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ANALYTICAL REPORT

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

Laboratory Job ID: 240-113559-1
Client Project/Site: Ford LTP Livonia MI - E203631

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

Attn: Kristoffer Hinskey

Authorized for release by:
6/17/2019 4:34:31 PM

Michael DelMonico, Project Manager I
(330)497-9396
michael.delmonico@testamericainc.com

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Definitions/Glossary

Client: ARCADIS U.S., Inc. Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
E	Result exceeded calibration range.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

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

Job ID: 240-113559-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-113559-1

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

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

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

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

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

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

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

RECEIPT

The samples were received on 6/1/2019 9:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 0.8º C, 1.2º C and 1.4º C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Samples SUMP-34940 BEACON-01053019 (240-113559-1) and TRIP BLANK (240-113559-2) were analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 06/12/2019.

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

VOLATILE ORGANIC COMPOUNDS (GCMS SIM)

Sample SUMP-34940 BEACON-01053019 (240-113559-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The samples were analyzed on 06/03/2019.

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

Method Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

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

Protocol References:

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

Laboratory References:

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

Sample Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-113559-1	SUMP-34940 BEACON-01053019	Water	05/30/19 10:43	06/01/19 09:50	
240-113559-2	TRIP BLANK	Water	05/30/19 00:00	06/01/19 09:50	

Detection Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: SUMP-34940 BEACON-01053019
Lab Sample ID: 240-113559-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	1.9		1.0	0.16	ug/L	1		8260B	Total/NA
Vinyl chloride	0.68	J	1.0	0.20	ug/L	1		8260B	Total/NA

Client Sample ID: TRIP BLANK
Lab Sample ID: 240-113559-2

No Detections.

This Detection Summary does not include radiochemical test results.

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

Job ID: 240-113559-1

Client Sample ID: SUMP-34940 BEACON-01053019
Date Collected: 05/30/19 10:43
Date Received: 06/01/19 09:50

Lab Sample ID: 240-113559-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			06/03/19 16:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*111*		*63 - 125*		*06/03/19 16:38*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 16:56	1
cis-1,2-Dichloroethene	**1.9**		1.0	0.16	ug/L			06/12/19 16:56	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			06/12/19 16:56	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 16:56	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			06/12/19 16:56	1
Vinyl chloride	**0.68**	**J**	1.0	0.20	ug/L			06/12/19 16:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*90*		*70 - 121*		*06/12/19 16:56*	*1*
4-Bromofluorobenzene (Surr)	*89*		*59 - 120*		*06/12/19 16:56*	*1*
Toluene-d8 (Surr)	*101*		*70 - 123*		*06/12/19 16:56*	*1*
Dibromofluoromethane (Surr)	*99*		*75 - 128*		*06/12/19 16:56*	*1*

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: TRIP BLANK
Lab Sample ID: 240-113559-2
Date Collected: 05/30/19 00:00
Matrix: Water
Date Received: 06/01/19 09:50

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 17:18	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			06/12/19 17:18	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			06/12/19 17:18	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 17:18	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			06/12/19 17:18	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			06/12/19 17:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*85*		*70 - 121*		*06/12/19 17:18*	*1*
4-Bromofluorobenzene (Surr)	*89*		*59 - 120*		*06/12/19 17:18*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*06/12/19 17:18*	*1*
Dibromofluoromethane (Surr)	*94*		*75 - 128*		*06/12/19 17:18*	*1*

Surrogate Summary

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

Job ID: 240-113559-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(70-121)	(59-120)	(70-123)	(75-128)
190-19868-C-7 MS	Matrix Spike	87	100	110	99
190-19868-C-7 MSD	Matrix Spike Duplicate	84	105	109	96
240-113559-1	SUMP-34940 BEACON-01053019	90	89	101	99
240-113559-2	TRIP BLANK	85	89	98	94
LCS 240-385779/4	Lab Control Sample	88	104	108	99
MB 240-385779/6	Method Blank	91	94	109	100

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)
DBFM = Dibromofluoromethane (Surr)

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

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)
		DCA
Lab Sample ID	Client Sample ID	(63-125)
240-113559-1	SUMP-34940 BEACON-010530	111
240-113559-1 MS	SUMP-34940 BEACON-01053019	105
240-113559-1 MSD	SUMP-34940 BEACON-01053019	112
LCS 240-384199/4	Lab Control Sample	109
MB 240-384199/5	Method Blank	107

Surrogate Legend

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

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

Lab Sample ID: MB 240-385779/6
Matrix: Water
Analysis Batch: 385779

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 11:45	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			06/12/19 11:45	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			06/12/19 11:45	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 11:45	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			06/12/19 11:45	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			06/12/19 11:45	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*91*		*70 - 121*		*06/12/19 11:45*	*1*
4-Bromofluorobenzene (Surr)	*94*		*59 - 120*		*06/12/19 11:45*	*1*
Toluene-d8 (Surr)	*109*		*70 - 123*		*06/12/19 11:45*	*1*
Dibromofluoromethane (Surr)	*100*		*75 - 128*		*06/12/19 11:45*	*1*

Lab Sample ID: LCS 240-385779/4
Matrix: Water
Analysis Batch: 385779

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	10.0	11.0		ug/L		110	65 - 139
cis-1,2-Dichloroethene	10.0	10.9		ug/L		109	76 - 128
Tetrachloroethene	10.0	8.92		ug/L		89	74 - 130
trans-1,2-Dichloroethene	10.0	10.6		ug/L		106	78 - 133
Trichloroethene	10.0	8.92		ug/L		89	76 - 125
Vinyl chloride	10.0	9.68		ug/L		97	58 - 143

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*88*		*70 - 121*
4-Bromofluorobenzene (Surr)	*104*		*59 - 120*
Toluene-d8 (Surr)	*108*		*70 - 123*
Dibromofluoromethane (Surr)	*99*		*75 - 128*

Lab Sample ID: 190-19868-C-7 MS
Matrix: Water
Analysis Batch: 385779

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	10	U	100	96.2		ug/L		96	53 - 140
cis-1,2-Dichloroethene	320		100	417	E	ug/L		100	64 - 130
Tetrachloroethene	10	U F2	100	68.7		ug/L		69	51 - 136
trans-1,2-Dichloroethene	67		100	165		ug/L		99	68 - 133
Trichloroethene	530	E	100	592	E 4	ug/L		58	55 - 131
Vinyl chloride	10	U	100	107		ug/L		107	43 - 154

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*87*		*70 - 121*
4-Bromofluorobenzene (Surr)	*100*		*59 - 120*
Toluene-d8 (Surr)	*110*		*70 - 123*

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

Lab Sample ID: 190-19868-C-7 MS
Matrix: Water
Analysis Batch: 385779

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

Surrogate	MS %Recovery	MS Qualifier	Limits
Dibromofluoromethane (Surr)	*99*		*75 - 128*

Lab Sample ID: 190-19868-C-7 MSD
Matrix: Water
Analysis Batch: 385779

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	10	U	100	105		ug/L		105	53 - 140	9	35
cis-1,2-Dichloroethene	320		100	408	E	ug/L		91	64 - 130	2	21
Tetrachloroethene	10	U F2	100	89.8	F2	ug/L		90	51 - 136	27	23
trans-1,2-Dichloroethene	67		100	164		ug/L		97	68 - 133	1	24
Trichloroethene	530	E	100	599	E 4	ug/L		65	55 - 131	1	23
Vinyl chloride	10	U	100	108		ug/L		108	43 - 154	0	29

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*84*		*70 - 121*
4-Bromofluorobenzene (Surr)	*105*		*59 - 120*
Toluene-d8 (Surr)	*109*		*70 - 123*
Dibromofluoromethane (Surr)	*96*		*75 - 128*

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

Lab Sample ID: MB 240-384199/5
Matrix: Water
Analysis Batch: 384199

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			06/03/19 12:27	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	*107*		*63 - 125*		*06/03/19 12:27*	*1*

Lab Sample ID: LCS 240-384199/4
Matrix: Water
Analysis Batch: 384199

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dioxane	10.0	11.0		ug/L		110	59 - 131

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*109*		*63 - 125*

Lab Sample ID: 240-113559-1 MS
Matrix: Water
Analysis Batch: 384199

Client Sample ID: SUMP-34940 BEACON-01053019
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dioxane	2.0	U	10.0	11.1		ug/L		111	52 - 129

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

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*105*		*63 - 125*

Lab Sample ID: 240-113559-1 MSD
Client Sample ID: SUMP-34940 BEACON-01053019
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 384199

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dioxane	2.0	U	10.0	12.1		ug/L		121	52 - 129	9	13

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*112*		*63 - 125*

QC Association Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

GC/MS VOA

Analysis Batch: 384199

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-113559-1	SUMP-34940 BEACON-01053019	Total/NA	Water	8260B SIM	
MB 240-384199/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-384199/4	Lab Control Sample	Total/NA	Water	8260B SIM	
240-113559-1 MS	SUMP-34940 BEACON-01053019	Total/NA	Water	8260B SIM	
240-113559-1 MSD	SUMP-34940 BEACON-01053019	Total/NA	Water	8260B SIM	

Analysis Batch: 385779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-113559-1	SUMP-34940 BEACON-01053019	Total/NA	Water	8260B	
240-113559-2	TRIP BLANK	Total/NA	Water	8260B	
MB 240-385779/6	Method Blank	Total/NA	Water	8260B	
LCS 240-385779/4	Lab Control Sample	Total/NA	Water	8260B	
190-19868-C-7 MS	Matrix Spike	Total/NA	Water	8260B	
190-19868-C-7 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	

Lab Chronicle

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: SUMP-34940 BEACON-01053019
Lab Sample ID: 240-113559-1

Date Collected: 05/30/19 10:43
Matrix: Water
Date Received: 06/01/19 09:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	385779	06/12/19 16:56	LEE	TAL CAN
Total/NA	Analysis	8260B SIM		1	384199	06/03/19 16:38	SAM	TAL CAN

Client Sample ID: TRIP BLANK
Lab Sample ID: 240-113559-2

Date Collected: 05/30/19 00:00
Matrix: Water
Date Received: 06/01/19 09:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	385779	06/12/19 17:18	LEE	TAL CAN

Laboratory References:

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

Accreditation/Certification Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Laboratory: Eurofins TestAmerica, Canton

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

Authority	Program	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 *
Iowa	State Program	7	421	06-01-21
Kansas	NELAP	7	E-10336	04-30-20
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	03-31-20
Ohio VAP	State Program	5	CL0024	06-05-21
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.

MICHIGAN 190

1.4/C1.2 1.6/C1.4
1.0/C0.8

Chain of Custody Record

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other

TestAmerica Laboratories, Inc.

Client Contact	Client Project Manager: Kris Hinskey	Site Contact: Angela DeGrandis	Lab Contact: Mike DelMonico	COC No:
Company Name: Arcadis				
Address: 28550 Cabot Drive, Suite 500	Telephone: 248-994-2240	Telephone: 734-320-0065	Telephone: 330-497-9396	of COCs
City/State/Zip: Novi, MI, 48377	Email: kristoffer.hinskey@arcadis.com	Analysis Turnaround Time	Analyses	For lab use only
Phone: 248-994-2240		TAT if different from below		Walk-in client
Project Name: Ford LTP		☐ 3 weeks ☐ 2 weeks 5 Day ☑ 1 week ☐ 2 days ☐ 1 day		Lab sampling
Project Number: MI001454.0003	Method of Shipment/Carrier:			Job/SDG No:
PO # MI001454.0003	Shipping/Tracking No:			

Sample Identification	Sample Date	Sample Time	Matrix: Air	Aqueous	Sediment	Solid	Other:	Containers & Preservatives: H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Unpres	Other:	Filtered Sample (Y/N)	Composite=C / Grab=G	1,1-DCE 8260B	cis-1,2-DCE 8260B	Trans-1,2-DCE 8260B	PCE 8260B	TCE 8260B	Vinyl Chloride 8260B	1,4-Dioxane 8260B SIM	Sample Specific Notes / Special Instructions:
SUMP-34940 BEACON-01_053019	5/30/19	1043		X						X					N	G	X	X	X	X	X	X	X	6 containers
Trip Blank	5/30/19	—		X						X					—	—	—	—	—	—	—	—	—	Trip Blank

240-113559 Chain of Custody

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal By Lab ☐ Archive For ____ Months

Special Instructions/QC Requirements & Comments:

Submit all results through Cadena at jim.tomalia@cadena.com. Cadena #E203631
Level IV Reporting.

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Arcadis	5/30/19 1400	Novi cold Storage	Arcadis	5/30/19 1400
Relinquished by: Adam Richmond	Company: ARCADIS	Date/Time: 5/31/19 1025	Received by:	Company: ETA	Date/Time: 5-31-19 1030
Relinquished by:	Company: ETA	Date/Time: 5-31-19 1443	Received in Laboratory by:	Company: ETA	Date/Time: 6-1-19 950

TestAmerica Canton Sample Receipt Form/Narrative **Login # : 113559**
Canton Facility

Client _____ Site Name _____ Cooler unpacked by: Ryan Cribley

Cooler Received on 6-1-19 Opened on 6-1-19 950

FedEx: 1st Grd (Exp) UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____

Receipt After-hours: Drop-off Date/Time _____ Storage Location _____

TestAmerica Cooler # TA Foam Box Client Cooler Box Other _____

Packing material used: (Bubble Wrap) (Foam) (Plastic Bag) None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt — See Multiple Cooler Form
   IR GUN# IR-8 (CF **-0.2** °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #36 (CF **+0.7**°C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 3 total — (Yes) No
   -Were the seals on the outside of the cooler(s) signed & dated? (Yes) No NA
   -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes (No)
   -Were tamper/custody seals intact and uncompromised? (Yes) No NA
3. Shippers' packing slip attached to the cooler(s)? (Yes) No
4. Did custody papers accompany the sample(s)? (Yes) No
5. Were the custody papers relinquished & signed in the appropriate place? (Yes) No
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes (No)
7. Did all bottles arrive in good condition (Unbroken)? (Yes) No
8. Could all bottle labels be reconciled with the COC? (Yes) No
9. Were correct bottle(s) used for the test(s) indicated? (Yes) No
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.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No (NA) pH Strip Lot# **HC984738**
13. Were VOAs on the COC? (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)

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: Ryan

18. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) Trip Blank were received with bubble >6 mm in diameter. (Notify PM)

19. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.
Time preserved: _____ Preservative(s) added/Lot number(s): _____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

Login # : 113559

TestAmerica Canton Sample Receipt Multiple Cooler Form

Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
TA (circled) Client Box Other	IR-8 (circled) #36	1.4	1.2	Wet Ice (circled) Blue Ice Dry Ice Water None
TA (circled) Client Box Other	IR-8 (circled) #36	1.0	0.8	Wet Ice (circled) Blue Ice Dry Ice Water None
TA (circled) Client Box Other	IR-8 (circled) #36	1.6	1.4	Wet Ice (circled) Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-8 #36			Wet Ice Blue Ice Dry Ice Water None

☐ See Temperature Excursion Form

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

DATA VERIFICATION REPORT

June 17, 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
Event Specific Scope of Work References: Sample COC
Laboratory: TestAmerica - North Canton
Laboratory submittal: 113559-1
Sample date: 2019-05-30
Report received by CADENA: 2019-06-17
Initial Data Verification completed by CADENA: 2019-06-17
Number of Samples:2
Sample Matrices: Water
Test Categories: GCMS VOC
Please see attached criteria report or sample result/qualified analytical result summary for qualifier flags assigned to sample data.

The following minor QC exceptions or missing information were noted:

> GCMS VOC QC batch MS/MSD recovery outliers or RPD outliers were not determined using a client sample so qualification was not required based on these sample-specific QC outliers.

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

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

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.
B	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: 113559-1

Lab Sample ID	Sample ID	Collection Date (mm/yy/dd)	Collection Time (hh:mm:ss)	Volatile Organics by GCMS	8260B with Single Ion Monitoring	Comment
2401135591	SUMP-34940 BEACON-01053019	5/30/2019	10:43:00	X	X	
2401135592	TRIP BLANK	5/30/2019	12:00:00	X		

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631
Laboratory: TestAmerica - North Canton
Laboratory Submittal: 113559-1

		Sample Name:	SUMP-34940 BEACON-01053019				TRIP BLANK			
		Lab Sample ID:	2401135591				2401135592			
		Sample Date:	5/30/2019				5/30/2019			
Analyte	Cas No.	Result	Report Limit	Units	Valid Qualifier	Result	Report Limit	Units	Valid Qualifier
GC/MS VOC									
OSW-8260B									
1,1-Dichloroethene	75-35-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---
cis-1,2-Dichloroethene	156-59-2	1.9	1.0	ug/l	---	ND	1.0	ug/l	---
Tetrachloroethene	127-18-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---
trans-1,2-Dichloroethene	156-60-5	ND	1.0	ug/l	---	ND	1.0	ug/l	---
Trichloroethene	79-01-6	ND	1.0	ug/l	---	ND	1.0	ug/l	---
Vinyl chloride	75-01-4	0.68	1.0	ug/l	J	ND	1.0	ug/l	---
OSW-8260BBSim									
1,4-Dioxane	123-91-1	ND	2.0	ug/l	---				

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

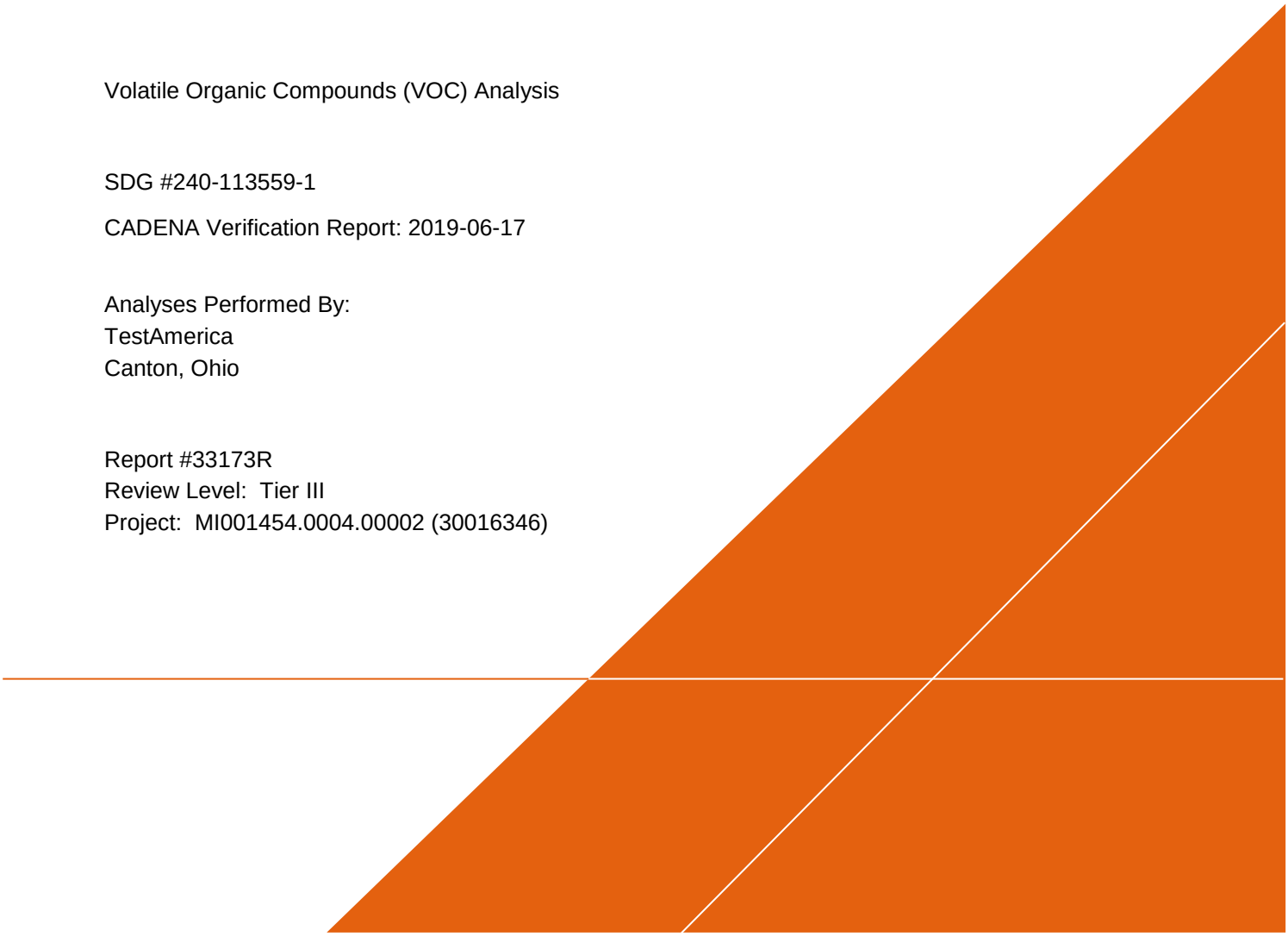
Volatile Organic Compounds (VOC) Analysis

SDG #240-113559-1

CADENA Verification Report: 2019-06-17

Analyses Performed By:
TestAmerica
Canton, Ohio

Report #33173R
Review Level: Tier III
Project: MI001454.0004.00002 (30016346)



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-113559-1 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:

SDG	Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
						VOC (Full Scan)	VOC (SIM)	MISC
240-113559-1	SUMP-34940 BEACON-01053019	240-113559-1	Water	5/30/2019		X	X	
	TRIP BLANK	240-113559-2	Water	5/30/2019		X		

DATA REVIEW

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

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

DATA REVIEW

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. 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.

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.

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

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Andrew Korycinski

SIGNATURE: 

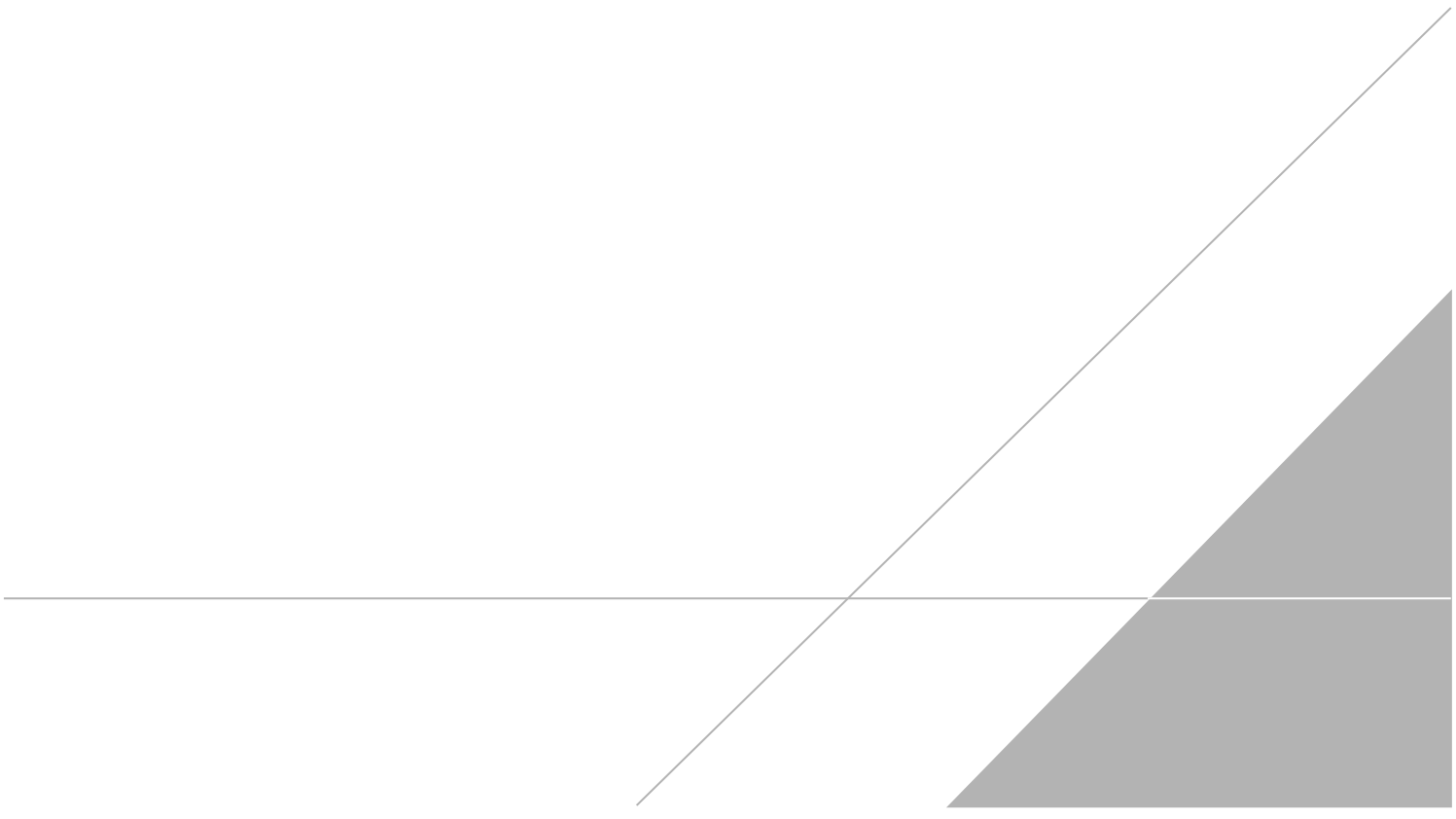
DATE: August 6, 2019

PEER REVIEW: Dennis Capria

DATE: August 7, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



MICHIGAN 190

1.4/C1.2 1.6/C1.4
1.0/C0.8

Chain of Custody Record

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other

TestAmerica Laboratories, Inc.

Client Contact	Client Project Manager: Kris Hinskey	Site Contact: Angela DeGrandis	Lab Contact: Mike DelMonico	COC No:
Company Name: Arcadis				
Address: 28550 Cabot Drive, Suite 500	Telephone: 248-994-2240	Telephone: 734-320-0065	Telephone: 330-497-9396	of COCs
City/State/Zip: Novi, MI, 48377	Email: kristoffer.hinskey@arcadis.com	Analysis Turnaround Time	Analyses	For lab use only
Phone: 248-994-2240		TAT if different from below		Walk-in client
Project Name: Ford LTP		☐ 3 weeks ☐ 2 weeks 5 Day ☑ 1 week ☐ 2 days ☐ 1 day		Lab sampling
Project Number: MI001454.0003	Method of Shipment/Carrier:			Job/SDG No:
PO # MI001454.0003	Shipping/Tracking No:			

Sample Identification	Sample Date	Sample Time	Matrix: Air	Aqueous	Sediment	Solid	Other:	Containers & Preservatives: H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Unpres	Other:	Filtered Sample (Y/N)	Composite=C / Grab=G	1,1-DCE 8260B	cis-1,2-DCE 8260B	Trans-1,2-DCE 8260B	PCE 8260B	TCE 8260B	Vinyl Chloride 8260B	1,4-Dioxane 8260B SIM	Sample Specific Notes / Special Instructions:
SUMP-34940 BEACON-01_053019	5/30/19	1043		X						X					N	G	X	X	X	X	X	X	X	6 containers
Trip Blank	5/30/19	—		X						X					—	—	—	—	—	—	—	—	—	Trip Blank

240-113559 Chain of Custody

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal By Lab ☐ Archive For ____ Months

Special Instructions/QC Requirements & Comments:

Submit all results through Cadena at jim.tomalia@cadena.com. Cadena #E203631
Level IV Reporting.

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Arcadis	5/30/19 1400	Novi cold Storage	Arcadis	5/30/19 1400
Relinquished by: Adam Richmond	Company: ARCADIS	Date/Time: 5/31/19 1025	Received by:	Company: ETA	Date/Time: 5-31-19 1030
Relinquished by:	Company: ETA	Date/Time: 5-31-19 1443	Received in Laboratory by:	Company: ETA	Date/Time: 6-1-19 950

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

Job ID: 240-113559-1

Client Sample ID: SUMP-34940 BEACON-01053019
Date Collected: 05/30/19 10:43
Date Received: 06/01/19 09:50

Lab Sample ID: 240-113559-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	2.0	U	2.0	0.86	ug/L			06/03/19 16:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*111*		*63 - 125*		*06/03/19 16:38*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 16:56	1
cis-1,2-Dichloroethene	**1.9**		1.0	0.16	ug/L			06/12/19 16:56	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			06/12/19 16:56	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 16:56	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			06/12/19 16:56	1
Vinyl chloride	**0.68**	**J**	1.0	0.20	ug/L			06/12/19 16:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*90*		*70 - 121*		*06/12/19 16:56*	*1*
4-Bromofluorobenzene (Surr)	*89*		*59 - 120*		*06/12/19 16:56*	*1*
Toluene-d8 (Surr)	*101*		*70 - 123*		*06/12/19 16:56*	*1*
Dibromofluoromethane (Surr)	*99*		*75 - 128*		*06/12/19 16:56*	*1*

Client: ARCADIS U.S., Inc.
Job ID: 240-113559-1
Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: TRIP BLANK
Lab Sample ID: 240-113559-2
Date Collected: 05/30/19 00:00
Matrix: Water
Date Received: 06/01/19 09:50

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 17:18	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			06/12/19 17:18	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			06/12/19 17:18	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			06/12/19 17:18	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			06/12/19 17:18	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			06/12/19 17:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*85*		*70 - 121*		*06/12/19 17:18*	*1*
4-Bromofluorobenzene (Surr)	*89*		*59 - 120*		*06/12/19 17:18*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*06/12/19 17:18*	*1*
Dibromofluoromethane (Surr)	*94*		*75 - 128*		*06/12/19 17:18*	*1*

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6/7/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP Off-Site Sampling
Project #: MI001454.0003
Workorder #: 1906008

Dear Mr. Jim Tomalia

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

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WORK ORDER #: 1906008

Work Order Summary

CLIENT:	Mr. Jim Tomalia Arcadis U.S., Inc. 28550 Cabot Dr. Suite 500 Novi, MI 48377	**BILL TO:**	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	517-819-0356	**P.O. #**	MI001454.0003.00002
FAX:		**PROJECT #**	MI001454.0003 Ford LTP Off-Site Sampling
DATE RECEIVED:	06/03/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	06/07/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA-34940BEACON-01_052919	Modified TO-15	7.0 "Hg	5 psi
02A	IAB-34940BEACON-02_052919	Modified TO-15	4.5 "Hg	5 psi
03A	IAF-34940BEACON-01_052919	Modified TO-15	7.0 "Hg	5 psi
04A	IAG-34940BEACON-03_052919	Modified TO-15	7.5 "Hg	5 psi
05A	DUP-34940BEACON-01_052919	Modified TO-15	8.5 "Hg	5 psi
06A	Lab Blank	Modified TO-15	NA	NA
07A	CCV	Modified TO-15	NA	NA
08A	LCS	Modified TO-15	NA	NA
08AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 06/07/19

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

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
Arcadis U.S., Inc.
Workorder# 1906008

Five 6 Liter Summa Canister (100% Cert Ambient) samples were received on June 03, 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	</=30% RSD with 2 compounds allowed out to < 40% RSD	</=30% RSD with 4 compounds allowed out to < 40% RSD
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 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

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	AA-34940BEACON-01_052919		
Lab ID:	1906008-01A	**Date/Time Analyzed:**	6/4/19 08:53 PM
Date/Time Collected:	5/30/19 10:36 AM	**Dilution Factor:**	1.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060415

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.083	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.094	0.32	0.63	1.3
cis-1,2-Dichloroethene	156-59-2	0.077	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.084	0.59	1.2	0.24 J
trans-1,2-Dichloroethene	156-60-5	0.054	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.13	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.035	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	115
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	101

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	IAB-34940BEACON-02_052919		
Lab ID:	1906008-02A	**Date/Time Analyzed:**	6/4/19 09:29 PM
Date/Time Collected:	5/30/19 10:43 AM	**Dilution Factor:**	1.58
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060416

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.075	0.31	0.63	Not Detected
1,4-Dioxane	123-91-1	0.085	0.28	0.57	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.070	0.31	0.63	Not Detected
Tetrachloroethene	127-18-4	0.076	0.54	1.1	0.39 J
trans-1,2-Dichloroethene	156-60-5	0.049	0.31	0.63	Not Detected
Trichloroethene	79-01-6	0.12	0.42	0.85	Not Detected
Vinyl Chloride	75-01-4	0.032	0.20	0.40	0.19 J

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	115
4-Bromofluorobenzene	460-00-4	70-130	90
Toluene-d8	2037-26-5	70-130	97

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	IAF-34940BEACON-01_052919		
Lab ID:	1906008-03A	**Date/Time Analyzed:**	6/4/19 10:05 PM
Date/Time Collected:	5/30/19 10:40 AM	**Dilution Factor:**	1.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060417

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.083	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.094	0.32	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.077	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.084	0.59	1.2	0.30 J
trans-1,2-Dichloroethene	156-60-5	0.054	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.13	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.035	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	118
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	97

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	IAG-34940BEACON-03_052919		
Lab ID:	1906008-04A	**Date/Time Analyzed:**	6/4/19 10:40 PM
Date/Time Collected:	5/30/19 11:28 AM	**Dilution Factor:**	1.79
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060418

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.085	0.35	0.71	Not Detected
1,4-Dioxane	123-91-1	0.096	0.32	0.64	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.079	0.35	0.71	Not Detected
Tetrachloroethene	127-18-4	0.086	0.61	1.2	0.25 J
trans-1,2-Dichloroethene	156-60-5	0.055	0.35	0.71	Not Detected
Trichloroethene	79-01-6	0.13	0.48	0.96	Not Detected
Vinyl Chloride	75-01-4	0.036	0.23	0.46	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	105
4-Bromofluorobenzene	460-00-4	70-130	98
Toluene-d8	2037-26-5	70-130	96

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	DUP-34940BEACON-01_052919		
Lab ID:	1906008-05A	**Date/Time Analyzed:**	6/4/19 11:16 PM
Date/Time Collected:	5/30/19 12:00 AM	**Dilution Factor:**	1.87
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060419

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.089	0.37	0.74	Not Detected
1,4-Dioxane	123-91-1	0.10	0.34	0.67	0.30 J
cis-1,2-Dichloroethene	156-59-2	0.082	0.37	0.74	Not Detected
Tetrachloroethene	127-18-4	0.089	0.63	1.3	0.41 J
trans-1,2-Dichloroethene	156-60-5	0.058	0.37	0.74	Not Detected
Trichloroethene	79-01-6	0.14	0.50	1.0	Not Detected
Vinyl Chloride	75-01-4	0.038	0.24	0.48	0.19 J

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	113
4-Bromofluorobenzene	460-00-4	70-130	89
Toluene-d8	2037-26-5	70-130	95

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	Lab Blank		
Lab ID:	1906008-06A	**Date/Time Analyzed:**	6/4/19 02:25 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21060408c

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.047	0.20	0.40	Not Detected
1,4-Dioxane	123-91-1	0.054	0.18	0.36	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.044	0.20	0.40	Not Detected
Tetrachloroethene	127-18-4	0.048	0.34	0.68	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.031	0.20	0.40	Not Detected
Trichloroethene	79-01-6	0.074	0.27	0.54	Not Detected
Vinyl Chloride	75-01-4	0.020	0.13	0.26	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	115
4-Bromofluorobenzene	460-00-4	70-130	94
Toluene-d8	2037-26-5	70-130	97

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	CCV		
Lab ID:	1906008-07A	**Date/Time Analyzed:**	6/4/19 09:06 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21060402

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	92
1,4-Dioxane	123-91-1	100
cis-1,2-Dichloroethene	156-59-2	97
Tetrachloroethene	127-18-4	104
trans-1,2-Dichloroethene	156-60-5	95
Trichloroethene	79-01-6	97
Vinyl Chloride	75-01-4	93

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	101
Toluene-d8	2037-26-5	70-130	103

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	LCS		
Lab ID:	1906008-08A	**Date/Time Analyzed:**	6/4/19 09:46 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21060403

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	91
1,4-Dioxane	123-91-1	104
cis-1,2-Dichloroethene	156-59-2	102
Tetrachloroethene	127-18-4	104
trans-1,2-Dichloroethene	156-60-5	80
Trichloroethene	79-01-6	95
Vinyl Chloride	75-01-4	94

D: Analyte not within the DoD scope of accreditation.

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

* % Recovery is calculated using unrounded analytical results.

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	LCSD		
Lab ID:	1906008-08AA	**Date/Time Analyzed:**	6/4/19 11:57 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21060406

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	96
1,4-Dioxane	123-91-1	107
cis-1,2-Dichloroethene	156-59-2	109
Tetrachloroethene	127-18-4	100
trans-1,2-Dichloroethene	156-60-5	84
Trichloroethene	79-01-6	97
Vinyl Chloride	75-01-4	98

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	103
4-Bromofluorobenzene	460-00-4	70-130	99
Toluene-d8	2037-26-5	70-130	100

* % Recovery is calculated using unrounded analytical results.

June 9, 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: 1906008
Sample date: 2019-05-30
Report received by CADENA: 2019-06-07
Initial Data Verification completed by CADENA: 2019-06-09

5 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 Valid Qualifiers

Valid Qualifiers	Description
<	Less than the reported concentration.
>	Greater than the reported concentration.
B	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.

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

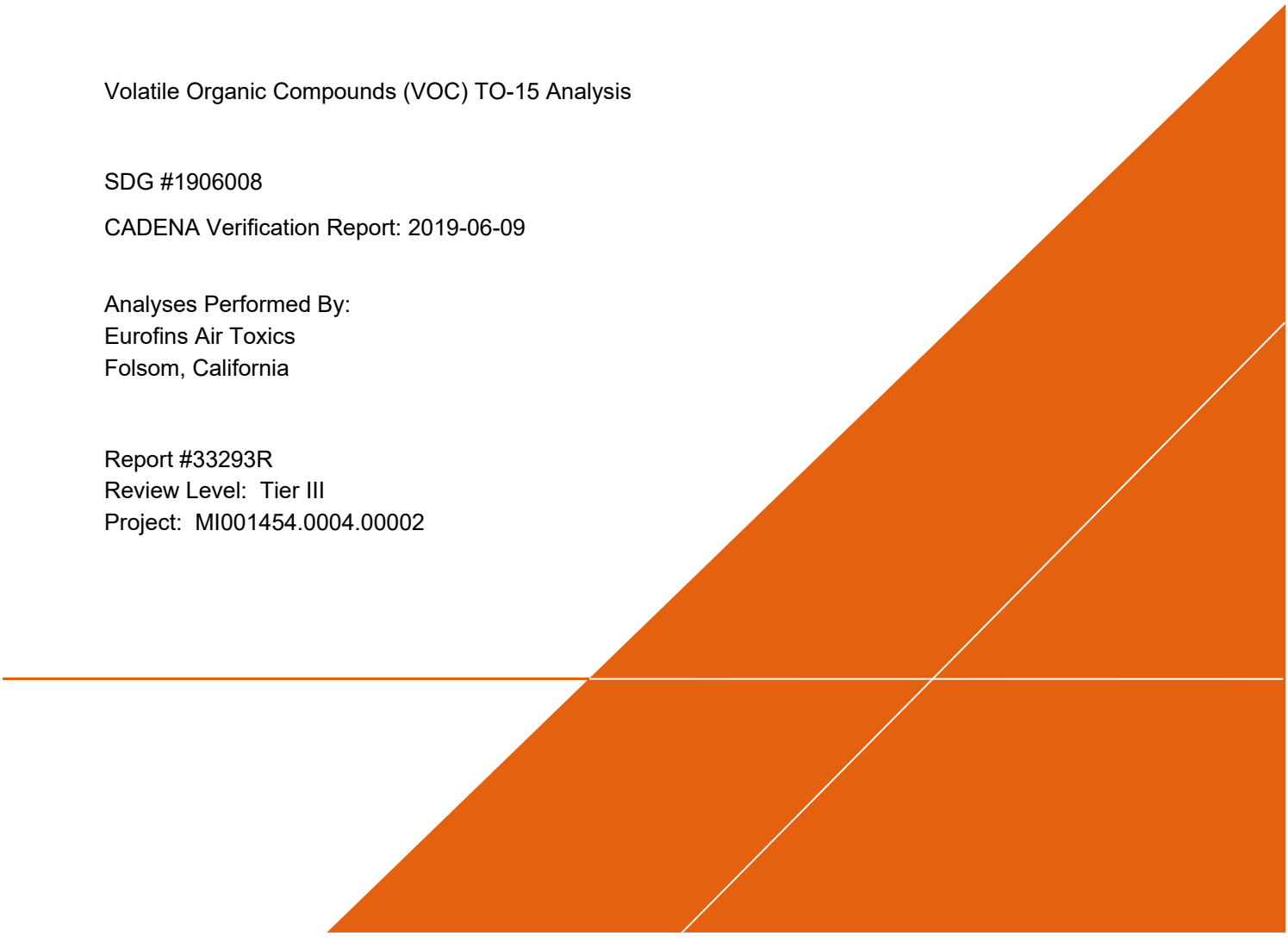
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1906008

CADENA Verification Report: 2019-06-09

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #33293R
Review Level: Tier III
Project: MI001454.0004.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1906008 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:

SDG	Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
						TO-15 (Full Scan)	TO-15 (SIM)	MISC
1906008	AA-34940BEACON-01_052919	1906008-01A	Air	5/30/2019		X		
	IAB-34940BEACON-02_052919	1906008-02A	Air	5/30/2019		X		
	IAF-34940BEACON-01_052919	1906008-03A	Air	5/30/2019		X		
	IAG-34940BEACON-03_052919	1906008-04A	Air	5/30/2019		X		
	DUP-34940BEACON-01_052919	1906008-05A	Air	5/30/2019	IAB-34940BEACON-02_052919	X		

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

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

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 ensure 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.

DATA REVIEW

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. Field Duplicate Sample Analysis

The field duplicate analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 35% for air matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are not greater than five times the RL, a control limit of one times the RL is applied to the difference between the duplicate sample results.

Results (in µg/m^3) for the field duplicate samples are summarized in the following table.

Sample ID / Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
IAB-34940BEACON-02_052919/ DUP-34940BEACON-01_052919	1,4-Dioxane	0.57 U	0.30 J	AC
	Tetrachloroethene	0.39 J	0.41 J	AC
	Vinyl Chloride	0.19 J	0.19 J	AC

Notes:
AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

7. 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		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Canister return pressure (<-2"Hg)		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Field Duplicate Sample RPD		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

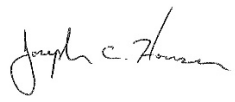
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

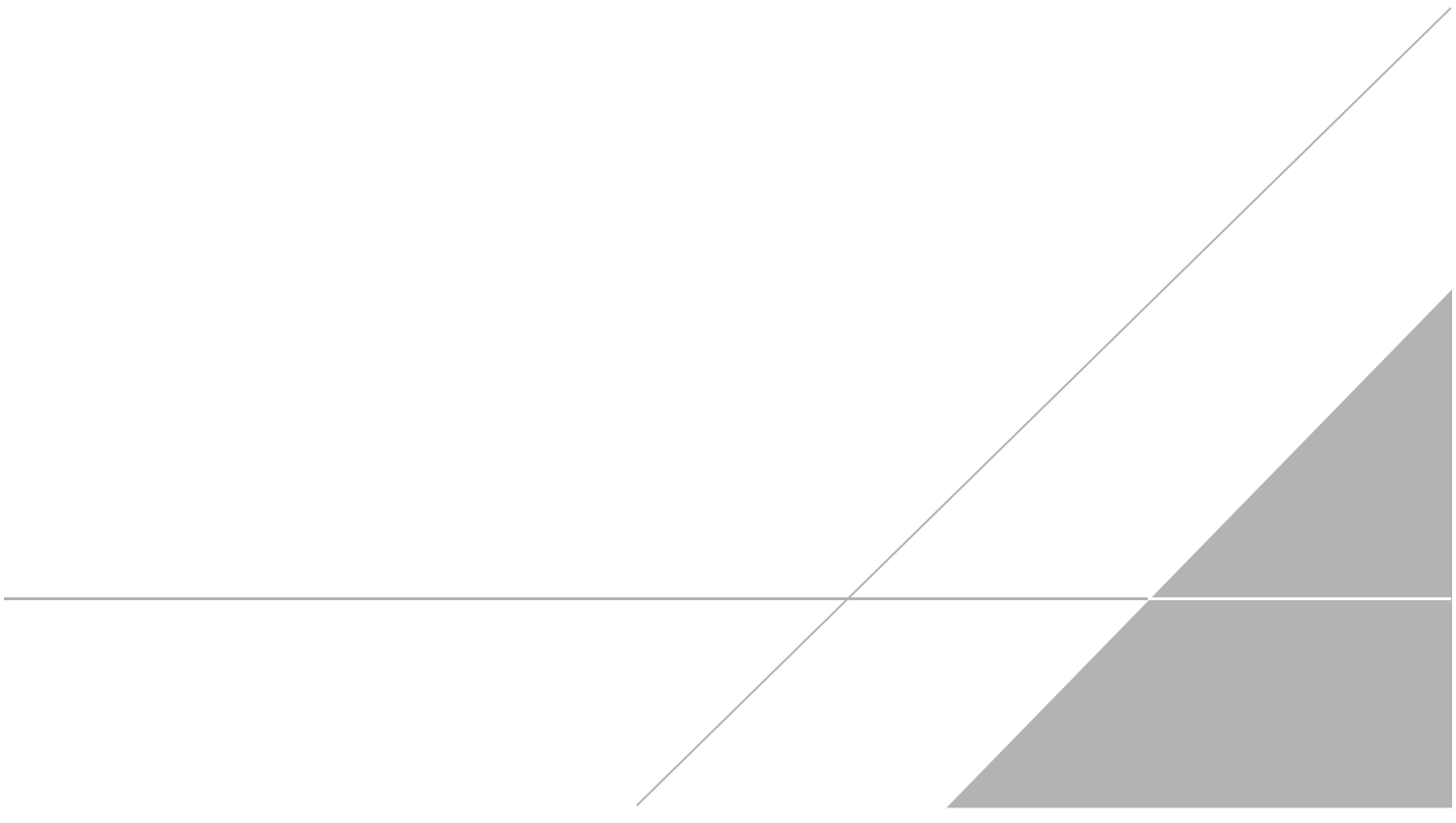
DATE: June 28, 2019

PEER REVIEW: Dennis Capria

DATE: July 1, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	AA-34940BEACON-01_052919		
Lab ID:	1906008-01A	**Date/Time Analyzed:**	6/4/19 08:53 PM
Date/Time Collected:	5/30/19 10:36 AM	**Dilution Factor:**	1.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060415

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.083	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.094	0.32	0.63	1.3
cis-1,2-Dichloroethene	156-59-2	0.077	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.084	0.59	1.2	0.24 J
trans-1,2-Dichloroethene	156-60-5	0.054	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.13	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.035	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	115
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	101

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	IAB-34940BEACON-02_052919		
Lab ID:	1906008-02A	**Date/Time Analyzed:**	6/4/19 09:29 PM
Date/Time Collected:	5/30/19 10:43 AM	**Dilution Factor:**	1.58
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060416

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.075	0.31	0.63	Not Detected
1,4-Dioxane	123-91-1	0.085	0.28	0.57	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.070	0.31	0.63	Not Detected
Tetrachloroethene	127-18-4	0.076	0.54	1.1	0.39 J
trans-1,2-Dichloroethene	156-60-5	0.049	0.31	0.63	Not Detected
Trichloroethene	79-01-6	0.12	0.42	0.85	Not Detected
Vinyl Chloride	75-01-4	0.032	0.20	0.40	0.19 J

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	115
4-Bromofluorobenzene	460-00-4	70-130	90
Toluene-d8	2037-26-5	70-130	97

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	IAF-34940BEACON-01_052919		
Lab ID:	1906008-03A	**Date/Time Analyzed:**	6/4/19 10:05 PM
Date/Time Collected:	5/30/19 10:40 AM	**Dilution Factor:**	1.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060417

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.083	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.094	0.32	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.077	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.084	0.59	1.2	0.30 J
trans-1,2-Dichloroethene	156-60-5	0.054	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.13	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.035	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	118
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	97

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	IAG-34940BEACON-03_052919		
Lab ID:	1906008-04A	**Date/Time Analyzed:**	6/4/19 10:40 PM
Date/Time Collected:	5/30/19 11:28 AM	**Dilution Factor:**	1.79
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060418

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.085	0.35	0.71	Not Detected
1,4-Dioxane	123-91-1	0.096	0.32	0.64	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.079	0.35	0.71	Not Detected
Tetrachloroethene	127-18-4	0.086	0.61	1.2	0.25 J
trans-1,2-Dichloroethene	156-60-5	0.055	0.35	0.71	Not Detected
Trichloroethene	79-01-6	0.13	0.48	0.96	Not Detected
Vinyl Chloride	75-01-4	0.036	0.23	0.46	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	105
4-Bromofluorobenzene	460-00-4	70-130	98
Toluene-d8	2037-26-5	70-130	96

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN
Ford LTP Off-Site Sampling

Client ID:	DUP-34940BEACON-01_052919		
Lab ID:	1906008-05A	**Date/Time Analyzed:**	6/4/19 11:16 PM
Date/Time Collected:	5/30/19 12:00 AM	**Dilution Factor:**	1.87
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd21.i / 21060419

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.089	0.37	0.74	Not Detected
1,4-Dioxane	123-91-1	0.10	0.34	0.67	0.30 J
cis-1,2-Dichloroethene	156-59-2	0.082	0.37	0.74	Not Detected
Tetrachloroethene	127-18-4	0.089	0.63	1.3	0.41 J
trans-1,2-Dichloroethene	156-60-5	0.058	0.37	0.74	Not Detected
Trichloroethene	79-01-6	0.14	0.50	1.0	Not Detected
Vinyl Chloride	75-01-4	0.038	0.24	0.48	0.19 J

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	113
4-Bromofluorobenzene	460-00-4	70-130	89
Toluene-d8	2037-26-5	70-130	95

Analysis Request /Canister Chain of Custody

For Laboratory Use Only 1906008

PID: _____ Workerorder#: _____ Page _1_ of _1_

180 Blue Ravine Rd. Suite B, Folsom, CA 95630

Phone (800) 985-5955; Fax (916) 351-8279

Client:	Arcadis	PID:	
Project Name:	Ford LTP Off-Site Sampling		
Project Manager:	Kris Hinskey	P.O.#	MI001454.0003.00002
Sampler:	Shantel Johnson		
Site Name:	34940 BEACON		

Special Instructions/Notes:
Report ONLY: 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, 1,4-Dioxane, PCE, TCE and VC. Submit results through Cadena at jim.tomalia@cadena.com. Cadena #E203631. Level IV Reporting

Turnaround Time (Rush surcharges may apply)

5 Day Turnaround Time

Lab ID	Sample Identification	Canister #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Canister Vacuum/Pressure		Lab Use Only		Requested Analyses	
				Date	Time	Date	Time	Intial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N2 / He	TO-15 (See Special Instructions/Notes)	
01A	AA-34940BEACON-01_052919	6L1537	21918	05/29/2019	11:54	05/30/2019	10:36	-28.5	-6.5			X	
02A	IA8-34940BEACON-02_052919	6L0753	40300	05/29/2019	11:47	05/30/2019	10:43	-28.5	-4			X	
03A	IAF-34940BEACON-01_052919	6L0792	40452	05/29/2019	11:39	05/30/2019	10:40	-28.5	-6			X	
04A	IAG-34940BEACON-03_052919	6L1732	40539	05/29/2019	11:44	05/30/2019	11:28	-28.5	-7			X	
05A	DUP-34940BEACON-01_052919	6L0911	40176	05/29/2019	NA	05/30/2019	NA	-28.5	-8			X	

Relinquished by: (Signature/Affiliation)	Arcadis	Date 5/30/19	Time 1600	Received by: (Signature/Affiliation)	Date 6/03/19 Time 0850
Relinquished by: (Signature/Affiliation)		Date	Time	Received by: (Signature/Affiliation)	Date Time
Relinquished by: (Signature/Affiliation)		Date	Time	Received by: (Signature/Affiliation)	Date Time

Lab Use Only

Shipper Name:	FedEx	Custody Seals Intact?	Yes		No	None

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

eurofins | Air Toxics

6/8/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP
Project #: MI001454.0003
Workorder #: 1906010

Dear Mr. Jim Tomalia

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

eurofins | Air Toxics

WORK ORDER #: 1906010

Work Order Summary

CLIENT:	Mr. Jim Tomalia Arcadis U.S., Inc. 28550 Cabot Dr. Suite 500 Novi, MI 48377	**BILL TO:**	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	517-819-0356	**P.O. #**	MI001454.0004.0001B
FAX:		**PROJECT #**	MI001454.0003 Ford LTP
DATE RECEIVED:	06/03/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	06/08/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SSMP-34940BEACON-01_053019	TO-15	6.0 "Hg	15 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

CERTIFIED BY: Heidi Hayes DATE: 06/08/19

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

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
Arcadis U.S., Inc.
Workorder# 1906010

One 1 Liter Summa Canister (100% Certified) sample was received on June 03, 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 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-34940BEACON-01_053019		
Lab ID:	1906010-01A	**Date/Time Analyzed:**	6/6/19 11:14 PM
Date/Time Collected:	5/30/19 11:25 AM	**Dilution Factor:**	2.52
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msda.i / a060620

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.5	4.0	5.0	Not Detected
1,4-Dioxane	123-91-1	2.6	14	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.0	4.0	5.0	Not Detected
Tetrachloroethene	127-18-4	1.0	6.8	8.5	2.7 J
trans-1,2-Dichloroethene	156-60-5	1.9	4.0	5.0	Not Detected
Trichloroethene	79-01-6	0.68	5.4	6.8	Not Detected
Vinyl Chloride	75-01-4	0.64	2.6	3.2	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	96
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	Lab Blank		
Lab ID:	1906010-02A	**Date/Time Analyzed:**	6/6/19 01:46 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a060606a

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.59	1.6	2.0	Not Detected
1,4-Dioxane	123-91-1	1.0	5.4	7.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.40	1.6	2.0	Not Detected
Tetrachloroethene	127-18-4	0.41	2.7	3.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.75	1.6	2.0	Not Detected
Trichloroethene	79-01-6	0.27	2.1	2.7	Not Detected
Vinyl Chloride	75-01-4	0.26	1.0	1.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	99
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	97

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

Client ID:	CCV		
Lab ID:	1906010-03A	**Date/Time Analyzed:**	6/6/19 11:16 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a060602

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	110
1,4-Dioxane	123-91-1	88
cis-1,2-Dichloroethene	156-59-2	102
Tetrachloroethene	127-18-4	109
trans-1,2-Dichloroethene	156-60-5	104
Trichloroethene	79-01-6	101
Vinyl Chloride	75-01-4	101

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	99
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	LCS		
Lab ID:	1906010-04A	**Date/Time Analyzed:**	6/6/19 11:41 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a060603

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	106
1,4-Dioxane	123-91-1	91
cis-1,2-Dichloroethene	156-59-2	112
Tetrachloroethene	127-18-4	107
trans-1,2-Dichloroethene	156-60-5	90
Trichloroethene	79-01-6	98
Vinyl Chloride	75-01-4	100

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	98

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1906010-04AA	**Date/Time Analyzed:**	6/6/19 12:06 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a060604

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	112
1,4-Dioxane	123-91-1	91
cis-1,2-Dichloroethene	156-59-2	115
Tetrachloroethene	127-18-4	104
trans-1,2-Dichloroethene	156-60-5	93
Trichloroethene	79-01-6	98
Vinyl Chloride	75-01-4	103

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	103
4-Bromofluorobenzene	460-00-4	70-130	99
Toluene-d8	2037-26-5	70-130	97

* % Recovery is calculated using unrounded analytical results.

July 08, 2019

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

CADENA project ID: E203631
Project: Ford Livonia Transmission Project - OFF-SITE - Soil Gas and Groundwater
Project number: 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: 1906010
Sample date: 2019-05-30
Report received by CADENA: 2019-07-08
Initial Data Verification completed by CADENA: 2019-07-08

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 Valid Qualifiers

Valid Qualifiers	Description
<	Less than the reported concentration.
>	Greater than the reported concentration.
B	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.

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

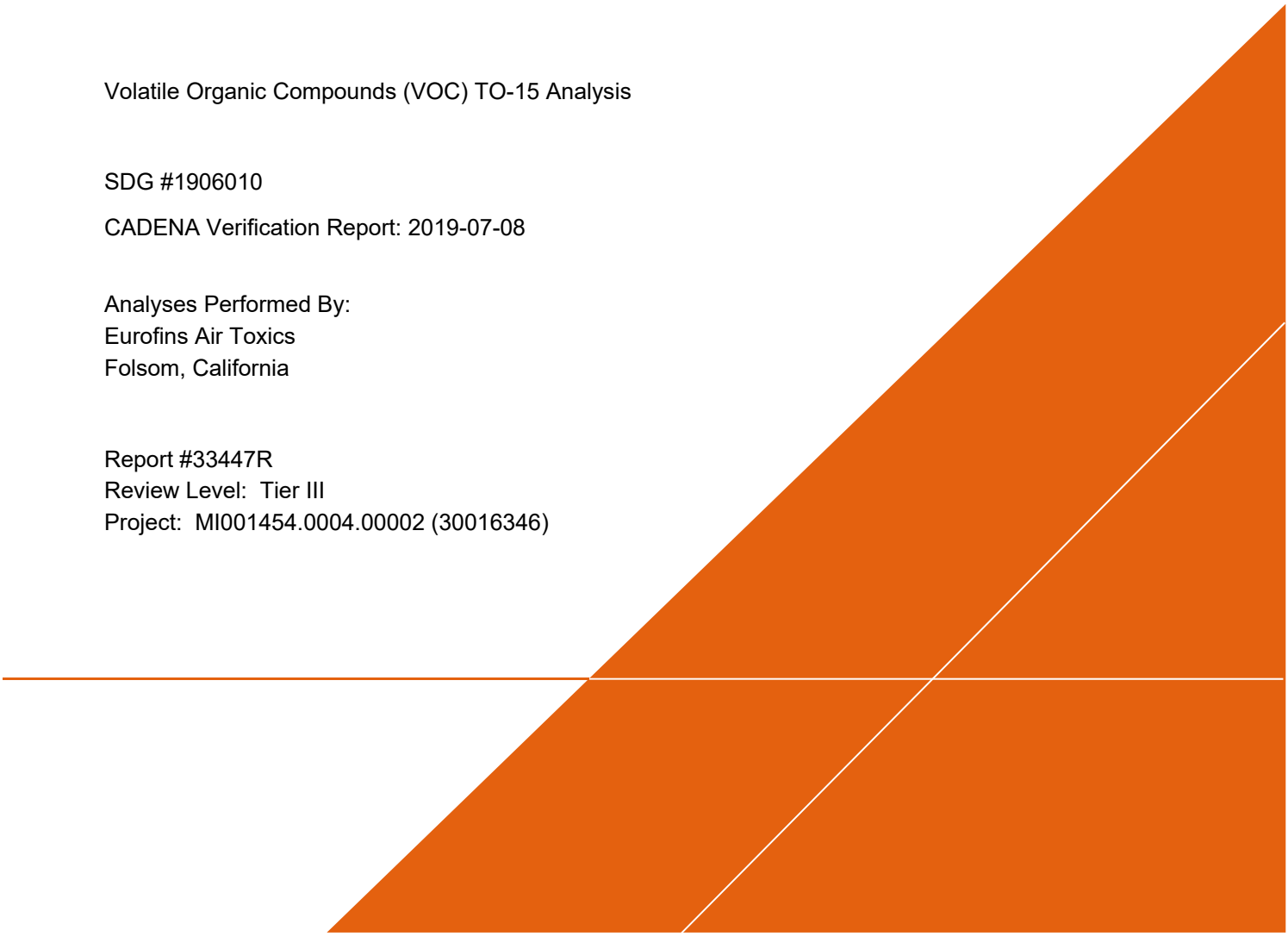
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1906010

CADENA Verification Report: 2019-07-08

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #33447R
Review Level: Tier III
Project: MI001454.0004.00002 (30016346)



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1906010 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:

SDG	Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
						TO-15 (Full Scan)	TO-15 (SIM)	MISC
1906010	SSMP-34940BEACON-01_053019	1906010-01A	Air	5/30/2019		X		

DATA REVIEW

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

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

DATA REVIEW

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.

DATA REVIEW

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 ensure 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.

DATA REVIEW

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. Field Duplicate Sample Analysis

The field duplicate analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 35% for air matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are not greater than five times the RL, a control limit of one times the RL is applied to the difference between the duplicate sample results.

A field duplicate was not performed on a sample location within this SDG.

7. 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		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Canister return pressure (<-2"Hg)		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Field Duplicate Sample RPD					X
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

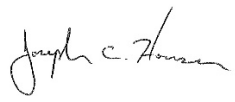
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

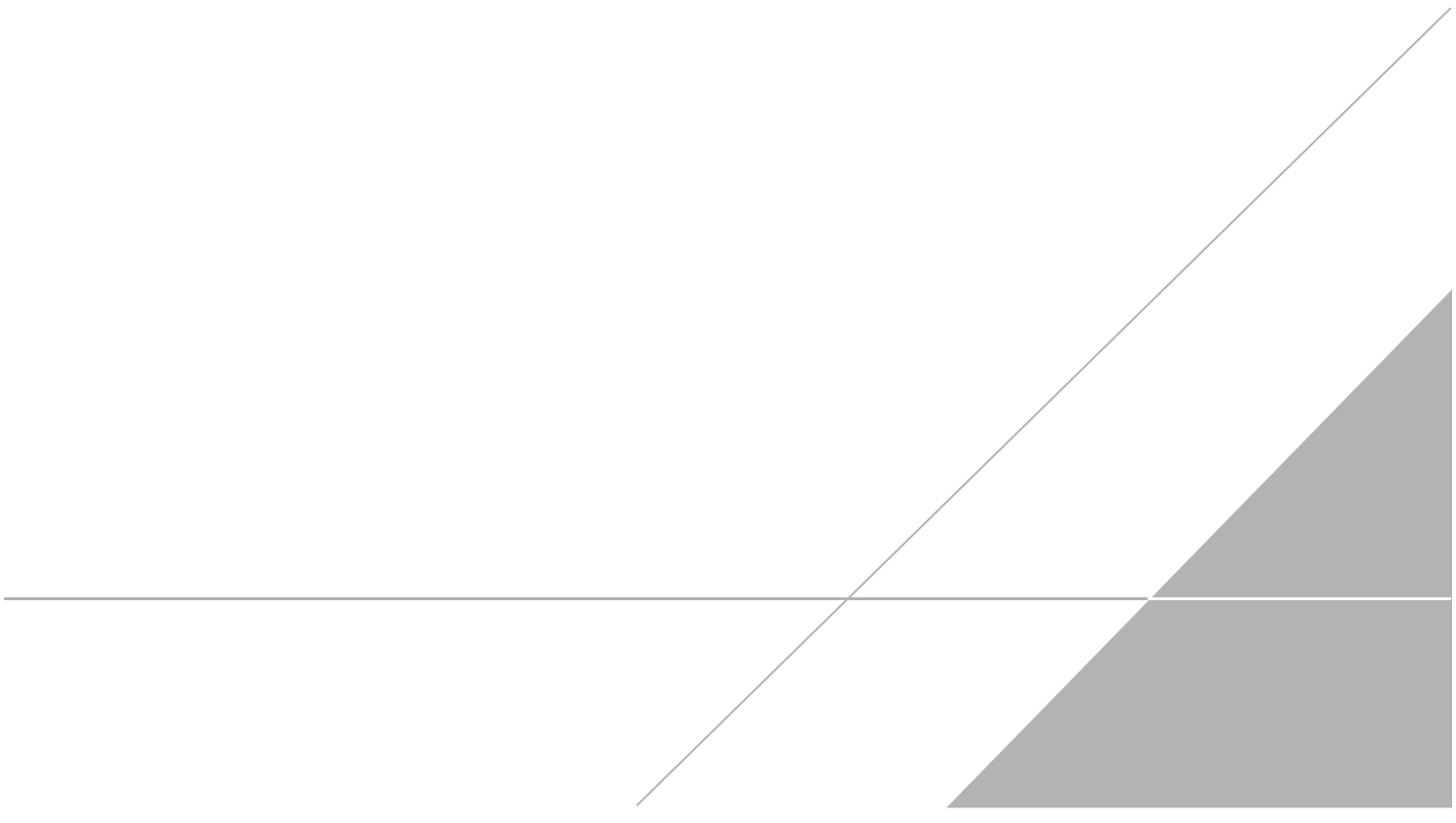
DATE: July 11, 2019

PEER REVIEW: Dennis Capria

DATE: July 11, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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

Client ID:	SSMP-34940BEACON-01_053019		
Lab ID:	1906010-01A	**Date/Time Analyzed:**	6/6/19 11:14 PM
Date/Time Collected:	5/30/19 11:25 AM	**Dilution Factor:**	2.52
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msda.i / a060620

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.5	4.0	5.0	Not Detected
1,4-Dioxane	123-91-1	2.6	14	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.0	4.0	5.0	Not Detected
Tetrachloroethene	127-18-4	1.0	6.8	8.5	2.7 J
trans-1,2-Dichloroethene	156-60-5	1.9	4.0	5.0	Not Detected
Trichloroethene	79-01-6	0.68	5.4	6.8	Not Detected
Vinyl Chloride	75-01-4	0.64	2.6	3.2	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	96
Toluene-d8	2037-26-5	70-130	95

Analysis Request /Canister Chain of Custody

For Laboratory Use Only
Workorder # : 1906010

PID: _____

Page __1__ of __1__

180 Blue Ravine Rd. Suite B, Folsom, CA 95630
Phone (800) 985-5955; Fax (916) 351-8279

Client: Arcadis PID:

Project Name: Ford LTP Off-Site Sampling

Project Manager: Kris Hinskey P.O# MI001454.0003.00002
Sampler: C.Weaver, H.Ladd

Site Name: 34940 BEACON

Special Instructions/Notes: Report ONLY: 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, 1,4-Dioxane, PCE, TCE and VC. Submit results through Cadena at jim.tomalia@cadena.com. Cadena #E203631. Level IV Reporting

Turnaround Time (Rush surcharges may apply)

5 Day Turnaround Time

Lab ID	Sample Identification	Canister #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Canister Vacuum/Pressure		Lab Use Only		Requested Analyses
				Date	Time	Date	Time	Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N2 / He	TO-15 (See Special Instructions/ Notes)
01A	SSMP-34940BEACON-01_053019	1L3130	23584	05/30/2019	11:11	05/30/2019	11:25	-29	-5.5			x

Relinquished by: (Signature/Affiliation) Date 5/30/19 Time 1600 Received by: (Signature/Affiliation) EA Date 6/03/19 Time 0850

Relinquished by: (Signature/Affiliation) Date Time Relinquished by: (Signature/Affiliation) Date Time

Relinquished by: (Signature/Affiliation) Date Time Relinquished by: (Signature/Affiliation) Date Time

Lab Use Only

Shipper Name: FedEx Custody Seals Intact? (Yes) No None

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