

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-108723-1 Client Project/Site: Ford LTP Livonia MI - E203631

For: ARCADIS U.S., Inc. 28550 Cabot Drive Suite 500 Novi, Michigan 48377

Attn: Kristoffer Hinskey

Mole Del your

Authorized for release by: 3/4/2019 5:14:40 PM Michael DelMonico, Project Manager I (330)497-9396 michael.delmonico@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



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Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631

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Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Quaimer	Quaimer Description	
U	Indicates the analyte was analyzed for but not detected.	5
Glossary		6
Abbreviation	These commonly used abbreviations may or may not be present in this report.	
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	
%R	Percent Recovery	
CFL	Contains Free Liquid	8
CNF	Contains No Free Liquid	
DER	Duplicate Error Ratio (normalized absolute difference)	9
Dil Fac	Dilution Factor	
DL	Detection Limit (DoD/DOE)	
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DLC	Decision Level Concentration (Radiochemistry)	
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MDA	Minimum Detectable Activity (Radiochemistry)	10
MDC	Minimum Detectable Concentration (Radiochemistry)	IJ
MDL	Method Detection Limit	
ML	Minimum Level (Dioxin)	
NC	Not Calculated	
ND	Not Detected at the reporting limit (or MDL or EDL if shown)	
PQL	Practical Quantitation Limit	
QC	Quality Control	
RER	Relative Error Ratio (Radiochemistry)	
RL	Reporting Limit or Requested Limit (Radiochemistry)	
RPD	Relative Percent Difference, a measure of the relative difference between two points	
TEF	Toxicity Equivalent Factor (Dioxin)	
TEO		

TEQ Toxicity Equivalent Quotient (Dioxin)

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Job ID: 240-108723-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-108723-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control sample was within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, sample was diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The sample was received on 3/1/2019 8:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.4° C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Samples MW-156S_022719 (240-108723-1) and TRIP BLANK (240-108723-2) were analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The sample was analyzed on 03/01/2019.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOLATILE ORGANIC COMPOUNDS (GCMS SIM)

Sample MW-156S_022719 (240-108723-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The sample was analyzed on 03/02/2019.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CAN
8260B SIM	Volatile Organic Compounds (GC/MS)	SW846	TAL CAN
5030B	Purge and Trap	SW846	TAL CAN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108723-1

Collected	Description of
ooncolcu	Received
02/27/19 11:00	03/01/19 08:15
02/27/19 00:00	03/01/19 08:15

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Detection Summary

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108723-1

Lab Sample ID: 240-108723-1

Lab Sample ID: 240-108723-2

No Detections.

No Detections.

Client Sample ID: TRIP BLANK

This Detection Summary does not include radiochemical test results.

Lab Sample ID: 240-108723-1 Matrix: Water

Client Sample ID: MW-156S_022719

Date Collected: 02/27/19 11:00 Date Received: 03/01/19 08:15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			03/02/19 15:13	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	84		63 - 125					03/02/19 15:13	1
Method: 8260B - Volatile O	rganic Compo	unds (GC/	MS)						
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/01/19 14:58	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/01/19 14:58	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/01/19 14:58	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/01/19 14:58	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/01/19 14:58	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/01/19 14:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	107		70 - 121					03/01/19 14:58	1
4-Bromofluorobenzene (Surr)	86		59 - 120					03/01/19 14:58	1
Toluene-d8 (Surr)	92		70 - 123					03/01/19 14:58	1
Dibromofluoromethane (Surr)	98		75 - 128					03/01/19 14:58	1

Client Sample Results

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: TRIP BLANK

Date Collected: 02/27/19 00:00 Date Received: 03/01/19 08:15

Lab Sample ID: 240-108723-2 Matrix: Water

5

8

Method: 8260B - Volatile Organic Compounds (GC/MS) **Result Qualifier** RL MDL Unit Dil Fac Analyte D Prepared Analyzed 1,1-Dichloroethene 1.0 U 1.0 0.19 ug/L 03/01/19 15:22 1 cis-1,2-Dichloroethene 1.0 U 0.16 ug/L 03/01/19 15:22 1.0 1 Tetrachloroethene 1.0 U 1.0 0.15 ug/L 03/01/19 15:22 1 trans-1,2-Dichloroethene 1.0 U 1.0 0.19 ug/L 03/01/19 15:22 1 0.10 ug/L Trichloroethene 1.0 U 1.0 03/01/19 15:22 1 Vinyl chloride 1.0 U 1.0 0.20 ug/L 03/01/19 15:22 1 Limits Prepared Surrogate %Recovery Qualifier Analyzed Dil Fac 03/01/19 15:22 1,2-Dichloroethane-d4 (Surr) 112 70 - 121 1 4-Bromofluorobenzene (Surr) 88 59 - 120 03/01/19 15:22 1 Toluene-d8 (Surr) 94 70 - 123 03/01/19 15:22 1 Dibromofluoromethane (Surr) 99 75 - 128 03/01/19 15:22 1

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Method: 8260B - Volatile Organic Compounds (GC/MS)

			Pe	ercent Surro	gate Recovery (Accept	ance Limits)
		DCA	BFB	TOL	DBFM	
Lab Sample ID	Client Sample ID	(70-121)	(59-120)	(70-123)	(75-128)	
240-108481-E-6 MS	Matrix Spike	97	108	100	88	
240-108481-F-6 MSD	Matrix Spike Duplicate	93	106	101	87	
240-108723-1	MW-156S_022719	107	86	92	98	
240-108723-2	TRIP BLANK	112	88	94	99	
LCS 240-369907/7	Lab Control Sample	95	107	100	86	
MB 240-369907/6	Method Blank	107	88	91	96	
Surrogate Legend						
DCA = 1,2-Dichloroeth	nane-d4 (Surr)					
BFB = 4-Bromofluorob	enzene (Surr)					
TOL = Toluene-d8 (Su	ırr)					
DBFM = Dibromofluor	omethane (Surr)					

Matrix: Water	IM - Volatile Organic	Compounds	Prep Type: Total/NA	
			Percent Surrogate Recovery (Acceptance Limits)	
		DCA		
Lab Sample ID	Client Sample ID	(63-125)		
240-108589-B-1 MS	Matrix Spike	82		
240-108589-B-1 MSD	Matrix Spike Duplicate	82		
240-108723-1	MW-156S_022719	84		
LCS 240-370005/4	Lab Control Sample	84		
MB 240-370005/5	Method Blank	80		
Surrogate Legend				

DCA = 1,2-Dichloroethane-d4 (Surr)

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RL

1.0

1.0

1.0

1.0

1.0

1.0

Limits

70 - 121

59 - 120

70 - 123

75 - 128

MDL Unit

0.19 ug/L

0.16 ug/L

0.15 ug/L

0.19 ug/L

0.10 ug/L

0.20 ug/L

D

Prepared

Lab Sample ID: MB 240-369907/6

Matrix: Water

1,1-Dichloroethene

Tetrachloroethene

Trichloroethene

Toluene-d8 (Surr)

Vinyl chloride

Surrogate

cis-1,2-Dichloroethene

trans-1,2-Dichloroethene

1,2-Dichloroethane-d4 (Surr)

4-Bromofluorobenzene (Surr)

Dibromofluoromethane (Surr)

Analyte

Analysis Batch: 369907

Method: 8260B - Volatile Organic Compounds (GC/MS)

MB MB

1.0 U

1.0 U

1.0 U

1.0 U

1.0 U

1.0 U

MB MB

107

88

91

96

Qualifier

%Recovery

Result Qualifier

Analyzed

03/01/19 12:32

03/01/19 12:32

03/01/19 12:32

03/01/19 12:32

03/01/19 12:32

03/01/19 12:32

03/01/19 12:32

03/01/19 12:32

Client Sample ID: Method Blank Prep Type: Total/NA

Dil Fac

1

1

1

1

1

1

1

1

Prepared Analyzed Dil Fac 03/01/19 12:32 1 03/01/19 12:32 1

Lab Sample ID: LCS 240-369907/7 Matrix: Water Analysis Batch: 369907

· · · · · , · · · · · · · · · · · · · · · · · · ·	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
1,1-Dichloroethene	10.0	10.5		ug/L		105	65 - 139	
cis-1,2-Dichloroethene	10.0	9.63		ug/L		96	76 - 128	
Tetrachloroethene	10.0	9.24		ug/L		92	74 ₋ 130	
trans-1,2-Dichloroethene	10.0	10.1		ug/L		101	78 - 133	
Trichloroethene	10.0	8.60		ug/L		86	76 - 125	
Vinyl chloride	10.0	10.8		ug/L		108	58 - 143	

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	95		70 - 121
4-Bromofluorobenzene (Surr)	107		59 - 120
Toluene-d8 (Surr)	100		70 - 123
Dibromofluoromethane (Surr)	86		75 - 128

100

Lab Sample ID: 240-108481-E-6 MS Matrix: Water Analysis Batch: 369907

Toluene-d8 (Surr)

	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
1,1-Dichloroethene	1.0	U	10.0	10.8		ug/L		108	53 - 140
cis-1,2-Dichloroethene	1.0	U	10.0	10.1		ug/L		101	64 - 130
Tetrachloroethene	1.0	U	10.0	9.43		ug/L		94	51 ₋ 136
trans-1,2-Dichloroethene	1.0	U	10.0	10.7		ug/L		107	68 - 133
Trichloroethene	0.25	J	10.0	9.24		ug/L		90	55 - 131
Vinyl chloride	1.0	U	10.0	11.7		ug/L		117	43 - 154
	MS	MS							
Surrogate	%Recovery	Qualifier	Limits						
1,2-Dichloroethane-d4 (Surr)	97		70 - 121						
4-Bromofluorobenzene (Surr)	108		59 - 120						

Client Sample ID: Lab Control Sample Prep Type: Total/NA

Client Sample ID: Matrix Spike Prep Type: Total/NA

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70 - 123

2 3 4 5 6 7

8 9 10 11 12

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 240-108481-E-6 MS **Client Sample ID: Matrix Spike Matrix: Water** Prep Type: Total/NA Analysis Batch: 369907 MS MS %Recovery Qualifier Surrogate Limits Dibromofluoromethane (Surr) 75 - 128 88 Lab Sample ID: 240-108481-F-6 MSD **Client Sample ID: Matrix Spike Duplicate Matrix: Water Prep Type: Total/NA** Analysis Batch: 369907 Sample Sample Spike MSD MSD %Rec. RPD **Result Qualifier** Analyte Added **Result Qualifier** Unit D %Rec Limits RPD Limit 1,1-Dichloroethene 1.0 U 10.0 10.1 ug/L 101 53 - 140 6 35 cis-1,2-Dichloroethene 10.0 21 1.0 U 9.77 ug/L 98 64 - 130 3 Tetrachloroethene 1.0 U 10.0 9.26 ug/L 93 51 - 136 2 23 24 trans-1,2-Dichloroethene 1.0 U 10.0 10.0 100 7 ug/L 68 - 133 Trichloroethene 0.25 J 10.0 8.95 ug/L 87 55 - 131 3 23 Vinyl chloride 1.0 U 10.0 11.7 ug/L 117 43 - 154 0 29 MSD MSD %Recovery Qualifier Surrogate Limits 1,2-Dichloroethane-d4 (Surr) 93 70 - 121 4-Bromofluorobenzene (Surr) 106 59 - 120 Toluene-d8 (Surr) 101 70 - 123 75 - 128 Dibromofluoromethane (Surr) 87

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 240-3 Matrix: Water	70005/5							C	lie	nt Sam	ple ID: Metho Prep Type: Te	
Analysis Batch: 370005	ME	мв										
Analyte		t Qualifier	RL	I	MDL	Unit		D	Pr	repared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0		0.86	ug/L					03/02/19 13:07	1
	МЕ	B MB										
Surrogate	%Recovery	Qualifier	Limits						Pi	repared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	80	5	63 - 125								03/02/19 13:07	1
_ Lab Sample ID: LCS 240-3	270005/4						Cli	ont S	ar	nnio ID	: Lab Control	Samplo
Matrix: Water	10003/4								a	iipie ib	Prep Type: To	
Analysis Batch: 370005			.									
			Spike		LCS				_	~-	%Rec.	
Analyte			Added	Result		litier	Unit		D	%Rec	Limits	
1,4-Dioxane			10.0	11.8			ug/L			118	59 - 131	
	LCS LC	s										
Surrogate	%Recovery Qu	alifier	Limits									
1,2-Dichloroethane-d4 (Surr)	84		63 - 125									

10

Method: 8260B SIM - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 240-10858 Matrix: Water	89-B-1 MS						CI	ient Sa	mple ID: I Prep Ty		
Analysis Batch: 370005											
	Sample	Sample	Spike	MS	MS				%Rec.		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits		
1,4-Dioxane	11		10.0	22.7		ug/L		119	52 - 129		
	MS	MS									
Surrogate	%Recovery	Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr) Lab Sample ID: 240-1085	82 89-B-1 MSD		63 - 125			Client	Samp	le ID: N	Aatrix Spil	ke Dup	licate
Lab Sample ID: 240-1085 Matrix: Water			63 - 125			Client	Samp	le ID: N	latrix Spil Prep Ty		
Lab Sample ID: 240-1085	89-B-1 MSD	Sample	63 - 125 Spike	MSD	MSD	Client	Samp	le ID: N			
Lab Sample ID: 240-1085 Matrix: Water	89-B-1 MSD Sample	Sample Qualifier		-	MSD Qualifier	Client Unit	Samp D	le ID: N %Rec	Prep Ty		al/NA
Lab Sample ID: 240-1085 Matrix: Water Analysis Batch: 370005	89-B-1 MSD Sample	•	Spike	-	-				Prep Tyj %Rec.	pe: Tot	al/NA RPD
Lab Sample ID: 240-10856 Matrix: Water Analysis Batch: 370005 Analyte	89-B-1 MSD Sample Result	Qualifier	Spike Added	Result	-	Unit		%Rec	Prep Typ %Rec. Limits	pe: Tot	al/NA RPD Limit
Lab Sample ID: 240-10856 Matrix: Water Analysis Batch: 370005 Analyte	89-B-1 MSD Sample Result 11	Qualifier MSD	Spike Added	Result	-	Unit		%Rec	Prep Typ %Rec. Limits	pe: Tot	al/NA RPD Limit

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108723-1

GC/MS VOA

Analysis Batch: 369907

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-108723-1	MW-156S_022719	Total/NA	Water	8260B	
240-108723-2	TRIP BLANK	Total/NA	Water	8260B	
MB 240-369907/6	Method Blank	Total/NA	Water	8260B	
LCS 240-369907/7	Lab Control Sample	Total/NA	Water	8260B	
240-108481-E-6 MS	Matrix Spike	Total/NA	Water	8260B	
240-108481-F-6 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
Analysis Batch: 3700)05				
Lab Sample ID	Client Sample ID	Ргер Туре	Matrix	Method	Prep Batch
Lab Sample ID 240-108723-1		Prep Type Total/NA	Matrix Water	Method 8260B SIM	Prep Batch
	Client Sample ID				Prep Batch
240-108723-1	Client Sample ID MW-156S_022719	Total/NA	Water	8260B SIM	Prep Batch
240-108723-1 MB 240-370005/5	Client Sample ID MW-156S_022719 Method Blank	Total/NA Total/NA	Water Water	8260B SIM 8260B SIM	Prep Batch

Lab Sample ID: 240-108723-1

Lab Sample ID: 240-108723-2

Matrix: Water

Matrix: Water

1 2 3 4 5 6 7 8 9 10

12

Client Sample ID: MW-156S_022719 Date Collected: 02/27/19 11:00 Date Received: 03/01/19 08:15

Bate Received								
	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	369907	03/01/19 14:58	LRW	TAL CAN
Total/NA	Analysis	8260B SIM		1	370005	03/02/19 15:13	SAM	TAL CAN

Lab Chronicle

Client Sample ID: TRIP BLANK Date Collected: 02/27/19 00:00 Date Received: 03/01/19 08:15

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	369907	03/01/19 15:22	LRW	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108723-1

Laboratory: TestAmerica Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date	
California	State Program	9	2927	02-23-19 *	
Connecticut	State Program	1	PH-0590	12-31-19	
Florida	NELAP	4	E87225	06-30-19	
Illinois	NELAP	5	200004	07-31-19	
Kansas	NELAP	7	E-10336	04-30-19 *	
Kentucky (UST)	State Program	4	58	02-23-20	
Kentucky (WW)	State Program	4	98016	12-31-19	
Minnesota	NELAP	5	039-999-348	12-31-19 *	
Minnesota (Petrofund)	State Program	1	3506	07-31-19	
Nevada	State Program	9	OH00048	07-31-19	
New Jersey	NELAP	2	OH001	06-30-19	
New York	NELAP	2	10975	03-31-19 *	
Ohio VAP	State Program	5	CL0024	09-06-19	
Oregon	NELAP	10	4062	02-23-20	
Pennsylvania	NELAP	3	68-00340	08-31-19 *	
Texas	NELAP	6	T104704517-18-10	08-31-19	
USDA	Federal		P330-16-00404	12-28-19	
Virginia	NELAP	3	460175	09-14-19	
Washington	State Program	10	C971	01-12-20 *	
West Virginia DEP	State Program	3	210	12-31-19	

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sampler Sampler Line: Sampler Line: Deliversity U.S. Inc. U.S. Inc. Deliversity E.txiti U.S. Inc. U.S. Inc. Deliversity E.txiti U.S. Inc. U.S. Inc. Deliversity E.txiti U.S. Inc. Deliversity Deliversity Deliversity U.S. Inc. Deliversity Deliversity Deliversity U.S. Inc. Deliversity Deliversity Deliversity Monting@readersity Deliversity Deliversity Deliversity Monting Deliversity Deliversity Deliversity Deliversity Monting Deliversity Deliversity Deliversity Deliversity Deliversity	0/1
Thome Phone Edds 0.5. Inc. Use Suite 500 Dave Requested (days) Edds 0.1 Drive Suite 500 Dave Requested (days) I deb I deb I deb 1 deb I deb I deb I deb I deb I deb 1 deb I deb I deb I deb I deb I deb 1 deb I deb I deb I deb I deb I deb 1 deb I deb I deb I deb I deb I deb 1 deb I deb I deb I deb I deb I deb 1 deb I deb I deb I deb I deb I deb 1 deb I deb 1 deb I deb 1 deb I deb I deb I deb I deb I deb	
U.S., Inc. Due Date Requested (days): of Drive Suite 500 Due Date Requested (days): of Drive Suite 500 I du Y / Zul H R randle@arcadie-us.com Due Date Requested (days): Donal M E203631 Date Requested (days): Date Requested (days): Date Requested (days): Date Requested Requested (days): Date Requested (days): Date Requested Requested Requested (days): Date Requested (days): Date Requested	
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Mile light Mile light 2.41 HR I die geradie-us com De # Mile light 2.41 HR Mile light Mile light Mile light Mile light Mile light Mile light Mile ligh	
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Clanton Facility	Cooler unpacked by:
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2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 7	
-Were the seals on the outside of the cooler(s) signed & dated?	S No NA
	es No
-Were tamper/custody seals intact and uncompromised?	S No NA
	s) No
	es) No
5. Were the custody papers relinquished & signed in the appropriate place?	s) No checked for pH
6. Was/were the person(s) who collected the samples clearly identified on the COC? Ye	es No Receiving:
7. Did all bottles arrive in good condition (Unbroken)?	No No
8. Could all bottle labels be reconciled with the COC?	VOAs Oil and Grease
9. Were correct bottle(s) used for the test(s) indicated?	NO TOC
ici Summer quantif reference in Printing and States	No
11. Are these work share samples? Ye	es No
If yes, Questions 12-16 have been checked at the originating laboratory.	
in the set become set by the set of the set	es No NA pH Strip Lot# HC86
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WI-NC-099



March 04, 2019

Kris Hinskey Arcadis Inc 10559 Citation Ave Suite 100 Brighton, MI 48116

CADENA project ID: E203631 Project: Ford Livonia Transmission Project - OFF-SITE - Soil Gas and Groundwater Project number: MI001454.0002/3/4.00002/2B/3B Client project scope reference: Sample COC only was used to define project analytical requirements. Laboratory: TestAmerica - North Canton Laboratory submittal: 108723-1 Sample date: 2019-02-27 Report received by CADENA: 2019-03-04 Initial Data Verification completed by CADENA: 2019-03-04

There were no significant QC anomalies or exceptions to report.

Data verification for the report specified above was completed using the Ford Motor Company Environmental Laboratory Technical Specification, the CADENA Standard Operating Procedure for the Verification of Environmental Analytical Data and the associated analytical methods as references for evaluating the batch QC, sample data and report content. The EPA National Functional Guidelines for validating organic and inorganic data were used as guidance when addressing out of control QC results and the associated data qualifiers.

1 Water sample and a trip blank were analyzed for GCMS VOC parameter(s).

Sample/MS/MSD Surrogate Recovery, Blank/LCS Surrogate Recovery, LCS/LCD Recovery, Blank Contamination and Hold Time Exception were reviewed as part of our verification.

The definitions of the qualifiers used for this data package are defined in the analytical report. CADENA valid qualifiers are defined in the table below. To view and download a PDF copy of the laboratory analytical report access the CADENA CLMS at http://clms.cadenaco.com/index.cfm.

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Inc, 1099 Highland Drive, Suite E, Ann Arbor, MI 48108 517-819-0356

CADENA Valid Qualifiers

Valid Qualifiers	Description
<	Less than the reported concentration.
>	Greater than the reported concentration.
В	The analyte / compound was detected in the associated blank. For Organic methods the sample concentration was greater than the RDL and less than 5x (or 10x for common lab contaminates) the blank concentration and is considered non-detect at the reported concentration. For Inorganic methods the sample concentration was greater than the RDL and less than 10x the blank concentration and is considered non-detect at the reported concentration.
E	The analyte / Compound reported exceeds the calibration range and is considered estimated.
EMPC	Estimated Minimum Potential Contamination - Dioxin/Furan analyses only.
J	Indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound or when the data indicates the presence of an analyte / compound but the result is less than the sample Quantitation limit, but greater than zero. The flag is also used in data validation to indicate a reported value should be considered estimated due to associated quality assurance deficiencies.
J-	The result is an estimated quantity, but the result may be biased low.
JB	NON-DETECT AT THE CONCENTRATION REPORTED AND ESTIMATED
JH	The sample result is considered estimated and is potentially biased high.
JL	The sample result is considered estimated and is potentially biased low.
JUB	NON-DETECT AT THE REPORTING LIMIT AND ESTIMATED
NJ	Tentatively identified compound with approximated concentration.
R	Indicates the value is considered to be unusable. (Note: The analyte / compound may or may not be present.)
TNTC	Too Numerous to Count - Asbestos and Microbiological Results.
U	Indicates that the analyte / compound was analyzed for, but not detected.
UB	The analyte / compound was detected in the associated blank. For Organic methods the sample concentration was less than the RDL and less than 5x (or 10x for common lab contaminates) the blank concentration and is considered non-detect at the RDL. For Inorganic methods the sample concentration was less than the RDL and less than 10x the blank concentration and is considered non-detect at the RDL.
UJ	The analyte / compound was not detected above the reported sample Quantitation limit. However, the Quantitation limit is considered to be approximate due to associated quality assurance results and may or may not represent the actual limit of Quantitation to accurately and precisely report the analyte in the sample.

SAMPLING AND ANALYSIS SUMMARY

CADENA Project ID: E203631 Laboratory: TestAmerica-North Canton Laboratory Submittal: 108723-1

		Collection Date	Collection Time	Volatile Organics	8260B with Single	
Lab Sample ID	Sample ID	(mm/yy/dd)	(hh:mm:ss)	by GCMS	Ion Monitoring	Comment
2401087231	MW-156S_022719	2/27/2019	11:00:00	х	х	
2401087232	TRIP BLANK	2/27/2019	12:00:00	x		

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631

Laboratory: TestAmerica - North Canton Laboratory Submittal: 108723-1

	Sample Name: Lab Sample ID: Sample Date:	MW-156S_022719 2401087231 2/27/2019				TRIP BLANK 2401087232 2/27/2019				
			Report		Valid		Report		Valid	
Analyte	Cas No.	Result	Limit	Units	Qualifier	Result	Limit	Units	Qualifier	
GC/MS VOC OSW-8260B										
1,1-Dichloroethene	75-35-4	ND	1.0	ug/l		ND	1.0	ug/l		
cis-1,2-Dichloroethene	156-59-2	ND	1.0	ug/l		ND	1.0	ug/l		
Tetrachloroethene	127-18-4	ND	1.0	ug/l		ND	1.0	ug/l		
trans-1,2-Dichloroethene	156-60-5	ND	1.0	ug/l		ND	1.0	ug/l		
Trichloroethene	79-01-6	ND	1.0	ug/l		ND	1.0	ug/l		
Vinyl chloride	75-01-4	ND	1.0	ug/l		ND	1.0	ug/l		
OSW-8260BBSim										
1,4-Dioxane	123-91-1	ND	2.0	ug/l						



Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) Analysis

SDG #240-108723-1 CADENA Verification Report: 2019-03-04

Analyses Performed By: TestAmerica Canton, Ohio

Report #31967R Review Level: Tier II/Plus Project: MI001454.0003.00002

SUMMARY

This data quality assessment/verification summarizes the confirmation of detected compounds (if applicable), review of the verification/Tier II validation review performed by CADENA Inc. and review of level II laboratory data package completeness for Sample Delivery Group (SDG) # 240-108723-1 for samples collected in association with the Ford – Livonia, Michigan site. Only detected compound confirmations and omitted deviations from the CADENA verification/Tier II report are documented in this report. The Tier II/Plus validation is performed in the instance when a sample location has a detection of Vinyl Chloride at a concentration of 5 ppb or less. The detection and the concentration are reviewed and verified based on the instrument calibration and laboratory raw data. Only analytical data associated with constituents of concern were reviewed for this verification. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

				Sample	Parent		Analysis		
SDG	Sample ID	Lab ID	Matrix	Collection Date	Sample	voc	VOC (SIM)	MISC	
0.40.400700.4	MW-156S_022719	240-108723-1	Water	2/27/2019		Х	Х		
240-108723-1	TRIP BLANK	240-108723-2	Water	2/27/2019		Х			

Notes:

VOC = volatile organic compound SIM = selective ion monitoring MISC = miscellaneous

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

		Reported			mance ptable	Not	
	Items Reviewed		Yes	No	Yes	Required	
1.	Sample receipt condition		Х		Х		
2.	Requested analyses and sample results		Х		Х		
3.	Master tracking list		Х		Х		
4.	Methods of analysis		Х		Х		
5.	Reporting limits		Х		Х		
6.	Sample collection date		Х		Х		
7.	Laboratory sample received date		Х		Х		
8.	Sample preservation verification (as applicable)		Х		Х		
9.	Sample preparation/extraction/analysis dates		Х		Х		
10.	Fully executed Chain-of-Custody (COC) form		Х		Х		
	Narrative summary of Quality Assurance or sample problems provided		х		Х		
12.	Data Package Completeness and Compliance		Х		Х		

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8260B and 8260B SIM. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
 - U The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
 - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
 - E The compound was quantitated above the calibration range.
 - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
 - J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
 - UJ The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
 - 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.
 - UB Analyte considered non-detect at the listed value due to associated blank contamination.
 - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
 - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

DATA REVIEW

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

1.1 Initial Calibration

The method specifies percent relative standard deviation (%RSD) and relative response factor (RRF) limits for select compounds only. A technical review of the data applies limits to all compounds with no exceptions.

All target compounds associated with the initial calibration standards must exhibit a %RSD less than the control limit (15%) or a correlation coefficient greater than 0.99 and an RRF value greater than control limit (0.05).

1.2 Continuing Calibration

All target compounds associated with the continuing calibration verification (CCV) standard must exhibit a percent difference (%D) less than the control limit (20%) and RRF value greater than control limit (0.05).

Calibration criteria are only reviewed when detections of vinyl chloride were present in samples. No compounds were detected in the samples within this SDG; therefore, calibration criteria was not evaluated.

2. Compound Identification

Compounds are identified on the GC/MS by using the analyte's relative retention time, ion spectra, and concentration.

No compounds were detected in the samples within this SDG.

3. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in the CADENA Inc. review and this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 8260B/8260B-SIM	Re	ported		ermance eptable	Not	
		Yes	No	Yes	Required	
GAS CHROMATOGRAPHY/MASS SPECTROME	FRY (GC/I	NS)				
Tier II+ Validation						
Compound identification and quantitation						
A. Reconstructed ion chromatograms	X				Х	
B. Quantitation Reports	X				Х	
C. RT of sample compounds within the established RT windows	X				Х	

Notes:

RT retention time

VERIFICATION/VALIDATION PERFORMED BY: Andrew Korycinski

SIGNATURE:

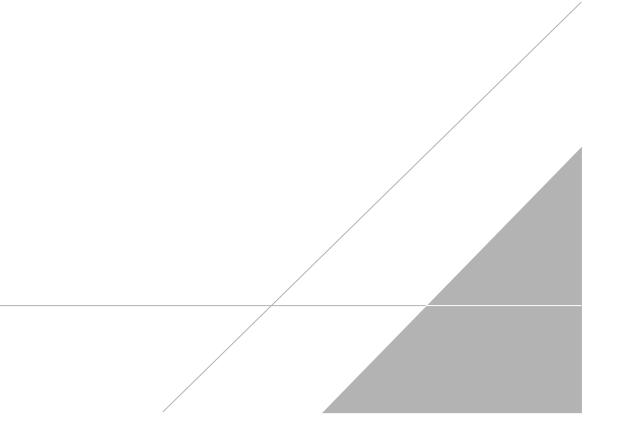
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DATE: March 5, 2019

PEER REVIEW: Dennis Capria

DATE: March 5, 2019

CHAIN OF CUSTODY CORRECTED SAMPLE ANALYSIS DATA SHEETS



Example Sample/N, Koration Sample/N, Koration Demonstration trans Prove. Prove. Prove. Extent U.S., Inc. U.S., Inc. Demonstration Prove. Extent U.S., Inc. U.S., Inc. Demonstration Prove. Extent Prove. U.S., Inc. Demonstration Demonstration Demonstration Prove. Prove. Prove. U.S., Inc. Demonstration	μ.Fr	THE LEADER IN ENVIRONMENTAL TESTING
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Client Sample ID: MW-156S_022719

Lab Sample ID: 240-108723-1 Matrix: Water

Date Collected: 02/27/19 11:00 Date Received: 03/01/19 08:15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			03/02/19 15:13	1	7
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac	
1,2-Dichloroethane-d4 (Surr)	84		63 - 125			-		03/02/19 15:13	1	
Method: 8260B - Volatile O	Organic Compo	unds (GC/	MS)							1
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	1
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/01/19 14:58	1	
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/01/19 14:58	1	
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/01/19 14:58	1	Ĩ
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/01/19 14:58	1	
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/01/19 14:58	1	
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/01/19 14:58	1	
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac	
1,2-Dichloroethane-d4 (Surr)	107		70 - 121			-		03/01/19 14:58	1	
4-Bromofluorobenzene (Surr)	86		59 - 120					03/01/19 14:58	1	
Toluene-d8 (Surr)	92		70 - 123					03/01/19 14:58	1	
			75 - 128					03/01/19 14:58		

Client Sample Results

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: TRIP BLANK

Date Collected: 02/27/19 00:00 Date Received: 03/01/19 08:15

TestAmerica	Job	ID:	240-	1087	23-1

Lab Sample ID: 240-108723-2 Matrix: Water

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Method: 8260B - Volatile Organic Compounds (GC/MS) Analyte **Result Qualifier** RL MDL Unit Dil Fac D Prepared Analyzed 1,1-Dichloroethene 1.0 U 1.0 0.19 ug/L 03/01/19 15:22 1 cis-1,2-Dichloroethene 1.0 U 0.16 ug/L 03/01/19 15:22 1.0 1 Tetrachloroethene 1.0 U 1.0 0.15 ug/L 03/01/19 15:22 1 trans-1,2-Dichloroethene 1.0 U 1.0 0.19 ug/L 03/01/19 15:22 1 0.10 ug/L Trichloroethene 1.0 U 1.0 03/01/19 15:22 1 Vinyl chloride 1.0 U 1.0 0.20 ug/L 03/01/19 15:22 1 Limits Prepared Surrogate %Recovery Qualifier Analyzed Dil Fac 03/01/19 15:22 1,2-Dichloroethane-d4 (Surr) 112 70 - 121 1 4-Bromofluorobenzene (Surr) 88 59 - 120 03/01/19 15:22 1 Toluene-d8 (Surr) 94 70 - 123 03/01/19 15:22 1 Dibromofluoromethane (Surr) 99 75 - 128 03/01/19 15:22 1