Final SVE Pilot Test Extension Report

Defense Depot Memphis, Tennessee
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Department of the Army

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Acronyms and Abbreviations

bgs	below ground surface
btoc	below top of casing
CF	chloroform
cfm	cubic feet per minute
CT	carbon tetrachloride
CVOC	chlorinated volatile organic compound
DCA	1,2 dichloroethane
DCE	1,1-dichloroethene
DDMT	Defense Depot Memphis, Tennessee
DQE	data quality evaluation
DQO	data quality objective
ft	feet/foot
in	inch/inches
lb/hr	pounds per hour
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit
mL/min	milliliters per minute
PAL	project action level
PCE	tetrachloroethene
PID	photoionization detector
ppbV	parts per billion by volume
ppm	parts per million
QAPP	Quality Assurance Project Plan
QC	quality control
SAI	Source Areas Investigation
SCHD	Shelby County Health Department
SVE	soil vapor extraction
TCE	trichloroethene
USACE	United States Army Corps of Engineers
VMP	vapor monitoring point
VOC	volatile organic compound
WC	water column

1 Introduction

This *SVE Pilot Test Extension Memorandum* was prepared by HDR, Inc. (HDR) under Contract Number W91278-16-D-0061-W9127819F0090 to the United States Army Corps of Engineers (USACE), Mobile District. This data report describes system operations and analytical results during extended operation, April to October 2021, of the soil vapor extraction (SVE) system pilot test at the Main Installation of the former Defense Depot Memphis, Tennessee (DDMT).

1.1 SVE System

The SVE system, manufactured by Geotech Environmental Equipment, Inc., includes a 10-horsepower aluminum fan regenerative blower manufactured by Rotron. The blower produces a flow rate of 120 cubic feet per minute (cfm) at 90 inches of water column (in WC). The blower system is mounted in a 5 x 10 foot (ft) enclosed trailer. The SVE system is powered by three-phase 100 ampere service from the existing service in Building 265. The SVE system trailer is secured within a 6-ft tall chain link, barbed wire fence and anchored to the ground.

The SVE blower is connected to well SVE-1 via 2-inch inside diameter suction hose sloped away from the blower to minimize condensate generation. The SVE-1 well screen extends from 43 to 73 ft below ground surface (bgs); the top of sand in the fluvial deposits was 30 ft bgs and the depth to water at nearby well DR2-1 was 85.4 ft below top of casing (btoc) in April 2019. The location of SVE-1 and fenced enclosure are shown on Figure 1.

Vapor extracted from SVE-1 passes through a 55-gallon moisture separator before being discharged to the atmosphere, without treatment, from the exhaust pipe discharge located 10 ft above ground surface. Instruments and sample ports in the SVE system influent and effluent piping allow sample collection and measurements of flow, temperature, and pressure. A dilution valve is located upstream from the moisture separator; the valve is operated manually to reduce flow from the SVE well by adding ambient air. A process flow diagram is provided on Figure 2.

Seven vapor monitoring points (VMPs) were installed in the test area (Figure 1) in June and August 2019. Each VMP has a 1-ft long, stainless steel mesh screen placed in the sand-gravel of the lower fluvial deposits at depths of 31.5 to 43.5 ft bgs for shallow VMPs TTA2-1 to TTA-2-6 and 75 ft bgs for the deep VMP TTA2-5D. The VMPs are located 8 to 112 ft from SVE-1 (Figure 1).

1.2 Initial Pilot Test

The initial pilot test was conducted from August 2019 to May 2020 and was described in the *Final Soil Vapor Extraction Pilot Test Report* (HDR, 2020). The dilution valve was used to reduce chlorinated volatile organic compound (CVOC) concentrations in the effluent discharge below the Shelby County Health Department (SCHD) de minimus level of 0.1 pound per hour (lb/hr) and, per discussion with SCHD personnel, eliminate the need for a permit. The pilot test was conducted with the dilution valve closed for one week following start of operations on 29 August; the dilution valve was open from 4 September to 30 December and then closed through shutdown on 14 May. Conclusions for the initial pilot test stated in the report were:

- The SVE system operated without problem throughout the test; the only downtime was for 3 days when the utility power supply was off. No condensate was generated during operations.
- Pressure measurements at VMPs were -2.3 in WC or lower at the VMP furthest from the SVE well (112 ft) indicating a significant radius of influence. Vapor sample concentrations decreased 91 to 100% at six of the seven VMPs and 92% at the SVE well.
- Groundwater concentrations decreased 5 to 91% at 11 of 14 wells in close proximity to the SVE well; three wells in the area had increased concentrations.
- Approximately 200 pounds of CVOCs were removed during the test. The mass removed is much greater than the estimated mass of approximately 10 pounds in the *Source Areas Investigation* (SAI) (e2M, 2009). The difference indicates a significant amount of contaminant mass was adsorbed to soil in TTA-2, possibly beneath buildings since high CVOC concentrations were not observed in soil samples from the borings outside the buildings during the SAI.
- The final vapor concentrations and effluent discharge rate indicate SVE system operation could further decrease contaminant mass at TTA-2. Final CVOC concentrations at VMPs TTA2-2 and TTA2-6 indicate additional SVE wells in the TTA-2 area should be considered if SVE is conducted during additional remedial action. Further investigation through soil and vapor sampling in TTA-2 is recommended.

2 System Operations

The test extension was conducted from 21 April to 13 October 2021 in order to obtain additional data for consideration of SVE in further remedial action and to further reduce CVOC mass and groundwater impacts. Two data reports have been submitted for the pilot test extension; *SVE Pilot Test Extension Startup Memorandum* (HDR, 2021a) and the *SVE Pilot Test Extension Interim Data Report* (HDR, 2021b).

The trailer-mounted system was moved from the storage bay in Building 265 to the fenced enclosure, the blower was connected to the SVE well, and electrical power was re-connected on 15 April. Baseline pressure and photoionization detector (PID) readings at the seven TTA-2 VMPs were collected on 21 April and vapor samples were collected on 21 and 22 April.

The SVE blower was started on 22 April after vapor samples were collected from VMPs. The system was inspected prior to startup; system measurements were recorded following startup and compared to the manufacturer's recommended values. Effluent samples were collected following startup with the dilution valve closed and open. System operations began with the dilution valve open to avoid exceeding the SCHD de minimus criterion for VOC emissions. Initial sample results showed emissions rates were below the SCHD criterion; the dilution valve was closed on 11 May and remained closed through shut down on 13 October.

3 System Inspection and Monitoring

System monitoring consisted of weekly inspections to confirm the blower was operating properly; temperature, pressure and flow rates for the SVE system were recorded twice monthly. The blower operated without problem and system measurements were consistent with measurements from the initial test. The only issue noted was that the blower was off during the 28 September inspection; there was no obvious cause and the blower was restarted.

System readings are shown on Table 1. During the test extension, there was only one reading from the influent meter before it malfunctioned. The average effluent flow rates during the test extension were 215 cfm with the dilution valve closed and 275 cfm with the dilution valve open. The effluent flow rates are consistent with rates from the initial test and indicate influent flow rates from SVE-1 were near 110 cfm with the dilution valve open and 200 cfm with the dilution valve closed. The large difference between influent and effluent flow rates (110 cfm to 275 cfm) is due to air intake from the open dilution valve decreasing flow from the SVE well.

System inspections in July and October 2021 included measurement of blower influent vacuum and comparison to the 100 in WC set point, inspection of the air filter on the SVE flow meter for moisture, measurement of SVE system current draw, inspection for loose fittings/bolts, and measurement of the pressure drop across the filter/moisture separator. SVE system measurements were within manufacture specifications and no maintenance was required. The system did not generate condensate.

Pressure and PID readings at the VMPs were made in April at startup, in July after 3 months and in October prior to shut down. A manometer was used to measure pressure. PID readings were made after purging three casing volumes and collecting a sample in a Tedlar bag; the highest reading was recorded. A flow restrictor was used in April and October to limit the flow rate to 200 milliliters per minute (mL/min) during purging and sample collection; a flow restrictor was not used in July. The pressure measurements are shown on Table 2 and the PID readings are shown on Table 3.

Vapor samples were collected from system effluent in April, July and October. The samples were collected in 6-liter summa canisters without a flow regulator. The samples were shipped to ALS Laboratories in Simi Valley, California for volatile organic compound (VOC) analysis by Method TO-15.

Vapor samples were collected from TTA-2 VMPs in April and October. Each VMP was purged of three casing volumes using a 200 mL/min flow controller; a 1-liter summa canister was then attached to the flow controller and the vapor sample was collected. Duplicate samples were collected by diverting the sample from the flow controller into two 1-liter Summa canisters using the laboratory supplied tee. The samples were shipped to ALS Laboratories in Simi Valley, California, for VOC analysis by Method TO-15.

4 Monitoring Results

4.1 Field Measurements

Pressure measurements at VMPs are shown on Table 2. The April pressure measurements prior to system startup were -0.7 to -2.1 inches in WC. The measurements in July and October were -4.9 to -10.2 in WC indicating vapor capture from all VMPs.

PID measurements at VMPs are shown on Table 3. The measurements were 0.3 to 2.8 parts per million (ppm) at startup; similar to the May 2020 measurements of 0.4 to 3.2 ppm at the end of the initial test. Most measurements in July and October were slightly lower at 0.1 to 1.9 ppm; two measurements in July were significantly higher, 18.2 ppm at TTA2-2 and 6.1 ppm at TTA-2-6.

4.2 Analytical Results

4.2.1 Data Quality Evaluation

Analytical data from the April, July and October 2021 vapor sampling events were reviewed by the HDR Project Chemist using guidelines in the *DDMT Uniform Federal Policy-Quality Assurance Project Plan* (QAPP) (HDR, 2018). The complete analytical results for field and quality control (QC) samples, including data quality evaluation (DQE) flags, are presented in Appendix A. The laboratory analytical reports are included in Appendix B (electronic copies only). The Data Quality Review Reports are provided in Appendix C.

Sample results for the soil vapor samples were reported using limits of quantitation (LOQs), limits of detection (LODs), and method detection limits (MDLs). VOC data met project data quality objectives (DQOs) and were determined to be sufficient to support the pilot test extension review. The main findings from the review of the soil vapor analytical data are summarized separately below.

- Several analytes were qualified as estimated (J, J+, or UJ) in some samples due to second source standard results outside required limits.
- Several analytes were qualified as estimated (J or UJ) in some samples due to continuing calibration standard results outside required limits.
- Ethanol was qualified as non-detect (U) in some samples due to detection of ethanol in the method blank.
- Ethanol was qualified as non-detect (U) in some samples due to detection of ethanol in the canister batch certification blanks.
- Several analytes were qualified as estimated (J+, J-, or UJ) in some samples due to LCS recoveries outside control limits.
- Several analytes were qualified as estimated (J or UJ) due to field duplicate results outside control limits.

- Any result reported below the LOQ but above the MDL was qualified “J” and considered an estimated result (unless overridden by other QC flags).

4.2.2 Sample Results

4.2.2.1 April 2021

Vapor samples were collected from all VMPs in the TTA-2 test area. SVE effluent samples were collected from the effluent sample port. The first effluent sample was collected with the dilution valve closed. The dilution valve was then opened and the effluent discharge allowed to stabilize for approximately 40 minutes before the second effluent sample was collected. Analytical results for the primary CVOCs and for other VOCs detected above the LOQ in at least one sample are shown on Table 4.

TCE and PCE were reported above the project action levels (PALs) in all seven VMP samples with concentrations of 33 to 2400 parts per billion by volume (ppbV) for tetrachloroethene (PCE) and 2.1 to 180 ppbV for trichloroethene (TCE). Carbon tetrachloride (CT) was reported above the PAL in five samples with concentrations of 110 to 1000 ppbV. Chloroform (CF) was reported above the PAL in three samples with concentrations of 50 to 200 ppbV. 1,1-dichloroethene (DCE) and 1,2 dichloroethane (DCA) were reported slightly above the PAL in one sample each. The VMPs with individual CVOC concentrations above 1,000 ppbV are TTA2-1, TTA2-2 and TTA2-6.

The SVE effluent samples exceeded PALs for CT, CF, PCE and TCE with concentrations of 37 to 710 ppbV. PCE and CT had the highest concentrations, as in the VMP samples. CVOC concentrations in the sample collected with the dilution valve open were approximately 40% of the concentrations in the sample collected with the dilution valve closed; this is consistent with the ratio of influent flow to effluent flow when the dilution valve is open (110 cfm to 275 cfm).

4.2.2.2 July 2021

Vapor samples were not collected from the VMPs in July. SVE effluent samples were collected from the effluent sample port with the dilution valve open and closed; the samples were collected in the same sequence as described for April. Analytical results are shown on Table 5.

The SVE effluent samples exceeded PALs for DCE, CT, CF, PCE and TCE with concentrations of 35 to 810 ppbV. PCE and CT had the highest concentrations, as in April. The ratio of CVOC concentrations in the samples collected with the dilution valve open and closed was approximately 40% as in April.

4.2.2.3 October 2021

Vapor samples were collected from all VMPs in the TTA-2 test area. An SVE effluent sample was collected from the effluent sample port with the dilution valve closed. Analytical results are shown on Table 6.

TCE and PCE were reported above the PALs in all seven VMP samples with concentrations of 16 to 1500 ppbV for PCE and 3.2 to 520 ppbV for TCE. CT was reported above the PAL in four samples with concentrations of 25 to 530 ppbV. CF was reported above the PAL in one sample with a concentration 180 ppbV. DCE and DCA were each reported slightly above the PALs in one and two samples respectively. Only the sample from TTA2-2 had an individual CVOC concentration (PCE) above 1,000 ppbV.

The SVE effluent sample exceeded PALs for DCE, DCA, CT, CF, PCE and TCE with concentrations of 0.75 to 720 ppbV. CT, PCE and TCE had the highest concentrations, as in the VMP samples.

5 Effluent Discharge and Mass Removal

The mass discharge rate for CVOCs is calculated in lb/hr for SVE samples based on the reported concentrations of each CVOC and the effluent flow rate. The emission rates based on samples collected in May 2020 and in April, July and October 2021 are shown on Table 7. The discharge rates for operations with the dilution valve closed decreased slightly from 0.0089 lb/hr in May 2020 to 0.0082 lb/hr in April 2021, 0.0079 lb/hr in July, and 0.0072 lb/hr in October 2021.

The CVOC mass removed by the SVE system is calculated based on the operating hours for each period and the mass discharge rate for that period. The SVE system was operated with the dilution valve open from 22 April to 11 May; the April discharge rate 0.0042 lb/hr was used for that period. The SVE system was then operated with the dilution valve closed from 11 May to shut down on 13 October. The average of the nearest discharge rates were used for May to July and July to October. The mass discharge for each operating period and the cumulative mass removed are shown on Table 8. The cumulative mass removed is 30.8 pounds during the extension and 227 pounds over the initial and extended test periods.

6 Concentration Trends

6.1 System Effluent

The primary CVOC concentrations in effluent samples collected with the dilution valve closed during the initial and extended test periods are shown on Table 9. VC was not detected in any samples. The total concentrations of the parent compounds (CT, PCE and TCE), which are also present at the highest concentrations, are also shown.

The individual CVOC concentrations decreased 56% to 94% during the initial test period and the total CT, PCE and TCE concentrations decreased by 92%. Of the three main contaminants, TCE concentrations decreased the least at 64%.

The decrease was less during the extended test period. CT, CF and cDCE decreased by 39% to 52%, PCE decreased by only 3% and TCE increased 35%. The total CT, PCE and TCE concentrations decreased by 17%.

6.2 Vapor Monitoring Points

The primary CVOC concentrations in VMP samples collected during the initial and extended test periods are shown on Table 10. The total concentrations of CT, PCE and TCE are also shown.

CVOC concentrations in the April 2021 samples increased at four VMPS (TTA2-1, TTA2-3, TTA2-4, TTA-25D); May 2020 and April 2021 sample concentrations were about the same at two VMPs (TTA2-2 and TTA2-6); and the April 2021 concentrations decreased at TTA2-5.

CVOC concentrations in the October 2021 samples decreased at four VMPS (TTA2-1, TTA2-3, TTA2-4 and TTA2-6); were about the same at TTA2-2 and increased at two VMPs (TTA2-5 and TTA2-5D).

The changes in total CT, PCE and TCE concentrations from June 2019 to October 2021 were decreases of -95.2% to -99.9% at six VMPs and an increase of 206% at TTA2-2.

6.3 Groundwater

Nineteen TTA-2 LTM wells in TTA-2 were sampled semiannually from April 2019 through October 2021. Concentrations of the primary CVOCs in these LTM wells are shown on Table 11. The LTM wells were divided by those in the area of Buildings 261 and 265 or downgradient, and those to the northwest (Figure 3). CVOC concentrations in TTA-2 Northwest wells are hydraulically upgradient or side-gradient to the SVE Pilot Test area and are expected to have limited impact from the SVE pilot test.

CT, PCE and TCE are the parent contaminant compounds at TTA-2; cDCE and VC result from reductive dechlorination of PCE and TCE during EBT. Residual soil contamination being removed by SVE should primarily be the parent contaminants. The total concentration of CT, PCE and TCE in the TTA-2 wells was calculated for each sample event, and the % change in the total concentration from April 2019 to May 2020, May 2020 to October 2021 and April 2019 to October 2021 were determined for each well where concentrations exceeded the MCL for CT, PCE and/or TCE in either pair of LTM events (Table 11).

The change in concentration was calculated for all three periods in 9 of 12 Building 261/265 wells and 6 of 7 Northwest TTA-2 wells. For the Building 261/265 wells, the total concentration of CT, PCE and TCE decreased in both the initial and extended periods of operation at five wells, in only the initial period at one well and in only the extended period at two wells; the total concentration increased in both periods at one well. For the Northwest TTA-2 wells, the total concentration of CT, PCE and TCE decreased in both the initial and extended periods of operation at two wells, in only the initial period at three wells and in only the extended period at one well.

The change in total concentration of CT, PCE and TCE after the initial and extended operating periods are shown on Figure 3 and discussed below.

- Total concentrations decreased 55% to 96% in six Building 261/265 wells with the greatest decrease at DR2-1. Three wells had increased concentrations, 44% at MW-26,

73% at PMW92-02 and 3945% at PMW85-01. The very large increase at PMW85-01 resulted from a concentration of 1.2 µg/L in April 2019 and 48.1 µg/L in October 2021; there was a concurrent decrease in the vinyl chloride concentration at PMW85-01 from 18.4 µg/L in April 2019 to non-detect in October 2021.

- Total concentrations decreased 2% to 17% in four Northwest TTA-2 wells with the greatest decrease at MW-218. Two wells had increased concentrations of 33% at MW-267 and 39% at MW-294.

7 Summary

- The SVE system operated throughout the extended test period, except for one unexplained shutdown.
- Pressure measurements at VMPs in July and October 2021 were -4.9 to -10.2 in WC for all VMPs, indicating vapor capture at all VMPs from 8 to 112 ft from SVE-1.
- Total CT, PCE and TCE concentrations in vapor from June 2019 to October 2021 decreased -95.2% to -99.9% at six VMPs and increased 206% at TTA2-2.
- Total CT, PCE and TCE concentrations in SVE effluent decreased 92% from 20740 ppbV in August 2019 to 1600 ppbV in May 2020 and another 17% to 1330 ppbV in October 2021; the total reduction was 94%.
- During the initial test period, the mass emission rate with the dilution valve closed decreased 92% from 0.113 lb/hr in August 2019 to 0.0089 lb/hr in May 2020. The additional decrease in the extended test period was 19% to 0.0072 lb/hr in October 2021; the total reduction was 94%.
- The CVOC mass removal in the extended period was 30.8 pounds for a total of 227.5 pounds in both the initial and extended test period.
- Total CT, PCE and TCE concentrations in groundwater from April 2019 to October 2021 decreased 55 to 96% at six Building 261/265 wells and increased 44 to 3945% at three Building 261/265 wells. The concentrations decreased 2% to 17% at four Northwest TTA-2 wells and increased 33% to 39% at two Northwest TTA-2 wells.
- The effluent emission rate, mass removal and elevated CVOC concentrations in some TTA-2 VMPs and monitoring wells indicates continued SVE operations would be useful. Further investigation through soil and vapor sampling may indicate an additional SVE well is needed.

8 References

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HDR, 2021a. *SVE Pilot Test Extension Startup Memorandum, Defense Distribution Depot, Memphis Tennessee*. Prepared for the U.S. Army Corps of Engineers, Mobile District. June 2021.

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Tables

TABLE 1
SVE SYSTEM OPERATION READINGS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Date	Time	Influent Pressure (in WC)	(Blower Influent) Effluent Pressure (in WC)	Dilution Valve (%Open)	Influent Flow (cfm)	Effluent Flow (cfm)	Current (Ampere)	Blower Inlet Temp (deg F)	Blower Effluent Temp (deg F)
Initial Operations									
5/5/2020	940	-78	-82	0	212	215	22.7	68	174
5/12/2020	1115	-78	-83	0	220	220	22.1	60	168
Extended Operations									
4/22/2021	1120	-76	-80	0	215	215	22.4	64	162
4/22/2021	1515	-32	-45	100	NR	280	17.3	65	123
5/5/2021	1105	-34	-46	100	NR	270	18.3	70	132
5/11/2021	1110	-33	-46	100	NR	280	17.8	62	124
5/11/2021	1130	-78	-83	0	NR	220	23.3	60	150
5/26/2021	1222	-79	-82	0	NR	210	23.0	64	178
6/7/2021	1240	-79	-82	0	NR	210	23.0	66	178
6/22/2021	1115	-79	-82	0	NR	220	23.0	70	179
7/8/2021	1614	-78	-82	0	NR	210	22.5	70	180
7/14/2021	1138	-80	-82	0	NR	215	25.7	72	182
7/14/2021	1240	-34	-46	100	NR	275	18.0	72	145
7/27/2021	1230	-78	-82	0	NR	230	22.4	72	186
8/10/2021	1345	-78	-82	0	NR	210	22.6	72	186
8/31/2021	1700	-78	-81	0	NR	215	22.5	68	178
9/13/2021	1130	-79	-83	0	NR	210	23.4	70	180
9/18/2021	1200	-76	-80	0	NR	215	23.1	70	170
10/13/2021	1340	-78	-82	0	NR	215	22.9	70	180

Notes
in WC: inches of water column
cfm: cubic feet per minute
deg F: degrees Fahrenheit
NR: Influent flow meter inoperable, not recorded

TABLE 2
PRESSURE MEASUREMENTS AT VMPS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Date	Dilution Valve (%Open)	TTA2-1	TTA2-2	TTA2-3	TTA2-4	TTA2-5	TTA2-5D	TTA2-6
Distance from SVE-1 (ft)		77	87	31	58	16	8	112
Initial Operations								
6/17/2019	-	-0.6	-0.8	0.0	-0.5	-0.6	-	-0.5
8/27/2019[2]	Off	-0.1	0.0	-0.3	-0.2	-0.2	-0.1	-0.2
8/28/2019[3]	100	-4.7	-4.4	-5.4	-4.9	-5.9	-7.1	-4.4
8/29/2019[4]	0	-5.3	-5.4	-6.4	-5.6	-7.6	-8.9	-4.9
12/4/2019	100	-2.6	-2.7	-3.7	-2.6	-3.9	-5.1	-2.7
12/4/2019	0	-3.7	-3.5	-5.1	-3.6	-5.6	-7.4	-3.4
5/12/2020	0	-4.7	-4.1	-4.4	-4.3	-5.6	-6.8	-2.3
Extended Operations								
4/21/2021[5]	Off	-1.0	-1.8	-0.8	-2.1	-0.8	-0.7	-2.0
7/14/2021	0	-6.1	-6.6	-7.8	-6.9	-8.9	-10.2	-6.1
10/13/2021	0	-4.9	-5.4	-7.1	-5.6	-7.6	-9	-5.1

Note:

1) Pressure measurements made with a digital manometer; units are in inches of water; negative values indicate a partial vacuum was created.
2) Pressure measurements prior to startup of the SVE blower.
3) Pressure measurements at the end of Step Test 1.
4) Pressure measurements at the end of Step Test 2.
5) Pressure measurements prior to startup of SVE Pilot Test Extension.

TABLE 3
PID READINGS AT VMPS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Date	Dilution Valve (%Open)	TTA2-1	TTA2-2	TTA2-3	TTA2-4	TTA2-5	TTA2-5D	TTA2-6
Distance from SVE-1 (ft)		77	87	31	58	16	8	112
Initial Operations								
6/17/2019	Off	9.5	9.3	4.4	7.3	3.3	-	7.1
8/25/2019	Off	-	-	-	-	14.7	16.2	-
8/28/2019	0	-	-	15.6	-	16.2	8.0	-
12/4/2019	Off	0	9.7	0.2	0.1	5.9	4.3	11.2
5/13/2020	0	0.4	3.2	0.4	0.6	1.7	1.5	3.1
Extended Operations								
4/21/2021	Off	1.9	2.8	1.3	1.2	1.1	0.3	2.0
7/14/2021	0	0	18.2	0.7	0.1	1.9	0.9	6.1
10/13/2021	0	0	1.1	0.6	0.1	0.4	0.4	0.4

Notes:

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

TABLE 4
VAPOR ANALYTICAL RESULTS SUMMARY, APRIL 2021
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Location ID		VMP TTA2-1	VMP TTA2-2	VMP TTA2-3	VMP TTA2-4	VMP TTA2-5	VMP TTA2-5D	VMP TTA2-6
	Sample ID		PT-V-2.1-5	PT-V-2.2-5	PT-V-2.3-5-RE	PT-V-2.4-5	PT-V-2.5-5	PT-V-2.5 D-5	PT-V-2.6-5
	Lab ID		P2102136-001	P2102136-003	P2102152-003	P2102136-005	P2102136-002	P2102152-001	P2102136-004
	Date		4/21/2021	4/21/2021	4/22/2021	4/21/2021	4/21/2021	4/22/2021	4/21/2021
Primary CVOCs	Units	PAL							
1,1,2,2-Tetrachloroethane	ppbV	0.55	12 U	11 U	4.7 U	1.5 U	0.42 U	0.35 U	19 U
1,1,2-Trichloroethane	ppbV	2.03	14 U	14 U	5.8 U	1.8 U	0.52 U	0.43 U	23 U
1,1-Dichloroethene	ppbV	29	**33**	15 J	20	4.5	0.26 J	0.15 J	32 U
1,2-Dichloroethane	ppbV	0.64	19 U	19 U	7.9 U	2.4 U	**1.1**	0.25 J	31 U
Carbon Tetrachloride	ppbV	14.2	**370**	**1000**	**560**	**110**	13	14	**760**
Chloroform	ppbV	32.6	11 J	25	**52**	11	**50**	5.3	**200**
cis-1,2-Dichloroethene	ppbV	39.5	12 J	9.1 J	22	6.7	8.5	0.99	25 J
Dichloromethane (Methylene Chloride)	ppbV	2.85	23 U	22 U	9.2 U	2.8 U	1.4	0.67 U	37 U
Tetrachloroethene	ppbV	0.99	**1400**	**1300**	**770**	**280**	**58**	**33**	**2400**
trans-1,2-Dichloroethene	ppbV	134	20 U	19 U	8.2 U	2.5 U	0.73 U	0.6 U	33 U
Trichloroethene	ppbV	2.06	**130**	**130**	**180**	**41**	**15**	**2.1**	**120**
Vinyl Chloride	ppbV	14.8	31 U	30 U	13 U	0.62 J	0.14 J	0.93 U	51 U
Other VOCs									
1,1,2-Trichlorotrifluoroethane	ppbV	NE	110	470	120	26	1.2	1.7	150
2-Butanone (MEK)	ppbV	NE	51 U	49 U	21 U	6.4 U	2.2	0.79 J	83 U
2-Propanol (Isopropyl Alcohol)	ppbV	NE	61 U	59 U	25 U	7.7 U	2.7	1.2 J	99 U
4-Methyl-2-pentanone	ppbV	NE	3.8 J	6.5 J	15 U	4.6 U	9.2	2.3	4.7 J
Acetone	ppbV	NE	330 U	320 U	130 U	15 J	21	11	530 U
Benzene	ppbV	NE	25 U	23 U	10 U	2.1 J	3	0.57 J	40 U
Carbon Disulfide	ppbV	NE	49 U	46 U	20 U	3.8 J	1.1 J	4.8	78 U
Dichlorodifluoromethane (CFC 12)	ppbV	NE	16 U	15 U	1.5 J	1.2 J	0.51 J	0.48	26 U
Ethanol	ppbV	NE	55 J	410 U	170 U	53 U	31	13 U	690 U
Ethylbenzene	ppbV	NE	18 U	17 U	7.3 U	2.3 U	0.16 J	0.75	29 U
Hexane	ppbV	NE	22 U	21 U	9 U	2.8 U	2	0.19 J	36 U
m,p-Xylenes	ppbV	NE	35 U	33 U	14 U	4.4 U	0.71 J	4.2	56 U
Naphthalene	ppbV	NE	15 UJ	14 UJ	6.1 U	1.9 UJ	0.15 J	0.6	24 UJ
n-Nonane	ppbV	NE	15 UJ	15 UJ	6.2 U	1.9 UJ	0.2 J	1.6	25 UJ
n-Octane	ppbV	NE	17 U	16 U	6.8 U	2.1 U	0.61 U	1.5	27 U
o-Xylene	ppbV	NE	18 U	18 U	7.5 U	2.3 U	0.31 J	1.3	30 U
Propene	ppbV	NE	46 U	44 U	18 U	34	6.5	0.78 J	74 U
Toluene	ppbV	NE	21 U	20 U	8.4 U	0.6 J	4.8	8.9	34 U
Trichlorofluoromethane	ppbV	NE	84	230	76	15	0.99	1.1	40

Notes:
1) Results above PAL shown in **bold**
2) Results shown for primary CVOCs and for other VOCs detected above the LOQ.
ppbV: parts per billion by volume
PAL: Project Action Limits
LOD: Limit of Detection
LOQ: Limit of Quantitation
NE: not established
DQE Flags:
U: Not detected at LOD
UJ: Not detected, LOD estimated
J: Estimated concentration
Method:
TO-15

TABLE 4
VAPOR ANALYTICAL RESULTS SUMMARY, APRIL 2021
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Location ID		SVE-1	SVE-1
	Sample ID		PT-V-SVE1-EFF1-5	PT-V-SVE1-EFF2-5
	Lab ID		P2102151-001	P2102151-002
	Date		4/22/2021	4/22/2021
Primary CVOCs	Units	PAL	Open (100%)	Closed (0%)
1,1,2,2-Tetrachloroethane	ppbV	0.55	1.6 U	3.9 U
1,1,2-Trichloroethane	ppbV	2.03	2 U	4.8 U
1,1-Dichloroethene	ppbV	29	5.1	12
1,2-Dichloroethane	ppbV	0.64	2.6 U	6.4 U
Carbon Tetrachloride	ppbV	14.2	**250**	**630**
Chloroform	ppbV	32.6	**37**	**92**
cis-1,2-Dichloroethene	ppbV	39.5	8.9	22
Dichloromethane (Methylene Chloride)	ppbV	2.85	3.1 U	7.5 U
Tetrachloroethene	ppbV	0.99	**280**	**710**
trans-1,2-Dichloroethene	ppbV	134	2.7 U	6.7 U
Trichloroethene	ppbV	2.06	**62**	**150**
Vinyl Chloride	ppbV	14.8	4.3 U	10 U
Other VOCs				
1,1,2-Trichlorotrifluoroethane	ppbV	NE	56	140
2-Butanone (MEK)	ppbV	NE	7 U	17 U
2-Propanol (Isopropyl Alcohol)	ppbV	NE	8.3 U	20 U
4-Methyl-2-pentanone	ppbV	NE	5 U	12 U
Acetone	ppbV	NE	45 U	110 U
Benzene	ppbV	NE	3.3 U	8.1 U
Carbon Disulfide	ppbV	NE	6.6 U	16 U
Dichlorodifluoromethane (CFC 12)	ppbV	NE	0.74 J	1.1 J
Ethanol	ppbV	NE	58 U	140 U
Ethylbenzene	ppbV	NE	2.5 U	6 U
Hexane	ppbV	NE	3 U	7.4 U
m,p-Xylenes	ppbV	NE	4.7 U	12 U
Naphthalene	ppbV	NE	2 U	5 U
n-Nonane	ppbV	NE	2.1 U	5.1 U
n-Octane	ppbV	NE	2.3 U	5.6 U
o-Xylene	ppbV	NE	2.5 U	6.1 U
Propene	ppbV	NE	6.2 U	15 U
Toluene	ppbV	NE	2.8 U	6.9 U
Trichlorofluoromethane	ppbV	NE	30	73

Notes:
1) Results above PAL shown in **bold**
2) Results shown for primary CVOCs and for other VOCs detected above the LOQ.
ppbV: parts per billion by volume
PAL: Project Action Limits
LOD: Limit of Detection
LOQ: Limit of Quantitation
NE: not established
DQE Flags:
U: Not detected at LOD
UJ: Not detected, LOD estimated
J: Estimated concentration
Method:
TO-15

TABLE 5
VAPOR ANALYTICAL RESULTS SUMMARY, JULY 2021
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Location ID		SVE-1	SVE-1
	Sample ID		PT-V-SVE1-EFF1-6	PT-V-SVE1-EFF2-6
	Lab ID		P2103826-002	P2103826-001
	Date		7/14/2021	7/14/2021
Primary CVOCs	Units	PAL	Open (100%)	Closed (0%)
1,1,2,2-Tetrachloroethane	ppbV	0.55	0.4 U	1.6 U
1,1,2-Trichloroethane	ppbV	2.03	0.5 U	2 U
1,1-Dichloroethene	ppbV	29	13	**35**
1,2-Dichloroethane	ppbV	0.64	0.31 J	2.7 U
Carbon Tetrachloride	ppbV	14.2	**140**	**400**
Chloroform	ppbV	32.6	32	**86**
cis-1,2-Dichloroethene	ppbV	39.5	14	37
Dichloromethane (Methylene Chloride)	ppbV	2.85	1.5 U	5.9 U
Tetrachloroethene	ppbV	0.99	**310**	**810**
trans-1,2-Dichloroethene	ppbV	133.5	0.69 U	2.7 U
Trichloroethene	ppbV	2.06	**89**	**240**
Vinyl Chloride	ppbV	14.8	1.1 U	4.3 U
Other VOCs				
1,1,2-Trichlorotrifluoroethane	ppbV	NE	46	120
1,1-Dichloroethene	ppbV	NE	13	35
Carbon Disulfide	ppbV	NE	10	11 U
Trichlorofluoromethane	ppbV	NE	16	46

Notes:
1) Results above PAL shown in **bold**
2) Results shown for primary CVOCs and for other VOCs detected above the LOQ.
ppbV: parts per billion by volume
$\mu g/m^3$: microgram per cubic meter
PAL: Project Action Limits
LOD: Limit of Detection
LOQ: Limit of Quantitation
NE: not established
DQE Flags:
U: Not detected at LOD
J: Estimated concentration
Method:
TO-15

TABLE 6
VAPOR ANALYTICAL RESULTS SUMMARY, OCTOBER 2021
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Location ID		VMP TTA2-1	VMP TTA2-2	VMP TTA2-3	VMP TTA2-4	VMP TTA2-5	VMP TTA2-5D	VMP TTA2-6
	Sample ID		PT-V-2.1-6	PT-V-2.2-6	PT-V-2.3-6	PT-V-2.4-6	PT-V-2.5-6	PT-V-2.5D-6	PT-V-2.6-6
	Lab ID		P2105435-001	P2105435-002	P2105435-003	P2105435-004	P2105435-005	P2105435-006	P2105435-007
	Date		10/13/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021
Primary CVOCs	Units	PAL							
1,1,2,2-Tetrachloroethane	ppbV	0.55	0.38 U	3 U	1.2 U	0.14 U	1.1 U	0.15 U	0.89 U
1,1,2-Trichloroethane	ppbV	2.03	0.47 U	3.7 U	1.6 U	0.18 U	1.4 U	0.19 U	1.1 U
1,1-Dichloroethene	ppbV	29	2.4	24	2.5 J	0.72 J	1.9 U	**38**	1.5 U
1,2-Dichloroethane	ppbV	0.64	0.64 U	5 U	2.1 U	0.24 U	**1.5 J**	0.19 J	**1.8 J**
Carbon Tetrachloride	ppbV	14.2	2.8	**530**	7.4	3.6	**25**	**56**	**110**
Chloroform	ppbV	32.6	4.6	20	3.9 J	1.7	12	12	**180**
cis-1,2-Dichloroethene	ppbV	39.5	0.65 U	20	5.2 J	3.6	1.1 J	31	30
Dichloromethane (Methylene Chloride)	ppbV	2.85	1.4 U	11 U	4.5 U	0.51 U	4 U	0.53 U	3.2 U
Tetrachloroethene	ppbV	0.99	**16**	**1500**	**700**	**12**	**470**	**130**	**910**
trans-1,2-Dichloroethene	ppbV	134	0.65 U	5.1 U	2.1 U	0.24 U	1.9 U	0.21 J	1.5 U
Trichloroethene	ppbV	2.06	**3.2**	**520**	**27**	**8.8**	**12**	**130**	**42**
Vinyl Chloride	ppbV	14.8	1 U	7.9 U	3.3 U	0.38 U	3 U	0.32 J	2.4 U
Other VOCs									
1,1,2-Trichlorotrifluoroethane	ppbV	NE	0.16 J	830	0.74 J	0.16 J	1 U	0.11 J	1.6 J
1,1-Dichloroethane	ppbV	NE	0.64 U	5 U	2.1 U	0.67 J	1.9 U	6.6	1.5 U
4-Methyl-2-pentanone	ppbV	NE	4 J	6.1 U	4.4 J	2.7	7.2 J	6	9.2 J
Dichlorodifluoromethane (CFC 12)	ppbV	NE	0.75 J	7.7 U	1.2 J	0.55 J	2.9 U	1.4	0.75 J
Trichlorofluoromethane	ppbV	NE	14	38	26	0.29 J	1.3 U	1.3	0.52 J

Notes:
1) Results above PAL shown in **bold**
2) Results shown for primary CVOCs and for other VOCs detected above the LOQ.
ppbV: parts per billion by volume
PAL: Project Action Limits
LOD: Limit of Detection
LOQ: Limit of Quantitation
NE: not established
DQE Flags:
U: Not detected at LOD
J: Estimated concentration
Method:
TO-15

TABLE 6
VAPOR ANALYTICAL RESULTS SUMMARY, OCTOBER 2021
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Location ID		SVE-1
	Sample ID		PT-V-SVE1-EFF2-6
	Lab ID		P2105435-009
	Date		10/13/2021
Primary CVOCs	Units	PAL	
1,1,2,2-Tetrachloroethane	ppbV	0.55	0.32 U
1,1,2-Trichloroethane	ppbV	2.03	0.41 U
1,1-Dichloroethene	ppbV	29	**42**
1,2-Dichloroethane	ppbV	0.64	**0.75 J**
Carbon Tetrachloride	ppbV	14.2	**300**
Chloroform	ppbV	32.6	**61**
cis-1,2-Dichloroethene	ppbV	39.5	31
Dichloromethane (Methylene Chloride)	ppbV	2.85	1.2 U
Tetrachloroethene	ppbV	0.99	**720**
trans-1,2-Dichloroethene	ppbV	134	0.4 J
Trichloroethene	ppbV	2.06	**310**
Vinyl Chloride	ppbV	14.8	0.86 U
Other VOCs			
1,1,2-Trichlorotrifluoroethane	ppbV	NE	120
1,1-Dichloroethane	ppbV	NE	0.76 J
4-Methyl-2-pentanone	ppbV	NE	0.67 U
Dichlorodifluoromethane (CFC 12)	ppbV	NE	1.2 J
Trichlorofluoromethane	ppbV	NE	33

Notes:
1) Results above PAL shown in **bold**
2) Results shown for primary CVOCs and for other VOCs detected above the LOQ.
ppbV: parts per billion by volume
PAL: Project Action Limits
LOD: Limit of Detection
LOQ: Limit of Quantitation
NE: not established
DQE Flags:
U: Not detected at LOD
J: Estimated concentration
Method:
TO-15

TABLE 7
CVOC MASS DISCHARGE RATES
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Sample	**Date**	**Dilution**			
SVE1-EFF2-3	**5/12/2020**	**0%**			
	Eff. Conc.	Eff. Conc.	Flow	Flow	Mass
Units	ppbv	µg/m3	cfm	m3/Hr	lb/Hr
Carbon Tetrachloride	630	3964	217	368.68	0.0032
Chloroform	110	537	217	368.68	0.0004
cis-1,2-Dichloroethene	51	202	217	368.68	0.0002
Trichloroethene	230	1236	217	368.68	0.0010
Tetrachloroethene	740	5020	217	368.68	0.0041
				Total lb/Hr	**0.0089**

SVE1-EFF2-5	**4/22/2021**	**0%**			
	Eff. Conc.	Eff. Conc.	Flow	Flow	Mass
Units	ppbv	µg/m3	cfm	m3/Hr	lb/Hr
Carbon Tetrachloride	630	4000	215	365.29	0.0032
Chloroform	92	450	215	365.29	0.0004
cis-1,2-Dichloroethene	22	87	215	365.29	0.0001
Trichloroethene	150	830	215	365.29	0.0007
Tetrachloroethene	710	4800	215	365.29	0.0039
				Total lb/Hr	**0.0082**

SVE1-EFF1-5	**4/22/2021**	**100%**			
	Eff. Conc.	Eff. Conc.	Flow	Flow	Mass
Units	ppbv	µg/m3	cfm	m3/Hr	lb/Hr
Carbon Tetrachloride	250	1600	280	475.72	0.0017
Chloroform	37	180	280	475.72	0.0002
cis-1,2-Dichloroethene	8.9	35	280	475.72	0.0000
Trichloroethene	62	330	280	475.72	0.0003
Tetrachloroethene	280	1900	280	475.72	0.0020
				Total lb/Hr	**0.0042**

SVE1-EFF2-6	**7/14/2021**	**0%**			
	Eff. Conc.	Eff. Conc.	Flow	Flow	Mass
Units	ppbv	µg/m3	cfm	m3/Hr	lb/Hr
Carbon Tetrachloride	400	2500	215	365.29	0.0020
Chloroform	86	420	215	365.29	0.0003
cis-1,2-Dichloroethene	37	150	215	365.29	0.0001
Trichloroethene	240	1300	215	365.29	0.0010
Tetrachloroethene	810	5500	215	365.29	0.0044
				Total lb/Hr	**0.0079**

SVE1-EFF1-6	**7/14/2021**	**100%**			
	Eff. Conc.	Eff. Conc.	Flow	Flow	Mass
Units	ppbv	µg/m3	cfm	m3/Hr	lb/Hr
Carbon Tetrachloride	140	880	275	467.23	0.0009
Chloroform	32	150	275	467.23	0.0002
cis-1,2-Dichloroethene	14	55	275	467.23	0.0001
Trichloroethene	89	480	275	467.23	0.0005
Tetrachloroethene	310	2100	275	467.23	0.0022
				Total lb/Hr	**0.0038**

SVE1-EFF2-6	**10/13/2021**	**0%**			
	Eff. Conc.	Eff. Conc.	Flow	Flow	Mass
Units	ppbv	µg/m3	cfm	m3/Hr	lb/Hr
Carbon Tetrachloride	61	300	215	365.29	0.0002
Chloroform	300	1900	215	365.29	0.0015
cis-1,2-Dichloroethene	31	120	215	365.29	0.0001
Trichloroethene	310	1700	215	365.29	0.0014
Tetrachloroethene	720	4900	215	365.29	0.0039
				Total lb/Hr	**0.0072**

TABLE 7
CVOC MASS DISCHARGE RATES
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Notes:

Eff. Conc. = SVE system effluent concentration
Inf. Conc. = SVE system influent concentration
lb/Hr = pounds per hour
ppbv = parts per billion by volume
µg/m3 = micrograms per cubic meter
cfm = cubic feet per minute
m3/Hr = cubic meters per hour

TABLE 8
CVOC MASS REMOVAL
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Start Date	End Date	Operating Hours	Effluent Emission Rate (lb/hr)	Estimated VOC Mass Removal (lbs)	Cumulative Mass Removed (lbs)
Initial Operations					
8/27/19 12:18	8/28/19 8:49	21	0.083	1.7	1.7
8/28/19 8:49	8/29/19 11:30	27	0.111	3.0	4.7
8/29/19 11:30	9/4/19 14:50	147	0.111	16.4	21.0
9/4/19 14:50	12/5/19 8:00	2201	0.044	96.8	117.9
12/5/19 8:00	12/30/19 15:00	607	0.017	10.1	128.0
12/30/19 15:00	5/14/20 17:30	3195	0.022	68.7	196.7
Extended Operations					
4/22/21 11:20	5/11/21 11:10	456	0.0042	1.9	198.6
5/11/21 11:10	7/14/21 11:37	1536	0.0081	12.4	211.0
7/14/21 11:37	10/13/21 13:40	2186	0.0076	16.5	227.5

Notes:
lbs pounds
lb/hr pounds per hour

TABLE 9
CVOC CONCENTRATION CHANGE, SVE EFFLUENT
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Initial Operations	Sample ID		SVE1-INF-2	SVE1-EFF-2	SVE1-EFF2-3	SVE1-EFF2-4	
	Lab ID		P1905162-001	P1905369-002	P1907426-001	P2002687-001	
	Date		8/29/2019	9/9/2019	12/5/2019	5/12/2020	
	Dilution		Closed (0%)	Closed (0%)	Closed (0%)	Closed (0%)	% Change
Primary CVOCs	Units	PAL					
Carbon Tetrachloride	ppbV	14.2	**7100**	**15000**	**4200**	**630**	-91%
Chloroform	ppbV	32.6	**250**	**400**	**340**	**110**	-56%
cis-1,2-Dichloroethene	ppbV	39.5	**170**	**780**	**210**	**51**	-70%
Tetrachloroethene	ppbV	0.99	**13000**	**9200**	**1700**	**740**	-94%
Trichloroethene	ppbV	2.06	**640**	**860**	**180**	**230**	-64%
Vinyl Chloride	ppbV	14.8	67 U	64 U	37 U	2.9 U	-
Total CT, PCE and TCE			**20740**	**25060**	**6080**	**1600**	**-92%**

Extended Operations	Sample ID		SVE1-EFF2-4	SVE1-EFF2-5	SVE1-EFF2-6	SVE1-EFF2-6	
	Lab ID		P2002687-001	P2102151-002	P2103826-001	P2105435-009	
	Date		5/12/2020	4/22/2021	7/14/2021	10/13/2021	
	Dilution		Closed (0%)	Closed (0%)	Closed (0%)	Closed (0%)	% Change
Primary CVOCs	Units	PAL					
Carbon Tetrachloride	ppbV	14.2	**630**	**630**	**400**	**300**	-52%
Chloroform	ppbV	32.6	**110**	**92**	**86**	**61**	-45%
cis-1,2-Dichloroethene	ppbV	39.5	**51**	22	37	31	-39%
Tetrachloroethene	ppbV	0.99	**740**	**710**	**810**	**720**	-3%
Trichloroethene	ppbV	2.06	**230**	**150**	**240**	**310**	35%
Vinyl Chloride	ppbV	14.8	2.9 U	10 U	4.3 U	0.86 U	-
Total CT, PCE and TCE			**1600**	**1490**	**1450**	**1330**	**-17%**

Notes:
1) Results above PAL shown in **bold**
ppbV: parts per billion by volume
PAL: Project Action Limits
LOD: Limit of Quantitation
-: not established

DQE Flags:
J: Estimated
U: Not detected above LOD.

TABLE 10
CVOC CONCENTRATION CHANGE, VMPs
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	VMP		TTA2-1	TTA2-1	TTA2-1	TTA2-1	TTA2-1		TTA2-2	TTA2-2	TTA2-2	TTA2-2		TTA2-3	TTA2-3	TTA2-3	TTA2-3	
	Date		6/17/2019	12/5/2019	5/12/2020	4/21/2021	10/13/2021	% Change	6/17/2019	5/12/2020	4/21/2021	10/13/2021	% Change	6/17/2019	5/12/2020	4/22/2021	10/13/2021	% Change
Primary CVOCs	Units	PAL																
Carbon Tetrachloride	ppbV	14.22	**3900**	**150**	10	**370**	2.8	-99.9%	**140**	**900**	**1000**	**530**	279%	**5200**	**26**	**560**	7.4	-99.9%
Chloroform	ppbV	32.63	**58**	3.2	11 U	11	4.6	-92.1%	**47**	32	25	20	-57%	**140**	2.8	**52**	3.9	-97.2%
cis-1,2-Dichloroethene	ppbV	39.52	**120**	2.9	6	12	0.65 U	-90.0%	1.7	19	9.1	20	1076%	**120**	1.3	22	5.2	-95.7%
Tetrachloroethene	ppbV	0.99	**13000**	**110**	**32**	**1400**	**16**	-99.9%	**680**	**2000**	**1300**	**1500**	121%	**9800**	**78**	**770**	**700**	-92.9%
Trichloroethene	ppbV	2.06	**420**	**3.2**	**4.1**	**130**	**3.2**	-99.2%	**13**	**350**	**130**	**520**	3900%	**450**	**6.7**	**180**	**27**	-94.0%
Vinyl Chloride	ppbV	14.77	21 U	0.9 U	20 U	31 U	1 U	-	2.7 U	10 U	30 U	7.9 U	-	43 U	0.26 U	13 U	3.3 U	-
Total CT, PCE and TCE	**ppbV**		**17320**	**263**	**46.1**	**1900**	**22**	**-99.9%**	**833**	**3250**	**2430**	**2550**	**206%**	**15450**	**111**	**1510**	**734.4**	**-95.2%**

	VMP		TTA2-4	TTA2-4	TTA2-4	TTA2-4		TTA2-5	TTA2-5	TTA2-5	TTA2-5	TTA2-5	TTA2-5	
	Date		6/17/2019	5/12/2020	4/21/2021	10/13/2021	% Change	6/17/2019	8/25/2019	12/5/2019	5/12/2020	4/21/2021	10/13/2021	% Change
Primary CVOCs	Units	PAL												
Carbon Tetrachloride	ppbV	14.22	**3700**	12	**110**	3.6	-100%	**7300**	**9300**	0.07	**77**	13	**25**	-99.7%
Chloroform	ppbV	32.63	**110**	3.5	11	1.7	-98%	**300**	**390**	0.46 U	24	**50**	12	-96.0%
cis-1,2-Dichloroethene	ppbV	39.52	27	9.3	6.7	3.6	-87%	**120**	**150**	0.26	2	8.5	1.1	-99.1%
Tetrachloroethene	ppbV	0.99	**6000**	**33**	**280**	**12**	-100%	**11000**	**15000**	0.3	**700**	**58**	**470**	-95.7%
Trichloroethene	ppbV	2.06	**210**	**24**	**41**	**8.8**	-96%	**640**	**720**	1.7	**10**	**15**	**12**	-98.1%
Vinyl Chloride	ppbV	14.77	28 U	0.25 U	0.62	0.38 U	-	64 U	73 U	0.88 U	3.0 U	0.14	3 U	-
Total CT, PCE and TCE	**ppbV**		**9910**	**69.0**	**431**	**24.4**	**-99.8%**	**18940**	**25020**	**2.1**	**787**	**86**	**507**	**-97.3%**

	VMP		TTA2-5D	TTA2-5D	TTA2-5D	TTA2-5D		TTA2-6	TTA2-6	TTA2-6	TTA2-6	TTA2-6	
	Date		8/25/2019	5/12/2020	4/22/2021	10/13/2021	% Change	6/17/2019	12/5/2019	5/12/2020	4/21/2021	10/13/2021	% Change
Primary CVOCs	Units	PAL											
Carbon Tetrachloride	ppbV	14.22	**6000**	0.081	14	**56**	-99%	**15000**	**4900**	**340**	**760**	**110**	-99.3%
Chloroform	ppbV	32.63	**370**	0.13 U	5.3	12	-97%	**670**	**570**	**250**	**200**	**180**	-73.1%
cis-1,2-Dichloroethene	ppbV	39.52	**150**	0.17 U	0.99	31	-79%	**250**	**160**	28	25	30	-88.0%
Tetrachloroethene	ppbV	0.99	**14000**	0.09	**33**	**130**	-99%	**14000**	**6600**	**2200**	**2400**	**910**	-93.5%
Trichloroethene	ppbV	2.06	**370**	0.12 U	**2.1**	**130**	-65%	**1600**	**390**	**56**	**120**	**42**	-97.4%
Vinyl Chloride	ppbV	14.77	92 U	0.26 U	0.93 U	0.32	-	70 U	120 U	10 U	51 U	2.4 U	-
Total CT, PCE and TCE	**ppbV**		**20370**	**0.2**	**49.1**	**316**	**-98.4%**	**30600**	**12620**	**2874**	**3505**	**1272**	**-95.8%**

Notes:
1) Results above PAL shown in **bold**
ppbV: parts per billion by volume
PAL: Project Action Limits

TABLE 11
CVOC CONCENTRATION CHANGE, LTM WELLS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Bldg 261/285 Area

	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
	Date		4/10/2019	4/9/2019	4/9/2019	4/9/2019	4/10/2019	4/9/2019
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	**21.2**	-	1.59	**29.6**	2.72	-
Chloroform	µg/L	80	3.06	-	0.386	6.67	0.3	-
cis-1,2-Dichloroethene	µg/L	70	5.89	2.57	-	22.9	-	4.08
Tetrachloroethene	µg/L	5	**132**	2.02	**5.59**	**42.6**	**15.3**	**53.1**
Trichloroethene	µg/L	5	4.18	-	0.511	**14.2**	1.33	4.15
Vinyl chloride	µg/L	2	-	-	-	0.475	-	**2.16**
Total CT, PCE and TCE			157.4	2.0	7.7	86.4	19.4	57.3

	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
	Date		10/12/2019	10/12/2019	10/12/2019	10/12/2019	10/12/2019	10/12/2019
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	**12.5**	-	1.42	**33.4**	3.2	-
Chloroform	µg/L	80	2.43	0.165	0.266	10	0.439	0.149
cis-1,2-Dichloroethene	µg/L	70	3.87	26.9	-	43.6	-	4.33
Tetrachloroethene	µg/L	5	**103**	3.73	4.7	**64.8**	**11.6**	**48.8**
Trichloroethene	µg/L	5	2.89	2.91	0.455	**27.8**	1.16	4.45
Vinyl chloride	µg/L	2	-	**5.55**	-	-	-	1.1
Total CT, PCE and TCE			118.4	6.6	6.6	126.0	16.0	53.3

	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
	Date		5/17/2020	5/17/2020	5/17/2020	5/17/2020	5/17/2020	5/17/2020
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	2.54	-	1.08	**53**	2.3	-
Chloroform	µg/L	80	-	-	0.23	16.3	0.39	-
cis-1,2-Dichloroethene	µg/L	70	0.67	25.9	-	32	-	3.35
Tetrachloroethene	µg/L	5	**11.4**	0.92	3.23	**59.8**	**7.48**	**32.6**
Trichloroethene	µg/L	5	0.48	-	0.33	**19.3**	1.04	2.99
Vinyl chloride	µg/L	2	-	**2.72**	-	-	-	0.68
Total CT, PCE and TCE			14.4	0.9	4.6	132.1	10.8	35.6

Distance from SVE Well (feet)			21	631	577	420	123	146
	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
Percent (%) change Apr2019 to May2020			-91%	-	-40%	53%	-44%	-38%

	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
	Date		10/11/2020	10/13/2020	10/13/2020	10/11/2020	10/11/2020	10/11/2020
Primary CVOCs	**Units**	MCL						
Carbon tetrachloride	µg/L	5	1.76	-	0.998	**43.4**	1.26	-
Chloroform	µg/L	80	0.423	-	0.513	12.6	0.359	-
cis-1,2-Dichloroethene	µg/L	70	-	11.3	-	13.9	-	2.4
Tetrachloroethene	µg/L	5	4.4	**9.55**	2.86	**33.4**	4.09	**28.1**
Trichloroethene	µg/L	5	0.473	**6.74**	-	**8.2**	0.786	1.8
Vinyl chloride	µg/L	2	-	1.38	-	-	-	0.458
Total CT, PCE and TCE			6.6	16.3	3.9	85.0	6.1	29.9

	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
	Date		4/19/2021	4/20/2021	4/20/2021	4/19/2021	4/19/2021	4/19/2021
Primary CVOCs	**Units**	MCL						
Carbon tetrachloride	µg/L	5	1.68	-	1.5	**17.6**	1.43	-
Chloroform	µg/L	80	0.432	-	0.24	8.31	0.435	0.127
cis-1,2-Dichloroethene	µg/L	70	-	8.83	-	5.1	-	1.06
Tetrachloroethene	µg/L	5	4.11	0.95	**10.3**	**21.2**	4.3	**17.3**
Trichloroethene	µg/L	5	0.652	0.57	0.51	4.83	0.791	0.891
Vinyl chloride	µg/L	2	-	**3.78**	-	-	-	-
Total CT, PCE and TCE			6.4	1.5	12.3	43.6	6.5	18.2

	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
	Date		10/18/2021	10/18/2021	10/18/2021	10/18/2021	10/18/2021	10/18/2021
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	0.942	-	0.302	**11.2**	1.23	-
Chloroform	µg/L	80	0.35	-	0.193	6.94	0.386	0.391
cis-1,2-Dichloroethene	µg/L	70	-	33.8	-	3.4	-	0.272
Tetrachloroethene	µg/L	5	4.56	-	**10.4**	**17.3**	4.09	**10.9**
Trichloroethene	µg/L	5	0.585	-	0.384	3.87	0.862	0.541
Vinyl chloride	µg/L	2	-	**11.3**	-	-	-	-
Total CT, PCE and TCE			6.1	0.0	11.1	32.4	6.2	11.4

Distance from SVE Well (feet)			21	631	577	420	-	146
	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
Percent (%) change May2020 to Oct2021			-58%	-	139%	-75%	-43%	-68%

Distance from SVE Well (feet)			21	631	577	420	-	146
	Well ID		DR2-1	DR2-6	MW-26	MW-85	MW-88	MW-92
Percent (%) change Apr2019 to Oct2021			-96%	-	44%	-63%	-68%	-80%

Notes:
1) Results above MCL shown in **bold**
-: Not detected
µg/L: micrograms per liter
MCL: Maximum Contaminant Level

TABLE 11
CVOC CONCENTRATION CHANGE, LTM WELLS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

Bldg 261/285 Area

	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
	Date		4/9/2019	4/10/2019	4/9/2019	4/9/2019	4/9/2019	4/9/2019
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	-	3.66	-	**24.5**	-	-
Chloroform	µg/L	80	-	3.05	-	10.3	-	-
cis-1,2-Dichloroethene	µg/L	70	13.6	0.266	64.4	25.1	14.5	16.2
Tetrachloroethene	µg/L	5	0.401	**13.9**	0.547	**48.9**	2.31	0.446
Trichloroethene	µg/L	5	-	**17.4**	0.642	**16.7**	0.935	0.306
Vinyl chloride	µg/L	2	**70.9**	-	**18.4**	**3.93**	**68.3**	**14.4**
Total CT, PCE and TCE			0.4	35.0	1.2	90.1	3.2	0.8

	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
	Date		10/12/2019	10/13/2019	10/12/2019	10/12/2019	10/12/2019	10/12/2019
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	-	3.35	4.72	**37.9**	-	-
Chloroform	µg/L	80	-	2.55	14.8	8.98	-	-
cis-1,2-Dichloroethene	µg/L	70	10.8	-	45.2	20.5	6.97	15.7
Tetrachloroethene	µg/L	5	1.54	**12.3**	**15.3**	**47.1**	3.74	0.532
Trichloroethene	µg/L	5	0.528	**12.5**	**12.5**	**13.4**	1.05	-
Vinyl chloride	µg/L	2	**44.7**	-	-	1.42	**40**	**9.58**
Total CT, PCE and TCE			2.1	28.2	32.5	98.4	4.8	0.5

	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
	Date		5/17/2020	5/17/2020	5/17/2020	5/17/2020	5/17/2020	5/17/2020
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	-	3.29	**150**	**30.4**	-	-
Chloroform	µg/L	80	-	1.09	35.7	7.27	-	-
cis-1,2-Dichloroethene	µg/L	70	10.4	-	22.9	12.2	8.11	15.3
Tetrachloroethene	µg/L	5	2.56	**10.3**	**36.6**	**24.7**	4.35	0.32
Trichloroethene	µg/L	5	0.61	**2.77**	**13.1**	**6.63**	0.66	-
Vinyl chloride	µg/L	2	**47.7**	-	0.35	**2.05**	**39.8**	**10.6**
Total CT, PCE and TCE			3.2	16.4	199.7	61.7	5.0	0.3

Distance from SVE Well (feet)			215	2086	338	259	93	92
	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
Percent (%) change Apr2019 to May2020			-	-53%	16696%	-31%	54%	-

	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
	Date		10/11/2020	10/13/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020
Primary CVOCs	**Units**	MCL						
Carbon tetrachloride	µg/L	5	-	2.63	**44.7**	**8.06**	-	-
Chloroform	µg/L	80	-	1.09	29.2	5.75	-	-
cis-1,2-Dichloroethene	µg/L	70	9.39	-	8.34	6.42	3.5	17
Tetrachloroethene	µg/L	5	4.1	**12.4**	**22.8**	**16.3**	**8.49**	0.44
Trichloroethene	µg/L	5	0.647	2.5	**5.85**	3.44	0.618	0.34
Vinyl chloride	µg/L	2	**58**	-	-	**2.51**	**43.6**	**13.8**
Total CT, PCE and TCE			4.7	17.5	73.4	27.8	9.1	0.8

	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
	Date		4/19/2021	4/20/2021	4/19/2021	4/19/2021	4/19/2021	4/19/2021
Primary CVOCs	**Units**	MCL						
Carbon tetrachloride	µg/L	5	-	2.55	**25.7**	0.752	-	-
Chloroform	µg/L	80	-	0.902	12.9	2.06	-	-
cis-1,2-Dichloroethene	µg/L	70	6.94	-	3.63	7.41	2.16	18.3
Tetrachloroethene	µg/L	5	4.52	**13.6**	**20.7**	**7.38**	**5.79**	0.32
Trichloroethene	µg/L	5	0.336	2.68	**5.38**	2.35	0.25	0.25
Vinyl chloride	µg/L	2	**43.1**	-	-	**2.63**	**31**	**12.5**
Total CT, PCE and TCE			4.9	18.8	51.8	10.5	6.0	0.6

	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
	Date		10/18/2021	10/18/2021	10/18/2021	10/18/2021	10/18/2021	10/18/2021
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	-	2.4	**21.2**	0.255	-	-
Chloroform	µg/L	80	-	0.78	11.9	1.29	-	-
cis-1,2-Dichloroethene	µg/L	70	7.62	-	2.46	9.19	3.85	15.4
Tetrachloroethene	µg/L	5	1.18	**11.6**	**20.7**	4	**5.61**	0.4
Trichloroethene	µg/L	5	0.263	1.82	**6.19**	1.58	-	-
Vinyl chloride	µg/L	2	**31**	-	-	1.44	**26.7**	**10.6**
Total CT, PCE and TCE			1.4	15.8	48.1	5.8	5.6	0.4

Distance from SVE Well (feet)			215	2086	338	259	93	92
	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
Percent (%) change May2020 to Oct2021			-	-3%	-76%	-91%	12%	-

Distance from SVE Well (feet)			215	2086	338	259	93	92
	Well ID		MW-113	MW-259	PMW85-01	PMW85-05	PMW92-02	PMW92-03
Percent (%) change Apr2019 to Oct2021			-	-55%	3945%	-94%	73%	-

Notes:
1) Results above MCL shown in **bold**
-: Not detected
µg/L: micrograms per liter
MCL: Maximum Contaminant Level

TABLE 11
CVOC CONCENTRATION CHANGE, LTM WELLS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

NW TTA-2

	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
	Date		4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/10/2019	4/10/2019
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	1.13	**86.2**	**5.58**	**16.2**	**9.53**	4.04
Chloroform	µg/L	80	1.4	5.39	2.04	0.518	7.98	0.905
cis-1,2-Dichloroethene	µg/L	70	0.389	1.88	-	0.326	4.46	1.48
Tetrachloroethene	µg/L	5	**16.6**	**28**	**16.2**	**35.2**	**15.6**	**30.9**
Trichloroethene	µg/L	5	**23.2**	**20**	**28**	**15.8**	4.91	**22.1**
Vinyl chloride	µg/L	2	-	-	-	-	-	-
Total CT, PCE and TCE			40.9	134.2	49.8	67.2	30.0	57.0

	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
	Date		10/12/2019	10/12/2019	10/12/2019	10/10/2019	10/11/2019	10/11/2019
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	1.79	**90.1**	**5.4**	**10.8**	**13.7**	1.21
Chloroform	µg/L	80	1.71	5.65	1.91	0.44	7.1	0.993
cis-1,2-Dichloroethene	µg/L	70	0.411	1.58	-	0.267	4.18	6.49
Tetrachloroethene	µg/L	5	**18.8**	**27.1**	**15.9**	**29.7**	**19.9**	**14.5**
Trichloroethene	µg/L	5	**26**	**19.7**	**26.1**	**12.4**	**5.5**	**15.5**
Vinyl chloride	µg/L	2	-	-	-	-	-	-
Total CT, PCE and TCE			46.6	136.9	47.4	52.9	39.1	31.2

	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
	Date		5/17/2020	5/17/2020	5/17/2020	5/17/2020	5/18/2020	5/18/2020
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	1.52	**77.8**	**5.3**	**2.96**	**15.8**	1.65
Chloroform	µg/L	80	1.6	4.62	1.82	0.22	4.52	0.649
cis-1,2-Dichloroethene	µg/L	70	0.45	1.25	-	-	1.86	5.26
Tetrachloroethene	µg/L	5	**16.1**	**24.2**	**15.8**	**28.3**	**12**	**20.5**
Trichloroethene	µg/L	5	**21.3**	**19.4**	**26**	**9.89**	2.92	**18**
Vinyl chloride	µg/L	2	-	-	-	-	-	-
Total CT, PCE and TCE			38.9	121.4	47.1	41.2	30.7	40.2

Distance from SVE Well (feet)			1488	1271	871	626	265	784
	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
Percent (%) change Apr2019 to May2020			-5%	-10%	-5%	-39%	2%	-30%

	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
	Date		10/13/2020	10/13/2020	10/13/2020	10/13/2020	10/14/2020	10/14/2020
Primary CVOCs	**Units**	MCL						
Carbon tetrachloride	µg/L	5	1.48	**66.6**	**5.39**	2.08	**5.67**	0.49
Chloroform	µg/L	80	1.51	4.45	1.98	0.425	2.37	0.85
cis-1,2-Dichloroethene	µg/L	70	0.467	0.745	-	-	0.934	9.77
Tetrachloroethene	µg/L	5	**16.8**	**23.7**	**16.7**	**24.8**	**12.9**	**18**
Trichloroethene	µg/L	5	**20.4**	**20.8**	**24.3**	**12.1**	2.64	**16.9**
Vinyl chloride	µg/L	2	-	-	-	-	-	-
Total CT, PCE and TCE			38.7	111	46.4	39.0	21.2	35.4

	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
	Date		4/20/2021	4/20/2021	4/20/2021	4/20/2021	4/21/2021	4/21/2021
Primary CVOCs	**Units**	MCL						
Carbon tetrachloride	µg/L	5	1.47	**73.4**	3.92	1.72	**6.75**	1.83
Chloroform	µg/L	80	1.65	4.33	1.74	0.303	1.85	0.434
cis-1,2-Dichloroethene	µg/L	70	0.49	0.902	-	-	0.71	1.84
Tetrachloroethene	µg/L	5	**15.8**	**26.1**	**16.5**	**23.4**	**9.82**	**40.3**
Trichloroethene	µg/L	5	**21.4**	**18.7**	**24.6**	**11.4**	2.48	21.9
Vinyl chloride	µg/L	2	-	-	-	-	-	-
Total CT, PCE and TCE			38.7	118	45.0	36.5	19.1	64.0

	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
	Date		10/18/2021	10/18/2021	10/18/2021	10/18/2021	10/20/2021	10/20/2021
Primary CVOCs	Units	MCL						
Carbon tetrachloride	µg/L	5	1.49	**87.6**	3.59	4.34	**7.73**	2.12
Chloroform	µg/L	80	1.65	4.64	1.71	0.363	2.03	0.49
cis-1,2-Dichloroethene	µg/L	70	0.354	0.948	-	-	0.563	1.19
Tetrachloroethene	µg/L	5	**18.1**	**25.9**	**15.9**	**55.6**	**13.7**	**52.8**
Trichloroethene	µg/L	5	**18.8**	**17.5**	**21.8**	**29.7**	4.65	**24.5**
Vinyl chloride	µg/L	2	-	-	-	-	-	-
Total CT, PCE and TCE			38.4	131	41.3	89.6	26.1	79.4

Distance from SVE Well (feet)			1488	1271	871	626	265	784
	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
Percent (%) change May2020 to Oct2021			-1%	8%	-12%	118%	-15%	98%

Distance from SVE Well (feet)			1488	1271	871	626	265	784
	Well ID		MW-64	MW-217	MW-218	MW-267	MW-292	MW-294
Percent (%) change Apr2019 to Oct2021			-6%	-2%	-17%	33%	-13%	39%

Notes:
1) Results above MCL shown in **bold**
-: Not detected
µg/L: micrograms per liter
MCL: Maximum Contaminant Level

TABLE 11
CVOC CONCENTRATION CHANGE, LTM WELLS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

NW TTA-2

	Well ID		MW-303
	Date		-
Primary CVOCs	Units	MCL	
Carbon tetrachloride	µg/L	5	-
Chloroform	µg/L	80	-
cis-1,2-Dichloroethene	µg/L	70	-
Tetrachloroethene	µg/L	5	-
Trichloroethene	µg/L	5	-
Vinyl chloride	µg/L	2	-
Total CT, PCE and TCE			-

	Well ID		MW-303
	Date		-
Primary CVOCs	Units	MCL	
Carbon tetrachloride	µg/L	5	-
Chloroform	µg/L	80	-
cis-1,2-Dichloroethene	µg/L	70	-
Tetrachloroethene	µg/L	5	-
Trichloroethene	µg/L	5	-
Vinyl chloride	µg/L	2	-
Total CT, PCE and TCE			-

	Well ID		MW-303
	Date		5/17/2020
Primary CVOCs	Units	MCL	
Carbon tetrachloride	µg/L	5	-
Chloroform	µg/L	80	0.42
cis-1,2-Dichloroethene	µg/L	70	-
Tetrachloroethene	µg/L	5	**15.5**
Trichloroethene	µg/L	5	2.32
Vinyl chloride	µg/L	2	-
Total CT, PCE and TCE			17.8

Distance from SVE Well (feet)			942
	Well ID		MW-303
Percent (%) change Apr2019 to May2020			-

	Well ID		MW-303
	Date		10/13/2020
Primary CVOCs	**Units**	MCL	
Carbon tetrachloride	µg/L	5	-
Chloroform	µg/L	80	0.417
cis-1,2-Dichloroethene	µg/L	70	-
Tetrachloroethene	µg/L	5	**11.7**
Trichloroethene	µg/L	5	1.32
Vinyl chloride	µg/L	2	-
Total CT, PCE and TCE			13.0

	Well ID		MW-303
	Date		4/20/2021
Primary CVOCs	**Units**	MCL	
Carbon tetrachloride	µg/L	5	-
Chloroform	µg/L	80	0.47
cis-1,2-Dichloroethene	µg/L	70	-
Tetrachloroethene	µg/L	5	**5.49**
Trichloroethene	µg/L	5	0.447
Vinyl chloride	µg/L	2	-
Total CT, PCE and TCE			5.9

	Well ID		MW-303
	Date		10/18/2021
Primary CVOCs	Units	MCL	
Carbon tetrachloride	µg/L	5	-
Chloroform	µg/L	80	0.671
cis-1,2-Dichloroethene	µg/L	70	-
Tetrachloroethene	µg/L	5	1.55
Trichloroethene	µg/L	5	0.343
Vinyl chloride	µg/L	2	-
Total CT, PCE and TCE			1.9

Distance from SVE Well (feet)			942
	Well ID		MW-303
Percent (%) change May2020 to Oct2021			-89%

Distance from SVE Well (feet)			942
	Well ID		MW-303
Percent (%) change Apr2019 to Oct2021			-

Notes:
1) Results above MCL shown in **bold**
-: Not detected
µg/L: micrograms per liter
MCL: Maximum Contaminant Level

Figures

Legend

- SVE Well
- VMP
- Fluvial Aquifer Well
- SVE Fence System
- Buildings *490 - DDMT Assigned Number*

Figure 1

TTA-2 SVE Pilot Test Location Map

SVE Pilot Test Extension

Main Installation
Defense Depot Memphis, Tennessee

N
W E
S

0 25 50
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 6/18/2020
Edition: Rev 0

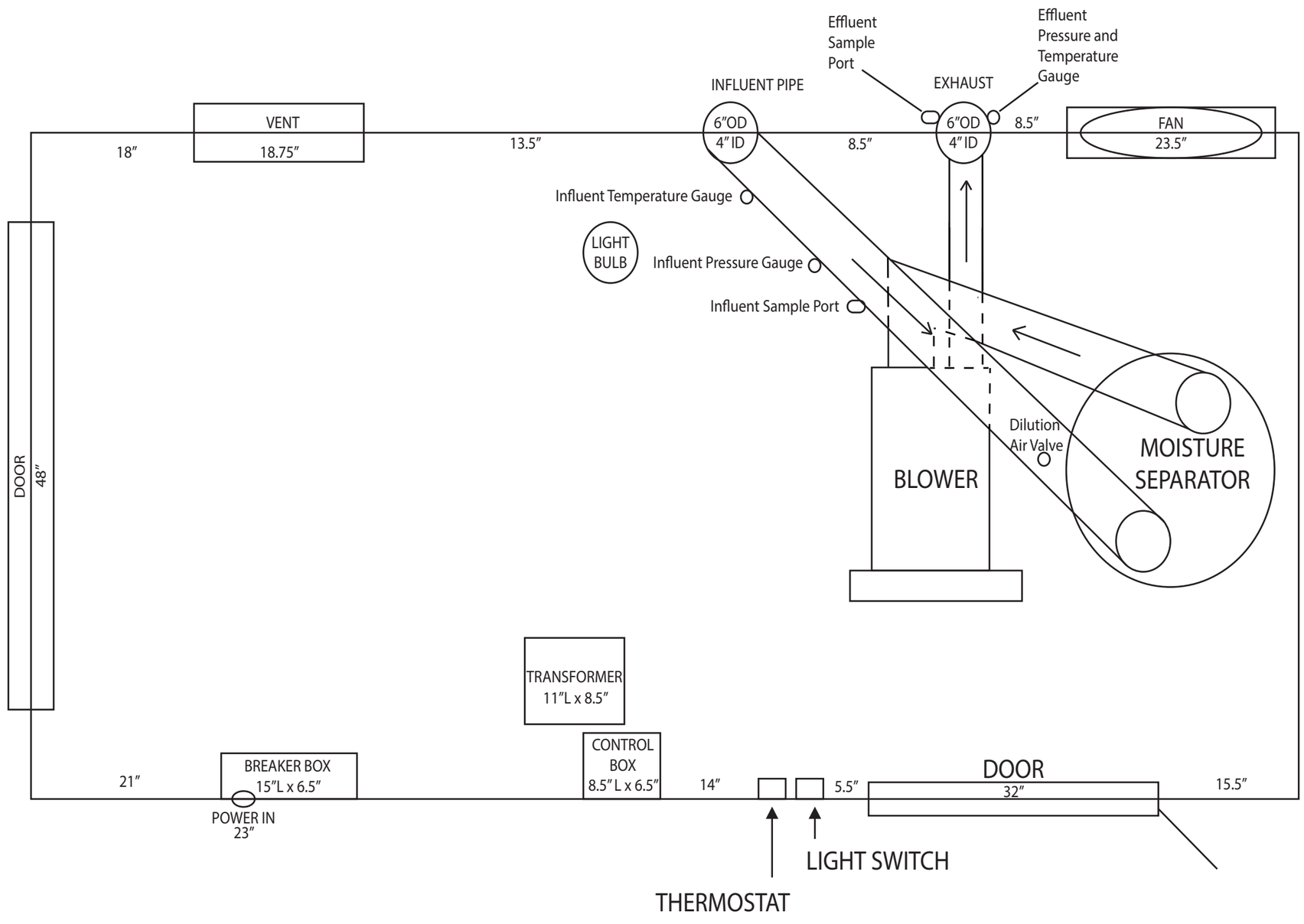
Document Path: W:\SVEStartUp\05_Pilot Test Location Map.mxd

Figure 2

SVE System Process Flow Diagram

SVE Pilot Test Extension

Main Installation
Defense Depot
Memphis, Tennessee



Air Flow

Date: 11/4/2019
Edition: Draft

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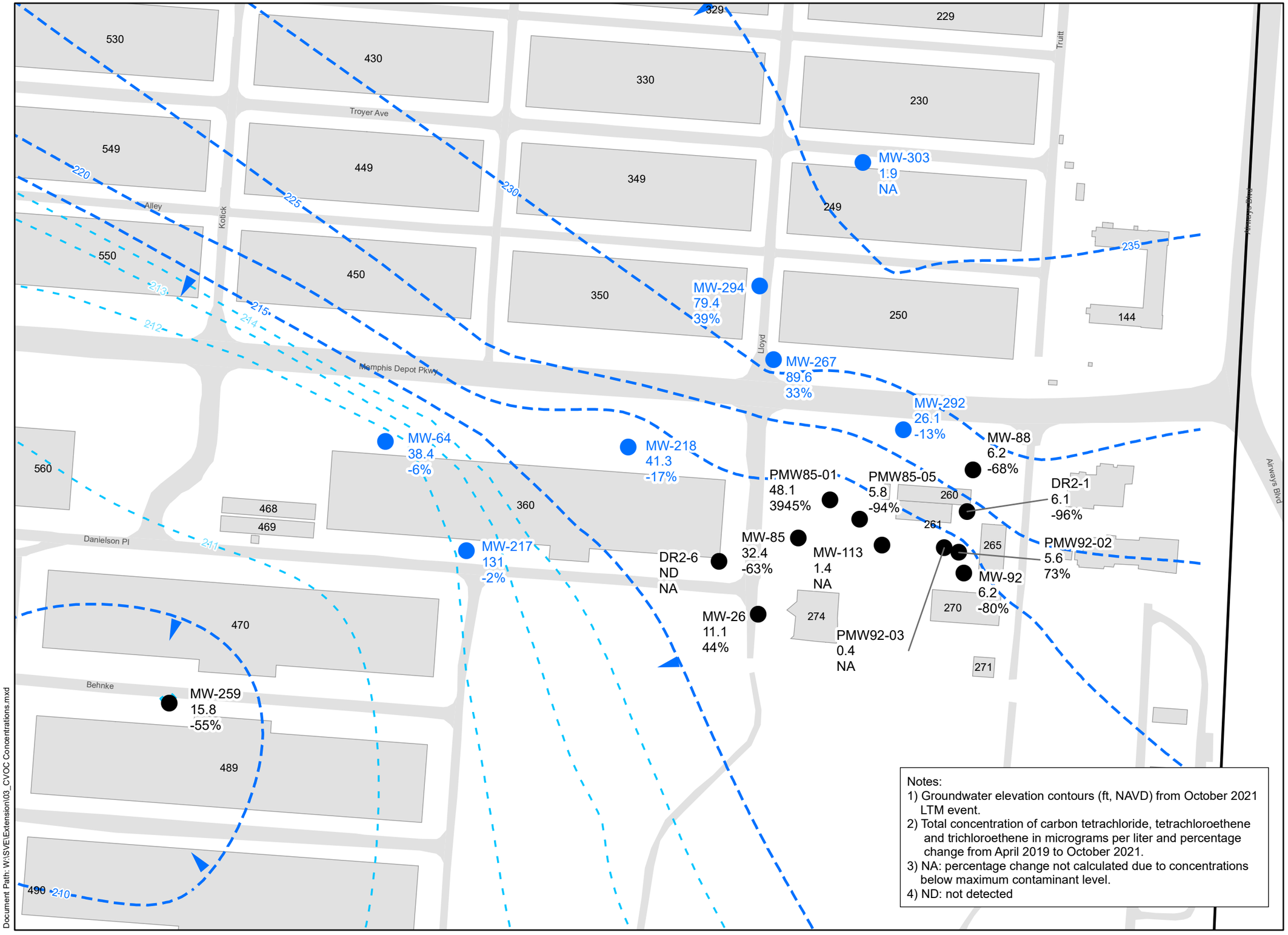

Notes:
1) Groundwater elevation contours (ft, NAVD) from October 2021 LTM event.
2) Total concentration of carbon tetrachloride, tetrachloroethene and trichloroethene in micrograms per liter and percentage change from April 2019 to October 2021.
3) NA: percentage change not calculated due to concentrations below maximum contaminant level.
4) ND: not detected

Figure 3

Change in CVOC Concentrations, TTA-2 LTM Wells

SVE Pilot Test Extension

Main Installation
Defense Depot
Memphis, Tennessee

Legend

- TTA-2, 261/265
- TTA-2, Northwest
- Groundwater Flow Direction
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Property Boundary
- Roads
- Buildings
- Clay Elevation Exceeds Fluvial Aquifer Groundwater Elevation

N
W E
S

0 200 400
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 1/3/2022
Edition: Rev 0

Document Path: W:\SVE\Extension\03_CVOC Concentrations.mxd

A

Appendix A.
Analytical Results

TABLE A-1
VAPOR ANALYTICAL RESULTS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Sample ID	PT-V-2.1-5	PT-V-2.2-5	PT-V-2.3-5-RE	PT-V-2.4-5	PT-V-2.5-5	PT-V-2.5 D-5	PT-V-2.5 D-5-DUP
	Lab ID	P2102136-001	P2102136-003	P2102152-003	P2102136-005	P2102136-002	P2102152-001	P2102152-002
	Date	4/21/2021	4/21/2021	4/22/2021	4/21/2021	4/21/2021	4/22/2021	4/22/2021
Component	Units							
1,1,1-Trichloroethane	ppbV	14 U	14 U	5.8 U	1.8 U	0.094 J	0.43 U	0.38 U
1,1,2,2-Tetrachloroethane	ppbV	12 U	11 U	4.7 U	1.5 U	0.42 U	0.35 U	0.31 U
1,1,2-Trichloroethane	ppbV	14 U	14 U	5.8 U	1.8 U	0.52 U	0.43 U	0.38 U
1,1,2-Trichlorotrifluoroethane	ppbV	110	470	120	26	1.2	1.7	1.8
1,1-Dichloroethane	ppbV	20 U	19 U	8.2 U	1.5 J	0.56 J	0.6 U	0.53 U
1,1-Dichloroethene	ppbV	33	15 J	20	4.5	0.26 J	0.15 J	0.14 J
1,2,4-Trichlorobenzene	ppbV	20 U	19 U	8.2 U	2.6 U	0.095 J	0.61 U	0.54 U
1,2,4-Trimethylbenzene	ppbV	16 U	15 U	6.5 U	2 U	0.56 J	0.34 J	0.42 U
1,2-Dibromo 3-Chloropropane	ppbV	16 U	15 U	6.3 U	2 U	0.56 U	0.47 U	0.41 U
1,2-Dibromoethane	ppbV	10 U	9.7 U	4.1 U	1.3 U	0.37 U	0.048 J	0.27 U
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ppbV	11 U	11 U	4.6 UJ	1.4 U	0.41 U	0.33 UJ	0.3 UJ
1,2-Dichlorobenzene	ppbV	13 U	13 U	5.4 U	1.7 U	0.48 U	0.4 U	0.35 U
1,2-Dichloroethane	ppbV	19 U	19 U	7.9 U	2.4 U	1.1	0.25 J	0.26 J
1,2-Dichloropropane	ppbV	17 U	16 U	6.9 U	2.1 U	0.44 J	0.08 J	0.091 J
1,3,5-Trimethylbenzene	ppbV	16 U	16 U	6.6 U	2 U	0.18 J	0.17 J	0.43 U
1,3-Butadiene	ppbV	36 U	34 U	14 U	4.5 U	1.3 U	1.1 U	0.94 U
1,3-Dichlorobenzene	ppbV	13 U	13 U	5.4 U	1.7 U	0.48 U	0.4 U	0.35 U
1,4-Dichlorobenzene	ppbV	13 U	12 U	5.3 U	1.6 U	0.47 U	0.39 U	0.35 U
1,4-Dioxane	ppbV	22 U	21 U	8.8 U	2.7 U	0.79 U	0.65 U	0.58 U
2-Butanone (MEK)	ppbV	51 U	49 U	21 U	6.4 U	2.2	0.79 J	0.96 J
2-Hexanone	ppbV	37 UJ	35 UJ	15 U	4.6 UJ	0.27 J	1.1 U	0.23 J
2-Propanol (Isopropyl Alcohol)	ppbV	61 U	59 U	25 U	7.7 U	2.7	1.2 J	1.3 J
3-Chloro-1-propene (Allyl Chloride)	ppbV	25 U	24 U	10 U	3.2 U	0.91 U	0.75 U	0.66 U
4-Ethyltoluene	ppbV	16 U	16 U	6.6 U	2 U	0.24 J	0.49 U	0.43 U
4-Methyl-2-pentanone	ppbV	3.8 J	6.5 J	15 U	4.6 U	9.2	2.3	2.6
Acetone	ppbV	330 U	320 U	130 U	15 J	21	11	12
Acetonitrile	ppbV	48 U	45 U	19 U	6 U	1.3 J+	1.4 U	1.3 U
Acrolein	ppbV	72 U	69 U	29 U	9.1 U	1.1 J	1.2 J	0.85 J
Acrylonitrile	ppbV	70 U	66 U	28 U	8.8 U	2.5 U	2.1 U	1.8 U
alpha-Pinene	ppbV	14 U	14 U	5.8 U	1.8 U	0.081 J	0.43 U	0.38 U
Benzene	ppbV	25 U	23 U	10 U	2.1 J	3	0.57 J	0.3 J
Benzyl Chloride	ppbV	31 U	29 U	12 U	3.9 U	1.1 U	0.91 U	0.81 U
Bromodichloromethane	ppbV	12 U	11 U	4.8 U	1.5 U	0.42 U	0.35 U	0.31 U
Bromoform	ppbV	7.7 U	7.4 U	3.1 U	0.97 U	0.28 U	0.23 U	0.21 U
Bromomethane	ppbV	20 U	19 U	8.2 U	2.5 U	0.73 U	0.6 U	0.54 U
Carbon Disulfide	ppbV	49 U	46 U	20 U	3.8 J	1.1 J	4.8	2.2
Carbon Tetrachloride	ppbV	370	1000	560	110	13	14	15
Chlorobenzene	ppbV	17 U	16 U	6.9 U	2.1 U	0.15 J	0.51 U	0.45 U
Chloroethane	ppbV	30 U	28 U	12 U	3.7 U	0.32 J	0.89 U	0.79 U
Chloroform	ppbV	11 J	25	52	11	50	5.3	5.5
Chloromethane	ppbV	38 U	36 U	15 U	4.8 U	0.37 J	0.22 J	0.26 J
cis-1,2-Dichloroethene	ppbV	12 J	9.1 J	22	6.7	8.5	0.99	1
cis-1,3-Dichloropropene	ppbV	18 U	17 U	7.1 U	2.2 U	0.64 U	0.53 U	0.47 U
Cumene	ppbV	16 U	15 U	6.5 U	2 U	0.33 J	0.23 J	0.28 J
Cyclohexane	ppbV	44 U	42 U	18 U	5.5 U	0.54 J	0.23 J	1.2 U
Dibromochloromethane	ppbV	9.2 U	8.8 U	3.7 U	1.2 U	0.33 U	0.27 U	0.24 U
Dichlorodifluoromethane (CFC 12)	ppbV	16 U	15 U	1.5 J	1.2 J	0.51 J	0.48	0.47
Dichloromethane (Methylene Chloride)	ppbV	23 U	22 U	9.2 U	2.8 U	1.4	0.67 U	0.6 U
d-Limonene	ppbV	3 J	13 U	5.7 U	1.8 U	0.33 J	0.098 J	0.37 U
Ethanol	ppbV	55 J	410 U	170 U	53 U	31	13 U	11 U
Ethyl Acetate	ppbV	42 UJ	40 UJ	17 U	3.1 J	9.1 J	0.61 J+	0.57 J+
Ethylbenzene	ppbV	18 U	17 U	7.3 U	2.3 U	0.16 J	0.75	0.073 J
Hexachlorobutadiene	ppbV	7.4 UJ	7 UJ	3 U	0.93 UJ	0.27 UJ	0.22 U	0.2 U
Hexane	ppbV	22 U	21 U	9 U	2.8 U	2	0.19 J	0.35 J
m,p-Xylenes	ppbV	35 U	33 U	14 U	4.4 U	0.71 J	4.2	0.17 J
Methyl Methacrylate	ppbV	37 U	35 U	15 U	4.6 U	1.3 U	1.1 U	0.98 U
Methyl tert-Butyl Ether	ppbV	22 U	21 U	8.8 U	2.7 U	0.46 J	0.65 U	0.58 U
Naphthalene	ppbV	15 UJ	14 UJ	6.1 U	1.9 UJ	0.15 J	0.6	0.4 U
n-Butyl Acetate	ppbV	32 UJ	30 UJ	13 U	4 UJ	1.1 UJ	0.95 U	0.84 U
n-Heptane	ppbV	19 U	18 U	7.8 U	2.4 U	0.49 J	0.5 J	0.14 J
n-Nonane	ppbV	15 UJ	15 UJ	6.2 U	1.9 UJ	0.2 J	1.6	0.075 J
n-Octane	ppbV	17 U	16 U	6.8 U	2.1 U	0.61 U	1.5	0.1 J
n-Propylbenzene	ppbV	16 U	15 U	6.5 U	2 U	0.13 J	0.27 J	0.42 U
o-Xylene	ppbV	18 U	18 U	7.5 U	2.3 U	0.31 J	1.3	0.49 U
Propene	ppbV	46 U	44 U	18 U	34	6.5	0.78 J	1.1 J
Styrene	ppbV	18 U	18 U	7.5 U	2.3 U	0.67 U	0.55 U	0.49 U
Tetrachloroethene	ppbV	1400	1300	770	280	58	33	35
Tetrahydrofuran (THF)	ppbV	4.3 J	49 U	21 U	6.4 U	0.36 J	1.5 U	1.4 U
Toluene	ppbV	21 U	20 U	8.4 U	0.6 J	4.8	8.9	0.87
trans-1,2-Dichloroethene	ppbV	20 U	19 U	8.2 U	2.5 U	0.73 U	0.6 U	0.53 U
trans-1,3-Dichloropropene	ppbV	17 U	16 U	6.9 U	2.1 U	0.61 U	0.51 U	0.45 U
Trichloroethene	ppbV	130	130	180	41	15	2.1	2.3
Trichlorofluoromethane	ppbV	84	230	76	15	0.99	1.1	1.1
Vinyl Acetate	ppbV	240 UJ	230 UJ	96 U	30 UJ	10 J	2.1 J	6.3 U
Vinyl Chloride	ppbV	31 U	30 U	13 U	0.62 J	0.14 J	0.93 U	0.83 U

Notes:
ppbV: parts per billion by volume
LOD: Limit of Detection
DQE Flags:
J: Estimated concentration
U: Undetected at LOD
Method:
TO-15

TABLE A-1
VAPOR ANALYTICAL RESULTS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Sample ID	PT-V-2.6-5	PT-V-2.1-6	PT-V-2.2-6	PT-V-2.3-6	PT-V-2.4-6	PT-V-2.5-6	PT-V-2.5D-6	PT-V-2.5D-6 DUP
	Lab ID	P2102136-004	P2105435-001	P2105435-002	P2105435-003	P2105435-004	P2105435-005	P2105435-006	P2105435-008
	Date	4/21/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021	10/13/2021
Component	Units								
1,1,1-Trichloroethane	ppbV	23 U	0.45 U	3.5 U	1.5 U	0.17 U	1.3 U	0.12 J	0.14 J
1,1,2,2-Tetrachloroethane	ppbV	19 U	0.38 U	3 U	1.2 U	0.14 U	1.1 U	0.15 U	0.11 U
1,1,2-Trichloroethane	ppbV	23 U	0.47 U	3.7 U	1.6 U	0.18 U	1.4 U	0.19 U	0.14 U
1,1,2-Trichlorotrifluoroethane	ppbV	150	0.16 J	830	0.74 J	0.16 J	1 U	0.11 J	0.15 J
1,1-Dichloroethane	ppbV	33 U	0.64 U	5 U	2.1 U	0.67 J	1.9 U	6.6	6.6
1,1-Dichloroethene	ppbV	32 U	2.4	24	2.5 J	0.72 J	1.9 U	38	38
1,2,4-Trichlorobenzene	ppbV	33 U	0.66 U	5.1 U	2.2 U	0.24 U	1.9 U	0.26 U	0.2 U
1,2,4-Trimethylbenzene	ppbV	26 U	0.49 U	3.9 U	1.6 U	0.18 U	1.5 U	0.19 U	0.15 U
1,2-Dibromo 3-Chloropropane	ppbV	25 U	0.5 U	4 U	1.7 U	0.19 U	1.5 U	0.2 U	0.15 U
1,2-Dibromoethane	ppbV	17 U	0.34 U	2.6 U	1.1 U	0.13 U	1 U	0.13 U	0.1 U
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ppbV	18 U	0.7 U	5.5 U	2.3 U	0.26 U	2.1 U	0.27 U	0.21 U
1,2-Dichlorobenzene	ppbV	22 U	0.44 J	3.4 U	1.4 U	0.16 U	1.3 U	0.17 U	0.13 U
1,2-Dichloroethane	ppbV	31 U	0.64 U	5 U	2.1 U	0.24 U	1.5 J	0.19 J	0.18 J
1,2-Dichloropropane	ppbV	27 U	0.56 U	4.4 U	1.8 U	0.21 U	1.7 U	0.13 J	0.14 J
1,3,5-Trimethylbenzene	ppbV	26 U	0.53 U	4.1 U	1.7 U	0.2 U	1.6 U	0.21 U	0.16 U
1,3-Butadiene	ppbV	57 U	2.2 U	17 U	7.2 U	0.82 U	6.5 U	0.86 U	0.66 U
1,3-Dichlorobenzene	ppbV	22 U	0.43 U	3.4 U	1.4 U	0.16 U	1.3 U	0.17 U	0.13 U
1,4-Dichlorobenzene	ppbV	21 U	0.43 U	3.4 U	1.4 U	0.16 U	1.3 U	0.17 U	0.13 U
1,4-Dioxane	ppbV	35 U	0.68 U	5.3 U	2.2 U	0.25 U	2 U	0.27 U	0.2 U
2-Butanone (MEK)	ppbV	83 U	1.7 U	13 U	2.8 J	0.64 U	5 U	2.1 J	15 J
2-Hexanone	ppbV	60 UJ	0.78 U	6.1 U	2.6 U	0.29 U	2.3 U	0.18 J	0.53 J
2-Propanol (Isopropyl Alcohol)	ppbV	99 U	3.8 U	30 U	13 U	1.4 U	11 U	0.63 J	1.2 J
3-Chloro-1-propene (Allyl Chloride)	ppbV	41 U	0.83 U	6.5 U	2.7 U	0.31 U	2.4 U	0.32 U	0.25 U
4-Ethyltoluene	ppbV	26 U	0.99 U	7.8 U	3.3 U	0.37 U	2.9 U	0.39 U	0.3 U
4-Methyl-2-pentanone	ppbV	4.7 J	4 J	6.1 U	4.4 J	2.7	7.2 J	6	6.5
Acetone	ppbV	530 U	17 U	130 U	35 J	4.2 J	25 J	22 J	120 J
Acetonitrile	ppbV	77 U	2.9 U	23 U	9.5 U	1.1 U	8.6 U	1.1 U	2.6 J
Acrolein	ppbV	120 U	2.3 U	18 U	7.6 U	0.87 U	6.9 U	1.8 J	3.5
Acrylonitrile	ppbV	110 U	2.3 U	18 U	7.6 U	0.86 U	6.8 U	0.91 U	0.7 U
alpha-Pinene	ppbV	23 U	0.46 U	3.6 U	1.5 U	0.17 U	1.4 U	0.18 U	0.14 U
Benzene	ppbV	40 U	0.81 U	6.4 U	2.7 U	0.45 J	2.4 U	0.18 J	0.22 J
Benzyl Chloride	ppbV	50 U	1 U	7.8 U	3.3 U	0.37 U	3 U	0.39 U	0.3 U
Bromodichloromethane	ppbV	19 U	0.39 U	3 U	1.3 U	0.14 U	1.1 U	0.31 J	0.33 J
Bromoform	ppbV	13 U	0.47 U	3.7 U	1.5 U	0.18 U	1.4 U	0.18 U	0.14 U
Bromomethane	ppbV	33 U	0.67 U	5.2 U	2.2 U	0.25 U	2 U	0.26 UJ	4.6 J
Carbon Disulfide	ppbV	78 U	1.6 U	13 U	5.3 U	0.6 U	4.8 U	0.7 J	0.97 J
Carbon Tetrachloride	ppbV	760	2.8	530	7.4	3.6	25	56	58
Chlorobenzene	ppbV	28 U	0.53 U	4.1 U	1.7 U	0.2 U	1.6 U	0.21 U	0.16 U
Chloroethane	ppbV	48 U	0.98 U	7.7 U	3.2 U	0.37 U	2.9 U	0.39 U	0.66 J
Chloroform	ppbV	200	4.6	20	3.9 J	1.7	12	12	12
Chloromethane	ppbV	62 U	2.4 U	18 U	7.8 U	0.88 U	7 U	0.28 J+	2.3 J+
cis-1,2-Dichloroethene	ppbV	25 J	0.65 U	20	5.2 J	3.6	1.1 J	31	32
cis-1,3-Dichloropropene	ppbV	29 U	1.1 U	8.4 U	3.5 U	0.4 U	3.2 U	0.42 U	0.32 U
Cumene	ppbV	26 U	0.53 U	4.1 U	1.7 U	0.2 U	1.6 U	0.21 U	0.16 U
Cyclohexane	ppbV	71 U	1.5 U	11 U	4.8 U	0.54 U	4.3 U	0.57 U	0.44 U
Dibromochloromethane	ppbV	15 U	0.3 U	2.4 U	1 U	0.11 U	0.9 U	0.12 U	0.042 J
Dichlorodifluoromethane (CFC 12)	ppbV	26 U	0.75 J	7.7 U	1.2 J	0.55 J	2.9 U	1.4	1.4
Dichloromethane (Methylene Chloride)	ppbV	37 U	1.4 U	11 U	4.5 U	0.51 U	4 U	0.53 U	0.41 U
d-Limonene	ppbV	23 U	0.85 U	6.6 U	2.8 U	0.32 U	2.5 U	0.15 J	0.25 U
Ethanol	ppbV	690 U	6.4 J	53 U	22 U	5.1 J	55 J	5 J	4.8 J
Ethyl Acetate	ppbV	68 UJ	2.6 U	21 U	8.6 U	0.98 U	23 J	1 U	0.79 U
Ethylbenzene	ppbV	29 U	0.6 U	4.7 U	2 U	0.22 U	1.8 U	0.23 U	0.18 U
Hexachlorobutadiene	ppbV	12 UJ	0.44 UJ	3.5 UJ	1.5 U	0.16 U	1.3 U	0.17 U	0.13 UJ
Hexane	ppbV	36 U	1.3 U	10 U	4.4 U	0.5 U	4 U	0.19 J	0.17 J
m,p-Xylenes	ppbV	56 U	1.2 U	9.1 U	3.8 U	0.43 U	3.4 U	0.45 U	0.15 J
Methyl Methacrylate	ppbV	60 U	2.3 U	18 U	7.6 U	0.86 U	6.8 U	0.91 U	0.69 U
Methyl tert-Butyl Ether	ppbV	35 U	0.67 U	5.3 U	2.2 U	0.25 U	2 U	0.27 U	0.2 U
Naphthalene	ppbV	24 UJ	0.9 U	7.1 U	3 U	0.34 U	2.7 U	0.35 U	0.27 U
n-Butyl Acetate	ppbV	51 UJ	0.67 U	5.3 U	2.2 U	0.25 U	2 U	0.26 U	0.2 U
n-Heptane	ppbV	31 U	1.2 U	9 U	3.8 U	0.43 U	3.4 U	0.45 U	0.35 U
n-Nonane	ppbV	25 UJ	0.93 U	7.3 U	3.1 U	0.35 U	2.7 U	0.36 U	0.28 U
n-Octane	ppbV	27 U	1 U	7.9 U	3.3 U	0.38 U	3 U	0.4 U	0.3 U
n-Propylbenzene	ppbV	26 U	0.53 U	4.1 U	1.7 U	0.2 U	1.6 U	0.21 U	0.16 U
o-Xylene	ppbV	30 U	0.6 U	4.7 U	2 U	0.22 U	1.8 U	0.23 U	0.18 U
Propene	ppbV	74 U	2.8 U	22 U	9.3 U	1.1 U	8.4 U	1.2 J	6.7 J+
Styrene	ppbV	30 U	1.1 U	8.7 U	3.6 U	0.41 U	3.3 U	0.44 U	0.33 U
Tetrachloroethene	ppbV	2400	16	1500	700	12	470	130	130
Tetrahydrofuran (THF)	ppbV	83 U	1 U	8.1 U	3.4 U	0.38 U	3.1 U	0.41 U	0.31 U
Toluene	ppbV	34 U	0.27 J	5.4 U	2.3 U	0.56 J	3.2 J	0.45 J	0.22 J
trans-1,2-Dichloroethene	ppbV	33 U	0.65 U	5.1 U	2.1 U	0.24 U	1.9 U	0.21 J	0.21 J
trans-1,3-Dichloropropene	ppbV	27 U	1 U	8.2 U	3.4 U	0.39 U	3.1 U	0.41 U	0.31 U
Trichloroethene	ppbV	120	3.2	520	27	8.8	12	130	140
Trichlorofluoromethane	ppbV	40	14	38	26	0.29 J	1.3 U	1.3	1.3
Vinyl Acetate	ppbV	380 UJ	12 U	92 U	38 U	4.4 U	35 U	3.5 J	44 J
Vinyl Chloride	ppbV	51 U	1 U	7.9 U	3.3 U	0.38 U	3 U	0.32 J	0.38 J+

Notes:
ppbV: parts per billion by volume
LOD: Limit of Detection
DQE Flags:
J: Estimated concentration
U: Undetected at LOD
Method:
TO-15

TABLE A-1
VAPOR ANALYTICAL RESULTS
SVE PILOT TEST EXTENSION
Main Installation - Defense Depot Memphis, Tennessee

	Sample ID	PT-V-2.6-6	PT-V-SVE1-EFF1-5	PT-V-SVE1-EFF2-5	PT-V-SVE1-EFF1-6	PT-V-SVE1-EFF2-6	PT-V-SVE1-EFF2-6
	Lab ID	P2105435-007	P2102151-001	P2102151-002	P2103826-002	P2103826-001	P2105435-009
	Date	10/13/2021	4/22/2021	4/22/2021	7/14/2021	7/14/2021	10/13/2021
Component	Units						
1,1,1-Trichloroethane	ppbV	1.1 U	2 U	4.8 U	0.5 U	2 U	0.38 U
1,1,2,2-Tetrachloroethane	ppbV	0.89 U	1.6 U	3.9 U	0.4 U	1.6 U	0.32 U
1,1,2-Trichloroethane	ppbV	1.1 U	2 U	4.8 U	0.5 U	2 U	0.41 U
1,1,2-Trichlorotrifluoroethane	ppbV	1.6 J	56	140	46	120	120
1,1-Dichloroethane	ppbV	1.5 U	2.7 U	6.7 U	1.3 U	5.2 U	0.76 J
1,1-Dichloroethene	ppbV	1.5 U	5.1	12	13	35	42
1,2,4-Trichlorobenzene	ppbV	1.5 U	2.8 U	6.7 U	0.7 U	2.8 U	0.56 U
1,2,4-Trimethylbenzene	ppbV	1.2 U	2.2 U	5.3 U	0.56 U	2.2 U	0.42 U
1,2-Dibromo 3-Chloropropane	ppbV	1.2 U	2.1 U	5.2 U	0.53 U	2.1 U	0.43 U
1,2-Dibromoethane	ppbV	0.79 U	1.4 U	3.4 U	0.36 U	1.4 U	0.29 U
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ppbV	1.6 U	1.5 U	3.7 U	0.74 U	2.9 U	0.6 U
1,2-Dichlorobenzene	ppbV	1 U	1.8 U	4.4 U	0.46 U	1.8 U	0.37 U
1,2-Dichloroethane	ppbV	1.8 J	2.6 U	6.4 U	0.31 J	2.7 U	0.75 J
1,2-Dichloropropane	ppbV	1.2 J	2.3 U	5.6 U	0.59 U	2.4 U	0.41 J
1,3,5-Trimethylbenzene	ppbV	1.2 U	2.2 U	5.4 U	0.56 U	2.2 U	0.45 U
1,3-Butadiene	ppbV	5.2 U	4.8 U	12 U	2.3 UJ	9.3 UJ	1.9 U
1,3-Dichlorobenzene	ppbV	1 U	1.8 U	4.4 U	0.46 U	1.8 U	0.37 U
1,4-Dichlorobenzene	ppbV	1 U	1.8 U	4.3 U	0.86 U	3.4 U	0.37 U
1,4-Dioxane	ppbV	1.6 U	3 U	7.2 U	0.76 U	3 U	0.58 U
2-Butanone (MEK)	ppbV	2.6 J	7 U	17 U	0.86 J	6.9 U	1.5 U
2-Hexanone	ppbV	1.8 U	5 U	12 U	0.67 U	2.7 U	0.67 U
2-Propanol (Isopropyl Alcohol)	ppbV	9 U	8.3 U	20 U	4.1 U	16 U	3.3 U
3-Chloro-1-propene (Allyl Chloride)	ppbV	1.9 U	3.4 U	8.3 U	0.88 U	3.5 U	0.71 U
4-Ethyltoluene	ppbV	2.3 U	2.2 U	5.4 U	1.1 U	4.2 U	0.85 U
4-Methyl-2-pentanone	ppbV	9.2 J	5 U	12 U	0.67 U	2.7 U	0.67 U
Acetone	ppbV	51 J	45 U	110 U	18 U	73 U	14 U
Acetonitrile	ppbV	6.8 U	6.5 U	16 U	3.1 U	12 U	2.5 U
Acrolein	ppbV	2.8 J	9.8 U	24 U	2.2 U	8.7 U	2 U
Acrylonitrile	ppbV	5.4 U	9.5 U	23 U	2.4 U	9.4 U	2 U
alpha-Pinene	ppbV	1.1 U	2 U	4.8 U	0.93 U	3.7 U	0.4 U
Benzene	ppbV	1.9 U	3.3 U	8.1 U	0.86 U	3.4 U	0.69 U
Benzyl Chloride	ppbV	2.4 U	4.2 U	10 U	1 U	4 U	0.85 U
Bromodichloromethane	ppbV	0.91 U	1.6 U	3.9 U	0.41 U	1.6 U	0.33 U
Bromoform	ppbV	1.1 U	1.1 U	2.6 U	0.5 U	2 U	0.4 U
Bromomethane	ppbV	1.4 J	2.7 U	6.7 U	0.71 U	2.8 U	0.57 U
Carbon Disulfide	ppbV	3.8 U	6.6 U	16 U	10	11 U	1.4 U
Carbon Tetrachloride	ppbV	110	250	630	140	400	300
Chlorobenzene	ppbV	0.66 J	2.3 U	5.6 U	0.6 U	2.4 U	0.45 U
Chloroethane	ppbV	2.3 U	4 U	9.9 U	2 U	7.8 U	0.84 U
Chloroform	ppbV	180	37	92	32	86	61
Chloromethane	ppbV	5.5 U	5.2 U	13 U	2.5 U	9.9 U	2 U
cis-1,2-Dichloroethene	ppbV	30	8.9	22	14	37	31
cis-1,3-Dichloropropene	ppbV	2.5 U	2.4 U	5.8 U	0.6 U	2.4 U	0.92 U
Cumene	ppbV	1.2 U	2.2 U	5.3 U	0.56 U	2.2 U	0.45 U
Cyclohexane	ppbV	3.4 U	6 U	15 U	1.6 U	6.3 U	1.2 U
Dibromochloromethane	ppbV	0.71 U	1.3 U	3.1 U	0.32 U	1.3 U	0.26 U
Dichlorodifluoromethane (CFC 12)	ppbV	0.75 J	0.74 J	1.1 J	0.69 J	1.8 J	1.2 J
Dichloromethane (Methylene Chloride)	ppbV	3.2 U	3.1 U	7.5 U	1.5 U	5.9 U	1.2 U
d-Limonene	ppbV	2 U	1.9 U	4.7 U	0.93 U	3.7 U	0.72 U
Ethanol	ppbV	7.1 U	58 U	140 U	7.1 U	80 J	15 U
Ethyl Acetate	ppbV	6.2 U	5.7 U	14 U	2.9 UJ	12 UJ	2.2 U
Ethylbenzene	ppbV	1.4 U	2.5 U	6 U	0.63 U	2.5 U	0.51 U
Hexachlorobutadiene	ppbV	1 UJ	1 U	2.4 U	0.48 U	1.9 U	0.38 UJ
Hexane	ppbV	3.1 U	3 U	7.4 U	1.5 U	5.8 U	0.57 J
m,p-Xylenes	ppbV	2.7 U	4.7 U	12 U	1.3 U	5 U	0.99 U
Methyl Methacrylate	ppbV	5.4 U	5 U	12 U	2.6 U	10 U	2 U
Methyl tert-Butyl Ether	ppbV	1.6 U	3 U	7.2 U	0.31 J	3 U	0.89 J
Naphthalene	ppbV	2.1 U	2 U	5 U	0.95 U	3.8 U	0.77 U
n-Butyl Acetate	ppbV	1.6 U	4.3 U	11 U	0.58 UJ	2.3 UJ	0.57 U
n-Heptane	ppbV	2.7 U	2.6 U	6.3 U	1.3 U	5 U	0.98 U
n-Nonane	ppbV	2.2 U	2.1 U	5.1 U	0.98 U	3.9 U	0.79 U
n-Octane	ppbV	2.4 U	2.3 U	5.6 U	1.1 U	4.4 U	0.86 U
n-Propylbenzene	ppbV	1.2 U	2.2 U	5.3 U	0.56 U	2.2 U	0.45 U
o-Xylene	ppbV	1.4 U	2.5 U	6.1 U	0.63 U	2.5 U	0.51 U
Propene	ppbV	6.7 U	6.2 U	15 U	3 U	12 U	2.4 U
Styrene	ppbV	2.6 U	2.5 U	6.1 U	1.2 U	4.8 U	0.95 U
Tetrachloroethene	ppbV	910	280	710	310	810	720
Tetrahydrofuran (THF)	ppbV	2.4 U	7 U	17 U	0.93 U	3.7 U	0.88 U
Toluene	ppbV	1.6 U	2.8 U	6.9 U	0.73 U	2.9 U	0.59 U
trans-1,2-Dichloroethene	ppbV	1.5 U	2.7 U	6.7 U	0.69 U	2.7 U	0.4 J
trans-1,3-Dichloropropene	ppbV	2.4 U	2.3 U	5.6 U	1.1 U	4.5 U	0.89 U
Trichloroethene	ppbV	42	62	150	89	240	310
Trichlorofluoromethane	ppbV	0.52 J	30	73	16	46	33
Vinyl Acetate	ppbV	14 J	32 U	78 U	12 U	49 U	10 U
Vinyl Chloride	ppbV	2.4 U	4.3 U	10 U	1.1 U	4.3 U	0.86 U

Notes:
ppbV: parts per billion by volume
LOD: Limit of Detection
DQE Flags:
J: Estimated concentration
U: Undetected at LOD
Method:
TO-15

B

Appendix B.

Laboratory Analytical Reports

(electronic copies only)

C

Appendix C.
Data Quality Review Reports

DATA QUALITY REVIEW REPORT

VOLATILES IN AIR by USEPA Method TO-15

Project: DDMT Memphis REAT-2 SVE Pilot Test
Project/Task Number: 10101451 001
Sample Data Package: P2102136, P2102151, P2102152
Laboratory: ALS Environmental, Simi Valley, California
Sample Matrix: Soil Gas
Sampling Dates: 21-22 April 2021
Validation Guidelines: Project Quality Assurance Project Plan (QAPP) (Final Soil Vapor Extraction Pilot Test Work Plan, Defense Depot Memphis, Tennessee, TN4210020570 [HDR, May 2019]); United States Environmental Protection Agency (USEPA) *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air,* 2nd edition (1999) Method TO-15; and professional judgment
Validation Level: Stage 2bVM
Data Reviewer: Lynn K. Lutz, HDR

Sample ID	Collection Date	ALS ID	TO-15 VOCs	Canister Volume
PT-V-SVE1-EFF1-5	21 April 2021	P2102151-001	X	6 L
PT-V-SVE1-EFF2-5	21 April 2021	P2102151-002	X	6 L
PT-V-DUP1-5	22 April 2021	P2102152-002	X	1 L
PT-V-2.1-5	21 April 2021	P2102136-001	X	1 L
PT-V-2.2-5	21 April 2021	P2102136-003	X	1 L
PT-V-2.3-5 RE	22 April 2021	P2102152-003	X	1 L
PT-V-2.4-5	21 April 2021	P2102136-005	X	1 L
PT-V-2.5-5	21 April 2021	P2102136-002	X	1 L
PT-V-2.5D-5	22 April 2021	P2102152-001	X	1 L
PT-V-2.6-5	21 April 2021	P2102136-004	X	1 L

SUMMARY

All laboratory data were acceptable with qualification.

I. SAMPLE RECEIPT / CHAIN OF CUSTODY

The samples were collected in 1-liter or 6-liter Summa canisters. The samples were received in good condition. The canisters' initial field pressures (vacuums) of -28 inches mercury to -30 inches mercury were within the acceptable range of -25 to -30 inches mercury. The chains of custody (COCs) were filled out and signed. No qualification was required.

II. SAMPLES ANALYZED

All planned samples were collected and analyzed. No qualification was required.

III. HOLDING TIMES

The holding time criterion of 30 days was met. No qualification was required.

IV. GC/MS TUNING

GC/MS BFB tuning criteria were met. Sample analyses were begun within 24 hours of the BFB analysis. No qualification was required.

V. INSTRUMENT CALIBRATION

INITIAL CALIBRATIONS

Initial calibration criteria of relative standard deviation (RSD) less than 30% were met. No qualification was required.

SECOND SOURCE STANDARDS

Several analytes had results outside the criterion of %D less than 30% and required qualification as shown below.

Analyte	%D	Associated Samples	Qualifier
Ethyl acetate	+57%	PT-V-DUP1-5 PT-V-2.1-5 PT-V-2.2-5 PT-V-2.3-5 RE PT-V-2.4-5 PT-V-2.5-5 PT-V-2.5D-5 PT-V-2.6-5	ND = UJ Detections = J

CONTINUING CALIBRATIONS

Several analytes had results outside the criterion of %D less than 30% and required qualification as shown below.

CCV	Analyte	%D	Associated Samples	Qualifier
5/17/21	2-Hexanone	-35%	PT-V-2.1-5 PT-V-2.2-5 PT-V-2.4-5 PT-V-2.6-5	UJ
	n-Butyl acetate	-37%		UJ
	n-Nonane	-34%		UJ
	Naphthalene	-42%		UJ
	Hexachlorobutadiene	-31%		UJ
5/18/21	1,2-Dichloro-1,1,2,2-tetrafluoroethane	+31%	PT-V-2.5-5	ND = NQ
	Vinyl acetate	+30.1%		J
	Naphthalene	-30.3%		J
5/19/21	1,2-Dichloro-1,1,2,2-tetrafluoroethane	-32%	PT-V-DUP1-5 PT-V-2.3-5 RE PT-V-2.5D-5	UJ

VI. BLANKS

METHOD BLANKS

Ethanol was detected in one method blank, and associated sample results were qualified as shown below.

Method Blank	Analyte	Blank Conc	Sample	Sample Conc	Qualification
5/19/21	Ethanol	0.395 ng on column	PT-V-2.5D-5	1.34 J ng on column	U

CANISTER BATCH CERTIFICATION BLANKS
Some analytes were detected in the batch blanks, and associated sample results required qualification as shown below.

Canister batch blank	Analyte	Blank Conc	Sample	Sample Conc	Qualification
Batch 27499 1SS01159	Ethanol	0.742 ng	PT-V-DUP1-5 PT-V-2.3-5 RE	1.288 ng 1.037 ng	U U
Batch 27485 AC02152	Ethanol	0.479 ng	PT-V-2.5D-5	1.34 ng	U

VII. LABORATORY CONTROL SAMPLES (LCS) and LABORATORY CONTROL SAMPLE DUPLICATE (LCSD)
Some recoveries were outside control limits, and associated sample results required qualification as shown below.

LCS	Analyte	Recovery	Control Limits	Associated Samples	Qualifier
5/17/21	Vinyl acetate	53%	56-137%	PT-V-2.1-5 PT-V-2.2-5 PT-V-2.4-5 PT-V-2.6-5	UJ
	Naphthalene	160%	62-156%		None - ND
5/18/21	Acetonitrile	137%	59-131%	PT-V-2.5-5	J+
	Allyl chloride	130%	57-127%		None – ND
	Vinyl acetate	54%	56-137%		J-
	Naphthalene	157%	62-156%		J+
5/19/21	Acetonitrile	38%	59-131%	PT-V-2.5D-5 PT-V-DUP1-5 PT-V-2.3-5 RE	UJ
	Allyl chloride	134%	57-127%		UJ
	Vinyl acetate	55%	56-137%		UJ or J-

VIII. SURROGATES
Surrogate recoveries were within control limits. No qualification was required.

IX. LABORATORY DUPLICATES
Lab duplicate analysis was performed on samples PT-V-2.4-5 and PT-V-SVE1-EFF2-5 from this project. All RPDs were less than 5%, within the control limit of 30%. No qualification was required.

X. FIELD DUPLICATES
PT-V-DUP1-5 was collected as a field duplicate of PT-V-2.5D-5. All analytes detected above the limit of quantitation (LOQ) had relative percent difference (RPD) values below the control limit of 30%, and sample results did not require qualification, except as shown below.

Parent / FD sample	Analyte	Concentrations	RPD	Qualifier
PT-V-2.5D-5 PT-V-DUP1-5	Carbon disulfide	15 / 6.7 µg/m^3	76%	J / J
	Toluene	34 / 3.3 µg/m^3	165%	J / J
	n-Octane	7.1 / 0.48 µg/m^3	61%	J / J
	Ethylbenzene	3.3 / 0.32 µg/m^3	165%	J / J
	n-Nonane	8.6 / 0.39 µg/m^3	39%	J / J
	m/p-Xylenes	18 / 0.73 µg/m^3	184%	J / J
	o-Xylene	5.7 / ND µg/m^3	--	J / UJ
	Naphthalene	3.2 / ND µg/m^3	--	J / UJ

XI. INTERNAL STANDARDS (ISTD)

The ISTD criterion of area responses within 40% of the CCV was met for all samples. No qualification was required.

XII. LIMITS OF QUANTITATION (LOQs), LIMITS OF DETECTION (LODs) AND DETECTION LIMITS (DLs)

Some samples were analyzed only at dilution due to high concentrations indicated in the screening analysis. The dilutions resulted in elevated LOQs, greater than the PAL for some analytes.

XIII. SAMPLE RESULTS / TRANSCRIPTION VERIFICATION

Transcription between the data packages and the EDDs was verified. Results between the DL and LOQ have been qualified as estimated (J).

DATA QUALITY REVIEW REPORT

VOLATILES IN AIR by USEPA Method TO-15

Project: DDMT Memphis REAT-2 SVE
Project/Task Number: 10101451 001
Sample Data Package: P2103826
Laboratory: ALS Environmental, Simi Valley, California
Sample Matrix: Soil Gas
Sampling Dates: 14 July 2021
Validation Guidelines: Project Quality Assurance Project Plan (QAPP) (Final Soil Vapor Extraction Pilot Test Work Plan, Defense Depot Memphis, Tennessee, TN4210020570 [HDR, May 2019]); United States Environmental Protection Agency (USEPA) *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air,* 2nd edition (1999) Method TO-15; and professional judgment
Validation Level: Stage 2bVM
Data Reviewer: Lynn K. Lutz, HDR

Sample ID	Collection Date	ALS ID	TO-15 VOCs	Canister Volume
PT-V-SVE1-EFF1-6	14 July 2021	P2103826-002	X	6 L
PT-V-SVE1-EFF2-6	14 July 2021	P2103826-001	X	6 L

SUMMARY
All laboratory data were acceptable with qualification.

I. SAMPLE RECEIPT / CHAIN OF CUSTODY

The samples were collected in 6-liter Summa canisters. The samples were received in good condition. The canisters' initial field pressures (vacuums) of -29.8 and -29.82 inches mercury were within the acceptable range of -25 to -30 inches mercury. The chains of custody (COCs) were filled out and signed. No qualification was required.

II. SAMPLES ANALYZED

All planned samples were collected and analyzed. No qualification was required.

III. HOLDING TIMES

The holding time criterion of 30 days was met. No qualification was required.

IV. GC/MS TUNING

GC/MS BFB tuning criteria were met. Sample analyses were begun within 24 hours of the BFB analysis. No qualification was required.

V. INSTRUMENT CALIBRATION

INITIAL CALIBRATIONS

Initial calibration criteria of relative standard deviation (RSD) less than 30% were met. No qualification was required.

SECOND SOURCE STANDARDS
Several analytes had results outside the criterion of %D less than 30% and required qualification as shown below.

Analyte	%D	Associated Samples	Qualifier
Ethyl acetate	+42%, +40%	All	UJ
n-Butyl acetate	+35%, +33%	All	UJ

CONTINUING CALIBRATIONS
Several analytes had results outside the criterion of %D less than 30% and required qualification as shown below.

CCV	Analyte	%D	Associated Samples	Qualifier
7/29/2021	1,3-Butadiene	-30.4%	All	UJ
	n-Butyl acetate	-33%		UJ
7/29/2021 closing	n-Butyl acetate	-32%	All	UJ

VI. BLANKS
METHOD BLANKS
Ethanol was detected in one method blank, and associated sample results were qualified as shown below.

Method Blank	Analyte	Blank Conc	Sample	Sample Conc	Qualification
7/29/2021	Ethanol	0.39 J ppbv	PT-V-SVE1-EFF1-6	ND	None
			PT-V-SVE1-EFF2-6	80 ppbv	None

CANISTER BATCH CERTIFICATION BLANKS
Some analytes were detected at low levels in the batch blanks. Sample results did not require qualification.

VII. LABORATORY CONTROL SAMPLES (LCS) and LABORATORY CONTROL SAMPLE DUPLICATE (LCSD)
Some recoveries were outside control limits, and associated sample results required qualification as shown below.

LCS	Analyte	Recovery	Control Limits	Associated Samples	Qualifier
7/29/2021	Ethyl acetate	142%, 140%	65-128%	All	None - ND
	n-Butyl acetate	135%, OK	65-134%		None – ND
	n-Octane	124%, 124%	69-121%		None - ND

VIII. SURROGATES
Surrogate recoveries were within control limits. No qualification was required.

IX. LABORATORY DUPLICATES

Lab duplicate analysis was performed on samples PT-V-SVE1-EFF2-6 from this project. All RPDs were 0.2% to 14%, within the control limit of 30%. No qualification was required.

X. FIELD DUPLICATES

A field duplicate was not collected. No qualification was required.

XI. INTERNAL STANDARDS (ISTD)

The ISTD criterion of area responses within 40% of the CCV was met for all samples. No qualification was required.

XII. LIMITS OF QUANTITATION (LOQs), LIMITS OF DETECTION (LODs) AND DETECTION LIMITS (DLs)

Some samples were analyzed only at dilution due to high concentrations indicated in the screening analysis. The dilutions resulted in elevated LOQs, greater than the PAL for some analytes.

XIII. SAMPLE RESULTS / TRANSCRIPTION VERIFICATION

Transcription between the data packages and the EDDs was verified. Results between the DL and LOQ have been qualified as estimated (J).

DATA QUALITY REVIEW REPORT

VOLATILES IN AIR by USEPA Method TO-15

Project: DDMT Memphis REAT-2 SVE
Project/Task Number: 10101451 001
Sample Data Package: P2105435
Laboratory: ALS Environmental, Simi Valley, California
Sample Matrix: Soil Gas
Sampling Dates: 13 October 2021
Validation Guidelines: Project Quality Assurance Project Plan (QAPP) (Final Soil Vapor Extraction Pilot Test Work Plan, Defense Depot Memphis, Tennessee, TN4210020570 [HDR, May 2019]); United States Environmental Protection Agency (USEPA) *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air,* 2nd edition (1999) Method TO-15; and professional judgment
Validation Level: Stage 2bVM
Data Reviewer: Lynn K. Lutz, HDR

Sample ID	Collection Date	ALS ID	TO-15 VOCs	Canister Volume
PT-V-SVE1-EFF2-6	13 October 2021	P2105435-009	X	6 L
DUP-1	13 October 2021	P2105435-008	X	1 L
PT-V-2.1-6	13 October 2021	P2105435-001	X	1 L
PT-V-2.2-6	13 October 2021	P2105435-002	X	1 L
PT-V-2.3-6	13 October 2021	P2105435-003	X	1 L
PT-V-2.4-6	13 October 2021	P2105435-004	X	1 L
PT-V-2.5-6	13 October 2021	P2105435-005	X	1 L
PT-V-2.5D-6	13 October 2021	P2105435-006	X	1 L
PT-V-2.6-6	13 October 2021	P2105435-007	X	1 L

SUMMARY

All laboratory data were acceptable with qualification.

I. SAMPLE RECEIPT / CHAIN OF CUSTODY

The samples were collected in 1-liter or 6-liter Summa canisters. The samples were received in good condition. The canisters' initial field pressures (vacuums) of -27.3 inches mercury to -30 inches mercury were within the acceptable range of -25 to -30 inches mercury. The chains of custody (COCs) were filled out and signed. No qualification was required.

II. SAMPLES ANALYZED

All planned samples were collected and analyzed. No qualification was required.

III. HOLDING TIMES

The holding time criterion of 30 days was met. No qualification was required.

IV. GC/MS TUNING

GC/MS BFB tuning criteria were met. Sample analyses were begun within 24 hours of the BFB analysis. No qualification was required.

V. INSTRUMENT CALIBRATION

INITIAL CALIBRATIONS

Initial calibration criteria of relative standard deviation (RSD) less than 30% were met. No qualification was required.

SECOND SOURCE STANDARDS

All results were within the required criterion of %D less than 30%. No qualification was required.

CONTINUING CALIBRATIONS

Several analytes had results outside the criterion of %D less than 30% and required qualification as shown below.

CCV	Analyte	%D	Associated Samples	Qualifier
10/26/21 02:45	Propene	+35.8%	DUP-1	J+
	Chloromethane	+35.6%	PT-V-2.5D-6 DUP-1	J+ J+
10/26/21 14:21	Chloromethane	+32.9%	PT-V-2.5D-6 DUP-1	J+ J+
	Hexachlorobutadiene	-33.6%	PT-V-2.1-6 PT-V-2.2-6 PT-V-2.6-6 DUP-1 PT-V-SVE1-EFF2-6	UJ UJ UJ UJ UJ

VI. BLANKS

METHOD BLANKS

Analytes were not detected in the method blank. No qualification was required.

CANISTER BATCH CERTIFICATION BLANKS

Several analytes were detected in one canister batch blank. Associated sample results were qualified as shown in the table below. Most analytes did not require qualification, as the sample result was either well above the blank results or was non-detect.

Canister blank	Analyte	Blank result	Associated sample	Sample result	Qualifier
Batch 28377 (6-L can)	Ethanol	1194 pg	PT-V-SVE1-EFF2-6	2109 pg	U
Batch 28381 (1-L can)	Ethanol	181 pg	PT-V-2.6-6	371 pg	U

VII. LABORATORY CONTROL SAMPLES (LCS) and LABORATORY CONTROL SAMPLE DUPLICATE (LCSD)

Some recoveries were outside control limits, and associated sample results required qualification as shown below.

LCS	Analyte	Recovery	Control Limits	Associated Samples	Qualifier
10/25/21	Chloromethane	134%, OK	59-132%	PT-V-2.5D-6	J+
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	OK, 122%	63-121%	--	None – ND
10/26/21	Propene	139%, OK	57-136%	DUP-1	J+
	Chloromethane	142%, 137%	59-132%	DUP-1	J+
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	122%, 123%	63-121%	--	None – ND
	Vinyl chloride	131%, 128%	64-127%	DUP-1	J+

VIII. SURROGATES
Surrogate recoveries were within control limits. No qualification was required.

IX. LABORATORY DUPLICATES
Lab duplicate analysis was not performed on any samples from this project. No qualification was required.

X. FIELD DUPLICATES
DUP-1 was collected as a field duplicate of PT-V-2.5D-6. All analytes detected above the limit of quantitation (LOQ) had relative percent difference (RPD) values below the control limit of 30%, and sample results did not require qualification, except as shown below.

Parent / FD sample	Analyte	Concentrations	RPD	Qualifier
PT-V-2.5D-6 DUP-1	2-Butanone (MEK)	2.1 / 15 ppbv	151%	J / J
	Acetone	22 / 120 ppbv	136%	J / J
	Bromomethane	ND / >RL	--	UJ / J
	Propene	1.2J /6.7 ppbv	139%	J / J
	Vinyl acetate	3.5J / 44 ppbv	171%	J / J

XI. INTERNAL STANDARDS (ISTD)
The ISTD criterion of area responses within 40% of the CCV was met for all samples. No qualification was required.

XII. LIMITS OF QUANTITATION (LOQs), LIMITS OF DETECTION (LODs) AND DETECTION LIMITS (DLs)
Some samples were analyzed only at dilution due to high concentrations indicated in the screening analysis. The dilutions resulted in elevated LOQs, greater than the PAL for some analytes.

XIII. SAMPLE RESULTS / TRANSCRIPTION VERIFICATION
Transcription between the data packages and the EDDs was verified. Results between the DL and LOQ have been qualified as estimated (J).