

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

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

TestAmerica Job ID: 240-108813-1 Client Project/Site: Ford LTP Livonia MI - E203631

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

Attn: Kristoffer Hinskey

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Authorized for release by: 3/5/2019 3:20:25 PM Michael DelMonico, Project Manager I (330)497-9396 michael.delmonico@testamericainc.com

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

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

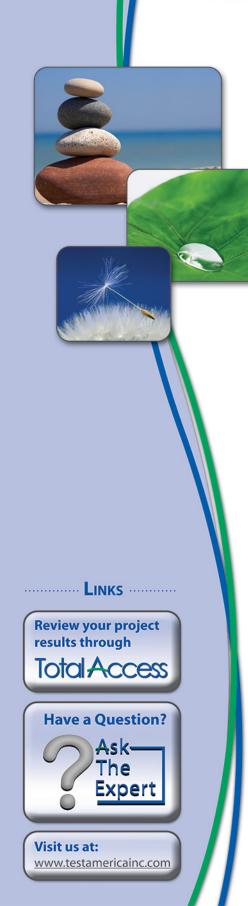


Table of Contents

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

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

3

Qualifiers

GC/MS VOA

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

Glossary

Quaimer	Qualmer Description	
U	Indicates the analyte was analyzed for but not detected.	5
Glossary		6
Abbreviation	These commonly used abbreviations may or may not be present in this report.	
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	
%R	Percent Recovery	
CFL	Contains Free Liquid	8
CNF	Contains No Free Liquid	
DER	Duplicate Error Ratio (normalized absolute difference)	9
Dil Fac	Dilution Factor	
DL	Detection Limit (DoD/DOE)	
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DLC	Decision Level Concentration (Radiochemistry)	
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MDA	Minimum Detectable Activity (Radiochemistry)	10
MDC	Minimum Detectable Concentration (Radiochemistry)	
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)

Job ID: 240-108813-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-108813-1

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 temperature of the cooler at receipt was 0.4° C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample MW-183S-030119 (240-108813-1) was analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. 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.

VOLATILE ORGANIC COMPOUNDS (GCMS SIM)

Sample MW-183S-030119 (240-108813-1) 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.

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

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

Protocol References:

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

Laboratory References:

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

Sample Summary

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108813-1

Lab Sample ID	Client Sample ID	Matrix	Collected Received
240-108813-1	MW-183S-030119	Water	03/01/19 09:50 03/02/19 09:45

Client Sample ID: MW-183S-030119

No Detections.

Lab Sample ID: 240-108813-1

This Detection Summary does not include radiochemical test results.

Lab Sample ID: 240-108813-1

Client Sample ID: MW-183S-030119 Date Collected: 03/01/19 09:50

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 18:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	80		63 - 125					03/04/19 18:24	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			03/04/19 16:12	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/04/19 16:12	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/04/19 16:12	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/04/19 16:12	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/04/19 16:12	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/04/19 16:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	97		70 - 121					03/04/19 16:12	1
4-Bromofluorobenzene (Surr)	69		59 - 120					03/04/19 16:12	1
Toluene-d8 (Surr)	74		70 - 123					03/04/19 16:12	1
Dibromofluoromethane (Surr)	97		75 - 128					03/04/19 16:12	

Matrix: Water

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

			Pe	ercent Surro	ogate Recovery (A	cceptance Limits)
		DCA	BFB	TOL	DBFM	
Lab Sample ID	Client Sample ID	(70-121)	(59-120)	(70-123)	(75-128)	
240-108804-H-1 MSD	Matrix Spike Duplicate	83	75	74	90	
240-108804-K-1 MS	Matrix Spike	87	77	74	92	
240-108813-1	MW-183S-030119	97	69	74	97	
LCS 240-370116/4	Lab Control Sample	85	76	77	92	
MB 240-370116/6	Method Blank	90	67	72	92	
Surrogate Legend						
DCA = 1,2-Dichloroeth	ane-d4 (Surr)					
BFB = 4-Bromofluorob	enzene (Surr)					
TOL = Toluene-d8 (Su	rr)					
DBFM = Dibromofluoro	omethane (Surr)					

latrix: Water			Prep Type: Total/NA
-			Percent Surrogate Recovery (Acceptance Limits)
		DCA	
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	
240-108813-1	MW-183S-030119	80	
LCS 240-370124/4	Lab Control Sample	86	
MB 240-370124/5	Method Blank	86	

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

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

5

10

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

Lab Sample ID: MB 240-370116/6 Matrix: Water Analysis Batch: 370116

	MB	МВ							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U –	1.0	0.19	ug/L			03/04/19 11:28	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/04/19 11:28	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/04/19 11:28	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/04/19 11:28	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/04/19 11:28	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/04/19 11:28	1
	МВ	МВ							

							_
Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac	
1,2-Dichloroethane-d4 (Surr)	90		70 - 121		03/04/19 11:28	1	
4-Bromofluorobenzene (Surr)	67		59 - 120		03/04/19 11:28	1	
Toluene-d8 (Surr)	72		70 - 123		03/04/19 11:28	1	
Dibromofluoromethane (Surr)	92		75 - 128		03/04/19 11:28	1	

Lab Sample ID: LCS 240-370116/4 Matrix: Water Analysis Batch: 370116

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
1,1-Dichloroethene	10.0	9.73		ug/L		97	65 - 139	
cis-1,2-Dichloroethene	10.0	11.6		ug/L		116	76 - 128	
Tetrachloroethene	10.0	10.8		ug/L		108	74 ₋ 130	
trans-1,2-Dichloroethene	10.0	12.2		ug/L		122	78 - 133	
Trichloroethene	10.0	11.6		ug/L		116	76 - 125	
Vinyl chloride	10.0	8.87		ug/L		89	58 - 143	

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	85		70_121
4-Bromofluorobenzene (Surr)	76		59 - 120
Toluene-d8 (Surr)	77		70 - 123
Dibromofluoromethane (Surr)	92		75 - 128

74

Lab Sample ID: 240-108804-H-1 MSD **Matrix: Water** Analysis Batch: 370116

Toluene-d8 (Surr)

Analysis Datch. 570110											
	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	9.37		ug/L		94	53 - 140	1	35
cis-1,2-Dichloroethene	1.0	U	10.0	11.2		ug/L		112	64 - 130	1	21
Tetrachloroethene	1.0	U	10.0	9.83		ug/L		98	51 - 136	2	23
trans-1,2-Dichloroethene	1.0	U	10.0	11.5		ug/L		115	68 - 133	2	24
Trichloroethene	0.14	J	10.0	11.2		ug/L		110	55 - 131	1	23
Vinyl chloride	1.0	U	10.0	9.89		ug/L		99	43 - 154	10	29
	MSD	MSD									
Surrogate	%Recovery	Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	83		70 - 121								
4-Bromofluorobenzene (Surr)	75		59 - 120								

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

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

TestAmerica Canton

70 - 123

Limits

75 - 128

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

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

Matrix: Water

Matrix: Water

Surrogate

Analysis Batch: 370116

Dibromofluoromethane (Surr)

Client Sample ID: Matrix Spike Duplicate

2 3 4 5 7 8

10

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

Prep Type: Total/NA

									Thep Type. Totaling
Analysis Batch: 370116									
	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
1,1-Dichloroethene	1.0	U	10.0	9.28		ug/L		93	53 - 140
cis-1,2-Dichloroethene	1.0	U	10.0	11.3		ug/L		113	64 - 130
Tetrachloroethene	1.0	U	10.0	9.64		ug/L		96	51 - 136
trans-1,2-Dichloroethene	1.0	U	10.0	11.3		ug/L		113	68 - 133
Trichloroethene	0.14	J	10.0	11.0		ug/L		109	55 ₋ 131
Vinyl chloride	1.0	U	10.0	8.92		ug/L		89	43 - 154
	MS	MS							
Surrogate	%Recovery	Qualifier	Limits						
1,2-Dichloroethane-d4 (Surr)	87		70 - 121						
4-Bromofluorobenzene (Surr)	77		59 - 120						
Toluene-d8 (Surr)	74		70 - 123						
Dibromofluoromethane (Surr)	92		75 - 128						

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

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

MSD MSD

%Recovery Qualifier

90

Lab Sample ID: MB 240-3 Matrix: Water	70124/5							Clie	ent Sam	ple ID: Method Prep Type: To	
Analysis Batch: 370124	МВ	МВ									
Analyte	Result	Qualifier	RL	N	/IDL Ur	it	D	Р	repared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	(0.86 ug	/L				03/04/19 13:45	1
	MB	MB									
Surrogate	%Recovery	Qualifier	Limits					Р	repared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	86		63 - 125							03/04/19 13:45	1
Lab Sample ID: LCS 240-3	370124/4						Client	Sai	mple ID	: Lab Control S	Sample
Matrix: Water										Prep Type: To	
Analysis Batch: 370124											
-			Spike	LCS	LCS					%Rec.	
Analyte			Added	Result	Qualifi	er Ur	it	D	%Rec	Limits	
1,4-Dioxane			10.0	12.1		ug	/L		121	59 - 131	
	LCS LCS	S									
Surrogate	%Recovery Qu	alifier	Limits								
1,2-Dichloroethane-d4 (Surr)	86		63 - 125								

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

Lab Sample ID: 240-1088 Matrix: Water	804-B-1 MS						C	lient Sa	mple ID: I Prep Ty		
Analysis Batch: 370124	Comula	Commite	Orailea								
	-	Sample	Spike	-	-				%Rec.		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits		
1,4-Dioxane	2.0	U	10.0	11.6		ug/L		116	52 - 129		
	MS	MS									
Surrogate	%Recovery	Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr) Lab Sample ID: 240-1088	83 804-B-1 MSD		63 - 125			Client	Samp	le ID: N	latrix Spil	ke Dup	licate
-			63 - 125			Client	Samp	le ID: N	latrix Spil Prep Tyj		
Lab Sample ID: 240-1088 Matrix: Water	804-B-1 MSD	Sample	63 - 125 Spike	MSD	MSD	Client	Samp	le ID: N			
Lab Sample ID: 240-1088 Matrix: Water	804-B-1 MSD Sample	Sample Qualifier			MSD Qualifier	Client Unit	Samp D	le ID: N %Rec	Prep Ty		al/NA
Lab Sample ID: 240-1088 Matrix: Water Analysis Batch: 370124	804-B-1 MSD Sample	Qualifier	Spike		Qualifier				Prep Tyj %Rec.	pe: Tot	al/NA RPD
Lab Sample ID: 240-1088 Matrix: Water Analysis Batch: 370124 Analyte	804-B-1 MSD Sample Result	Qualifier U	Spike Added	Result	Qualifier	Unit		%Rec	Prep Ty %Rec. Limits	pe: Tot	al/NA RPD Limit
Lab Sample ID: 240-1088 Matrix: Water Analysis Batch: 370124 Analyte	Sod-B-1 MSD Sample Result 2.0	Qualifier U MSD	Spike Added	Result	Qualifier	Unit		%Rec	Prep Ty %Rec. Limits	pe: Tot	al/NA RPD Limit

QC Association Summary

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108813-1

GC/MS VOA

Analysis Batch: 370116

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-108813-1	MW-183S-030119	Total/NA	Water	8260B	
MB 240-370116/6	Method Blank	Total/NA	Water	8260B	
LCS 240-370116/4	Lab Control Sample	Total/NA	Water	8260B	
240-108804-H-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
240-108804-K-1 MS	Matrix Spike	Total/NA	Water	8260B	
nalysis Batch: 3701	24				
	24 Client Sample ID	Ргер Туре	Matrix	Method	Prep Batch
nalysis Batch: 3701		Prep Type Total/NA	Matrix Water	Method 8260B SIM	Prep Batch
nalysis Batch: 3701 Lab Sample ID	Client Sample ID				Prep Batch
Lab Sample ID 240-108813-1	Client Sample ID MW-183S-030119	Total/NA	Water	8260B SIM	Prep Batch
Lab Sample ID 240-108813-1 MB 240-370124/5	Client Sample ID MW-183S-030119 Method Blank	Total/NA Total/NA	Water Water	8260B SIM 8260B SIM	Prep Batch

Lab Sample ID: 240-108813-1

Matrix: Water

Client Sample ID: MW-183S-030119 Date Collected: 03/01/19 09:50 Date Received: 03/02/19 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	370116	03/04/19 16:12	LEE	TAL CAN
Total/NA	Analysis	8260B SIM		1	370124	03/04/19 18:24	SAM	TAL CAN

Laboratory References:

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

Client: ARCADIS U.S., Inc. Project/Site: Ford LTP Livonia MI - E203631 TestAmerica Job ID: 240-108813-1

Laboratory: TestAmerica Canton

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

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

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

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COOLANT: Wet Ice Blue Ice Dry Ice Water None	
1. Cooler temperature upon receipt	
IR GUN# IR-8 (CF -0.2 °C) Observed Cooler Temp. (), 6 °C Corrected IR GUN #36 (CF +0.7°C) Observed Cooler Temp. °C Corrected C	Cooler Temp°C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity	/ Yes No Yes No NA
-Were the seals on the outside of the cooler(s) signed & dated? -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes No
-Were tamper/custody seals on the bothe(s) of bothe kits (LEFIg/Merig)?	Yes No NA
 Shippers' packing slip attached to the cooler(s)? 	Yes No
 Shipper's packing sip attached to the coole((s)). Did custody papers accompany the sample(s)? 	(Ves No
5. Were the custody papers relinquished & signed in the appropriate place?	Yes No Tests that are not checked for pH by
6. Was/were the person(s) who collected the samples clearly identified on the CO	C? (Yes) No Receiving:
7. Did all bottles arrive in good condition (Unbroken)?	Yes No
8. Could all bottle labels be reconciled with the COC?	Yes No VOAs
9. Were correct bottle(s) used for the test(s) indicated?	Yes No Oil and Grease TOC
10. Sufficient quantity received to perform indicated analyses?	Yes No
11. Are these work share samples?	Yes No
If yes, Questions 12-16 have been checked at the originating laboratory.	Ver Ne AN HOUSE Let HOPELEDE
12. Were all preserved sample(s) at the correct pH upon receipt?13. Were VOAs on the COC?	Yes No NA pH Strip Lot# <u>HC861525</u> Yes No
14. Were air bubbles >6 mm in any VOA vials? Larger than this.	Yes No NA
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #	Yes No
16. Was a LL Hg or Me Hg trip blank present?	Yes No
Contacted PM Date by via	Verbal Voice Mail Other
Concerning	
	Complete processed how
17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES	Samples processed by:
18. SAMPLE CONDITION	
Sample(s) were received after the recomme	nded holding time had expired.
Sample(s) wer	re received in a broken container.
Sample(s) were received with bubbl	e >6 mm in diameter. (Notify PM)
19. SAMPLE PRESERVATION	
Sample(a)	were further preserved in the laboratory
Sample(s) Time preserved:Preservative(s) added/Lot number(s):	in the factor of the fac
VOA Sample Preservation - Date/Time VOAs Frozen:	



March 05, 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: 108813-1 Sample date: 2019-03-01 Report received by CADENA: 2019-03-05 Initial Data Verification completed by CADENA: 2019-03-05

There were no significant QC anomalies or exceptions to report.

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

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

SAMPLING AND ANALYSIS SUMMARY

CADENA Project ID: E203631 Laboratory: TestAmerica-North Canton Laboratory Submittal: 108813-1

		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
2401088131	MW-183S-030119	3/1/2019	9:50:00	х	Х	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631 Laboratory: TestAmerica - North Canton Laboratory Submittal: 108813-1

		Sample Name: Lab Sample ID: Sample Date:	MW-183 2401088 3/1/201	3131	19	
				Report		Valid
	Analyte	Cas No.	Result	Limit	Units	Qualifier
GC/MS VOC						
<u>OSW-8260</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	
<u>OSW-8260</u>	<u>OBBSim</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 #240-108813-1 CADENA Verification Report: 2019-03-05

Analyses Performed By: TestAmerica Canton, Ohio

Report #31983R Review Level: Tier II/Plus Project: MI001454.0003.00002

SUMMARY

This data quality assessment/verification summarizes the confirmation of detected compounds (if applicable), review of the verification/Tier II validation review performed by CADENA Inc. and review of level II laboratory data package completeness for Sample Delivery Group (SDG) # 240-108813-1 for samples collected in association with the Ford – Livonia, Michigan site. Only detected compound confirmations and omitted deviations from the CADENA verification/Tier II report are documented in this report. The Tier II/Plus validation is performed in the instance when a sample location has a detection at a concentration of 5 ppb or less. The detection and the concentration are reviewed and verified based on the instrument calibration and laboratory raw data. Only analytical data associated with constituents of concern were reviewed for this verification. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

				Sample	Parent		Analysis	
SDG	Sample ID	Lab ID	Matrix	Collection Date	Sample	voc	VOC (SIM)	MISC
240-108813-1	MW-183S-030119	240-108813-1	Water	3/1/2019		Х	Х	

Notes:

VOC = volatile organic compound

SIM = selective ion monitoring

MISC = miscellaneous

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

		Reported		Performance Acceptable		Not
	Items Reviewed	No	Yes	No	Yes	Required
1. 3	Sample receipt condition		Х		Х	
2.	Requested analyses and sample results		Х		Х	
3. I	Master tracking list		Х		Х	
4. I	Methods of analysis		Х		Х	
5. I	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. 3	Sample preparation/extraction/analysis dates		Х		Х	
10.	Fully executed Chain-of-Custody (COC) form		Х		Х	
	Narrative summary of Quality Assurance or sample provided		х		Х	
12.	Data Package Completeness and Compliance		Х		Х	

ORGANIC ANALYSIS INTRODUCTION

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

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

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

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

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

DATA REVIEW

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Calibration

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

1.1 Initial Calibration

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

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

1.2 Continuing Calibration

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

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

2. Compound Identification

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

No compounds were detected in the samples within this SDG.

3. System Performance and Overall Assessment

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

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 8260B/8260B-SIM	Re	ported		ermance eptable	Not	
	No	Yes	No	Yes	Required	
GAS CHROMATOGRAPHY/MASS SPECTROMET	RY (GC/I	MS)		1		
Tier II+ Validation						
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	

Notes:

RT retention time

VERIFICATION/VALIDATION PERFORMED BY: Andrew Korycinski

SIGNATURE:

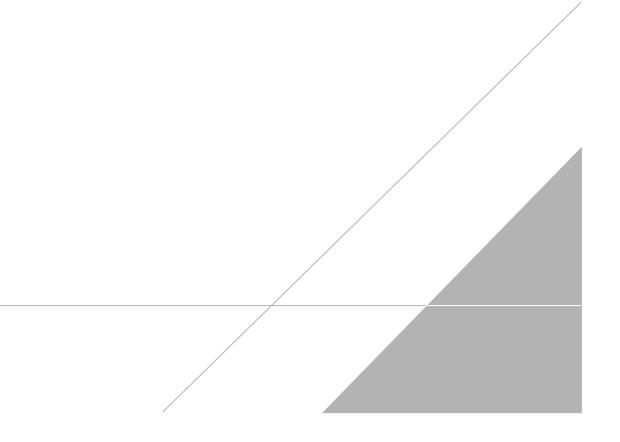
a Kajt

DATE: March 6, 2019

PEER REVIEW: Dennis Capria

DATE: March 6, 2019

CHAIN OF CUSTODY CORRECTED SAMPLE ANALYSIS DATA SHEETS



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3/5/2019

Lab Sample ID: 240-108813-1

Matrix: Water

Client Sample ID: MW-183S-030119 Date Collected: 03/01/19 09:50

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 18:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	80		63 - 125			-		03/04/19 18:24	1
Method: 8260B - Volatile C	organic 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			03/04/19 16:12	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/04/19 16:12	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/04/19 16:12	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/04/19 16:12	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/04/19 16:12	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/04/19 16:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	97		70 - 121			-		03/04/19 16:12	1
4-Bromofluorobenzene (Surr)	69		59 - 120					03/04/19 16:12	1
Toluene-d8 (Surr)	74		70 - 123					03/04/19 16:12	1
Dibromofluoromethane (Surr)	97		75 - 128					03/04/19 16:12	1