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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

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

TestAmerica Job ID: 240-108814-1

Client Project/Site: Ford LTP Livonia MI - E203631

For:

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

Attn: Kristoffer Hinskey

Mile Del Your

Authorized for release by: 3/11/2019 4:39:15 PM

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

michael.delmonico@testamericainc.com

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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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Definitions/Glossary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

Qualifiers

GC/MS VOA

Qualifier **Qualifier Description**

Ū Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	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

Decision Level Concentration (Radiochemistry) DLC

Estimated Detection Limit (Dioxin) **EDL** 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

Not Detected at the reporting limit (or MDL or EDL if shown) ND

PQL Practical Quantitation Limit

QC **Quality Control**

RER Relative Error Ratio (Radiochemistry)

Reporting Limit or Requested Limit (Radiochemistry) RL

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin) Toxicity Equivalent Quotient (Dioxin) **TEQ**

Case Narrative

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

Job ID: 240-108814-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-108814-1

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.

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 3/2/2019 9:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.2° C and 2.0° C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample SUMP-34600BEACON-01-022819 (240-108814-1) was analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The sample was analyzed on 03/06/2019.

The continuing calibration verification (CCV) associated with batch 370483 recovered above the upper control limit for Vinyl Chloride and/or 1,2-Dichloropropane. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The following sample is impacted: SUMP-34600BEACON-01-022819 (240-108814-1).

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

VOLATILE ORGANIC COMPOUNDS (GCMS SIM)

Sample SUMP-34600BEACON-01-022819 (240-108814-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The sample was analyzed on 03/04/2019.

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

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Method Summary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

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

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Sample Summary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-108814-1	SUMP-34600BEACON-01-022819	Water	02/28/19 17:10	03/02/19 09:45

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Detection Summary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

Lab Sample ID: 240-108814-1

Client Sample ID: SUMP-34600BEACON-01-022819

No Detections.

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Client Sample Results

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: SUMP-34600BEACON-01-022819

TestAmerica Job ID: 240-108814-1

Lab Sample ID: 240-108814-1

Matrix: Water

Date Collected: 02/28/19 17:10 Date Received: 03/02/19 09:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			03/04/19 18:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	80		63 - 125					03/04/19 18:48	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			03/06/19 18:55	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/06/19 18:55	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/06/19 18:55	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/06/19 18:55	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/06/19 18:55	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/06/19 18:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	104		70 - 121			-		03/06/19 18:55	1
4-Bromofluorobenzene (Surr)	98		59 - 120					03/06/19 18:55	1
Toluene-d8 (Surr)	108		70 - 123					03/06/19 18:55	1
Dibromofluoromethane (Surr)	94		75 - 128					03/06/19 18:55	1

Surrogate Summary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

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

Matrix: Water Prep Type: Total/NA

Percent Surrog					
		DCA	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(70-121)	(59-120)	(70-123)	(75-128)
240-108814-1	SUMP-34600BEACON-01-0228	104	98	108	94
LCS 240-370483/4	Lab Control Sample	107	110	123	103
MB 240-370483/6	Method Blank	114	99	112	111
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

		DCA	Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	(63-125)	
240-108804-B-1 MS	Matrix Spike	83	
240-108804-B-1 MSD	Matrix Spike Duplicate	84	
240-108814-1	SUMP-34600BEACON-01-0228 19	80	
LCS 240-370124/4	Lab Control Sample	86	
MB 240-370124/5	Method Blank	86	

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

TestAmerica Job ID: 240-108814-1

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

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

Lab Sample ID: MB 240-370483/6

Matrix: Water

Analysis Batch: 370483

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

	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/06/19 11:39	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/06/19 11:39	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/06/19 11:39	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/06/19 11:39	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/06/19 11:39	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/06/19 11:39	1

MB MB

Surrogate	%Recovery Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	114	70 - 121		03/06/19 11:39	1
4-Bromofluorobenzene (Surr)	99	59 - 120		03/06/19 11:39	1
Toluene-d8 (Surr)	112	70 - 123		03/06/19 11:39	1
Dibromofluoromethane (Surr)	111	75 - 128		03/06/19 11:39	1

Lab Sample ID: LCS 240-370483/4

Matrix: Water

Analysis Batch: 370483

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
1,1-Dichloroethene	10.0	10.6		ug/L		106	65 - 139	
cis-1,2-Dichloroethene	10.0	10.4		ug/L		104	76 - 128	
Tetrachloroethene	10.0	7.81		ug/L		78	74 - 130	
trans-1,2-Dichloroethene	10.0	10.8		ug/L		108	78 - 133	
Trichloroethene	10.0	8.44		ug/L		84	76 - 125	
Vinyl chloride	10.0	13.5		ug/L		135	58 - 143	

LCS LCS

Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	107		70 - 121
4-Bromofluorobenzene (Surr)	110		59 - 120
Toluene-d8 (Surr)	123		70 - 123
Dibromofluoromethane (Surr)	103		75 - 128

Lab Sample ID: MRL 240-370483/5	Client Sample ID: Lab Control Sample
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 370483	

	Spike	MRL	MRL				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Vinyl chloride	0.00100	0.00143		ng/uL		143	10 - 150	

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

Lab Sample ID: MB 240-370124/5 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA

Analysis Batch: 370124									
_	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1.4-Dioxane	2.0	U	2.0	0.86	ua/L			03/04/19 13:45	

TestAmerica Canton

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3/11/2019

TestAmerica Job ID: 240-108814-1

Client Sample ID: Method Blank

Client Sample ID: Lab Control Sample

Client Sample ID: Matrix Spike

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

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Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

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

Lab Sample ID: MB 240-370124/5

Matrix: Water

Analysis Batch: 370124

MB MB

%Recovery Qualifier Surrogate Limits Prepared Analyzed Dil Fac 1,2-Dichloroethane-d4 (Surr) 63 - 125 03/04/19 13:45 86

Lab Sample ID: LCS 240-370124/4

Matrix: Water

Analysis Batch: 370124

Spike LCS LCS %Rec. Added Result Qualifier Limits **Analyte** Unit D %Rec 1,4-Dioxane 10.0 12.1 ug/L 121 59 - 131

LCS LCS

Limits Surrogate %Recovery Qualifier 1,2-Dichloroethane-d4 (Surr) 63 - 125 86

Lab Sample ID: 240-108804-B-1 MS

Matrix: Water

Analysis Batch: 370124

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits 2.0 U 10.0 1,4-Dioxane 11.6 116 52 - 129 ug/L

MS MS

Surrogate %Recovery Qualifier Limits 1,2-Dichloroethane-d4 (Surr) 83 63 - 125

Lab Sample ID: 240-108804-B-1 MSD

Matrix: Water

Analysis Batch: 370124

Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit 1,4-Dioxane 2.0 Ū 10.0 113 11.3 ug/L 52 - 129

MSD MSD

%Recovery Qualifier Limits Surrogate 1,2-Dichloroethane-d4 (Surr) 63 - 125 84

Prep Type: Total/NA

TestAmerica Canton

3/11/2019

QC Association Summary

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

GC/MS VOA

Analysis Batch: 370124

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-108814-1	SUMP-34600BEACON-01-022819	Total/NA	Water	8260B SIM	
MB 240-370124/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-370124/4	Lab Control Sample	Total/NA	Water	8260B SIM	
240-108804-B-1 MS	Matrix Spike	Total/NA	Water	8260B SIM	
240-108804-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B SIM	

Analysis Batch: 370483

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-108814-1	SUMP-34600BEACON-01-022819	Total/NA	Water	8260B	
MB 240-370483/6	Method Blank	Total/NA	Water	8260B	
LCS 240-370483/4	Lab Control Sample	Total/NA	Water	8260B	
MRL 240-370483/5	Lab Control Sample	Total/NA	Water	8260B	

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Lab Chronicle

Client: ARCADIS U.S., Inc.

Project/Site: Ford LTP Livonia MI - E203631

TestAmerica Job ID: 240-108814-1

Lab Sample ID: 240-108814-1

Matrix: Water

Client Sample ID: SUMP-34600BEACON-01-022819

Date Collected: 02/28/19 17:10 Date Received: 03/02/19 09:45

ı		Batch	Batch		Dilution	Batch	Prepared		
	Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
	Total/NA	Analysis	8260B			370483	03/06/19 18:55	LEE	TAL CAN
	Total/NA	Analysis	8260B SIM		1	370124	03/04/19 18:48	SAM	TAL CAN

Laboratory References:

TAL CAN = 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.

TestAmerica Job ID: 240-108814-1

Project/Site: Ford LTP Livonia MI - E203631

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	02-23-20
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

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

Company.

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Chain of Custody Record

TestAmerica Laboratory location: N.Canton — 4101 Shuffel Street NW/ North Canton, OH 44720 / 330-497-9396

TestAmerica THE LIADER IN ENVIRONMENTAL TREFING

Telephone State State St	Contest Applied Appl	Counter; All Applies	Company Name: Arcadis	T	Service of Comments		-	:	-	-		Men	5	-									TestAmerica Laboratories, Inc.
Telephone: 246-246-246-246-246-246-246-246-246-246-	Telephone: 246-994-2240	Telephone 24.699.220		Client Project N	Janager: Kris !	Iinskey			Site (ontact	Angel	a DeGra	sipu			Lab	Contac	t: Mike	DelM	mico			COC No:
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Marini Marini	Sample Date	Andreward Committee Commit	PO# MI001454.0003	Shipping/Track	ing No:			-	_			day				-	30928						Job/SDG No.
Sample Date Time	Sample Date	1,4-Dioxin 1,3-Disposal (A fer may be assessed if samples are created disease for the Library For 1,4-Dioxin 1,4-D					Mate	ix		Contain	ers & Pr	reservativ	524	1000			DCE	8	-			_	The second second second
20-103814 Chairu of Crostody Sample Bispoal (A fer may be assessed if samples are retained longer than I month) Sample By Lab	1 1 1 2 1 2 1 3 4 4 4 4 4 4 4 4 4	Sample Disposal (A fee may be assessed if samples are retained longer than I month) Sample Disposal (A fee may be assessed if samples are retained longer than I month) Return to Client Y Disposal By Lab Archive For Months	Sample Identification	Sample Date	Sample Time	Ji.A.	1000		+OSZH			HOWN	Other:				-S,t-ensiT	PCE 82601					Sample Specific Notes / Special Instructions:
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3-1-19 1950

Date/Time: 2/28/19 Date/Time: 05/0/1/9

WI-NC-099

Login # :	
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	TestAmerica (Canton Sample Receipt	Multiple Cooler Form	
Cooler Description	IR Gun#	Observed Temp	Corrected Temp	Coolant
TA	8	2.2	2,0	wet ice
Li	17	1.9	1,2	11
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			☐ See Tem	perature Excursion Form

WI-NC-099 Cooler Receipt Form Page 2 - Multiple Coolers



March 11, 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: 108814-1 Sample date: 2019-02-28

Report received by CADENA: 2019-03-11

Initial Data Verification completed by CADENA: 2019-03-11

The following minor QC exceptions or missing information were noted:

GCMS VOC QC batch CCV response outliers as noted in the laboratory submittal case narrative were not used to qualify client sample results as part of this level 2 data package verification review.

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 was 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.
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: 108814-1

		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
2401088141	SUMP-34600BEACON-01-022819	2/28/2019	5:10:00	Х	Х	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631

Laboratory: TestAmerica - North Canton

Laboratory Submittal: 108814-1

Sample Name: SUMP-34600BEACON-01-022819

Lab Sample ID: 2401088141 **Sample Date:** 2/28/2019

		Jumpic Butc.	2, 20, 20	10		
				Report		Valid
	Analyte	Cas No.	Result	Limit	Units	Qualifier
GC/MS VOC						
•						
<u>OSW-8260</u>	<u>)B</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-8260	<u>DBBSim</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 #240-108814-1

CADENA Verification Report: 2019-03-11

Analyses Performed By:

TestAmerica Canton, Ohio

Report #32343R Review Level: Tier III

Project: MI001454.0003.00002

DATA REVIEW

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-108814-1 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	Parent Sample	Analysis		
SDG	Sample ID	Lab ID	Matrix	Collection Date		VOC (Full Scan)	VOC (SIM)	MISC
240-108814-1	SUMP-34600BEACON- 01-022819	240-108814-1	Water	2/28/2019		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		Х	
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		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.

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	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, with the exception of the compounds presented in the following table.

Sample Locations	Initial/Continuing	Compound	Criteria
SUMP-34600BEACON-01-022819	Continuing Calibration %D	Vinyl chloride	+25.3%

The criteria used to evaluate the initial and continuing calibration are presented in the following table. In the case of a calibration deviation, the sample results are qualified.

DATA REVIEW

Initial/Continuing	Criteria	Sample Result	Qualification
	RRF <0.05	Non-detect	R
	KKF <0.03	Detect	J
Initial and Continuing	RRF <0.01 ¹	Non-detect	R
Calibration	KKF \0.01	Detect	J
	RRF >0.05 or RRF >0.01 ¹	Non-detect	No Action
	KKF >0.05 01 KKF >0.01	Detect	NO ACTION
	%RSD > 15% or a correlation coefficient <0.99	Non-detect	UJ
Initial Calibration	70K3D > 1370 or a correlation coefficient <0.99	Detect	J
Illitial Calibration	%RSD >90%	Non-detect	R
	7000 /9070	Detect	J
	9/D >209/ (increase in consitivity)	Non-detect	No Action
	%D >20% (increase in sensitivity)	Detect	J
Cantinuina Calibration	0/D > 200/ (decrease in consistivity)	Non-detect	UJ
Continuing Calibration	%D >20% (decrease in sensitivity)	Detect	J
	0/D>000/ (incressed/degreese in consisting)	Non-detect	R
	%D >90% (increase/decrease in sensitivity)	Detect	J

Note:

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.

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.

¹ RRF of 0.01 only applies to compounds which are typically poor responding compounds (i.e., ketones, 1,4-dioxane, etc.)

DATA REVIEW

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 8260B/8260B-SIM		ported		ormance eptable	Not
		Yes	No	Yes	Required
GAS CHROMATOGRAPHY/MASS SPECTROMETE	RY (GC/N	/IS)			
Tier II Validation					
Holding times/Preservation		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		Х		X	
Continuing calibration RRFs		Х		X	
Continuing calibration %Ds		Х		X	
Instrument tune and performance check		Х		X	
lon abundance criteria for each instrument used		Х		X	
Internal standard		Х		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		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Andrew Korycinski

SIGNATURE:

DATE: April 8, 2019

a Kays

PEER REVIEW: Dennis Capria

DATE: April 8, 2019

CHAIN OF CUSTODY CORRECTED SAMPLE ANALYSIS DATA SHEETS

22 C20 1.4/C1.2 MICHIGAN 190

Chain of Custody Record

TestAmerica

TestAmerica Laboratories, Inc COC No: containers Sample Specific Notes/ Special Instructions: Valk-in client ab sampling lob/SDG No MIS 808S8 ensxoid-4, Analyses Lab Contact: Mike DelMonico Vinyl Chloride 82608 Telephone: 330-497-9396 .CE 8500B SCE 8500B × rans-1,2-DCE 8260B ds-1,2-DCE 8260B TestAmerica Laboratory location: N.Canton — 4101 Shuffel Street NW/ North Canton, OH 44720 / 330-497-9396 1-DCE 8560B Other 0 Composite-C / Grab-G 2 Filtered Sample (Y / N) Site Contact: Angela DeGrandi Analysis Turnaround Time Отрек: RCRA TAT if different from below

| 3 weeks | 3 weeks | 5 Day | 7 l week | 1 2 days | 1 1 day Unpres Telephone: 734-320-0065 HO*N HOEN NPDES HCI CONH +OSZH Other: MO bilog Matrix Jnknown rnoanby × Email: kristoffer.hinskey@arcadis.com Client Project Manager: Kris Hinskey iiA Regulatory program: Sample Date Sample Time Method of Shipment/Carrier: Felephone: 248-994-2240 Shipping/Tracking No: | Poison B 2/28/19 tin Irritant SUM1-34 600 Beacon-01-022819 pecial Instructions/QC Requirements & Cor Sample Identification Client Contact Address: 28550 Cabot Drive, Suite 500 Possible Hazard Identification roject Number: M1001454.0093 Sity/State/Zip: Novi, MI, 48377 roject Name: Ford LTP ompany Name: Arcadis PO# MI001454,0003 hone: 248-994-2240 V Non-Hazard Page 256 of 258

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Company. Arcalis

ubmit all results through Cadena at Jim.tomalia@cadena.com, Cadena #E203531

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2/28/19
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Date/Time:
3-3-19

Company

Received in Laborstony by

3-1-19 1950

Date/Time: 05/0/1/9

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Client Sample Results

Client: ARCADIS U.S., Inc.

TestAmerica Job ID: 240-108814-1

Project/Site: Ford LTP Livonia MI - E203631

Date Collected: 02/28/19 17:10 Matrix: Water

Date Received: 03/02/19 09:45

Method: 8260B SIM - Volati Analyte	_	mpounds (Qualifier	(GC/MS) RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			03/04/19 18:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	80		63 - 125			•		03/04/19 18:48	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			03/06/19 18:55	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/06/19 18:55	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/06/19 18:55	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/06/19 18:55	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/06/19 18:55	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/06/19 18:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	104		70 - 121			•		03/06/19 18:55	1
4-Bromofluorobenzene (Surr)	98		59 - 120					03/06/19 18:55	1
Toluene-d8 (Surr)	108		70 - 123					03/06/19 18:55	1
Dibromofluoromethane (Surr)	94		75 - 128					03/06/19 18:55	1



3/12/2019 Mr. Jim Tomalia Arcadis U.S., Inc. 28550 Cabot Dr. Suite 500 Novi MI 48377

Project Name: Ford LTP

Project #:

Workorder #: 1903146

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 3/6/2019 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager



WORK ORDER #: 1903146

Work Order Summary

CLIENT: Mr. Jim Tomalia BILL TO: Accounts Payable

Arcadis U.S., Inc.

28550 Cabot Dr.

Suite 500

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600

Novi, MI 48377 Highlands Ranch, CO 80129

PHONE: 517-819-0356 **P.O.** # MI001454.0003

FAX: PROJECT # Ford LTP

DATE RECEIVED: 03/06/2019 **CONTACT:** Ausha Scott

DATE COMPLETED: 03/12/2019

			RECEIPT	FINAL
FRACTION #	NAME	<u>TEST</u>	VAC./PRES.	PRESSURE
01A	SSMP-34600BEACON-01_030119	TO-15	5.3 "Hg	14.8 psi
02A	Lab Blank	TO-15	NA	NA
03A	CCV	TO-15	NA	NA
04A	LCS	TO-15	NA	NA
04AA	LCSD	TO-15	NA	NA

	1/4	eral player		
CERTIFIED BY:			DATE: $\frac{03/12/19}{}$	

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935 Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program) Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016. Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.



LABORATORY NARRATIVE EPA Method TO-15 Arcadis U.S., Inc. Workorder# 1903146

One 1 Liter Summa Canister (100% Certified) sample was received on March 06, 2019. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

As per client project requirements, the laboratory has reported estimated values for target compound hits that are below the Reporting Limit but greater than the Method Detection Limit. Concentrations that are below the level at which the canister was certified (0.2 ppbv for compounds reported at 0.5 ppbv and 0.8 ppbv for compounds reported at 2.0 ppbv) may be false positives.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicates as follows:

- B Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
 - J Estimated value.
 - E Exceeds instrument calibration range.
 - S Saturated peak.
 - Q Exceeds quality control limits.
- U Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.
 - UJ- Non-detected compound associated with low bias in the CCV
 - N The identification is based on presumptive evidence.
 - M Reported value may be biased due to apparent matrix interferences.
 - CN See Case Narrative.

File extensions may have been used on the data analysis sheets and indicates as follows:

- a-File was requantified
- b-File was quantified by a second column and detector
- r1-File was requantified for the purpose of reissue



EPA METHOD TO-15 GC/MS FULL SCAN Ford LTP

Client ID: SSMP-34600BEACON-01_030119

Lab ID: 1903146-01A **Date/Time Analyzed:** 3/11/19 07:08 PM

Date/Time Collected: 3/1/19 03:57 PM **Dilution Factor:** 2.44

Media: 1 Liter Summa Canister (100% Certified) Instrument/Filename: msda.i / a031115

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	1.8	3.9	4.8	Not Detected
1,4-Dioxane	123-91-1	3.5	8.8	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.4	3.9	4.8	Not Detected
Tetrachloroethene	127-18-4	1.5	6.6	8.3	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.4	3.9	4.8	Not Detected
Trichloroethene	79-01-6	2.1	5.2	6.6	Not Detected
Vinyl Chloride	75-01-4	1.2	2.5	3.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	98
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	101



Client ID: Lab Blank Lab ID: 1903146-02A

Date/Time Collected: NA - Not Applicable

Media: NA - Not Applicable

Date/Time Analyzed: 3/11/19 10:54 AM

Dilution Factor: 1.00

Instrument/Filename: msda.i / a031105a

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.75	1.6	2.0	Not Detected
1,4-Dioxane	123-91-1	1.4	3.6	7.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.59	1.6	2.0	Not Detected
Tetrachloroethene	127-18-4	0.61	2.7	3.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.56	1.6	2.0	Not Detected
Trichloroethene	79-01-6	0.86	2.1	2.7	Not Detected
Vinyl Chloride	75-01-4	0.48	1.0	1.3	Not Detected

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	99
4-Bromofluorobenzene	460-00-4	70-130	99
Toluene-d8	2037-26-5	70-130	101



Client ID: CCV

Lab ID: 1903146-03A **Date/Time Analyzed:** 3/11/19 09:09 AM

Date/Time Collected: NA - Not Applicable Dilution Factor: 1.00

Media: NA - Not Applicable Instrument/Filename: msda.i / a031102

Compound	CAS#	%Recovery
,1-Dichloroethene	75-35-4	109
,4-Dioxane	123-91-1	94
is-1,2-Dichloroethene	156-59-2	104
etrachloroethene	127-18-4	99
rans-1,2-Dichloroethene	156-60-5	103
richloroethene	79-01-6	98
/inyl Chloride	75-01-4	103

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	99
Toluene-d8	2037-26-5	70-130	102



Client ID: LCS

Lab ID: 1903146-04A **Date/Time Analyzed:** 3/11/19 09:45 AM

Date/Time Collected: NA - Not Applicable Dilution Factor: 1.00

Media: NA - Not Applicable Instrument/Filename: msda.i / a031103

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	112
1,4-Dioxane	123-91-1	96
cis-1,2-Dichloroethene	156-59-2	120
Tetrachloroethene	127-18-4	102
trans-1,2-Dichloroethene	156-60-5	94
Trichloroethene	79-01-6	102
Vinyl Chloride	75-01-4	109

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	99
4-Bromofluorobenzene	460-00-4	70-130	99
Toluene-d8	2037-26-5	70-130	102

^{* %} Recovery is calculated using unrounded analytical results.



Client ID: LCSD

Lab ID: 1903146-04AA **Date/Time Analyzed:** 3/11/19 10:10 AM

Date/Time Collected: NA - Not Applicable **Dilution Factor:** 1.00

Media: NA - Not Applicable Instrument/Filename: msda.i / a031104

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	114
1,4-Dioxane	123-91-1	96
cis-1,2-Dichloroethene	156-59-2	121
Tetrachloroethene	127-18-4	102
trans-1,2-Dichloroethene	156-60-5	93
Trichloroethene	79-01-6	101
Vinyl Chloride	75-01-4	108

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	101

^{* %} Recovery is calculated using unrounded analytical results.



March 12, 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: Eurofins Air Toxics - Folsom

Laboratory submittal: 1903146 Sample date: 2019-03-01

Report received by CADENA: 2019-03-12

Initial Data Verification completed by CADENA: 2019-03-12

1 Air sample was analyzed for TO-15 parameters.

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.

Analytical results reported between RDL and MDL are flagged 'J' and considered estimated values.

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.
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.



Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1903146

CADENA Verification Report: 2019-03-12

Analyses Performed By: Eurofins Air Toxics Folsom, California

Report #32252R Review Level: Tier III

Project: MI001454.0003.00002

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1903146 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		Analysis		
SDG	Sample ID	Lab ID	Matrix	Collection Date	Parent Sample	TO-15 (Full Scan)	TO-15 (SIM)	MISC
1903146	SSMP-34600BEACON- 01_030119	1903146-01A	Air	3/1/2019		x		

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

	Repor			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		Х	
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) Method TO-15 (Full Scan). 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	Return Canister Pressure
USEPA TO-15	Air	30 days from collection to analysis (Canister)	Ambient Temperature	< -2" Hg

All samples were analyzed within the specified holding time and canister return pressure / vacuum 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 (30%) 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 (30%) and RRF value greater than control limit (0.05).

All compounds associated with the continuing 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 requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% 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.

All identified compounds met the specified criteria.

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 VALIDATION CHECKLIST FOR VOCs

VOCs: TO-15 (Full Scan)		orted		eptable	Not
	No	Yes	No	Yes	Required
GAS CHROMATOGRAPHY/MASS SPECTROMETR	Y (GC/M	S)			
Tier II Validation					
Canister return pressure (<-2"Hg)		X		Х	
Tier III Validation				·	
System performance and column resolution		X		Х	
Initial calibration %RSDs		Х		Х	
Continuing calibration RRFs		Х		Х	
Continuing calibration %Ds		Х		Х	
Instrument tune and performance check		Х		Х	
Ion abundance criteria for each instrument used		Х		Х	
Internal standard		Х		Х	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		Х		Х	
B. Quantitation Reports		Х		Х	
C. RT of sample compounds within the established RT windows		Х		Х	
D. Transcription/calculation errors present		Х		Х	
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: Joseph C. Houser

SIGNATURE:

DATE: April 3, 2019

PEER REVIEW: Dennis Capria

DATE: April 4, 2019

CHAIN OF CUSTODY CORRECTED SAMPLE ANALYSIS DATA SHEETS



Client ID: SSMP-34600BEACON-01_030119

Lab ID: 1903146-01A **Date/Time Analyzed:** 3/11/19 07:08 PM

Date/Time Collected: 3/1/19 03:57 PM **Dilution Factor:** 2.44

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	1.8	3.9	4.8	Not Detected
1,4-Dioxane	123-91-1	3.5	8.8	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.4	3.9	4.8	Not Detected
Tetrachloroethene	127-18-4	1.5	6.6	8.3	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.4	3.9	4.8	Not Detected
Trichloroethene	79-01-6	2.1	5.2	6.6	Not Detected
Vinyl Chloride	75-01-4	1.2	2.5	3.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	98
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	101

Analysis Request /Canister Chain of Custody For Laboratory Use Only

1903146 Workorder #: 180 Blue Ravine Rd. Suite B, Folsom, CA 95630 Click links below to view: Phone (800) 985-5955; Fax (916) 351-8279 Canister Sampling Guide Helium Shroud Video Client: Ford Special Instructions/Notes: Report ONLY: 1,1-DCE, cis-1,2-PID: NA Turnaround Time (Rush surcharges may apply) Project Name: Ford LTP DCE, trans-1,2-DCE, 1,4-Dioxane, PCE, TCE and VC. 5 Day Turnaround Time Project Manager: Kris Hinskey P.O.# MI001454.0003 Canister Vacuum/Pressure Requested Analyses Sampler: Submit results through Cadena at jim.tomalia@cadena.com. Thrace Lab Use Only Site Name: 34600 Beacon Cadena #E203631. Level IV Reporting TO-15 (See Special Initial (in Hg) Final (psig) Gas: N₂ / He Final (in Hg) Start Sampling Lab Stop Sampling Flow Receipt Sample Identification Can# Information ID Information Controller # Date Time Date Time SSMP-34600BEACON-01_030\\A 23319 3-1-19 elinquished by:/(\$ignature/Affiliation) Time , Received by: (Signature/Affiliation) Date 3/06/19 Time Relinquished by: (Signature/Affiliation) (135 Time Received by: (Signature/Affiliation) Date Time Relinquished by: (Signature/Affiliation) Date Time Received by: (Signature/Affiliation) Date Time Lab Use Only Shipper Name: Custody Seals Intact? es. Sample Transportation Notice: Relinquishing signature on this document indicates that samples are shipped in compliance with all applicable local, State, Federal, and international laws, regulations, and ordinances of any kind. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Eurofins Air Toxics against any claim, demand, or action, of any kind, related to the collection, handling, of shipping of samples. D.O.T Hotline (800) 467-4922



3/12/2019 Mr. Jim Tomalia Arcadis U.S., Inc. 28550 Cabot Dr. Suite 500 Novi MI 48377

Project Name: Ford LTP

Project #:

Workorder #: 1903147

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 3/6/2019 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

50011



WORK ORDER #: 1903147

Work Order Summary

CLIENT: Mr. Jim Tomalia BILL TO: Accounts Payable

Arcadis U.S., Inc.

28550 Cabot Dr.

Suite 500

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600

Novi, MI 48377 Highlands Ranch, CO 80129

PHONE: 517-819-0356 **P.O.** # MI001454.0003

FAX: PROJECT # Ford LTP

DATE RECEIVED: 03/06/2019 **CONTACT:** Ausha Scott 03/12/2019

			RECEIPT	FINAL
FRACTION #	<u>NAME</u>	<u>TEST</u>	VAC./PRES.	PRESSURE
01A	AA-34600BEACON-01_022819	Modified TO-15	8.0 "Hg	5 psi
02A	IAB-34600BEACON-03_022819	Modified TO-15	8.0 "Hg	5 psi
03A	IAF-34600BEACON-02_022819	Modified TO-15	7.0 "Hg	5 psi
04A	Lab Blank	Modified TO-15	NA	NA
05A	CCV	Modified TO-15	NA	NA
06A	LCS	Modified TO-15	NA	NA
06AA	LCSD	Modified TO-15	NA	NA

	1	eide Tlayer		
CERTIFIED BY:		00	DATE: $\frac{03/12/19}{}$	

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935 Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program) Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016. Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.



LABORATORY NARRATIVE Modified TO-15 Arcadis U.S., Inc. Workorder# 1903147

Three 6 Liter Summa Canister (100% Certified) samples were received on March 06, 2019. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	TO-15	ATL Modifications
Initial Calibration	<pre><!--=30% RSD with 2 compounds allowed out to < 40% RSD</pre--></pre>	=30% RSD with 4 compounds allowed out to < 40% RSD</td
Blank and standards	Zero Air	UHP Nitrogen provides a higher purity gas matrix than zero air

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

As per project specific client request the laboratory has reported estimated values for target compound hits that are below the Reporting Limit but greater than the Method Detection Limit. All The canisters used for this project have been certified to the Reporting Limit for the target analytes included in this workorder. Concentrations that are below the level at which the canister was certified may be false positives.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

- B Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
 - J Estimated value.
 - E Exceeds instrument calibration range.
 - S Saturated peak.
 - Q Exceeds quality control limits.
- U Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.
 - UJ- Non-detected compound associated with low bias in the CCV
 - N The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:



a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue



Client ID: AA-34600BEACON-01_022819

Lab ID: 1903147-01A **Date/Time Analyzed:** 3/9/19 08:54 PM

Date/Time Collected: 3/1/19 01:27 PM Dilution Factor: 1.83

·		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.14	0.36	0.72	Not Detected
1,4-Dioxane	123-91-1	0.15	0.33	0.66	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.16	0.36	0.72	Not Detected
Tetrachloroethene	127-18-4	0.075	0.62	1.2	0.18 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.36	0.72	Not Detected
Trichloroethene	79-01-6	0.11	0.49	0.98	Not Detected
Vinyl Chloride	75-01-4	0.067	0.23	0.47	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	96



Client ID: IAB-34600BEACON-03_022819

Lab ID: 1903147-02A **Date/Time Analyzed:** 3/9/19 09:43 PM

Date/Time Collected: 3/1/19 04:46 PM **Dilution Factor:** 1.83

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.14	0.36	0.72	Not Detected
1,4-Dioxane	123-91-1	0.15	0.33	0.66	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.16	0.36	0.72	Not Detected
Tetrachloroethene	127-18-4	0.075	0.62	1.2	0.17 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.36	0.72	Not Detected
Trichloroethene	79-01-6	0.11	0.49	0.98	Not Detected
Vinyl Chloride	75-01-4	0.067	0.23	0.47	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	104
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	97



Client ID: IAF-34600BEACON-02_022819

Lab ID: 1903147-03A **Date/Time Analyzed:** 3/10/19 06:05 AM

Date/Time Collected: 3/1/19 04:44 PM **Dilution Factor:** 1.75

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.13	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.15	0.32	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.072	0.59	1.2	0.16 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.10	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.064	0.22	0.45	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	98



Client ID: Lab Blank Lab ID: 1903147-04A

Date/Time Collected: NA - Not Applicable

Media: NA - Not Applicable

Date/Time Analyzed: 3/9/19 07:34 PM

Dilution Factor: 1.00

Instrument/Filename: msd22.i / 22030906a

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.075	0.20	0.40	Not Detected
1,4-Dioxane	123-91-1	0.084	0.18	0.36	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.088	0.20	0.40	Not Detected
Tetrachloroethene	127-18-4	0.041	0.34	0.68	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.062	0.20	0.40	Not Detected
Trichloroethene	79-01-6	0.058	0.27	0.54	Not Detected
Vinyl Chloride	75-01-4	0.036	0.13	0.26	Not Detected

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	104
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	95



Client ID: CCV

Lab ID: 1903147-05A **Date/Time Analyzed:** 3/9/19 04:34 PM

Date/Time Collected: NA - Not Applicable Dilution Factor: 1.00

Media: NA - Not Applicable Instrument/Filename: msd22.i / 22030902

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	97
,4-Dioxane	123-91-1	127
is-1,2-Dichloroethene	156-59-2	100
etrachloroethene	127-18-4	100
ans-1,2-Dichloroethene	156-60-5	98
richloroethene	79-01-6	103
/inyl Chloride	75-01-4	99

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	109



Client ID: LCS

Lab ID: 1903147-06A **Date/Time Analyzed:** 3/9/19 05:14 PM

Date/Time Collected: NA - Not Applicable **Dilution Factor:** 1.00

Media: NA - Not Applicable Instrument/Filename: msd22.i / 22030903

Compound	CAS#	%Recovery
,1-Dichloroethene	75-35-4	98
,4-Dioxane	123-91-1	120
is-1,2-Dichloroethene	156-59-2	110
etrachloroethene	127-18-4	100
rans-1,2-Dichloroethene	156-60-5	86
richloroethene	79-01-6	102
/inyl Chloride	75-01-4	106

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	101
Toluene-d8	2037-26-5	70-130	105

^{* %} Recovery is calculated using unrounded analytical results.



Client ID: LCSD

Lab ID: 1903147-06AA **Date/Time Analyzed:** 3/9/19 05:54 PM

Date/Time Collected: NA - Not Applicable **Dilution Factor:** 1.00

Media: NA - Not Applicable Instrument/Filename: msd22.i / 22030904

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	101
1,4-Dioxane	123-91-1	120
cis-1,2-Dichloroethene	156-59-2	113
Tetrachloroethene	127-18-4	98
rans-1,2-Dichloroethene	156-60-5	87
Trichloroethene	79-01-6	101
Vinyl Chloride	75-01-4	109

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	105

^{* %} Recovery is calculated using unrounded analytical results.



March 12, 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: Eurofins Air Toxics - Folsom

Laboratory submittal: 1903147 Sample date: 2019-03-01

Report received by CADENA: 2019-03-12

Initial Data Verification completed by CADENA: 2019-03-12

3 Air samples were analyzed for TO-15 parameters.

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.

Analytical results reported between RDL and MDL are flagged 'J' and considered estimated values.

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.
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.



Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1903147

CADENA Verification Report: 2019-03-12

Analyses Performed By: Eurofins Air Toxics Folsom, California

Report #32253R Review Level: Tier III

Project: MI001454.0003.00002

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1903147 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		Analysis		
SDG	Sample ID	Lab ID	Matrix	Collection Date	Parent Sample	TO-15 (Full Scan)	TO-15 (SIM)	MISC
	AA-34600BEACON- 01_022819	AA- 34600BEACO N-01_022819	Air	3/1/2019		Х		
1903147	IAB-34600BEACON- 03_022819	IAB- 34600BEACO N-03_022819	Air	3/1/2019		X		
	IAF-34600BEACON- 02_022819	IAF- 34600BEACO N-02_022819	Air	3/1/2019		X		

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

	Repor		Performance Acceptable		Not
Items Reviewed	No	Yes	No	Yes	Required
Sample receipt condition		Х		X	
2. Requested analyses and sample results		Х		X	
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		Χ	
8. Sample preservation verification (as applicable)		Х		Χ	
Sample preparation/extraction/analysis dates		Х		Χ	
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) Method TO-15 (Full Scan). 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	Return Canister Pressure
USEPA TO-15	Air	30 days from collection to analysis (Canister)	Ambient Temperature	< -2" Hg

All samples were analyzed within the specified holding time and canister return pressure / vacuum 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 (30%) 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 (30%) and RRF value greater than control limit (0.05).

All compounds associated with the continuing 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 requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% 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.

All identified compounds met the specified criteria.

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 VALIDATION CHECKLIST FOR VOCs

VOCs: TO-15 (Full Scan)		Reported		ormance eptable	Not						
	No	Yes	No	Yes	Required						
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)											
Tier II Validation											
Canister return pressure (<-2"Hg)		Х		X							
Tier III Validation											
System performance and column resolution		Х		X							
Initial calibration %RSDs		Х		X							
Continuing calibration RRFs		Х		X							
Continuing calibration %Ds		Х		X							
Instrument tune and performance check		Х		X							
lon abundance criteria for each instrument used		X		Х							
Internal standard		Х		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		Х		Х							
E. Reporting limits adjusted to reflect sample dilutions		Х		X							

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE:

DATE: April 3, 2019

PEER REVIEW: Dennis Capria

DATE: April 4, 2019

CHAIN OF CUSTODY CORRECTED SAMPLE ANALYSIS DATA SHEETS



Client ID: AA-34600BEACON-01_022819

Lab ID: 1903147-01A **Date/Time Analyzed:** 3/9/19 08:54 PM

Date/Time Collected: 3/1/19 01:27 PM Dilution Factor: 1.83

·		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.14	0.36	0.72	Not Detected
1,4-Dioxane	123-91-1	0.15	0.33	0.66	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.16	0.36	0.72	Not Detected
Tetrachloroethene	127-18-4	0.075	0.62	1.2	0.18 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.36	0.72	Not Detected
Trichloroethene	79-01-6	0.11	0.49	0.98	Not Detected
Vinyl Chloride	75-01-4	0.067	0.23	0.47	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	96



Client ID: IAB-34600BEACON-03_022819

Lab ID: 1903147-02A **Date/Time Analyzed:** 3/9/19 09:43 PM

Date/Time Collected: 3/1/19 04:46 PM **Dilution Factor:** 1.83

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.14	0.36	0.72	Not Detected
1,4-Dioxane	123-91-1	0.15	0.33	0.66	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.16	0.36	0.72	Not Detected
Tetrachloroethene	127-18-4	0.075	0.62	1.2	0.17 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.36	0.72	Not Detected
Trichloroethene	79-01-6	0.11	0.49	0.98	Not Detected
Vinyl Chloride	75-01-4	0.067	0.23	0.47	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	104
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	97



Client ID: IAF-34600BEACON-02_022819

Lab ID: 1903147-03A **Date/Time Analyzed:** 3/10/19 06:05 AM

Date/Time Collected: 3/1/19 04:44 PM **Dilution Factor:** 1.75

		MDL	LOD	Rpt. Limit	Amount
Compound	CAS#	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
1,1-Dichloroethene	75-35-4	0.13	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.15	0.32	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.072	0.59	1.2	0.16 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.10	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.064	0.22	0.45	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	98

Analysis Request /Canister Chain of Custody

PID: _______ For Laboratory Use Only Workorder #: _______ 1903147 Click links below to view:

		Rd. Suite B, Folsom, CA 9	5630		****	······································					Samplin	g Guide	•			
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	t Name:	Ford LTP	PID:	PID: NA Special Instructions/Notes: Report ONLY: 1,1-DCE, cis-1,2-			1	Turnaround Time (Rush surcharges may apply)								
	Manager:	Kris Hinskey		DCE, trans-1,2-DCE, 1,4-Dioxane, PCE, TCE and VC. Submit P.O.# MI001454.0003			5 Day Turnaround Time									
Sample		111111111111111111111111111111111111111	P.U.# MIUU145	results through Cadena at jim.tomalia@cadena.com. Cadena		rom Cadena	Can	Canister Vacuum/Pressure			Requested Analyses			ıs		
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handling, of shipping of samples. D.O.T Hotline (800) 467-4922