77**	**0.227**	<0.499	<0.00459
trans-1,2-Dichloroethene	1.5200	<0.00458	<0.00451	**3.68 F**	**5.15**	**70.4**	0.166 F	<0.00459
Trichloroethene	0.1820	<0.00458	<0.00451	**96.6**	**297**	**742**	**7.71**	0.00727 J
Vinyl chloride	0.0294	<0.00458	<0.00451	<8.71	<4.49	**0.0435**	<0.499	<0.00459

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SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-30-25-26 8/18/2008 TA-1C Rnd 1	LSB-30-25-26 9/10/2008 TA-1C Rnd 2	LSB-30-25-26 10/2/2008 TA-1C Rnd 3	LSB-30-25-26 10/20/2008 TA-1C Rnd 4	LSB-30-25-26 11/11/2008 TA-1C Rnd 5	LSB-31-9-10 8/20/2008 TA-1A Rnd 1	LSB-32-11-12 8/19/2008 TA-4 Rnd 1
Primary CVOCs (mg/Kg)	Loess RG							
1,1,2,2-Tetrachloroethane	0.0112	**0.517**	**1.74**	**0.0901**	**0.0415**	<0.00319	<0.00313	**3.15**
1,1,2-Trichloroethane	0.0627	**0.0869 F**	**0.21 F**	0.0157	<0.00501	<0.00532	<0.00521	**0.124 F**
1,1-Dichloroethene	0.1500	<0.58	<0.562	<0.00583	<0.00601	<0.00639	<0.00625	<0.63
1,2-Dichloroethane	0.0329	<0.29	<0.281	<0.00291	<0.00301	<0.00319	<0.00313	<0.315
Carbon tetrachloride	0.2150	<0.483	<0.468	<0.00486	<0.00501	<0.00532	<0.00521	<0.525
Chloroform	0.9170	<0.193	<0.187	<0.00194	<0.002	<0.00213	0.0529	**12**
cis-1,2-Dichloroethene	0.7550	**2.71**	**1.49**	0.00768	0.00457 F	0.00108 F	<0.00521	<0.525
Methylene chloride	0.0305	<0.483	<0.468	<0.00486	<0.00501	<0.00532	<0.00521	<0.525
Tetrachloroethene	0.1806	<0.483	<0.468	<0.00486	<0.00501	<0.00532	<0.00521	0.0897 F
trans-1,2-Dichloroethene	1.5200	0.0503 F	<0.468	<0.00486	0.000504 F	0.0016 F	<0.00521	<0.525
Trichloroethene	0.1820	**1.26**	**1.05**	0.00625	0.00908	0.00923 J	<0.00521	**1.96**
Vinyl chloride	0.0294	<0.483	<0.468	<0.00486	<0.00501	<0.00532	<0.00521	<0.525

Bold: Exceeds RG
Underline: 10X RG
Shaded: RL > RG
<: Not detected above Reporting Limit (RL)
F: Concentration estimated < RL and > MDL
J: Estimated
Q: Quality control criteria failed; review require

TABLE B-1
SOIL ANALYTICAL RESULTS SUMMARY
THERMAL SVE CONFIRMATION SAMPLES
SOURCE AREAS LOESS/GROUNDWATER RA
Dunn Field - Defense Depot Memphis Tennessee

		LSB-32-11-12 9/11/2008 TA-4 Rnd 2	LSB-33-23-24 9/11/2008 TA-4 Rnd 2	LSB-34-20-21 9/11/2008 TA-4 Rnd 2	LSB-35-13-14 9/11/2008 TA-4 Rnd 2
Primary CVOCs (mg/Kg)	Loess RG				
1,1,2,2-Tetrachloroethane	0.0112	<0.00314	<0.00293	<0.00293	0.00229 F
1,1,2-Trichloroethane	0.0627	<0.00523	0.00943	<0.00488	<0.00507
1,1-Dichloroethene	0.1500	<0.00627	<0.00586	<0.00585	<0.00609
1,2-Dichloroethane	0.0329	<0.00314	<0.00293	<0.00293	<0.00304
Carbon tetrachloride	0.2150	<0.00523	<0.00489	<0.00488	<0.00507
Chloroform	0.9170	<0.00209	**0.929 J**	0.00127 F	<0.00203
cis-1,2-Dichloroethene	0.7550	<0.00523	0.00141 F	<0.00488	<0.00507
Methylene chloride	0.0305	<0.00523	0.00137 F	<0.00488	<0.00507
Tetrachloroethene	0.1806	<0.00523	0.0028 F	<0.00488	<0.00507
trans-1,2-Dichloroethene	1.5200	<0.00523	<0.00489	<0.00488	<0.00507
Trichloroethene	0.1820	<0.00523	0.0822 F	<0.00488	<0.00507
Vinyl chloride	0.0294	<0.00523	<0.00489	<0.00488	<0.00507

Bold: Exceeds RG
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Shaded: RL > RG
<: Not detected above Reporting Limit (RL)
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FINAL PAGE

ADMINISTRATIVE RECORD

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