

dialer call-out non-functioning; no alarm was noted (as would be expected with the system off), and the blower sound was not heard (and to be off) during these calls.

Operator error was determined to be the cause. A contributing factor was operator fatigue from manually transporting condensate to Building C, compounded by the system-alarm responses on January 5, 2018, (a lengthy response that included transporting condensate for

Seven IA samples plus one duplicate were collected as follows:

- x IA-168-A: location of former vapor degreaser (including duplicate)
- x IA-136-A: location of former vapor degreaser
- x IA-117-A: location in central portion of Building A northeast of former plating shop area
- x IA-079-A: location in eastern portion of Building A near autoclaves
- x IA-015-A: location in the middle of former plating shop area
- x IA-HRS5-A: location near former heater room sump in Building A basement
- x IA-021-A: location in northeastern portion of Building A north of IA-136-A area

All Summa[®] canisters and associated regulators functioned properly during IA sampling. Starting pressures ranged from -24 to -30 inches of mercury (Hg) and ending pressures ranged from zero to -4 inches of mercury (Hg). All canisters collected an adequate volume of air for sampling. Temperatures ranged from 39 to 45 degrees Fahrenheit during the sampling period, which had overcast skies and winds averaging eight miles per hour (mph), with gusts up to 28 mph. Barometric pressure averaged 30.06 during the sampling period. The Summa[®] canister sample locations are shown in Figure 1.

Analytical results—Data for the seven IA samples plus one duplicate sample were validated. No major issues were found, and all results are considered usable. The data validation report is included as Attachment A.

No exceedances of the indoor-air industrial-workscreening criterion for TCE (8.8 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$]) or any other chemical were detected during the Summa[®] canister sampling. Table 1 summarizes positive detections of chemical analytes in the IA samples. TCE and PCE results are presented in Figure 1. Though not an IA contaminant of concern, it is a parent compound to TCE, and appears in related groundwater analyses in other reports. Note that TCE breakdown products (cis- and trans-1,2 dichloroethene and dichloride) were likewise not detected.

The following is a summary of the analytical results:

- x TCE was detected in three of five samples, plus the duplicate

o IA-168-A-VS Tc ()Tj /TT2 1 Tf 40.2738 0 TD .0023 Ta.1 µg/m()Tj7.9648f .607.

FIGURE

TABLE

ATTACHMENT A

TO: T. APANAVAGE DATE: FEBRUARY 16, 2018
FROM: LEIGH A. CIOFANI COPIES: DV FILE
SUBJECT: ORGANIC DATA VALIDATION – VOC

TO: T. APANAVAGE
DATE: 02/16/18

PAGE 2
SDG 140-10566-1

EXECUTIVE SUMMARY

Laboratory Performance : None.

Other Factors Affecting Data Quality: Two results were qualified due to field duplicate imprecision. Results above the MDL but below the RL were qualified as estimated.

The data for these analyses were reviewed with reference to the USEPA "National Functional Guidelines for s-(-)Tjx

Appendix A

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted method detection limit for sample and method.
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
R	The sample result (detected) is unusable due to the quality of the data generated

Qualifier Codes:

- A = Lab Blank Contamination
- B = Field Blank Contamination
- C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
- C01 = GC/MS Tuning Noncompliance
- D = MS/MSD Recovery Noncompliance
- E = LCS/LCSD Recovery Noncompliance
- F = Lab Duplicate Imprecision
- G = Field Duplicate Imprecision
- H = Holding Time Exceedance
- I = ICP Serial Dilution Noncompliance
- J = ICP PDS Recovery Noncompliance; MSA's $r < 0.995$
- K = ICP Interference - includes ICS % R Noncompliance
- L = Instrument Calibration Range Exceedance
- M = Sample Preservation Noncompliance
- N = Internal Standard Noncompliance
- N01 = Internal Standard Recovery Noncompliance Dioxins
- N02 = Recovery Standard Noncompliance Dioxins
- N03 = Clean-up Standard Noncompliance Dioxins
- O = Poor Instrument Performance (i.e., base-time drifting)
- P = Uncertainty near detection limit ($< 2 \times$ IDL for inorganics and $<$ CRQL for organics)
- Q =

		0.38 U		0.38 U		0.38 U	
0.37 U		0.37 U		0.37 U		0.37 U	

	UG/M3									NM		
	UG/M3			UG/M3			UG/M3			UG/M3		
										IA-168-A-VS		
	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE	0.33	U		0.33	U		0.33	U		0.33	U	
1,1,2-TRICHLOROETHANE	0.57	U		0.57	U		0.57	U		0.57	U	
1,1-DICHLOROETHANE	0.2	U		0.2	U		0.2	U		0.2	U	
1,1-DICHLOROETHENE	0.28	U		0.28	U		0.28	U		0.28	U	
1,2,3-TRIMETHYLBENZENE	0.84	U		0.84	U		0.84	U		0.84	U	
1,2,4-TRICHLOROBENZENE	1.4	U		1.4	U		1.4	U		1.4	U	
1,2,4-TRIMETHYLBENZENE	0.61	U		0.61	U		0.61	U		0.61	U	
1,2-DICHLOROETHANE	0.38	U		0.38	U		0.38	U		0.38	U	
1,3,5-TRIMETHYLBENZENE	0.64	U		0.64	U		0.64	U		0.64	U	
BENZENE	0.43	J	P	0.4	J	P	0.43	J	P	0.38	J	P
CARBON TETRACHLORIDE	0.47	U		0.47	U		0.47	U		0.47	U	
CHLORODIFLUOROMETHANE	1.7			1.6			1.7			1.1	J	P
CHLOROFORM	0.37	U		0.37	U		0.37	U		0.37	U	
CIS-1,2-DICHLOROETHENE	0.48	U		0.48	U		0.48	U		0.48	U	
DICHLORODIFLUOROMETHANE	2.5			2.3			2.6			2.7		
ETHYLBENZENE	0.6	J	P	0.59	U		0.59	U		0.59	U	
METHYL TERT-BUTYL ETHER	1.2	U		1.2	U		1.2	U		1.2	U	
METHYLENE CHLORIDE	5.6			6.3			10			5		
NAPHTHALENE	1	U		1	U		1	U		1	U	
TETRACHLOROETHENE	0.54	U		6.3	J	G	0.54	UJ	G	0.54	U	
TOLUENE	16			4.5			5.9			2.3	U	
TOTAL XYLENES	2.4	J	P	0.52	U		0.52	U		0.52	U	
TRANS-1,2-DICHLOROETHENE	0.4	U		0.4	U		0.4	U		0.4	U	
TRICHLOROETHENE	0.57	J	P	1.1			0.48	J	P	0.56	J	P
VINYL CHLORIDE	0.37	U		0.37	U		0.37	U		0.37	U	

Appendix B

Results as Reported by the Laboratory

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1

SDG No.: _____

Client Sample ID: IA-015-A-VS Lab Sample ID: 140-10566-5

Matrix: low/med)5 LL Lab File ID: GA29P113.D

Analysis Method: TO 15 LL Date Collected: _____

14.20te.166-5

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: IA-021-A-VS Lab Sample ID: 140-10566-7
 Matrix: Air Lab File ID: GA29P115.D
 Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:34
 Sample wt/vol: 100(mL) Date Analyzed: 01/30/2018 01:14
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 17732 Units: ppb v/v

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.13	J	0.40	0.12
56-23-5	Carbon tetrachloride	153.81	ND		0.40	0.075
75-45-6	Chlorodifluoromethane	86.47	0.53		0.40	0.075
67-66-3	Chloroform	119.38	ND		0.40	0.075
156-59-2	c0 Td (RESULT) 61,56-59-2	96.94				

53

15385

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1

SDG No.: _____

Client Sample ID: IA-021-A-VS Lab Sample ID: 140-10566-7

Matrix: low/med)5 LL Lab File ID: GA29P115.D

Analysis Method: TO 15 LL Date Collected: _____

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: IA-079-A-VS Lab Sample ID: 140-10566-4
 Matrix: Air Lab File ID: GA29P112.D
 Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:30
 Sample wt/vol: 100(mL) Date Analyzed: 01/29/2018 23:05
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 17732 Units: ppb v/v

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.17	J	0.40	0.12
56-23-5	Carbon tetrachloride	153.81	ND		0.40	0.075
75-45-6	Chlorodifluoromethane	86.47	0.40		0.40	0.075
67-66-3	Chloroform	119.38	ND		0.40	0.075
156-59-2		96.94				

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: IA-117-A-VS Lab Sample ID: 140-10566-3
 Matrix: Air Lab File ID: GA29P111.D
 Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:31
 Sample wt/vol: 100(mL) Date Analyzed: 01/29/2018 22:22
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 17732 Units: ppb v/v

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.13	J	0.40	0.12
56-23-5	Carbon tetrachloride	153.81	ND		0.40	0.075
75-45-6	Chlorodifluoromethane	86.47	0.38	J	0.40	0.075
67-66-3	Chloroform	119.38	ND		0.40	0.075
156-59-2	cis-1,2-Dichloroethene	96.94	ND		0.40	0.12
75-71-8	Dichlorodifluoromethane	120.91	0.50		0.40	0.14
75-34-3	1,1-Dichloroethane	98.96	ND		0.40	0.050
107-06-2	1,2-Dichloroethane	98.96	ND		0.40	0.095
75-35-4	1,1-Dichloroethene	96.94	ND		0.40	0.070
100-41-4	Ethylbenzene	106.17	ND		0.40	0.14
75-09-2	Methylene Chloride	84.93	1.3		1.0	0.65
1634-04-4	Methyl tert-butyl ether	88.15	ND		2.0	0.34
91-20-3	Naphthalene	128.17	ND		0.20	0.20
127-18-4	Tetrachloroethene	165.83	ND		0.40	0.080
108-88-3	Toluene	92.14	1.5		0.60	0.60
156-60-5	trans-1,2-Dichloroethene	96.94	ND		0.40	0.10
120-82-1	1,2,4-Trichlorobenzene	181.45	ND		0.40	0.20
71-55-6	1,1,1-Trichloroethane	133.41	ND		0.40	0.060
79-00-5	1,1,2-Trichloroethane	133.41	ND		0.40	0.11
79-01-6	Trichloroethene	131.39	ND		0.20	0.070
526-73-8	1,2,3-Trimethylbenzene	120.19	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	120.20	ND		0.40	0.13
108-67-8	1,3,5-Trimethylbenzene	120.20	ND		0.40	0.13
75-01-4	Vinyl chloride	62.50	ND		0.20	0.15
1330-20-7 Td (526-73-8) Td 2zene) Tj 253.taTd (ND) Tj 66 0 T8 (0.12) Tj -255.6 -12 Td 1292.148.28(78.1						

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: IA-117-A-VS Lab Sample ID: 140-10566-3
 Matrix: Air Lab File ID: GA29P111.D
 Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:31
 Sample wt/vol: 100(mL) Date Analyzed: 01/29/2018 22:22
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 17732 Units: ug/m3

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.40	J	1.3	0.37
56-23-5	Carbon tetrachloride	153.81	ND		2.5	0.47
75-45-6	Chlorodifluoromethane	86.47	1.4	J	1.4	0.27
67-66-3	Chloroform	119.38	ND		2.0	0.37
156-59-2	cis-1,2-Dichloroethene	96.94	ND		1.6	0.48
75-71-8	Dichlorodifluoromethane	120.91	2.5		2.0	0.67
75-34-3	1,1-Dichloroethane	98.96	ND		1.6	0.20
107-06-2	1,2-Dichloroethane	98.96	ND		1.6	0.38
75-35-4	1,1-Dichloroethene	96.94	ND		1.6	0.28
100-41-4	Ethylbenzene	106.17	ND		1.7	0.59
75-09-2	Methylene Chloride	84.93	4.5		3.5	2.3
1634-04-4	Methyl tert-butyl ether	88.15	ND		7.2	1.2
91-20-3	Naphthalene	128.17	ND		1.0	1.0
127-18-4	Tetrachloroethene	165.83	ND		2.7	0.54
108-88-3	Toluene	92.14	5.5		2.3	2.3
156-60-5	trans-1,2-Dichloroethene	96.94	ND		1.6	0.40
120-82-1	1,2,4-Trichlorobenzene	181.45	ND		3.0	1.4
71-55-6	1,1,1-Trichloroethane	133.41	ND		2.2	0.33
79-00-5	1,1,2-Trichloroethane	133.41	ND		2.2	0.57
79-01-6	Trichloroethene	131.39	ND		1.1	0.38
526-73-8	1,2,3-Trimethylbenzene	120.19	ND		2.0	0.84
95-63-6	1,2,4-Trimethylbenzene	120.20	ND		2.0	0.61
108-67-8	1,3,5-Trimethylbenzene	120.20	ND		2.0	0.64
75-01-4	Vinyl chloride	62.50	ND		0.51	0.37
1330-20-7	Xylenes, Total	106.17	ND		3.5	0.52

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	98		60-140

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
SDG No.: _____
Client Sample ID: IA-136-A-VS Lab Sample ID: 140-10566-2
Matrix: Air Lab File ID: GA29P110.D
Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:32
Sample wt/vol: 100(mL) Date Analyzed: 01/29/2018 21:39
Soil Aliquot Vol: _____ Dilution Factor: 1
Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
% Moisture: _____ Level: (low/med) Low
Analysis Batch No.: 17732 Units: ug/m3

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.43	J	1.3	0.37
		153.81				

FORM I
 AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1

SDG No.: _____

Client Sample ID: IA-168-A-VS Lab Sample ID: 140-10566-1

Matrix: Air Lab File ID: GA29P108.D

Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:36

Sample wt/vSMethod: _____

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1

SDG No.: _____

Client Sample ID: IA-DUP1-A-VS Lab Sample ID: 140-10566-8

Matrix: Air Lab File ID: GA29P116.D

Analysis Method: TO 15 LL Date Collected: 01/24/2018 00:00

Sample wt/vol: _____

GC Column: _____

% Moisture: _____

D -55 TdP4O6TTTestASamplGC Cozl:

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FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
SDG No.: _____
Client Sample ID: IA-HRS5-A-VS Lab Sample ID: 140-10566-6
Matrix: Air Lab File ID: GA29P114.D
Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:25
Sample wt/vol: 100(mL) Date Analyzed: 01/30/2018 00:31
Soil Aliquot Vol: _____ Dilution Factor: 1
Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
% Moisture: _____ Level: (low/med) Low
Analysis Batch No.: 17732 Units: ppb v/v

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.12	J	0.40	0.12
56-23-5	Carbon tetrachloride	153.81				

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: IA-HRS5-A-VS Lab Sample ID: 140-10566-6
 Matrix: Air Lab File ID: GA29P114.D
 Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:25
 Sample wt/vol: 100(mL) Date Analyzed: 01/30/2018 00:31
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 17732 Units: ug/m3

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	0.38	J	1.3	0.37
56-23-5	Carbon tetrachloride	153.81	ND		2.5	0.47
75-45-6	Chlorodifluoromethane	86.47	1.1	J	1.4	0.27
67-66-3	Chloroform	119.38	ND		2.0	0.37
156-59-2		96.94	96.94 ND		2.0	ND 0.47
		119.38	56-23-5			

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Appendix C

Support Documentation

Job Narrative
140-10566-1

Receipt

The samples were received on 1/26/2018 at 9:30 AM. The samples arrived in good condition and properly preserved.

Air - GC/MS VOA - Method TO-15 LL

EPA methods TO-14A and TO-15 specify the use of humidified "zero air" as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by TestAmerica Knoxville.

Definitions/Glossary

Client: Tetra Tech GEO
Project/Site: LMC MRC - MRA3/BLDG-A

TestAmerica Job ID: 140-10566-1

Qualifiers

Air - GC/MS VOA

Qualifier Description

J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
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Method Summary

Client: Tetra Tech GEO
Project/Site: LMC MRC - MRA3/BLDG-A

TestAmerica Job ID: 140-10566-1

Method	Method Description	Protocol	Laboratory
TO 15 LL	Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: Tetra Tech GEO
Project/Site: LMC MRC - MRA3/BLDG-A

TestAmerica Job ID: 140-10566-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-10566-1	IA-168-A-VS	Air	01/24/18 19:36	01/26/18 09:30
140-10566-2	IA-136-A-VS	Air	01/24/18 19:32	01/26/18 09:30
140-10566-3	IA-117-A-VS	Air	01/24/18 19:31	01/26/18 09:30
140-10566-4	IA-079-A-VS	Air	01/24/18 19:30	01/26/18 09:30
140-10566-5	IA-015-A-VS	Air	01/24/18 19:27	01/26/18 09:30
140-10566-6	IA-HRS5-A-VS	Air	01/24/18 19:25	01/26/18 09:30
140-10566-7	IA-021-A-VS	Air	01/24/18 19:34	01/26/18 09:30
140-10566-8	IA-DUP1-A-VS	Air	01/24/18 00:00	01/26/18 09:30

% ! & ' (") !*

						!		
					"	#	\$	%

FIELD DUPLICATE PRECISION

ORIGINAL I	DUP IC	FRACTIO	ANALYT			RI	RL'	RL'	RPI	RPD > 50%	ORIGINAL SAMPLE CONC	DUPLICATE SAMPLE CONC	DIFFERENCE >2
IA-168-A-V	IA-DUP1-A-\	OV-M:	BENZEN	0.4 J	0.43 J	1.3	1.3	1.3	7.23	FALS	FALS	FALS	FALS
IA-168-A-V	IA-DUP1-A-\	OV-M:	CHLORODIFLUOROMETH	1.6	1.7	1.4	1.4	1.4	6.06	FALS	TRUI	TRUI	FALS
IA-168-A-V	IA-DUP1-A-\	OV-M:	DICHLORODIFLUOROMETH	2.3	2.6	2	2	2	12.24	FALS	TRUI	TRUI	FALS
IA-168-A-V	IA-DUP1-A-\	OV-M:	METHYLENE CHLOF	6.3	10	3.5	3.5	3.5	45.40	FALS	TRUI	TRUI	FALS
IA-168-A-V	IA-DUP1-A-\	OV-M:	TETRACHLOROETH	6.3	0.54 U	2.7	2.7	2.7	168.42	TRUI	TRUI	FALS	TRUI
IA-168-A-V	IA-DUP1-A-\	OV-M:	TOLUEN	4.5	5.9	2.3	2.3	2.3	26.92	FALS			

Method TO15 Low Level

Volatile Organic Compounds - Low
level (GC/MS) by Method TO 15

FORM V
AIR - GC/MS VOA INSTRUMENT PERFORMANCE CHECK

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Lab File ID: GBFBK13.D BFB Injection Date: 11/13/2017
 Instrument ID: MG BFB Injection Time: 14:59
 Analysis Batch No.: 15917

M/E	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE		
50	15.0 - 40.0 % of mass 95	20.3		
75	30.0 - 60.0 % of mass 95	51.8		
95	Base Peak, 100% relative abundance	100.0		
96	5.0 - 9.0 % of mass 95	6.7		
173	Less than 2.0 % of mass 174	0.4	(0.5)	1
174	50.0 - 120.00 % of mass 95	82.0		
175	5.0 - 9.0 % of mass 174	5.6	(6.8)	1
176	95.0 - 101.0 % of mass 174	79.5	(97.0)	1
177	5.0 - 9.0 % of mass 176	5.2	(6.5)	2

1-Value is % mass 174

2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
	IC 140-15917/3	GK13IC01.D	11/13/2017	16:15
	IC 140-15917/4	GK13IC02.D	11/13/2017	16:57
	IC 140-15917/5	GK13IC03.D	11/13/2017	17:39
	IC 140-15917/6	GK13IC04.D	11/13/2017	18:22
	IC 140-15917/7	GK13IC05.D	11/13/2017	19:05
	IC 140-15917/8	GK13IC06.D	11/13/2017	19:47
	ICIS 140-15917/9	GK13IC07.D	11/13/2017	20:29
	IC 140-15917/10	GK13IC08.D	11/13/2017	21:11
	IC 140-15917/11	GK13IC09.D	11/13/2017	21:54
	IC 140-15917/12	GK13IC10.D	11/13/2017	22:37
	ICV 140-15917/14	GICVK13.D	11/14/2017	00:02

FORM VI

Lab Name: _____ Job No.: _____

SDG No.: _____

Instrument ID: _____ GC Column: _____

_____ Calibration ID: _____

FORM VI
AIR - GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA

Lab Name: _____ Job No.: _____

SDG No.: _____

Instrument ID: _____ GC Column: _____ Heated Purge: (Y/N) _____

_____ Calibration ID: _____

FORM VI

Lab Name: _____ Job No.: _____

_____ Calibration ID: _____

FORM VI
AIR - GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1 Analy Batch No.: _____
SDG No.: _____
Instrument ID: MG GC Column: _____ Heated Purge: (Y/N) _____
_____ Calibration ID: _____

FORM VI

Lab Name: _____ Job No.: _____

_____ Calibration ID: _____

AIR - Gated Purge: (Y/N)

FORM VI

Heat

Lab Name: _____ Job No.: _____

SDG No.: _____

Instrument ID: _____ Heated Purge: (Y/N) _____

_____ Calibration ID: _____

Lab Name: _____

FORM VI
AIR - GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1 Analy Batch No.: 15917
SDG No.: _____
Instrument ID: MG GC Column: RTX-5 ID: 0.32(mm) Heated Purge: (Y/N) N
Calibration Start Date: 11/13/2017 16:15 Calibration End Date: 11/13/2017 22:37 Calibration ID: 1337

Curve Type Legend

Ave = Average ISTD

FORM VI
AIR - GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
READBACK PERCENT ERROR

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1 Analy Batch No.: 15917

SDG No.: _____

Instrument ID: MG GC Column: RTX-5 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 11/13/2017 16:15 Calibration End Date: 11/13/2017 22:37 Calibration ID: 1337

Calibration Files

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 140-15917/3	GK13IC01.D
Level 2	IC 140-15917/4	GK13IC02.D
Level 3	IC 140-15917/5	GK13IC03.D
Level 4	IC 140-15917/6	GK13IC04.D
Level 5	IC 140-15917/7	GK13IC05.D
Level 6	IC 140-15917/8	GK13IC06.D
Level 7	ICIS 140-15917/9	GK13IC07.D
Level 8	IC 140-15917/10	GK13IC08.D
Level 9	IC 140-15917/11	GK13IC09.D
Level 10	IC 140-15917/12	GK13IC10.D

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1 LVL 7	LVL 2 LVL 8	LVL 3 LVL 9	LVL 4 LVL 10	LVL 5	LVL 6
Chlorodifluoromethane	+++++	18.5						50				
Propene	+++++	+++++	19.8						50			
Dichlorodifluoromethane	+++++	18.0						50				
Chloromethane	+++++	+++++	+++++	22.4						50		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	+++++	5.2						50				
Vinyl chloride	23.3						50					
1,3-Butadiene	+++++	+++++	14.0						50			
Butane	+++++	+++++	22.4						50			
Bromomethane	+++++	+++++	8.0						50			
Chloroethane	+++++	+++++	9.1						50			
Ethanol	+++++	+++++	14.5						50			
Vinyl bromide	+++++	4.2						50				
2-Methylbutane	+++++	31.0						50				
Trichlorofluoromethane	+++++	12.8						50				

FORM VI

Lab Name: _____ Job No.: _____

SDG No.: _____

Instrument ID: _____ GC Column: _____

_____ Calibration ID: _____

FORM VI
AIR - GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
SDG No.: _____
Instrument ID: MG GC Column: _____ Heated Purge: (Y/N) _____
Calibration ID: _____

FORM VII
AIR - GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Lab Sample ID: ICV 140-15917/14 Calibration Date: 11/14/2017 00:02
 Instrument ID: MG Calib Start Date: 11/13/2017 16:15
 GC Column: RTX-5 ID: 0.32(mm) Calib End Date: 11/13/2017 22:37
 Lab File ID: GICVK13.D Conc. Units: ppb v/v Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
1,3-Dichlorobenzene	Ave	0.7589	0.7482		1.97	2.00	-1.4	35.0
sec-Butylbenzene	Ave	1.481	1.499		2.02	2.00	1.2	35.0
Benzyl chloride	Ave	0.9028	0.9351		2.07	2.00	3.6	35.0
1,4-Dichlorobenzene	Ave	0.7542	0.7438		1.97	2.00	-1.4	35.0
4-Isopropyltoluene	Ave	1.232	1.220		1.98	2.00	-1.0	35.0
1,2,3-Trimethylbenzene	Ave	1.102	0.9788		1.78	2.00	-11.1	35.0
1,2-Dichlorobenzene	Ave	0.7112	0.6972		1.96	2.00	-2.0	35.0
Butylbenzene	Ave	1.182	1.167		1.97	2.00	-1.3	35.0
Undecane	Ave	0.7036	0.6966		1.98	2.00	-1.0	35.0
1,2-Dibromo-3-Chloropropane	Ave	0.4410	0.2779		1.26	2.00	<u>-37.0 *</u>	35.0
1,2,4,5-Tetramethylbenzene	Ave	1.491	1.085		1.45	2.00	-27.3	35.0
Dodecane	Ave	0.6359	0.6663		2.10	2.00	4.8	35.0
1,2,4-Trichlorobenzene	Ave	0.5763	0.5970		2.07	2.00	3.6	35.0
Naphthalene	Ave	1.332	1.326		1.99	2.00	-0.4	35.0
Hexachlorobutadiene	Ave	0.5558	0.5688		2.05	2.00	2.3	35.0
1,2,3-Trichlorobenzene	Ave	0.5354	0.5806		2.17	2.00	8.5	35.0
2-Methylnaphthalene	Ave	0.5930	0.3864		2.99	4.59	<u>-34.8</u>	50.0
1-Methylnaphthalene	Ave	0.5668	0.4031		3.27	4.60	-28.9	50.0
4-Bromofluorobenzene (Surr)	Ave	0.7464	0.7320		3.92	4.00	-1.9	35.0

FORM VII
AIR - GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Lab Sample ID: CCVIS 140-17732/6 Calibration Date: 01/29/2018 12:28
 Instrument ID: MG Calib Start Date: 11/13/2017 16:15
 GC Column: RTX-5 ID: 0.32(mm) Calib End Date: 11/13/2017 22:37
 Lab File ID: GCCVA29A.D Conc. Units: ppb v/v Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Benzene	Ave	0.7871	0.7770		1.98	2.00	-1.3	30.0
Cyclohexane	Ave	0.1251	0.1250		2.00	2.00	-0.0	30.0
Carbon tetrachloride	Ave	0.6083	0.6744		2.22	2.00	10.9	30.0
1-Butanol	Ave	0.0867	0.0600		1.38	2.00	-30.8 *	30.0
2,2,4-Trimethylpentane	Ave	1.292	1.285		1.99	2.00	-0.6	30.0
Heptane	Ave	0.2801	0.2827		2.02	2.00	0.9	30.0
1,2-Dichloropropane	Ave	0.2921	0.2945		2.02	2.00	0.8	30.0
Trichloroethene	Ave	0.3686	0.3476		1.89	2.00	-5.7	30.0
Dibromomethane	Ave	0.3335	0.3310		1.99	2.00	-0.7	30.0
Bromodichloromethane	Ave	0.5724	0.6229		2.18	2.00	8.8	30.0
1,4-Dioxane	Ave	0.1022	0.0914		1.79	2.00	-10.5	30.0
Methyl methacrylate	Ave	0.2832	0.2617		1.85	2.00	-7.6	30.0
4-Methyl-2-pentanone (MIBK)	Ave	0.4776	0.4117		1.73	2.00	-13.8	30.0
cis-1,3-Dichloropropene	Ave	0.4483	0.4843		2.16	2.00	8.0	30.0
trans-1,3-Dichloropropene	Ave	0.4139	0.4540		2.19	2.00	9.7	30.0
Toluene	Ave	0.8891	0.8994		2.02	2.00	1.2	30.0
1,1,2-Trichloroethane	Ave	0.2665	0.2707		2.03	2.00	1.6	30.0
2-Hexanone	Ave	0.2473	0.2217		1.79	2.00	-10.4	30.0
Dibromochloromethane	Ave	0.5479	0.5815		2.12	2.00	6.1	30.0
Octane	Ave	0.3111	0.3278		2.11	2.00	5.4	30.0
1,2-Dibromoethane (EDB)	Ave	0.4779	0.5043		2.11	2.00	5.5	30.0
Tetrachloroethene	Ave	0.3430	0.3420		2.00	2.00	-0.3	30.0
Chlorobenzene	Ave	0.7131	0.7180		2.02	2.00	0.7	30.0
Ethylbenzene	Ave	1.141	1.191		2.09	2.00	4.4	30.0
m-Xylene & p-Xylene	Ave	0.8653	0.9365		4.33	4.00	8.2	30.0
Bromoform	Ave	0.5240	0.4862		1.86	2.00	-7.2	30.0
Styrene	Ave	0.6042	0.6661		2.21	2.00	10.2	30.0
Nonane	Ave	0.5902	0.6019		2.04	2.00	2.0	30.0
o-Xylene	Ave	0.9204	0.9467		2.06	2.00	2.9	30.0
1,1,2,2-Tetrachloroethane	Ave	0.6266	0.6413		2.05	2.00	2.3	30.0
1,2,3-Trichloropropane	Ave	0.1960	0.2055		2.10	2.00	4.8	30.0
Isopropylbenzene	Ave	1.272	1.348		2.12	2.00	6.0	30.0
Propylbenzene	Ave	0.3295	0.3492		2.12	2.00	6.0	30.0
2-Chlorotoluene	Ave	0.3120	0.3300		2.12	2.00	5.8	30.0
4-Ethyltoluene	Ave	1.197	1.207		2.02	2.00	0.9	30.0
1,3,5-Trimethylbenzene	Ave	0.4863	0.4886		2.01	2.00	0.5	30.0
Alpha Methyl Styrene	Ave	0.4487	0.4900		2.19	2.00	9.2	30.0
Decane	Ave	0.6981	0.7139		2.05	2.00	2.3	30.0
tert-Butylbenzene	Ave	1.099	1.123		2.05	2.00	2.2	30.0
1,2,4-Trimethylbenzene	Ave	1.039	1.075		2.07	2.00	3.4	30.0

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FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 140-17732/8
 Matrix: Air Lab File ID: G500BA29.D
 Analysis Method: TO 15 LL Date Collected: _____
 Sample wt/vol: 500(mL) Date Analyzed: 01/29/2018 14:29
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-5 ID: 0.32(mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 17732 Units: ug/m3

CAS NO.	COMPOUND NAME	MOLECULAR WEIGHT	RESULT	Q	RL	MDL
71-43-2	Benzene	78.11	ND		0.26	0.073
56-23-5	Carbon tetrachloride	153.81	ND		0.50	0.094
75-45-6	Chlorodifluoromethane	86.47	ND		0.28	0.053
67-66-3	Chloroform	119.38	ND		0.39	0.073
156-59-2	cis-1,2-Dichloroethene	96.94	ND		0.32	0.095
75-71-8	Dichlorodifluoromethane	120.91	ND		0.40	0.13
75-34-3	1,1-Dichloroethane	98.96	ND		0.32	0.040
107-06-2	1,2-Dichloroethane	98.96	ND		0.32	0.077
75-35-4	1,1-Dichloroethene	96.94	ND		0.32	0.056
100-41-4	Ethylbenzene	106.17	ND		0.35	0.12
75-09-2	Methylene Chloride	84.93	ND		0.69	0.45
1634-04-4	Methyl tert-butyl ether	88.15	ND		1.4	0.25
91-20-3	Naphthalene	128.17	ND		0.21	0.21
127-18-4	Tetrachloroethene	165.83	ND		0.54	0.11
108-88-3	Toluene	92.14	ND		0.45	0.45
156-60-5	trans-1,2-Dichloroethene	96.94	ND		0.32	0.079
120-82-1	1,2,4-Trichlorobenzene	181.45	ND		0.59	0.29
71-55-6	1,1,1-Trichloroethane	133.41	ND		0.44	0.065
Carbon tetrachloride (56-23-5) ND (0.50) (0.094) Benzene (71-43-2) ND (0.26) (0.073) Toluene (108-88-3) ND (0.45) (0.45) Methylene Chloride (75-09-2) ND (0.69) (0.45) 1,1,1-Trichloroethane (71-55-6) ND (0.44) (0.065) 1,2,4-Trichlorobenzene (120-82-1) ND (0.59) (0.29) 1,1-Dichloroethane (75-34-3) ND (0.32) (0.040) 1,2-Dichloroethane (107-06-2) ND (0.32) (0.077) Ethylbenzene (100-41-4) ND (0.35) (0.12) cis-1,2-Dichloroethene (156-59-2) ND (0.32) (0.095) Chloroform (67-66-3) ND (0.39) (0.073) Chlorodifluoromethane (75-45-6) ND (0.28) (0.053) Dichloroethene (75-35-4) ND (0.32) (0.056) Dichlorodifluoromethane (75-71-8) ND (0.40) (0.13) Methyl tert-butyl ether (1634-04-4) ND (1.4) (0.25) Naphthalene (91-20-3) ND (0.21) (0.21) Tetrachloroethene (127-18-4) ND (0.54) (0.11)						
WEIG935 Td (Td6 0 Td (0-13.2 0 Td469.0.2 -12 4(0-0.05Tj -250.2 -12 4-BTj o91) Tj106.17) (Surr) Tj -288 I S07 89 -1:						

FORM VIII
AIR - GC/MS VOA INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Sample No.: ICIS 140-15917/9 Date Analyzed: 11/13/2017 20:29
 Instrument ID: MG GC Column: RTX-5 ID: 0.32(mm)
 Lab File ID (Standard): GK13IC07.D Heated Purge: (Y/N) N
 Calibration ID: 1337

	CBM		DFBZ		CBZd5	
	AREA#	RT #	AREA#	RT #	AREA#	RT #
INITIAL CALIBRATION MID-POINT	485567	7.62	2785396	9.76	2750264	14.71
UPPER LIMIT	679794	7.95	3899554	10.09	3850370	15.04
LOWER LIMIT	291340	7.29	1671238	9.43	1650158	14.38
LAB SAMPLE ID	CLIENT SAMPLE ID					
ICV 140-15917/14	572242	7.61	3126736	9.75	3200010	14.70

CBM = Chlorobromomethane (IS)
 DFBZ = 1,4-Difluorobenzene
 CBZd5 = Chlorobenzene-d5 (IS)

Area Limit = 60%-140% of internal standard area
 RT Limit = ± 0.33 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII TO 15 LL

FORM VIII
AIR - GC/MS VOA INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Sample No.: CCVIS 140-17732/6 Date Analyzed: 01/29/2018 12:28
 Instrument ID: MG GC Column: RTX-5 ID: 0.32(mm)
 Lab File ID (Standard): GCCVA29A.D Heated Purge: (Y/N) N
 Calibration ID: 1337

	CBM		DFBZ		CBZd5	
	AREA#	RT #	AREA#	RT #	AREA#	RT #
12/24 HOUR STD	557591	7.58	3453200	9.72	3383205	14.68
UPPER LIMIT	780627	7.91	4834480	10.05	4736487	15.01
LOWER LIMIT	334555	7.25	2071920	9.39	2029923	14.35
LAB SAMPLE ID	CLIENT SAMPLE ID					
55/59134532152.d (R1) T Id 74/36487						
7.58557591			3453557591			
4.35						
9.71						

T Td 6(557591) Tj 97. 7.6014.35

LOCKHEED MARTIN CORPORATION (LMC) - MIDDLE RIVER COMPLEX (MRC)
BUILDING A
SDG 140-10566-1

SAMPLE IDENTIFICATION

IA-168-A-VS

COMPOUND

TRICHLOROETHENE

MW= 131.39

GAS CONSTANT = 24.45

COMPOUND AREA	14741
INTERNAL STANDARD AMOUNT (ppbv)	4
CALIBRATION VOLUME (mL)	500
DILUTION FACTOR	1
INTERNAL STANDARD AREA	3822959
AVERAGE RRF	0.3686
SAMPLE VOLUME (mL)	100

0.2092 ppbv

1.12 µg/m³

FORM I
 AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Knoxville Job No.: 140-10566-1
 SDG No.: _____
 Client Sample ID: IA-168-A-VS Lab Sample ID: 140-10566-1
 Matrix: Air Lab File ID: GA29P108.D
 Analysis Method: TO 15 LL Date Collected: 01/24/2018 19:36
 Sample wt/vsMethod: _____

ABCDEFGHIJFKLNMNIOPLQRGQLJSPJPT

UVEDWGABXYZYDOJGPaPGGPbMNIOMPLQRGQSJKTKL

cBZFdWBEYeIGfODgXYhhB

clEiBFGUDWCDjOkGijIOFYFIFYDOGABCDEF

HIFIGmYhBJ

nnUVEDWodnfODgXYhhBnUVEDWHIFInpqnPLQRLQPRMTPPQarnqdPstQLRaH

uYWZGvHJ

QbLMQLSwwMdMQGGGGGGGGGGGG

UhYBOFGvHJ

vdMQwRMdMxy

yIWChBGczCBJ

UhYBOF

vOABeFaGHIFBJ

PsmNIOMPLQRGPLJSwJKL

duyGBDFFhBCJ R

DDEEhYZFGyWCyGBDFFhB
