Environment Testing TestAmerica

ANALYTICAL REPORT

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

Laboratory Job ID: 240-119296-1

Client Project/Site: Ford LTP Livonia MI - E203631

For:

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

Attn: Kristoffer Hinskey

Moke Del Your

Authorized for release by: 10/7/2019 3:53:36 PM

Michael DelMonico, Project Manager I (330)497-9396

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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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Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Method Summary	5
Sample Summary	6
Detection Summary	7
Client Sample Results	8
Surrogate Summary	9
QC Sample Results	10
QC Association Summary	13
Lab Chronicle	14
Certification Summary	15
Chain of Custody	16

Definitions/Glossary

Client: ARCADIS U.S., Inc. Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Qualifiers

GC/MS VOA

Qualifier Qualifier Description

U Indicates the analyte was analyzed for but not detected.

Glossary

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
CNF Contains No Free Liquid

DER Duplicate Error Ratio (normalized absolute difference)

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)
MDC Minimum Detectable Concentration (Radiochemistry)

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)
TEQ Toxicity Equivalent Quotient (Dioxin)

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Case Narrative

Client: ARCADIS U.S., Inc.

Job ID: 240-119296-1 Project/Site: Ford LTP Livonia MI - E203631

Job ID: 240-119296-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-119296-1

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 samples were 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, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, Canton attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins 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 Eurofins TestAmerica and its client.

RECEIPT

The sample was received on 9/21/2019 9:50 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.3° C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample MW-111S 091919 (240-119296-1) was analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 10/02/2019.

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-111S_091919 (240-119296-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The sample was analyzed on 09/27/2019.

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

Method Summary

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

Job ID: 240-119296-1

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Sample Summary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

 Lab Sample ID
 Client Sample ID
 Matrix
 Collected
 Received
 Asset ID

 240-119296-1
 MW-111S_091919
 Water
 09/19/19 11:37
 09/21/19 09:50
 Asset ID

Job ID: 240-119296-1

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Detection Summary

Client: ARCADIS U.S., Inc.

Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: MW-111S_091919

Lab Sample ID: 240-119296-1

No Detections.

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Client Sample Results

Client: ARCADIS U.S., Inc. Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: MW-111S_091919

Date Collected: 09/19/19 11:37 Date Received: 09/21/19 09:50

1,2-Dichloroethane-d4 (Surr)

4-Bromofluorobenzene (Surr)

Dibromofluoromethane (Surr)

Toluene-d8 (Surr)

Lab Sample ID: 240-119296-1

10/02/19 00:08

10/02/19 00:08

10/02/19 00:08

10/02/19 00:08

Matrix: Water

Method: 8260B SIM - Vola Analyte	•	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L		-	09/27/19 17:57	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	79		63 - 125					09/27/19 17:57	1
- Method: 8260B - Volatile (Organic Compo	unds (GC/	MS)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			10/02/19 00:08	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			10/02/19 00:08	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			10/02/19 00:08	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			10/02/19 00:08	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			10/02/19 00:08	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			10/02/19 00:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac

70 - 121

59 - 120

70 - 123

75 - 128

119

98

102

89

10/7/2019

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Surrogate Summary

Client: ARCADIS U.S., Inc. Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

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

Matrix: Water Prep Type: Total/NA

			Pe	ercent Surre	ogate Reco
		DCA	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(70-121)	(59-120)	(70-123)	(75-128)
240-119296-1	MW-111S_091919	119	98	102	89
240-119319-D-1 MSD	Matrix Spike Duplicate	114	100	99	87
240-119319-E-1 MS	Matrix Spike	111	94	95	88
LCS 240-403458/4	Lab Control Sample	110	98	97	91
MB 240-403458/6	Method Blank	110	96	99	86
Surrogate Legend					

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

BFB = 4-Bromofluorobenzene (Surr)

TOL = Toluene-d8 (Surr)

DBFM = Dibromofluoromethane (Surr)

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

Matrix: Water Prep Type: Total/NA

_			Percent Surrogate Recovery (Acceptance Limits)
		DCA	
Lab Sample ID	Client Sample ID	(63-125)	
240-119294-A-1 MS	Matrix Spike	76	
240-119294-A-1 MSD	Matrix Spike Duplicate	77	
240-119296-1	MW-111S_091919	79	
LCS 240-402866/4	Lab Control Sample	75	
MB 240-402866/5	Method Blank	77	
Surrogate Legend			
DCA = 1,2-Dichloroeth	ane-d4 (Surr)		

Eurofins TestAmerica, Canton

10/7/2019

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

Job ID: 240-119296-1

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

Lab Sample ID: MB 240-403458/6

Matrix: Water

Analysis Batch: 403458

Client Samp	ole ID:	Meth	od Blank	
	Prep '	Type:	Total/NA	

MB MB Analyte Result Qualifier RL **MDL** Unit Prepared Analyzed Dil Fac 1,1-Dichloroethene 1.0 U 1.0 0.19 ug/L 10/01/19 22:16 cis-1,2-Dichloroethene 1.0 U 1.0 0.16 ug/L 10/01/19 22:16 1.0 U Tetrachloroethene 1.0 0.15 ug/L 10/01/19 22:16 trans-1,2-Dichloroethene 1.0 U 1.0 0.19 ug/L 10/01/19 22:16 Trichloroethene 1.0 0.10 ug/L 1.0 U 10/01/19 22:16 Vinyl chloride 1.0 U 1.0 0.20 ug/L 10/01/19 22:16

	MB	MB				
Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	110		70 - 121		10/01/19 22:16	1
4-Bromofluorobenzene (Surr)	96		59 - 120		10/01/19 22:16	1
Toluene-d8 (Surr)	99		70 - 123		10/01/19 22:16	1
Dibromofluoromethane (Surr)	86		75 - 128		10/01/19 22:16	1

Lab Sample ID: LCS 240-403458/4

Matrix: Water

1,1-Dichloroethene
cis-1,2-Dichloroethene
Tetrachloroethene
trans-1,2-Dichloroethene

Trichloroethene Vinyl chloride

Analyte

Analysis Batch: 403458

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

Spike Added	LCS Result		nit D	%Rec	%Rec. Limits	
10.0	8.78	u	g/L	88	65 - 139	
10.0	9.72	u	g/L	97	76 - 128	
10.0	8.12	u	g/L	81	74 - 130	
10.0	9.00	u	g/L	90	78 - 133	
10.0	7.92	u	g/L	79	76 - 125	
10.0	7.94	u	g/L	79	58 - 143	

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	110		70 - 121
4-Bromofluorobenzene (Surr)	98		59 - 120
Toluene-d8 (Surr)	97		70 - 123
Dibromofluoromethane (Surr)	91		75 - 128

Lab Sample ID: 240-119319-D-1 MSD

Matrix: Water

Analysis Batch: 403458

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

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
1,1-Dichloroethene	1.0	U	10.0	6.73		ug/L		67	53 - 140	15	35
cis-1,2-Dichloroethene	1.0	U	10.0	8.77		ug/L		88	64 - 130	3	21
Tetrachloroethene	1.0	U	10.0	7.15		ug/L		72	51 - 136	5	23
trans-1,2-Dichloroethene	1.0	U	10.0	7.94		ug/L		79	68 - 133	8	24
Trichloroethene	1.0	U	10.0	6.96		ug/L		70	55 - 131	6	23
Vinyl chloride	1.0	U	10.0	6.64		ug/L		66	43 - 154	2	29

	MSD	MSD	
Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	114		70 - 121
4-Bromofluorobenzene (Surr)	100		59 - 120
Toluene-d8 (Surr)	99		70 - 123

Eurofins TestAmerica, Canton

10/7/2019

Page 10 of 17

2

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Project/Site: Ford LTP Livonia MI - E203631

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

Lab Sample ID: 240-119319-D-1 MSD

Matrix: Water

Analysis Batch: 403458

Prep Type: Total/NA

Client Sample ID: Matrix Spike Duplicate

MSD MSD

Limits Surrogate %Recovery Qualifier Dibromofluoromethane (Surr) 75 - 128 87

Lab Sample ID: 240-119319-E-1 MS

Matrix: Water

Analysis Batch: 403458

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

Job ID: 240-119296-1

Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Unit %Rec Limits Analyte D 1.0 U 10.0 7.79 53 - 140 1,1-Dichloroethene ug/L 78 cis-1,2-Dichloroethene 1.0 U 8.99 90 64 - 130 10.0 ug/L 1.0 U Tetrachloroethene 10.0 7.49 ug/L 75 51 - 136trans-1,2-Dichloroethene 1.0 U 10.0 8.56 86 68 - 133 ug/L ug/L Trichloroethene 1.0 U 10.0 7.37 74 55 - 131 Vinyl chloride 1.0 U 10.0 6.74 ug/L 67 43 - 154

MS MS

Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	111		70 - 121
4-Bromofluorobenzene (Surr)	94		59 - 120
Toluene-d8 (Surr)	95		70 - 123
Dibromofluoromethane (Surr)	88		75 - 128

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

Lab Sample ID: MB 240-402866/5

Matrix: Water

Analysis Batch: 402866

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

MB MB **MDL** Unit Analyte Result Qualifier RI ח Prepared Analyzed Dil Fac 1,4-Dioxane 2.0 U 2.0 0.86 ug/L 09/27/19 11:40

MB MB Surrogate %Recovery 1,2-Dichloroethane-d4 (Surr)

Limits Qualifier 63 - 125 77

Prepared Analyzed Dil Fac 09/27/19 11:40

Prep Type: Total/NA

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 240-402866/4

Matrix: Water

Analysis Batch: 402866

LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 1,4-Dioxane 10.0 11.8 ug/L 118 59 - 131

LCS LCS

Surrogate %Recovery Qualifier Limits 63 - 125 1,2-Dichloroethane-d4 (Surr) 75

Lab Sample ID: 240-119294-A-1 MS

Matrix: Water

Analysis Batch: 402866

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

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits 2.0 U 1,4-Dioxane 10.0 11.8 ug/L 118 52 - 129

Eurofins TestAmerica, Canton

QC Sample Results

Client: ARCADIS U.S., Inc. Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Surrogate

1,2-Dichloroethane-d4 (Surr)

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

MSD MSD

%Recovery Qualifier

77

Surrogate 1,2-Dichloroethane-d4 (Surr)	MS %Recovery 76	MS Qualifier	Limits 63 - 125								
Lab Sample ID: 240-11929 Matrix: Water Analysis Batch: 402866	4-A-1 MSD					Client S	amp	le ID: N	latrix Spil Prep Ty		
,	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
1,4-Dioxane	2.0	U	10.0	11.6		ug/L		116	52 - 129	1	13

Limits

63 - 125

52 - 129

QC Association Summary

Client: ARCADIS U.S., Inc.

Job ID: 240-119296-1 Project/Site: Ford LTP Livonia MI - E203631

GC/MS VOA

Analysis Batch: 402866

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-119296-1	MW-111S_091919	Total/NA	Water	8260B SIM	
MB 240-402866/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-402866/4	Lab Control Sample	Total/NA	Water	8260B SIM	
240-119294-A-1 MS	Matrix Spike	Total/NA	Water	8260B SIM	
240-119294-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B SIM	

Analysis Batch: 403458

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-119296-1	MW-111S_091919	Total/NA	Water	8260B	
MB 240-403458/6	Method Blank	Total/NA	Water	8260B	
LCS 240-403458/4	Lab Control Sample	Total/NA	Water	8260B	
240-119319-D-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
240-119319-E-1 MS	Matrix Spike	Total/NA	Water	8260B	

Lab Chronicle

Client: ARCADIS U.S., Inc. Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Date Collected: 09/19/19 11:37

Date Received: 09/21/19 09:50

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	403458	10/02/19 00:08	LEE	TAL CAN
Total/NA	Analysis	8260B SIM		1	402866	09/27/19 17:57	SAM	TAL CAN

Laboratory References:

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

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Accreditation/Certification Summary

Client: ARCADIS U.S., Inc.

Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Laboratory: Eurofins TestAmerica, Canton

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

Authority	Program	Identification Number	
California	State	2927	02-23-20
Connecticut	State	PH-0590	12-31-19
Florida	NELAP	E87225	06-30-20
Georgia	State	4062	02-23-20
Illinois	NELAP	004498	07-31-20
lowa	State	421	06-01-20
Kansas	NELAP	E-10336	04-30-20
Kentucky (UST)	State	112225	02-23-20
Kentucky (WW)	State	KY98016	12-31-19
Minnesota	NELAP	OH00048	12-31-19
Minnesota (Petrofund)	State Program	3506	07-31-21
New Jersey	NELAP	OH001	06-30-20
New York	NELAP	10975	03-31-20
Ohio VAP	State	CL0024	06-05-21
Oregon	NELAP	4062	02-23-20
Pennsylvania	NELAP	68-00340	08-31-20
Texas	NELAP	T104704517-18-10	08-31-20
USDA	US Federal Programs	P330-16-00404	12-28-19
Virginia	NELAP	010101	09-14-20
Washington	State	C971	01-12-20
West Virginia DEP	State	210	12-31-19

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Chain of Custody Record

MICHIGAN TestAmerica Laboratory location: Brighton --- 10448 Citation Drive, Suite 200 / Brighton, MI 48116 / 810-229-2763 Client Contact Regulatory program: NPDES ☐ RCRA Other Company Name: Arcadis TestAmerica Laboratories, Inc. Client Project Manager: Kris Hinskey Site Contact: Rachel Bielak Lab Contact: Mike DelMonico COC No: Address: 28550 Cabot Drive, Suite 500 Telephone: 248-994-2240 Telephone: 248-946-6331 Telephone: 330-497-9396 City/State/Zip: Novi, MI, 48377 COCs Email: kristoffer.hinskey@arcadis.com Analysis Turnaround Tim Analyses or lab use only Phone: 248-994-2240 FAT if different from below Walk-in client ☐ 3 weeks Project Name: Ford LTP ₹ 2 weeks 10 day Lab sampling Project Number: M1001454.0004.0002B 1 week Method of Shipment/Carrier: 2 days 8260B PO # M1001454.0004.0002B Shipping/Tracking No: 1 day Job/SDG No: Vinyl Chloride Matrix Containers & Preservatives Sample Specific Notes / H2SO4 HN03 Special Instructions: Sample Date | Sample Time Sample Identification NW-1115 _ 09/9/9 113 CONTAINERS COUTAINER TRIP BLANK Possible Hazard Identification Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) Disposal By Lab | lammable sin Irritant Poison B □ Jnknown Archive For Non-Hazard Special Instructions/QC Requirements & Comments: Submit all results through Cadena at jim.tomalia@cadena.com. Cadena #E203631 Level IV Reporting requested. Company ARCANS Relinquished by: Received in Laboratory by: Company: Date/Time: 9-20-19 1130

	Receipt Form/Narrative	Login # : 119	796
Client Arcadis	Site Name	Cooler unpacke	ed by:
Cooler Received on 9-21.19 FedEx: 1st Grd Exp UPS FAS Clip		rica Courier Other	2
Receipt After-hours: Drop-off Date/Time_		ge Location	
	m Box Client Cooler Box	Other	
Packing material used: Bubble Wrap COOLANT: Wet Ice Blue Cooler temperature upon receipt IR GUN# IR-10 (CF +0.7 °C) Obse IR GUN #IR-11 (CF +0.9 °C) Obse	Ice Dry Ice Water None See M Served Cooler Temp. © -6 °C Con	Other ultiple Cooler Form rected Cooler Temp. 1.3 °C	
 Were tamper/custody seals on the outside. Were the seals on the outside of the control of the contr	cooler(s) signed & dated? ottle(s) or bottle kits (LLHg/MeHg)? d uncompromised? ooler(s)?	Ves No NA	
5. Were the custody papers relinquished &		Vac No Tes	ts that are not
6. Was/were the person(s) who collected t		coco v v	cked for pH by eiving:
7. Did all bottles arrive in good condition		Fes No	civing.
8. Could all bottle labels be reconciled with		Yes No VO	7.55
9. Were correct bottle(s) used for the test(s		TES INO	and Grease
10. Sufficient quantity received to perform		Yes No TO	C
11. Are these work share samples?		Yes No	
If yes, Questions 12-16 have been check	ked at the originating laboratory.		
12. Were all preserved sample(s) at the corr	rect pH upon receipt?	Yes No NA pH Strip	p Lot# HC991818
13. Were VOAs on the COC?		Yes No	
		Yes No NA	
15. Was a VOA trip blank present in the co	ooler(s)? Trip Blank Lot #	Yes No rec'd but	Len
 Was a VOA trip blank present in the co Was a LL Hg or Me Hg trip blank present 	ooler(s)? Trip Blank Lot #ent?	Yes No rec'd boo	ilen
Was a VOA trip blank present in the co Was a LL Hg or Me Hg trip blank prese Contacted PM Date	ooler(s)? Trip Blank Lot #ent?	Yes No rec'd boo	iken
	ooler(s)? Trip Blank Lot # ent? by	Yes No rec'd boo	
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning	ooler(s)? Trip Blank Lot # ent? by	Yes No recd but Yes No Yes No Yes No	essed by:
Was a VOA trip blank present in the co Was a LL Hg or Me Hg trip blank prese Contacted PM Date Date Date Date Date Date Date	ooler(s)? Trip Blank Lot # ent? by	Ves No recd boo	essed by:
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning 17. CHAIN OF CUSTODY & SAMPLE 18. SAMPLE CONDITION	by DISCREPANCIES	Ves No recd book Ves No	essed by:
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning 17. CHAIN OF CUSTODY & SAMPLE 18. SAMPLE CONDITION	by DISCREPANCIES	Ves No recd book Ves No	essed by:
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning 17. CHAIN OF CUSTODY & SAMPLE 18. SAMPLE CONDITION Sample(s) Ix 40 Trip blank	by	Ves No recd book Ves No	essed by:
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning	by	via Verbal Voice Mail Other Samples proce Mail Other Samples proce mended holding time had expired were received in a broken contain	essed by:
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning 17. CHAIN OF CUSTODY & SAMPLE 18. SAMPLE CONDITION	boler(s)? Trip Blank Lot #bybyby	via Verbal Voice Mail Other Samples proce mended holding time had expired were received in a broken contain abble >6 mm in diameter. (Notify limited by the contain abble >6 mm in diameter.)	essed by: er. PM)
15. Was a VOA trip blank present in the co 16. Was a LL Hg or Me Hg trip blank prese Contacted PM Date Concerning	by	via Verbal Voice Mail Other Samples proce Mail Other Samples proce mended holding time had expired were received in a broken contain	essed by: er. PM)

DATA VERIFICATION REPORT



October 08, 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: 30016346.0002B OFF-SITE GW SAMPLING Event Specific Scope of Work References: Sample COC

Laboratory: TestAmerica - North Canton

Laboratory submittal: 119296-1 Sample date: 2019-09-19

Report received by CADENA: 2019-10-08

Initial Data Verification completed by CADENA: 2019-10-08

Number of Samples:1 Sample Matrices:Water Test Categories:GCMS VOC

Please see attached criteria report or sample result/qualified analytical result summary for qualifier flags assigned to sample data.

There were no significant QC anomalies or exceptions to report.

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.

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.

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 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.
Е	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: 119296-1

		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
2401192961	MW-111S_091919	9/19/2019	11:37:00	Х	Х	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631

Laboratory: TestAmerica - North Canton

Laboratory Submittal: 119296-1

Sample Name: MW-111S_091919

Lab Sample ID: 2401192961 **Sample Date:** 9/19/2019

		Jumpic Dutc.	J/ 1J/ 20	10		
				Report		Valid
	Analyte	Cas No.	Result	Limit	Units	Qualifier
GC/MS VOC						
OSW-826	<u>50B</u>					
	1,1-Dichloroethene	75-35-4	ND	1.0	ug/l	
	cis-1,2-Dichloroethene	156-59-2	ND	1.0	ug/l	
	Tetrachloroethene	127-18-4	ND	1.0	ug/l	
	trans-1,2-Dichloroethene	156-60-5	ND	1.0	ug/l	
	Trichloroethene	79-01-6	ND	1.0	ug/l	
	Vinyl chloride	75-01-4	ND	1.0	ug/l	
OSW-826	<u>50BBSim</u>					
	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 #240-119296-1

CADENA Verification Report: 2019-10-08

Analyses Performed By:

TestAmerica Canton, Ohio

Report #34404R Review Level: Tier III Project: 30016346.00002

DATA REVIEW

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-119296-1 for samples collected in association with the Ford – Livonia, Michigan site. The review was conducted as a Tier III validation in addition to a verification/Tier II validation review performed by CADENA Inc. and included review of level IV laboratory data package completeness. Only elements of a Tier III validation effort (Tier III includes a detailed review of laboratory raw data to check for errors in calculation, calibration review, internal standard review and compound identification) and omitted deviations from the CADENA verification/Tier II report are documented in this report. Only analytical data associated with constituents of concern were reviewed for this validation. 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		ı	Analysis	
SDG	Sample ID	Lab ID	Matrix	Collection Date	Parent Sample	VOC (Full	VOC (SIM)	MISC
					Campio	Scan)	(3)	
240-119296-1	MW-92S_091818	240-119296-1	Water	9/19/2019		Х	Х	

DATA REVIEW

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

	Rep	Reported		mance ptable	Not
Items Reviewed	No	Yes	No	Yes	Required
Sample receipt condition		Х		X	
2. Requested analyses and sample results		Х		Х	
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		X	
9. Sample preparation/extraction/analysis dates		Х		X	
10. Fully executed Chain-of-Custody (COC) form		Х		X	
Narrative summary of Quality Assurance or sample problems provided		Х		Х	
12. Data Package Completeness and Compliance		Х		X	

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.

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8260B/8260B-SIM	Water	14 days from collection to analysis	Cool to < 6 °C; pH < 2 with HCl

All samples were analyzed within the specified holding time criteria.

2. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable and all analyses were performed within a 12-hour tune clock.

System performance and column resolution were acceptable.

3. 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.

3.1 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 (20%) or a correlation coefficient greater than 0.99 and an RRF value greater than control limit (0.05).

All compounds associated with the initial calibrations were within the specified control limits.

3.2 Continuing Calibration

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

All compounds associated with the calibrations were within the specified control limits.

4. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the internal standard compounds associated with the VOC exhibit area counts that are not greater than two times (+100%) or less than one-half (-50%) of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

5. Compound Identification

Compounds are identified on the GC/MS by using the analytes relative retention time and ion spectra.

DATA REVIEW

No compounds were detected in the sample within this SDG.

6. System Performance and Overall Assessment

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

DATA REVIEW

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 8260B/8260B-SIM		Reported		ormance eptable	Not
	No	Yes	No	Yes	Required
GAS CHROMATOGRAPHY/MASS SPECTROMETE	RY (GC/N	/IS)			
Tier II Validation					
Holding times/Preservation		Х		X	
Tier III Validation			·		
System performance and column resolution		X		X	
Initial calibration %RSDs		Х		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		Х		X	
B. Quantitation Reports		Х		X	
C. RT of sample compounds within the established RT windows		Х		Х	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		Х		Х	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Andrew Korycinski

SIGNATURE:

DATE: October 14, 2019

a Kaz

PEER REVIEW: Joseph C. Houser

DATE: October 14, 2019

CHAIN OF CUSTODY CORRECTED SAMPLE ANALYSIS DATA SHEETS

NO CORRECTIONS/QUALIFERS ADDED TO SAMPLE ANALYSIS DATA SHEETS

Chain of Custody Record

MICHIGAN TestAmerica Laboratory location: Brighton --- 10448 Citation Drive, Suite 200 / Brighton, MI 48116 / 810-229-2763 Client Contact Regulatory program: NPDES ☐ RCRA Other Company Name: Arcadis TestAmerica Laboratories, Inc. Client Project Manager: Kris Hinskey Site Contact: Rachel Bielak Lab Contact: Mike DelMonico COC No: Address: 28550 Cabot Drive, Suite 500 Telephone: 248-994-2240 Telephone: 248-946-6331 Telephone: 330-497-9396 City/State/Zip: Novi, MI, 48377 COCs Email: kristoffer.hinskey@arcadis.com Analysis Turnaround Tim Analyses or lab use only Phone: 248-994-2240 FAT if different from below Walk-in client ☐ 3 weeks Project Name: Ford LTP ₹ 2 weeks 10 day Lab sampling Project Number: M1001454.0004.0002B 1 week Method of Shipment/Carrier: 2 days 8260B PO # M1001454.0004.0002B Shipping/Tracking No: 1 day Job/SDG No: Vinyl Chloride Matrix Containers & Preservatives Sample Specific Notes / H2SO4 HN03 Special Instructions: Sample Date | Sample Time Sample Identification NW-1115 _ 09/9/9 113 CONTAINERS COUTAINER TRIP BLANK Possible Hazard Identification Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) Disposal By Lab | lammable sin Irritant Poison B □ Jnknown Archive For Non-Hazard Special Instructions/QC Requirements & Comments: Submit all results through Cadena at jim.tomalia@cadena.com. Cadena #E203631 Level IV Reporting requested. Company ARCANS Relinquished by: Received in Laboratory by: Company: Date/Time: 9-20-19 1130

Client Sample Results

Client: ARCADIS U.S., Inc. Job ID: 240-119296-1

Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: MW-111S_091919

Date Collected: 09/19/19 11:37 Date Received: 09/21/19 09:50

Lab Sample ID: 240-119296-1

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			09/27/19 17:57	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	79		63 - 125					09/27/19 17:57	1
Method: 8260B - Volatile O Analyte	•	unds (GC/ Qualifier	MS) RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Analyte	Result	Qualifier	RL			D	Prepared		Dil Fac
	•	Qualifier	•	MDL 0.19		<u>D</u>	Prepared	Analyzed 10/02/19 00:08	Dil Fac
Analyte	Result	Qualifier U	RL		ug/L	<u>D</u>	Prepared		Dil Fac
Analyte 1,1-Dichloroethene	Result 1.0	Qualifier U U	1.0 —	0.19	ug/L ug/L	<u>D</u>	Prepared	10/02/19 00:08	Dil Fac 1 1 1
Analyte 1,1-Dichloroethene cis-1,2-Dichloroethene	Result 1.0 1.0	Qualifier U U U	RL 1.0 1.0	0.19 0.16	ug/L ug/L ug/L	<u> </u>	Prepared	10/02/19 00:08 10/02/19 00:08	Dil Fac 1 1 1 1
Analyte 1,1-Dichloroethene cis-1,2-Dichloroethene Tetrachloroethene	Result 1.0 1.0 1.0	Qualifier U U U U	1.0 1.0 1.0	0.19 0.16 0.15	ug/L ug/L ug/L ug/L	<u> </u>	Prepared	10/02/19 00:08 10/02/19 00:08 10/02/19 00:08	Dil Fac 1 1 1 1 1 1 1

1.0 U	1.0	0.20 ug/L		10/02/19 00:08	1
%Recovery Qualifier	Limits		Prepared	Analyzed	Dil Fac
119	70 - 121			10/02/19 00:08	1
98	59 - 120			10/02/19 00:08	1
102	70 - 123			10/02/19 00:08	1
89	75 - 128			10/02/19 00:08	1
	%Recovery Qualifier 119 98 102	%Recovery Qualifier Limits 119 70 - 121 98 59 - 120 102 70 - 123	%Recovery Qualifier Limits 119 70 - 121 98 59 - 120 102 70 - 123	%Recovery Qualifier Limits Prepared 119 70 - 121 98 59 - 120 102 70 - 123	%Recovery Qualifier Limits Prepared Analyzed 119 70 - 121 10/02/19 00:08 98 59 - 120 10/02/19 00:08 102 70 - 123 10/02/19 00:08