eurofins | Air Toxics

3/25/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP
Project #:
Workorder #: 1903444

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 3/19/2019 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 #: 1903444

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
FAX:		**PROJECT #**	Ford LTP
DATE RECEIVED:	03/19/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	03/25/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA-11710BOSTONPOST-01_031319	Modified TO-15	6.1 "Hg	5.6 psi
02A	IAF-11710BOSTONPOST-01_031319	Modified TO-15	4.3 "Hg	5 psi
02B	IAF-11710BOSTONPOST-01_031319	Modified TO-15	4.3 "Hg	5 psi
03A	IAG-11710BOSTONPOST-01_031319	Modified TO-15	6.1 "Hg	5.1 psi
03B	IAG-11710BOSTONPOST-01_031319	Modified TO-15	6.1 "Hg	5.1 psi
04A	DUP-11710BOSTONPOST-01_031319	Modified TO-15	4.9 "Hg	4.6 psi
05A	Lab Blank	Modified TO-15	NA	NA
05B	Lab Blank	Modified TO-15	NA	NA
06A	CCV	Modified TO-15	NA	NA
06B	CCV	Modified TO-15	NA	NA
07A	LCS	Modified TO-15	NA	NA
07AA	LCSD	Modified TO-15	NA	NA
07B	LCS	Modified TO-15	NA	NA
07BB	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 03/25/19

Technical Director

Certification numbers: AZ Licensure AZ0775, FL NELAP - E8 , LA NELAP - 02089, NH NELAP - 209218, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-18-13, UT NELAP CA009332018-10, VA NELAP - 9505, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005-011, Effective date: 10/18/2018, Expiration date: 10/17/2019.
Eurofins Air Toxics LLC. 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# 1903444

Four 6 Liter Summa Canister (100% Certified) samples were received on March 19, 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 The canisters used for this project have been certified to the Reporting Limit for the target analytes included in this workorder. Concentrations that are below the level at which the canister was certified may be false positives.

The results for samples IAF-11710BOSTONPOST-01_031319 and IAF-11710BOSTONPOST-01_031319 in this report were acquired from two separate data files originating from the same analytical run. The two data files have the same base file name and are differentiated with a "sim" extension on the SIM data file.

Dilution was performed on samples IAF-11710BOSTONPOST-01_031319 and IAF-11710BOSTONPOST-01_031319 due to the presence of high level non-target species.

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

Client ID:	AA-11710BOSTONPOST-01_031319		
Lab ID:	1903444-01A	**Date/Time Analyzed:**	3/22/19 05:27 PM
Date/Time Collected:	3/14/19 01:12 PM	**Dilution Factor:**	1.74
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032216

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.13	0.34	0.69	Not Detected
1,4-Dioxane	123-91-1	0.14	0.31	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.34	0.69	Not Detected
Tetrachloroethene	127-18-4	0.071	0.59	1.2	0.18 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.34	0.69	Not Detected
Trichloroethene	79-01-6	0.10	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.063	0.22	0.44	Not Detected

J = Estimated value.
D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	97
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	IAF-11710BOSTONPOST-01_031319		
Lab ID:	1903444-02A	**Date/Time Analyzed:**	3/22/19 06:38 PM
Date/Time Collected:	3/14/19 01:16 PM	**Dilution Factor:**	5.20
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032218

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.39	1.0	2.1	Not Detected
1,4-Dioxane	123-91-1	0.44	0.94	1.9	2.6
cis-1,2-Dichloroethene	156-59-2	0.46	1.0	2.1	Not Detected
Tetrachloroethene	127-18-4	0.21	1.8	3.5	0.78 J
trans-1,2-Dichloroethene	156-60-5	0.32	1.0	2.1	Not Detected
Vinyl Chloride	75-01-4	0.19	0.66	1.3	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	99
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	95

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	IAF-11710BOSTONPOST-01_031319		
Lab ID:	1903444-02B	**Date/Time Analyzed:**	3/22/19 06:38 PM
Date/Time Collected:	3/14/19 01:16 PM	**Dilution Factor:**	5.20
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032218sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.054	0.22	0.56	0.80

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	107
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	IAG-11710BOSTONPOST-01_031319		
Lab ID:	1903444-03A	**Date/Time Analyzed:**	3/22/19 07:12 PM
Date/Time Collected:	3/14/19 01:14 PM	**Dilution Factor:**	5.63
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032219

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.42	1.1	2.2	Not Detected
1,4-Dioxane	123-91-1	0.47	1.0	2.0	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.50	1.1	2.2	Not Detected
Tetrachloroethene	127-18-4	0.23	1.9	3.8	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.35	1.1	2.2	Not Detected
Vinyl Chloride	75-01-4	0.20	0.72	1.4	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	102
Toluene-d8	2037-26-5	70-130	100

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	IAG-11710BOSTONPOST-01_031319		
Lab ID:	1903444-03B	**Date/Time Analyzed:**	3/22/19 07:12 PM
Date/Time Collected:	3/14/19 01:14 PM	**Dilution Factor:**	5.63
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032219sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.059	0.24	0.60	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	106
Toluene-d8	2037-26-5	70-130	103

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

Client ID:	DUP-11710BOSTONPOST-01_031319		
Lab ID:	1903444-04A	**Date/Time Analyzed:**	3/22/19 06:05 PM
Date/Time Collected:	3/14/19 12:00 AM	**Dilution Factor:**	1.57
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032217

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.31	0.62	Not Detected
1,4-Dioxane	123-91-1	0.13	0.28	0.56	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.31	0.62	Not Detected
Tetrachloroethene	127-18-4	0.064	0.53	1.1	0.19 J
trans-1,2-Dichloroethene	156-60-5	0.098	0.31	0.62	Not Detected
Trichloroethene	79-01-6	0.091	0.42	0.84	Not Detected
Vinyl Chloride	75-01-4	0.057	0.20	0.40	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	100
4-Bromofluorobenzene	460-00-4	70-130	98
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	Lab Blank		
Lab ID:	1903444-05A	**Date/Time Analyzed:**	3/22/19 10:16 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032205a

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

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	97
Toluene-d8	2037-26-5	70-130	93

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	Lab Blank		
Lab ID:	1903444-05B	**Date/Time Analyzed:**	3/22/19 10:16 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032205sima

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.010	0.043	0.11	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	98
Toluene-d8	2037-26-5	70-130	96

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

Client ID:	CCV		
Lab ID:	1903444-06A	**Date/Time Analyzed:**	3/22/19 08:34 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032202

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	93
1,4-Dioxane	123-91-1	113
cis-1,2-Dichloroethene	156-59-2	97
Tetrachloroethene	127-18-4	95
trans-1,2-Dichloroethene	156-60-5	96
Trichloroethene	79-01-6	98
Vinyl Chloride	75-01-4	97

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	89
4-Bromofluorobenzene	460-00-4	70-130	107
Toluene-d8	2037-26-5	70-130	105

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	CCV		
Lab ID:	1903444-06B	**Date/Time Analyzed:**	3/22/19 08:34 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032202sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	91

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	88
4-Bromofluorobenzene	460-00-4	70-130	109
Toluene-d8	2037-26-5	70-130	106

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

Client ID:	LCS		
Lab ID:	1903444-07A	**Date/Time Analyzed:**	3/22/19 09:07 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032203

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	91
1,4-Dioxane	123-91-1	109
cis-1,2-Dichloroethene	156-59-2	102
Tetrachloroethene	127-18-4	93
trans-1,2-Dichloroethene	156-60-5	80
Trichloroethene	79-01-6	92
Vinyl Chloride	75-01-4	99

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	89
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	105

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1903444-07AA	**Date/Time Analyzed:**	3/22/19 09:40 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032204

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	91
1,4-Dioxane	123-91-1	108
cis-1,2-Dichloroethene	156-59-2	103
Tetrachloroethene	127-18-4	90
trans-1,2-Dichloroethene	156-60-5	80
Trichloroethene	79-01-6	91
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	90
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	102

* % Recovery is calculated using unrounded analytical results.

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	LCS		
Lab ID:	1903444-07B	**Date/Time Analyzed:**	3/22/19 09:07 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032203sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	86

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	88
4-Bromofluorobenzene	460-00-4	70-130	106
Toluene-d8	2037-26-5	70-130	107

* % Recovery is calculated using unrounded analytical results.

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	LCSD		
Lab ID:	1903444-07BB	**Date/Time Analyzed:**	3/22/19 09:40 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22032204sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	85

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	89
4-Bromofluorobenzene	460-00-4	70-130	105
Toluene-d8	2037-26-5	70-130	106

* % Recovery is calculated using unrounded analytical results.

March 26, 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: 1903444
Sample date: 2019-03-14
Report received by CADENA: 2019-03-25
Initial Data Verification completed by CADENA: 2019-03-26

4 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

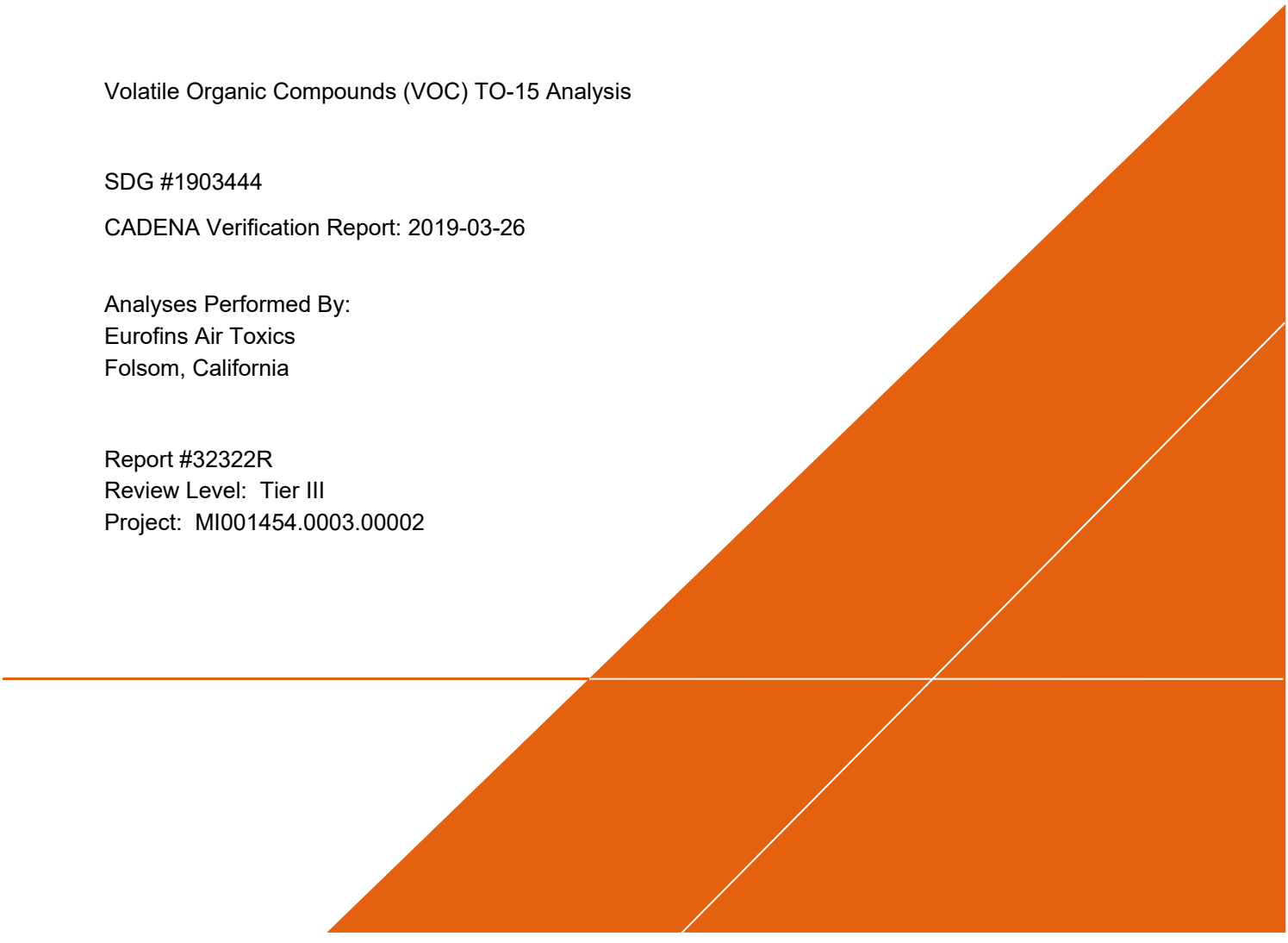
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1903444

CADENA Verification Report: 2019-03-26

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32322R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1903444 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
1903444	AA-11710BOSTONPOST-01_031319	1903444-01A	Air	3/14/2019		X		
	IAF-11710BOSTONPOST-01_031319	1903444-02A	Air	3/14/2019		X		
	IAG-11710BOSTONPOST-01_031319	1903444-03A	Air	3/14/2019		X		
	DUP-11710BOSTONPOST-01_031319	1903444-04A	Air	3/14/2019	AA-11710BOSTONPOST-01_031319	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 insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

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. System Performance and Overall Assessment

Note: The laboratory identified that the canister used for sample location IAF-11710BOSTONPOST-01_031319 (Laboratory ID 1903444-02A) had residue levels of constituents of concern and this contamination was from previous use of the canister at a completely different location. The table provided by the laboratory and included in the Chain of Custody, corrected sample analysis data sheets and Misc. tables section documents the carry-over/contamination identified by the laboratory. Based upon this information the canister is considered compromised and the accuracy of the results are in question. Therefore, the results for sample location IAF-11710BOSTONPOST-01_031319 (Laboratory ID 1903444-02A) were rejected and are considered not usable.

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	
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:

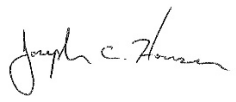
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

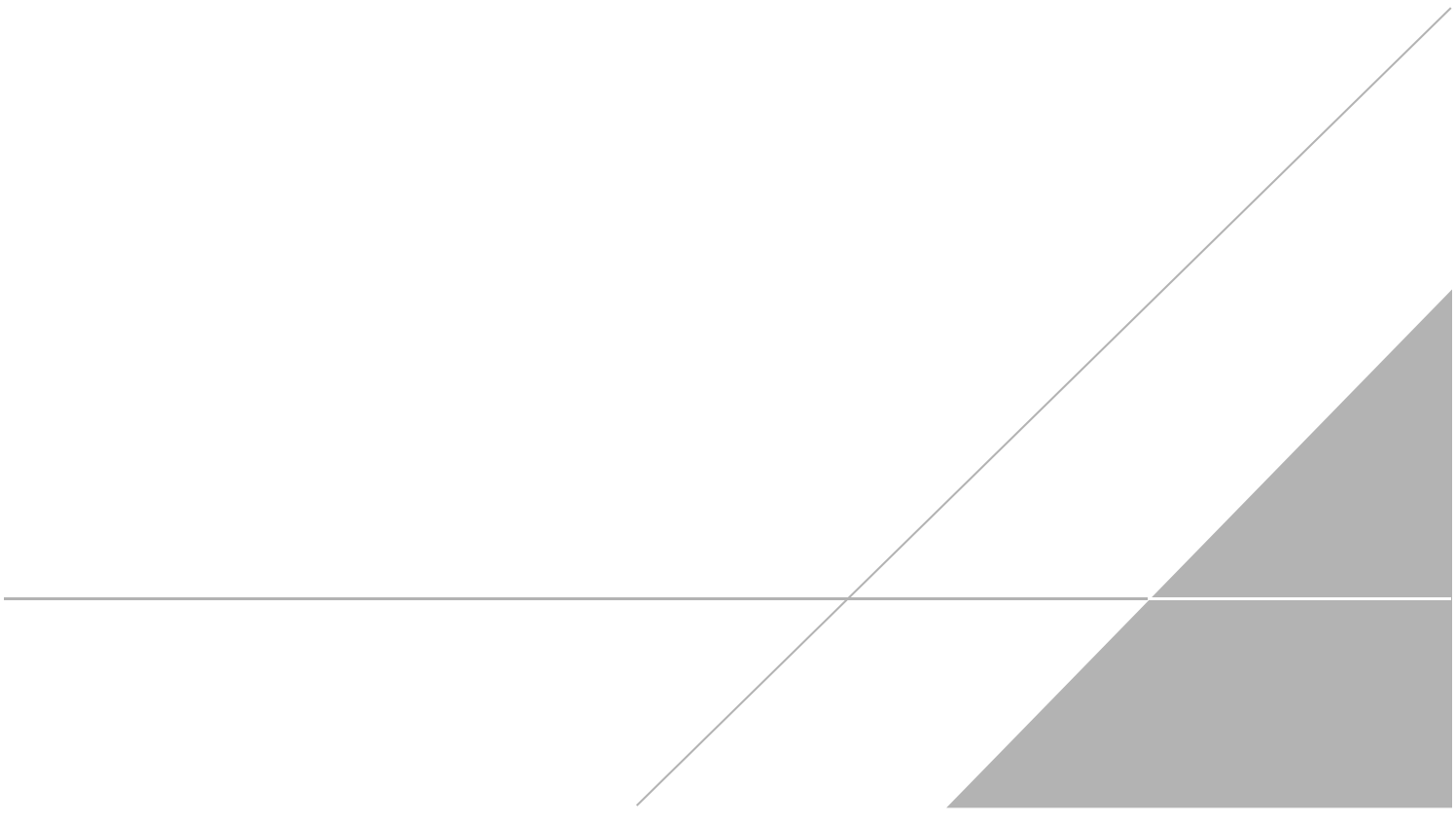
DATE: April 18, 2019

PEER REVIEW: Dennis Capria

DATE: April 22, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS AND MISC. TABLES



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

Client ID:	AA-11710BOSTONPOST-01_031319		
Lab ID:	1903444-01A	**Date/Time Analyzed:**	3/22/19 05:27 PM
Date/Time Collected:	3/14/19 01:12 PM	**Dilution Factor:**	1.74
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032216

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.13	0.34	0.69	Not Detected
1,4-Dioxane	123-91-1	0.14	0.31	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.34	0.69	Not Detected
Tetrachloroethene	127-18-4	0.071	0.59	1.2	0.18 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.34	0.69	Not Detected
Trichloroethene	79-01-6	0.10	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.063	0.22	0.44	Not Detected

J = Estimated value.
D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	97
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	IAF-11710BOSTONPOST-01_031319		
Lab ID:	1903444-02A	**Date/Time Analyzed:**	3/22/19 06:38 PM
Date/Time Collected:	3/14/19 01:16 PM	**Dilution Factor:**	5.20
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032218

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)	
1,1-Dichloroethene	75-35-4	0.39	1.0	2.1	Not Detected	R
1,4-Dioxane	123-91-1	0.44	0.94	1.9	2.6	
cis-1,2-Dichloroethene	156-59-2	0.46	1.0	2.1	Not Detected	
Tetrachloroethene	127-18-4	0.21	1.8	3.5	0.78 J	
trans-1,2-Dichloroethene	156-60-5	0.32	1.0	2.1	Not Detected	
Vinyl Chloride	75-01-4	0.19	0.66	1.3	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	99
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	95

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	IAF-11710BOSTONPOST-01_031319		
Lab ID:	1903444-02B	**Date/Time Analyzed:**	3/22/19 06:38 PM
Date/Time Collected:	3/14/19 01:16 PM	**Dilution Factor:**	5.20
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032218sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)	
Trichloroethene	79-01-6	0.054	0.22	0.56	0.80	R

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	107
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	IAG-11710BOSTONPOST-01_031319		
Lab ID:	1903444-03A	**Date/Time Analyzed:**	3/22/19 07:12 PM
Date/Time Collected:	3/14/19 01:14 PM	**Dilution Factor:**	5.63
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032219

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.42	1.1	2.2	Not Detected
1,4-Dioxane	123-91-1	0.47	1.0	2.0	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.50	1.1	2.2	Not Detected
Tetrachloroethene	127-18-4	0.23	1.9	3.8	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.35	1.1	2.2	Not Detected
Vinyl Chloride	75-01-4	0.20	0.72	1.4	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	93
4-Bromofluorobenzene	460-00-4	70-130	102
Toluene-d8	2037-26-5	70-130	100

MODIFIED EPA METHOD TO-15 GC/MS SIM
Ford LTP

Client ID:	IAG-11710BOSTONPOST-01_031319		
Lab ID:	1903444-03B	**Date/Time Analyzed:**	3/22/19 07:12 PM
Date/Time Collected:	3/14/19 01:14 PM	**Dilution Factor:**	5.63
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032219sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.059	0.24	0.60	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	106
Toluene-d8	2037-26-5	70-130	103

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

Client ID:	DUP-11710BOSTONPOST-01_031319		
Lab ID:	1903444-04A	**Date/Time Analyzed:**	3/22/19 06:05 PM
Date/Time Collected:	3/14/19 12:00 AM	**Dilution Factor:**	1.57
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd22.i / 22032217

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.31	0.62	Not Detected
1,4-Dioxane	123-91-1	0.13	0.28	0.56	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.31	0.62	Not Detected
Tetrachloroethene	127-18-4	0.064	0.53	1.1	0.19 J
trans-1,2-Dichloroethene	156-60-5	0.098	0.31	0.62	Not Detected
Trichloroethene	79-01-6	0.091	0.42	0.84	Not Detected
Vinyl Chloride	75-01-4	0.057	0.20	0.40	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	100
4-Bromofluorobenzene	460-00-4	70-130	98
Toluene-d8	2037-26-5	70-130	95

Only Data Associated With 11710 Boston Post Included Below

			Concentrations (ug/m3)					
		Canister	1,4-Dioxane			Trichloroethene		
Laboratory ID	Sample ID	Physical ID	Project Sample	Previous Sample	Blank Sample*	Project Sample	Previous Sample	Blank Sample*
1903444-02A	IAF-11710BOSTONPOST-01_031319	00383	2.6	870	Not Tested	0.80	140,000	Not Tested

*Blank sample prepared in cleaned canister after project sample analyzed. Prepared by filling cleaned canister with humidified UHP nitrogen for 3 days prior to analysis. Four affected canisters tested, two of which were project canisters and presented in the above table.

		Concentrations (ug/m3)			
		Canister	1,4-Dioxane		
Laboratory ID	Sample ID	Physical ID	Project sample	Previous sample	Prior 2 samples**

**Sequence of concentrations measured in prior two samples not provided.

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: 1903444

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

Click links below to view:
Canister Sampling Guide
Helium Shroud Video

Client:	Ford	PID:	NA
Project Name:	Ford LTP		
Project Manager:	Kris Hinskey	P.O.#	MI001454.0003
Sampler:			
Site Name:	11710 Boston Post		

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	Can #	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: N_2 / He	TO-15 (See Special Instructions/Notes)			
01A	AA-11710 BOSTONPOST-01_031319	6L0491	40313	3/13/19	1434	3/14/19	1312	-29	-6			X			
02A	IAF-11710 BOSTONPOST-01_031319	6L0741	23901	3/13/19	1419	3/14/19	1316	-29	-3.5			X			
03A	IAG-11710 BOSTONPOST-01_031319	6L0169	22573	3/13/19	1414	3/14/19	1314	-29	-5			X			
04A	DUP-11710BOSTONPOST-01_031319	6L1145	7067	3/13/19	[redacted]	3/14/19	[redacted]	-29	-5			X			

Relinquished by: (Signature/Affiliation) Arcadis	Date 3-15-19	Time 1600	Received by: (Signature/Affiliation)	Date 3/19/19 Time 0950
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

3/26/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP
Project #: MI001454.0003
Workorder #: 1903449

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 3/19/2019 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 #: 1903449

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:	03/19/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	03/26/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SSMP-11710BOSTONPOST-01_031419	TO-15	5.3 "Hg	16.5 psi
02A	SSMP-11710BOSTONPOST-02_031419	TO-15	6.3 "Hg	15.5 psi
03A	Lab Blank	TO-15	NA	NA
04A	CCV	TO-15	NA	NA
05A	LCS	TO-15	NA	NA
05AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 03/26/19

Technical Director

Certification numbers: AZ Licensure AZ0775, FL NELAP - E8 , LA NELAP - 02089, NH NELAP - 209218, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-18-13, UT NELAP CA009332018-10, VA NELAP - 9505, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005-011, Effective date: 10/18/2018, Expiration date: 10/17/2019.
Eurofins Air Toxics LLC. 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# 1903449

Two 1 Liter Summa Canister (100% Certified) samples were received on March 19, 2019. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

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

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

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

Definition of Data Qualifying Flags

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

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

M - Reported value may be biased due to apparent matrix interferences.

CN - See Case Narrative.

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

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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

Client ID:	SSMP-11710BOSTONPOST-01_031419		
Lab ID:	1903449-01A	**Date/Time Analyzed:**	3/22/19 10:09 PM
Date/Time Collected:	3/14/19 01:41 PM	**Dilution Factor:**	2.58
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd3.i / 3032215

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.8	4.1	5.1	Not Detected
1,4-Dioxane	123-91-1	1.7	9.3	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.1	4.1	5.1	Not Detected
Tetrachloroethene	127-18-4	1.8	7.0	8.8	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.1	5.1	Not Detected
Trichloroethene	79-01-6	1.1	5.5	6.9	Not Detected
Vinyl Chloride	75-01-4	1.8	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	109
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	97

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

Client ID:	SSMP-11710BOSTONPOST-02_031419		
Lab ID:	1903449-02A	**Date/Time Analyzed:**	3/22/19 10:36 PM
Date/Time Collected:	3/14/19 01:48 PM	**Dilution Factor:**	2.60
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd3.i / 3032216

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.8	4.1	5.2	Not Detected
1,4-Dioxane	123-91-1	1.7	9.4	19	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.1	4.1	5.2	Not Detected
Tetrachloroethene	127-18-4	1.8	7.0	8.8	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.1	5.2	Not Detected
Trichloroethene	79-01-6	1.1	5.6	7.0	Not Detected
Vinyl Chloride	75-01-4	1.9	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	109
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	99

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

Client ID:	Lab Blank		
Lab ID:	1903449-03A	**Date/Time Analyzed:**	3/22/19 02:28 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd3.i / 3032206a

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.71	1.6	2.0	Not Detected
1,4-Dioxane	123-91-1	0.65	3.6	7.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.44	1.6	2.0	Not Detected
Tetrachloroethene	127-18-4	0.68	2.7	3.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.59	1.6	2.0	Not Detected
Trichloroethene	79-01-6	0.43	2.1	2.7	Not Detected
Vinyl Chloride	75-01-4	0.72	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	107
4-Bromofluorobenzene	460-00-4	70-130	101
Toluene-d8	2037-26-5	70-130	99

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

Client ID:	CCV		
Lab ID:	1903449-04A	**Date/Time Analyzed:**	3/22/19 11:25 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd3.i / 3032202

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	101
1,4-Dioxane	123-91-1	88
cis-1,2-Dichloroethene	156-59-2	97
Tetrachloroethene	127-18-4	101
trans-1,2-Dichloroethene	156-60-5	96
Trichloroethene	79-01-6	99
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	99
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	LCS		
Lab ID:	1903449-05A	**Date/Time Analyzed:**	3/22/19 11:49 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd3.i / 3032203

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	106
1,4-Dioxane	123-91-1	86
cis-1,2-Dichloroethene	156-59-2	114
Tetrachloroethene	127-18-4	105
trans-1,2-Dichloroethene	156-60-5	90
Trichloroethene	79-01-6	106
Vinyl Chloride	75-01-4	104

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	101
4-Bromofluorobenzene	460-00-4	70-130	105
Toluene-d8	2037-26-5	70-130	99

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1903449-05AA	**Date/Time Analyzed:**	3/22/19 12:28 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd3.i / 3032204

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	108
1,4-Dioxane	123-91-1	84
cis-1,2-Dichloroethene	156-59-2	115
Tetrachloroethene	127-18-4	108
trans-1,2-Dichloroethene	156-60-5	92
Trichloroethene	79-01-6	103
Vinyl Chloride	75-01-4	107

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	98

* % Recovery is calculated using unrounded analytical results.

March 26, 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: 1903449
Sample date: 2019-03-14
Report received by CADENA: 2019-03-26
Initial Data Verification completed by CADENA: 2019-03-26

2 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

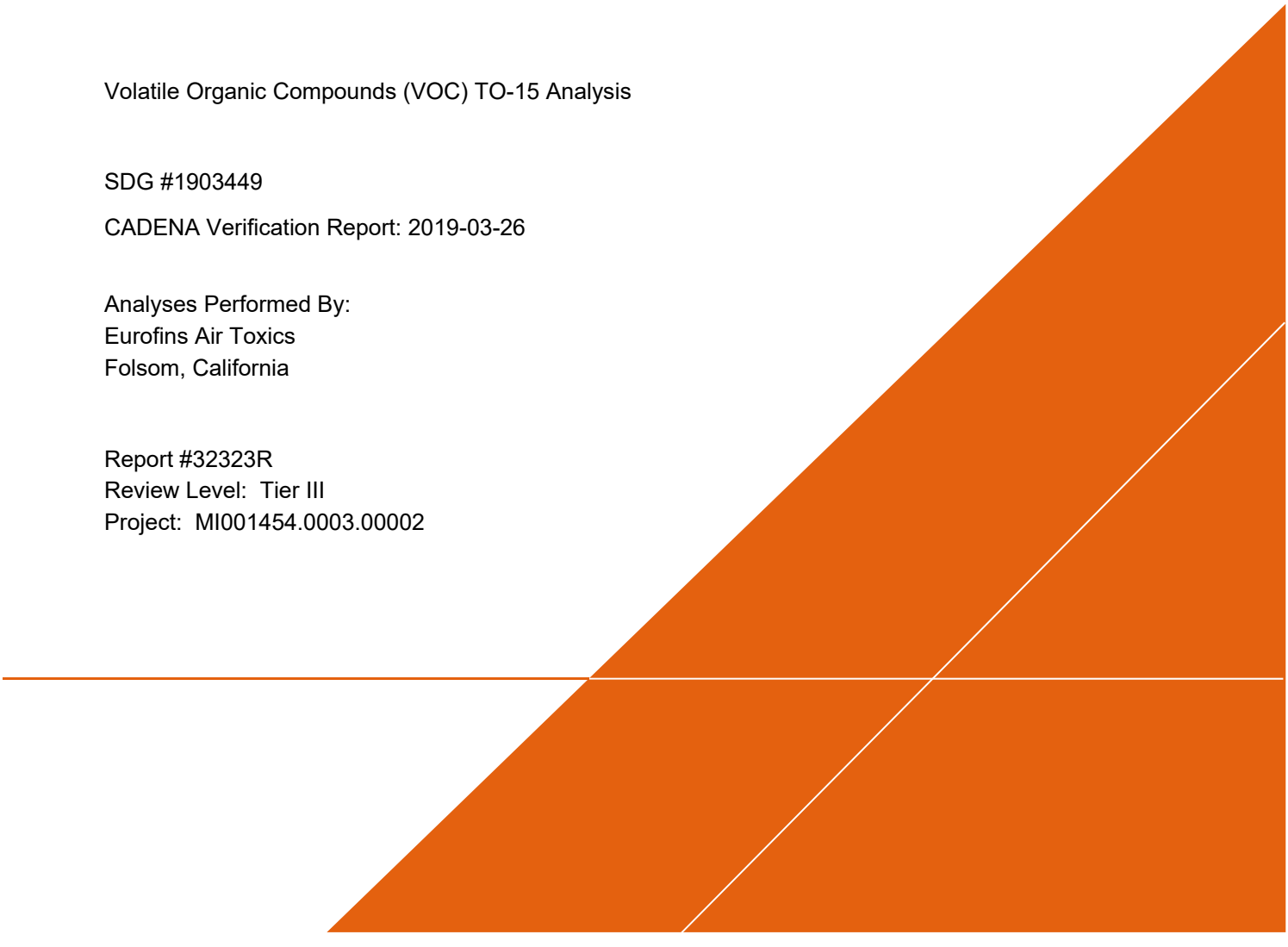
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1903449

CADENA Verification Report: 2019-03-26

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32323R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1903449 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
1903449	SSMP-11710BOSTONPOST-01_031419	1903449-01A	Air	3/14/2019		X		
	SSMP-11710BOSTONPOST-02_031419	1903449-02A	Air	3/14/2019		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 insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

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. 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	
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: 

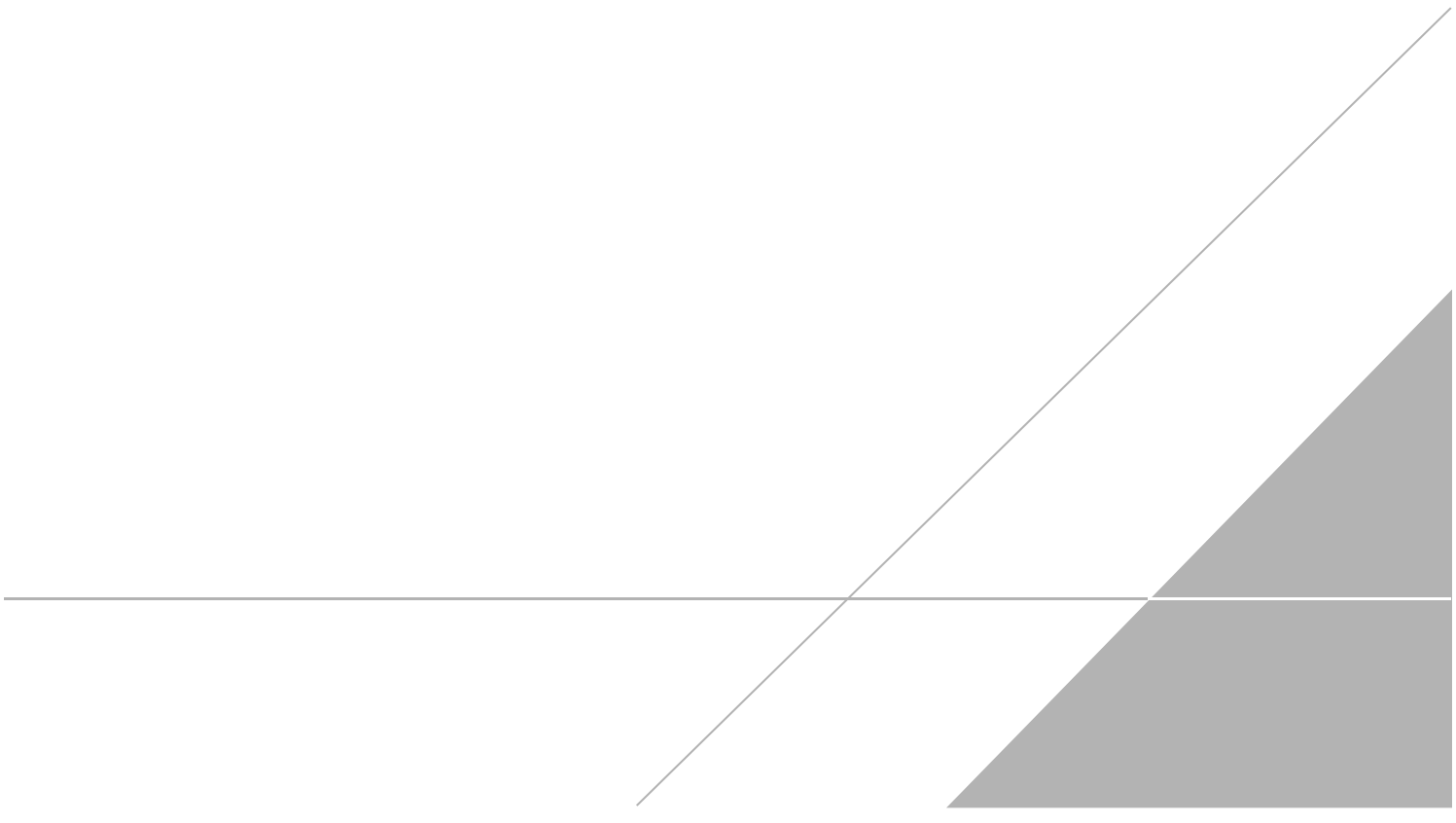
DATE: April 7, 2019

PEER REVIEW: Dennis Capria

DATE: April 8, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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

Client ID:	SSMP-11710BOSTONPOST-01_031419		
Lab ID:	1903449-01A	**Date/Time Analyzed:**	3/22/19 10:09 PM
Date/Time Collected:	3/14/19 01:41 PM	**Dilution Factor:**	2.58
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd3.i / 3032215

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.8	4.1	5.1	Not Detected
1,4-Dioxane	123-91-1	1.7	9.3	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.1	4.1	5.1	Not Detected
Tetrachloroethene	127-18-4	1.8	7.0	8.8	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.1	5.1	Not Detected
Trichloroethene	79-01-6	1.1	5.5	6.9	Not Detected
Vinyl Chloride	75-01-4	1.8	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	109
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	97

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

Client ID:	SSMP-11710BOSTONPOST-02_031419		
Lab ID:	1903449-02A	**Date/Time Analyzed:**	3/22/19 10:36 PM
Date/Time Collected:	3/14/19 01:48 PM	**Dilution Factor:**	2.60
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd3.i / 3032216

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.8	4.1	5.2	Not Detected
1,4-Dioxane	123-91-1	1.7	9.4	19	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.1	4.1	5.2	Not Detected
Tetrachloroethene	127-18-4	1.8	7.0	8.8	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.1	5.2	Not Detected
Trichloroethene	79-01-6	1.1	5.6	7.0	Not Detected
Vinyl Chloride	75-01-4	1.9	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	109
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	99

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: 1903449

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

Click links below to view:
Canister Sampling Guide
Helium Shroud Video

Client: Ford PID: NA
Project Name: Ford LTP
Project Manager: Kris Hinskey P.O.# MI001454.0003
Sampler:
Site Name: 11710 Boston Post

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	Can #	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: N_2 / He	TO-15 (See Special Instructions/Notes)				
01A	SSMP-11710 BOSTONPOST-01_031419	1L2367	23431	3/14/19	1331	3/14/19	1341	-29	-5			X				
02A	SSMP-11710 BOSTONPOST-02_031419	1L1631	23643	3/14/19	1336	3/14/19	1348	-29	-6			X				

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Arcadis	3-15-19	1600	FAST	3/19/19	0950
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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 240-109608-1
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:
3/27/2019 3:18:14 PM

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

Table of Contents

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
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.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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: 240-109608-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-109608-1

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

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

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

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

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

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

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

RECEIPT

The sample was received on 3/19/2019 8:20 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.0º C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample SUMP-11710BOSTONPOST-01-031319 (240-109608-1) was analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The sample was analyzed on 03/27/2019.

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-11710BOSTONPOST-01-031319 (240-109608-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The sample was analyzed on 03/20/2019.

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

Method Summary

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

TestAmerica Job ID: 240-109608-1

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

Protocol References:

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

Laboratory References:

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

Sample Summary

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

TestAmerica Job ID: 240-109608-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-109608-1	SUMP-11710BOSTONPOST-01-031319	Water	03/13/19 14:27	03/19/19 08:20

Detection Summary

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

TestAmerica Job ID: 240-109608-1

Client Sample ID: SUMP-11710BOSTONPOST-01-031319 **Lab Sample ID: 240-109608-1**

No Detections.

This Detection Summary does not include radiochemical test results.

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

TestAmerica Job ID: 240-109608-1

Client Sample ID: SUMP-11710BOSTONPOST-01-031319
Date Collected: 03/13/19 14:27
Date Received: 03/19/19 08:20

Lab Sample ID: 240-109608-1
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			03/20/19 20:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*63 - 125*		*03/20/19 20:38*	*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			03/27/19 01:05	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/27/19 01:05	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/27/19 01:05	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/27/19 01:05	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/27/19 01:05	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/27/19 01:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*114*		*70 - 121*		*03/27/19 01:05*	*1*
4-Bromofluorobenzene (Surr)	*82*		*59 - 120*		*03/27/19 01:05*	*1*
Toluene-d8 (Surr)	*92*		*70 - 123*		*03/27/19 01:05*	*1*
Dibromofluoromethane (Surr)	*113*		*75 - 128*		*03/27/19 01:05*	*1*

Surrogate Summary

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

TestAmerica Job ID: 240-109608-1

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)
240-109561-A-2 MS	Matrix Spike	94	108	103	93
240-109561-C-2 MSD	Matrix Spike Duplicate	95	107	103	93
240-109608-1	SUMP-11710BOSTONPOST-01 031319	114	82	92	113
LCS 240-373303/4	Lab Control Sample	94	107	103	92
MB 240-373303/6	Method Blank	110	85	94	105

Surrogate Legend

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

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	(10-150)	(10-150)	(10-150)	(10-150)
MRL 240-373303/5	Lab Control Sample	102	97	98	98

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)
240-109608-1	SUMP-11710BOSTONPOST-01	100
240-109639-C-7 MS	Matrix Spike	99
240-109639-C-7 MSD	Matrix Spike Duplicate	102
LCS 240-372435/4	Lab Control Sample	96
MB 240-372435/5	Method Blank	93

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (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	(10-150)
MRL 240-372435/6	Lab Control Sample	98

Surrogate Legend

Surrogate Summary

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

TestAmerica Job ID: 240-109608-1

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

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

Lab Sample ID: MB 240-373303/6
Matrix: Water
Analysis Batch: 373303

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			03/26/19 16:53	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/26/19 16:53	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/26/19 16:53	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/26/19 16:53	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/26/19 16:53	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/26/19 16:53	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*110*		*70 - 121*		*03/26/19 16:53*	*1*
4-Bromofluorobenzene (Surr)	*85*		*59 - 120*		*03/26/19 16:53*	*1*
Toluene-d8 (Surr)	*94*		*70 - 123*		*03/26/19 16:53*	*1*
Dibromofluoromethane (Surr)	*105*		*75 - 128*		*03/26/19 16:53*	*1*

Lab Sample ID: LCS 240-373303/4
Matrix: Water
Analysis Batch: 373303

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	10.7		ug/L		107	65 - 139
cis-1,2-Dichloroethene	10.0	10.2		ug/L		102	76 - 128
Tetrachloroethene	10.0	10.3		ug/L		103	74 - 130
trans-1,2-Dichloroethene	10.0	10.5		ug/L		105	78 - 133
Trichloroethene	10.0	9.52		ug/L		95	76 - 125
Vinyl chloride	10.0	10.1		ug/L		101	58 - 143

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 121*
4-Bromofluorobenzene (Surr)	*107*		*59 - 120*
Toluene-d8 (Surr)	*103*		*70 - 123*
Dibromofluoromethane (Surr)	*92*		*75 - 128*

Lab Sample ID: MRL 240-373303/5
Matrix: Water
Analysis Batch: 373303

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

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	0.00100	0.00106		ng/uL		106	10 - 150
cis-1,2-Dichloroethene	0.00100	0.00109		ng/uL		109	10 - 150
Tetrachloroethene	0.00100	0.00110		ng/uL		110	10 - 150
trans-1,2-Dichloroethene	0.00100	0.00111		ng/uL		111	10 - 150
Trichloroethene	0.00100	0.00104		ng/uL		104	10 - 150
Vinyl chloride	0.00100	0.00119		ng/uL		119	10 - 150

Surrogate	*MRL %Recovery*	*MRL Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*102*		*10 - 150*
4-Bromofluorobenzene (Surr)	*97*		*10 - 150*
Toluene-d8 (Surr)	*98*		*10 - 150*

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

Lab Sample ID: MRL 240-373303/5
Matrix: Water
Analysis Batch: 373303

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

Surrogate	MRL %Recovery	MRL Qualifier	Limits
Dibromofluoromethane (Surr)	*98*		*10 - 150*

Lab Sample ID: 240-109561-A-2 MS
Matrix: Water
Analysis Batch: 373303

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	1.0	U	10.0	10.6		ug/L		106	53 - 140
cis-1,2-Dichloroethene	1.0	U	10.0	10.1		ug/L		101	64 - 130
Tetrachloroethene	1.0	U	10.0	10.2		ug/L		102	51 - 136
trans-1,2-Dichloroethene	1.0	U	10.0	10.7		ug/L		107	68 - 133
Trichloroethene	0.79	J	10.0	9.96		ug/L		92	55 - 131
Vinyl chloride	1.0	U	10.0	10.4		ug/L		104	43 - 154

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 121*
4-Bromofluorobenzene (Surr)	*108*		*59 - 120*
Toluene-d8 (Surr)	*103*		*70 - 123*
Dibromofluoromethane (Surr)	*93*		*75 - 128*

Lab Sample ID: 240-109561-C-2 MSD
Matrix: Water
Analysis Batch: 373303

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	1.0	U	10.0	10.5		ug/L		105	53 - 140	1	35
cis-1,2-Dichloroethene	1.0	U	10.0	9.88		ug/L		99	64 - 130	2	21
Tetrachloroethene	1.0	U	10.0	9.93		ug/L		99	51 - 136	3	23
trans-1,2-Dichloroethene	1.0	U	10.0	10.4		ug/L		104	68 - 133	2	24
Trichloroethene	0.79	J	10.0	9.84		ug/L		91	55 - 131	1	23
Vinyl chloride	1.0	U	10.0	10.0		ug/L		100	43 - 154	4	29

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*95*		*70 - 121*
4-Bromofluorobenzene (Surr)	*107*		*59 - 120*
Toluene-d8 (Surr)	*103*		*70 - 123*
Dibromofluoromethane (Surr)	*93*		*75 - 128*

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

Lab Sample ID: MB 240-372435/5
Matrix: Water
Analysis Batch: 372435

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			03/20/19 12:04	1

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

Lab Sample ID: MB 240-372435/5
Matrix: Water
Analysis Batch: 372435

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

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	93		63 - 125		03/20/19 12:04	1

Lab Sample ID: LCS 240-372435/4
Matrix: Water
Analysis Batch: 372435

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	10.2		ug/L		102	59 - 131		

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	96		63 - 125

Lab Sample ID: MRL 240-372435/6
Matrix: Water
Analysis Batch: 372435

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

Analyte			Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits		
1,4-Dioxane			0.00100	0.00131	J	ng/uL		131	10 - 150		

Surrogate	MRL %Recovery	MRL Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	98		10 - 150

Lab Sample ID: 240-109639-C-7 MS
Matrix: Water
Analysis Batch: 372435

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		
1,4-Dioxane	150		10.0	158	4	ug/L		55	52 - 129		

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	99		63 - 125

Lab Sample ID: 240-109639-C-7 MSD
Matrix: Water
Analysis Batch: 372435

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
1,4-Dioxane	150		10.0	180	4	ug/L		272	52 - 129	13	13

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	102		63 - 125

QC Association Summary

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

TestAmerica Job ID: 240-109608-1

GC/MS VOA

Analysis Batch: 372435

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109608-1	SUMP-11710BOSTONPOST-01-031319	Total/NA	Water	8260B SIM	
MB 240-372435/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-372435/4	Lab Control Sample	Total/NA	Water	8260B SIM	
MRL 240-372435/6	Lab Control Sample	Total/NA	Water	8260B SIM	
240-109639-C-7 MS	Matrix Spike	Total/NA	Water	8260B SIM	
240-109639-C-7 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B SIM	

Analysis Batch: 373303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109608-1	SUMP-11710BOSTONPOST-01-031319	Total/NA	Water	8260B	
MB 240-373303/6	Method Blank	Total/NA	Water	8260B	
LCS 240-373303/4	Lab Control Sample	Total/NA	Water	8260B	
MRL 240-373303/5	Lab Control Sample	Total/NA	Water	8260B	
240-109561-A-2 MS	Matrix Spike	Total/NA	Water	8260B	
240-109561-C-2 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	

Lab Chronicle

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

TestAmerica Job ID: 240-109608-1

Client Sample ID: SUMP-11710BOSTONPOST-01-031319 **Lab Sample ID: 240-109608-1**
Date Collected: 03/13/19 14:27 **Matrix: Water**
Date Received: 03/19/19 08:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	373303	03/27/19 01:05	LRW	TAL CAN
Total/NA	Analysis	8260B SIM		1	372435	03/20/19 20:38	SAM	TAL CAN

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

Accreditation/Certification Summary

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

TestAmerica Job ID: 240-109608-1

Laboratory: TestAmerica Canton

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

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

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

MICHIGAN 190 1.2/C1.0

Chain of Custody Record

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

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

TestAmerica Laboratories, Inc.

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other

Client Contact	Client Project Manager: Kris Hinskey	Site Contact: Angela DeGrandis	Lab Contact: Mike DelMonico	COC No:
Company Name: Arcadis				of COCs
Address: 28550 Cabot Drive, Suite 500	Telephone: 248-994-2240	Telephone: 734-320-0065	Telephone: 330-497-9396	For lab use only
City/State/Zip: Novi, MI, 48377	Email: kristoffer.hinskey@arcadis.com	Analysis Turnaround Time	Analyses	Walk-in client
Phone: 248-994-2240		TAT if different from below ☐ 3 weeks ☐ 2 weeks 5 Day ☑ 1 week ☐ 2 days ☐ 1 day		Lab sampling
Project Name: Ford LTP				Job/SDG No:
Project Number: MI001454.0003	Method of Shipment/Carrier:			
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-11710BostonPost-01.031319	3-13-19	1427		X						X					N	G	X	X	X	X	X	X	X				8260B/8260BSIM

240-109608 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:
Ellen Redner	Arcadis	3/13/19 1830	Novi Cold Storage	Arcadis	3/13/19 1830
[signature]	Arcadis	3-18-19 1345	[signature]	TESTAMERICA	3/18/19 1345
[signature]	TESTAMERICA	3-18-19 1500	Received in Laboratory by: [signature]	Company: TA	Date/Time: 3/19/19 820

3/27/2019

TestAmerica Canton Sample Receipt Form/Narrative **Login # :** 109608
Canton Facility

Client Arcadis Site Name _____ Cooler unpacked by: BC

Cooler Received on 3/19/19 Opened on 3/19/19

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

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

TestAmerica Cooler # 14 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. 1.2 °C Corrected Cooler Temp. 1.0 °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 1 (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# **HC861525**
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: BC

18. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) _____ 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: _____

March 27, 2019

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

CADENA project ID: E203631
Project: Ford Livonia Transmission Project - OFF-SITE - Soil Gas and Groundwater
Project number: MI001454.0002/3/4.00002/2B/3B
Client project scope reference: Sample COC only was used to define project analytical requirements.
Laboratory: TestAmerica - North Canton
Laboratory submittal: 109608-1
Sample date: 2019-03-13
Report received by CADENA: 2019-03-27
Initial Data Verification completed by CADENA: 2019-03-27

There were no significant QC anomalies or exceptions to report.

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

1 Water sample was analyzed for GCMS VOC parameter(s).

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA 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: 109608-1

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
2401096081	SUMP-11710BOSTONPOST-01-031319	3/13/2019	2:27:00	X	X	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631
Laboratory: TestAmerica - North Canton
Laboratory Submittal: 109608-1

Sample Name: SUMP-11710BOSTONPOST-01-031319
Lab Sample ID: 2401096081
Sample Date: 3/13/2019

Analyte	Cas No.	Result	Report Limit	Units	Valid Qualifier
GC/MS VOC					
OSW-8260B					
1,1-Dichloroethene	75-35-4	ND	1.0	ug/l	---
cis-1,2-Dichloroethene	156-59-2	ND	1.0	ug/l	---
Tetrachloroethene	127-18-4	ND	1.0	ug/l	---
trans-1,2-Dichloroethene	156-60-5	ND	1.0	ug/l	---
Trichloroethene	79-01-6	ND	1.0	ug/l	---
Vinyl chloride	75-01-4	ND	1.0	ug/l	---
OSW-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

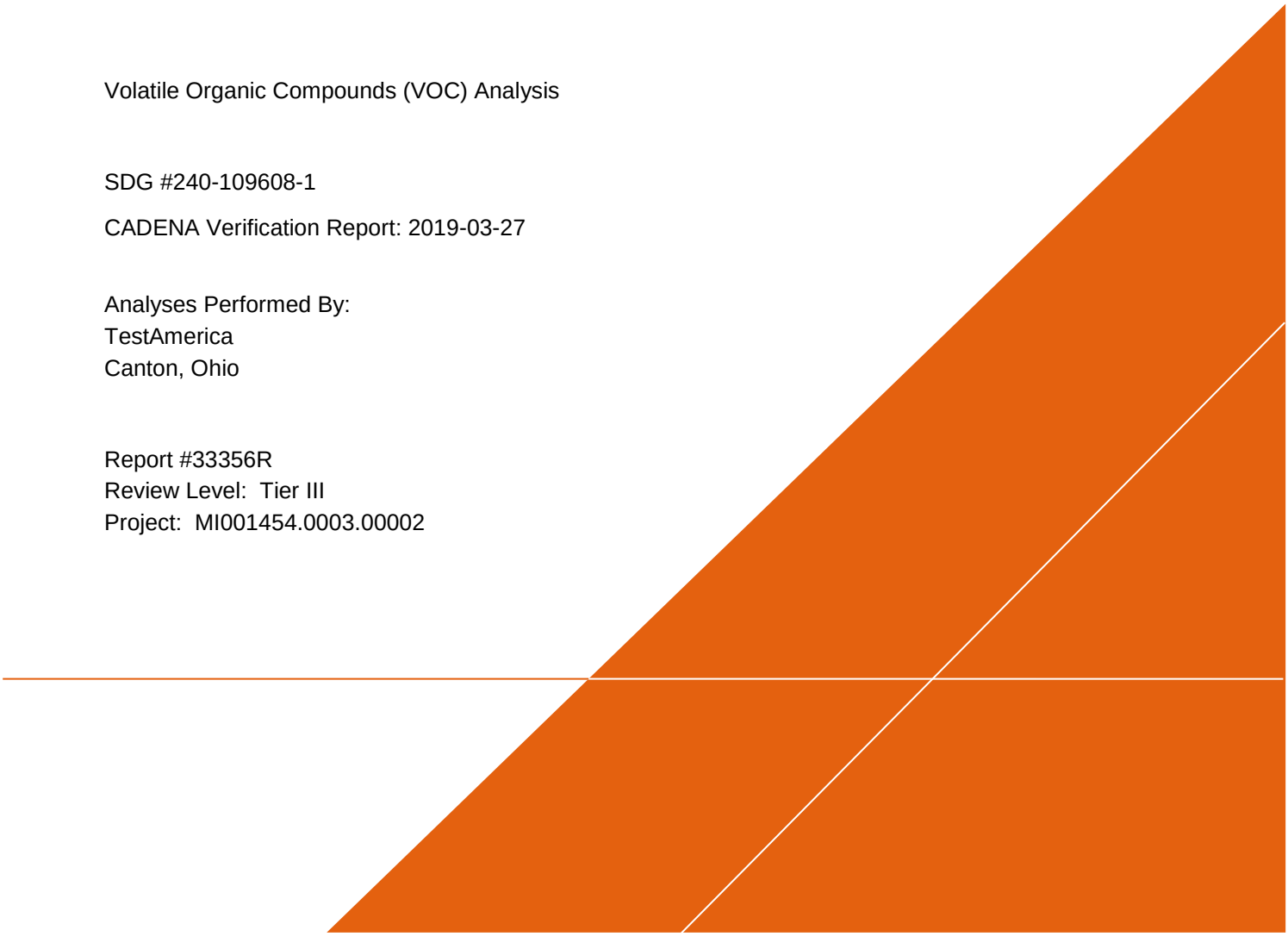
Volatile Organic Compounds (VOC) Analysis

SDG #240-109608-1

CADENA Verification Report: 2019-03-27

Analyses Performed By:
TestAmerica
Canton, Ohio

Report #33356R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-109608-1 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
240-109608-1	SUMP-11710BOSTONPOST-01-031319	240-109608-1	Water	3/13/2019		X	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.

DATA REVIEW

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: 

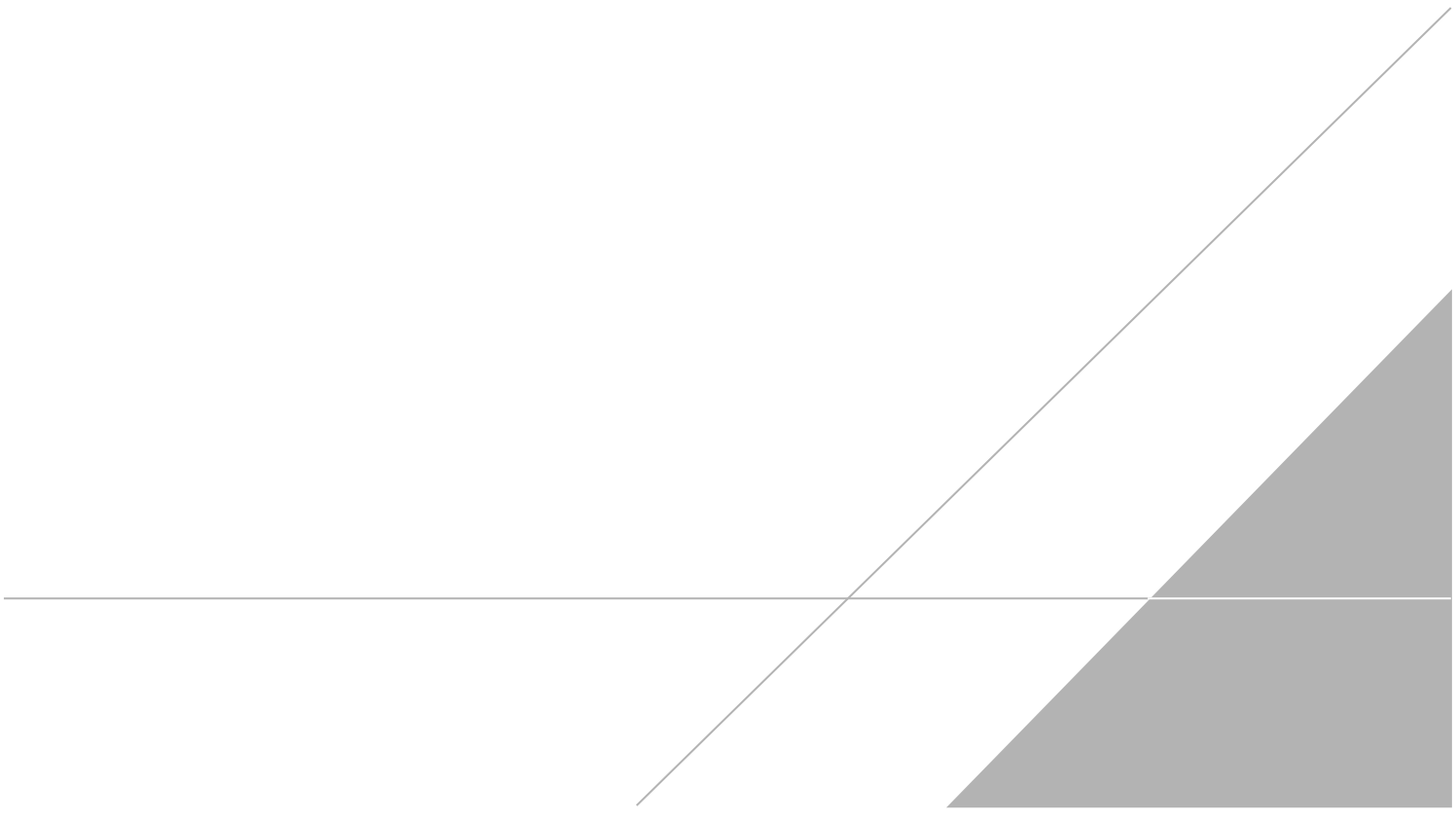
DATE: July 2, 2019

PEER REVIEW: Dennis Capria

DATE: July 2, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



MICHIGAN 190 1.2/C1.0

Chain of Custody Record

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

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

TestAmerica Laboratories, Inc.

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other

Client Contact	Client Project Manager: Kris Hinskey	Site Contact: Angela DeGrandis	Lab Contact: Mike DelMonico	COC No:
Company Name: Arcadis				of COCs
Address: 28550 Cabot Drive, Suite 500	Telephone: 248-994-2240	Telephone: 734-320-0065	Telephone: 330-497-9396	For lab use only
City/State/Zip: Novi, MI, 48377	Email: kristoffer.hinskey@arcadis.com	Analysis Turnaround Time	Analyses	Walk-in client
Phone: 248-994-2240		TAT if different from below ☐ 3 weeks ☐ 2 weeks 5 Day ☑ 1 week ☐ 2 days ☐ 1 day		Lab sampling
Project Name: Ford LTP				Job/SDG No:
Project Number: MI001454.0003	Method of Shipment/Carrier:			
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-11710BostonPost-01.031319	3-13-19	1427		X						X					N	G	X	X	X	X	X	X	X				8260B/8260BSIM

240-109608 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:
Ellen Redner	Arcadis	3/13/19 1830	Novi Cold Storage	Arcadis	3/13/19 1830
[signature]	Arcadis	3-18-19 1345	[signature]	TESTAMERICA	3/18/19 1345
[signature]	TESTAMERICA	3-18-19 1500	Received in Laboratory by: [signature]	Company: TA	Date/Time: 3/19/19 820

3/27/2019

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

TestAmerica Job ID: 240-109608-1

Client Sample ID: SUMP-11710BOSTONPOST-01-031319
Date Collected: 03/13/19 14:27
Date Received: 03/19/19 08:20

Lab Sample ID: 240-109608-1
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			03/20/19 20:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*63 - 125*		*03/20/19 20:38*	*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			03/27/19 01:05	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			03/27/19 01:05	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			03/27/19 01:05	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			03/27/19 01:05	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			03/27/19 01:05	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			03/27/19 01:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*114*		*70 - 121*		*03/27/19 01:05*	*1*
4-Bromofluorobenzene (Surr)	*82*		*59 - 120*		*03/27/19 01:05*	*1*
Toluene-d8 (Surr)	*92*		*70 - 123*		*03/27/19 01:05*	*1*
Dibromofluoromethane (Surr)	*113*		*75 - 128*		*03/27/19 01:05*	*1*

eurofins | Air Toxics

5/6/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP Off-Site Sampling
Project #:
Workorder #: 1904640

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 4/29/2019 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

eurofins | Air Toxics

WORK ORDER #: 1904640

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 #**	Ford LTP Off-Site Sampling
DATE RECEIVED:	04/29/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	05/06/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	DUP-11710BOSTONPOST-02_042319	Modified TO-15	6.0 "Hg	5 psi
02A	IAF-11710BOSTONPOST-01_042319	Modified TO-15	6.5 "Hg	5 psi
03A	IAG-11710BOSTONPOST-01_042319	Modified TO-15	6.0 "Hg	5 psi
03B	IAG-11710BOSTONPOST-01_042319	Modified TO-15	6.0 "Hg	5 psi
04A	DUP-11710BOSTONPOST-01_042319	Modified TO-15	4.0 "Hg	5 psi
04B	DUP-11710BOSTONPOST-01_042319	Modified TO-15	4.0 "Hg	5 psi
05A	AA-11710BOSTONPOST-01_042319	Modified TO-15	5.0 "Hg	5 psi
06A	Lab Blank	Modified TO-15	NA	NA
06B	Lab Blank	Modified TO-15	NA	NA
06C	Lab Blank	Modified TO-15	NA	NA
07A	CCV	Modified TO-15	NA	NA
07B	CCV	Modified TO-15	NA	NA
07C	CCV	Modified TO-15	NA	NA
08A	LCS	Modified TO-15	NA	NA
08AA	LCSD	Modified TO-15	NA	NA
08B	LCS	Modified TO-15	NA	NA
08BB	LCSD	Modified TO-15	NA	NA
08C	LCS	Modified TO-15	NA	NA
08CC	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 05/06/19

Technical Director

Certification numbers: AZ Licensure AZ0775, FL NELAP - E8 , LA NELAP - 02089, NH NELAP - 209218, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-18-13, UT NELAP CA009332018-10, VA NELAP - 9505, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005-011, Effective date: 10/18/2018, Expiration date: 10/17/2019.
Eurofins Air Toxics LLC. 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# 1904640

Five 6 Liter Summa Canister (100% Cert Ambient) samples were received on April 29, 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 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.

Samples DUP-11710BOSTONPOST-02_042319 and IAF-11710BOSTONPOST-01_042319 were transferred from Low Level analysis to full scan TO-15 due to high levels of non-target compounds.

Dilution was performed on samples DUP-11710BOSTONPOST-02_042319, IAF-11710BOSTONPOST-01_042319, IAG-11710BOSTONPOST-01_042319 and DUP-11710BOSTONPOST-01_042319 due to the presence of high level non-target species.

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

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

Client ID:	DUP-11710BOSTONPOST-02_042319		
Lab ID:	1904640-01A	**Date/Time Analyzed:**	5/2/19 05:11 PM
Date/Time Collected:	4/24/19 12:00 AM	**Dilution Factor:**	5.58
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd17.i / 17050212

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	4.9	8.8	11	Not Detected
1,4-Dioxane	123-91-1	21	30	40	Not Detected
cis-1,2-Dichloroethene	156-59-2	3.1	8.8	11	Not Detected
Tetrachloroethene	127-18-4	7.6	15	19	Not Detected
trans-1,2-Dichloroethene	156-60-5	3.3	8.8	11	Not Detected
Trichloroethene	79-01-6	5.4	12	15	Not Detected
Vinyl Chloride	75-01-4	2.8	5.7	7.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	76
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	IAF-11710BOSTONPOST-01_042319		
Lab ID:	1904640-02A	**Date/Time Analyzed:**	5/2/19 05:37 PM
Date/Time Collected:	4/24/19 08:40 AM	**Dilution Factor:**	5.70
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd17.i / 17050213

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	5.0	9.0	11	Not Detected
1,4-Dioxane	123-91-1	22	31	41	Not Detected
cis-1,2-Dichloroethene	156-59-2	3.2	9.0	11	Not Detected
Tetrachloroethene	127-18-4	7.7	15	19	Not Detected
trans-1,2-Dichloroethene	156-60-5	3.4	9.0	11	Not Detected
Trichloroethene	79-01-6	5.5	12	15	Not Detected
Vinyl Chloride	75-01-4	2.9	5.8	7.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	76
4-Bromofluorobenzene	460-00-4	70-130	101
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	IAG-11710BOSTONPOST-01_042319		
Lab ID:	1904640-03A	**Date/Time Analyzed:**	4/30/19 09:02 PM
Date/Time Collected:	4/24/19 08:36 AM	**Dilution Factor:**	8.40
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043015

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.63	1.7	3.3	Not Detected
1,4-Dioxane	123-91-1	0.70	1.5	3.0	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.74	1.7	3.3	Not Detected
Tetrachloroethene	127-18-4	0.34	2.8	5.7	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.52	1.7	3.3	Not Detected
Vinyl Chloride	75-01-4	0.30	1.1	2.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	106
4-Bromofluorobenzene	460-00-4	70-130	87
Toluene-d8	2037-26-5	70-130	107

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

Client ID:	IAG-11710BOSTONPOST-01_042319		
Lab ID:	1904640-03B	**Date/Time Analyzed:**	4/30/19 09:02 PM
Date/Time Collected:	4/24/19 08:36 AM	**Dilution Factor:**	8.40
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043015sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.088	0.36	0.90	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	103

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

Client ID:	DUP-11710BOSTONPOST-01_042319		
Lab ID:	1904640-04A	**Date/Time Analyzed:**	4/30/19 08:02 PM
Date/Time Collected:	4/24/19 12:00 AM	**Dilution Factor:**	7.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043014

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.58	1.5	3.1	Not Detected
1,4-Dioxane	123-91-1	0.65	1.4	2.8	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.68	1.5	3.1	Not Detected
Tetrachloroethene	127-18-4	0.32	2.6	5.2	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.48	1.5	3.1	Not Detected
Vinyl Chloride	75-01-4	0.28	0.99	2.0	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	106
4-Bromofluorobenzene	460-00-4	70-130	88
Toluene-d8	2037-26-5	70-130	106

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

Client ID:	DUP-11710BOSTONPOST-01_042319		
Lab ID:	1904640-04B	**Date/Time Analyzed:**	4/30/19 08:02 PM
Date/Time Collected:	4/24/19 12:00 AM	**Dilution Factor:**	7.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043014sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.081	0.33	0.83	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	89
Toluene-d8	2037-26-5	70-130	102

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

Client ID:	AA-11710BOSTONPOST-01_042319		
Lab ID:	1904640-05A	**Date/Time Analyzed:**	4/30/19 06:29 PM
Date/Time Collected:	4/24/19 08:44 AM	**Dilution Factor:**	1.61
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043012

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.32	0.64	Not Detected
1,4-Dioxane	123-91-1	0.13	0.29	0.58	0.33 J
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.64	Not Detected
Tetrachloroethene	127-18-4	0.066	0.55	1.1	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.64	Not Detected
Trichloroethene	79-01-6	0.094	0.43	0.86	Not Detected
Vinyl Chloride	75-01-4	0.059	0.20	0.41	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	116
4-Bromofluorobenzene	460-00-4	70-130	92
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	Lab Blank		
Lab ID:	1904640-06A	**Date/Time Analyzed:**	4/30/19 02:45 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043007a

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

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	94
Toluene-d8	2037-26-5	70-130	106

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

Client ID:	Lab Blank		
Lab ID:	1904640-06B	**Date/Time Analyzed:**	4/30/19 02:45 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043007sima

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.010	0.043	0.11	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	109
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	Lab Blank		
Lab ID:	1904640-06C	**Date/Time Analyzed:**	5/2/19 12:34 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17050205c

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.87	1.6	2.0	Not Detected
1,4-Dioxane	123-91-1	3.8	5.4	7.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.56	1.6	2.0	Not Detected
Tetrachloroethene	127-18-4	1.4	2.7	3.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.59	1.6	2.0	Not Detected
Trichloroethene	79-01-6	0.97	2.1	2.7	Not Detected
Vinyl Chloride	75-01-4	0.51	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	77
4-Bromofluorobenzene	460-00-4	70-130	101
Toluene-d8	2037-26-5	70-130	96

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

Client ID:	CCV		
Lab ID:	1904640-07A	**Date/Time Analyzed:**	4/30/19 09:54 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043002

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	82
1,4-Dioxane	123-91-1	101
cis-1,2-Dichloroethene	156-59-2	86
Tetrachloroethene	127-18-4	99
trans-1,2-Dichloroethene	156-60-5	89
Trichloroethene	79-01-6	115
Vinyl Chloride	75-01-4	88

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	98
Toluene-d8	2037-26-5	70-130	108

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

Client ID:	CCV		
Lab ID:	1904640-07B	**Date/Time Analyzed:**	4/30/19 09:54 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043002sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	110

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	99
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	CCV		
Lab ID:	1904640-07C	**Date/Time Analyzed:**	5/2/19 10:58 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17050202

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	116
1,4-Dioxane	123-91-1	93
cis-1,2-Dichloroethene	156-59-2	87
Tetrachloroethene	127-18-4	110
trans-1,2-Dichloroethene	156-60-5	108
Trichloroethene	79-01-6	92
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	79
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	96

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

Client ID:	LCS		
Lab ID:	1904640-08A	**Date/Time Analyzed:**	4/30/19 11:14 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043003

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	84
1,4-Dioxane	123-91-1	113
cis-1,2-Dichloroethene	156-59-2	98
Tetrachloroethene	127-18-4	100
trans-1,2-Dichloroethene	156-60-5	80
Trichloroethene	79-01-6	106
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	107
4-Bromofluorobenzene	460-00-4	70-130	97
Toluene-d8	2037-26-5	70-130	106

* % Recovery is calculated using unrounded analytical results.

Client ID:	LCSD		
Lab ID:	1904640-08AA	**Date/Time Analyzed:**	4/30/19 12:04 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043004

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	86
1,4-Dioxane	123-91-1	112
cis-1,2-Dichloroethene	156-59-2	99
Tetrachloroethene	127-18-4	100
trans-1,2-Dichloroethene	156-60-5	81
Trichloroethene	79-01-6	103
Vinyl Chloride	75-01-4	97

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	107
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	105

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCS		
Lab ID:	1904640-08B	**Date/Time Analyzed:**	4/30/19 11:14 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043003sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	100

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	97
Toluene-d8	2037-26-5	70-130	103

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1904640-08BB	**Date/Time Analyzed:**	4/30/19 12:04 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22043004sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	100

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	97
Toluene-d8	2037-26-5	70-130	102

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCS		
Lab ID:	1904640-08C	**Date/Time Analyzed:**	5/2/19 11:39 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17050203

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	115
1,4-Dioxane	123-91-1	88
cis-1,2-Dichloroethene	156-59-2	94
Tetrachloroethene	127-18-4	109
trans-1,2-Dichloroethene	156-60-5	92
Trichloroethene	79-01-6	90
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	80
4-Bromofluorobenzene	460-00-4	70-130	105
Toluene-d8	2037-26-5	70-130	95

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1904640-08CC	**Date/Time Analyzed:**	5/2/19 12:06 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17050204

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	112
1,4-Dioxane	123-91-1	90
cis-1,2-Dichloroethene	156-59-2	94
Tetrachloroethene	127-18-4	110
trans-1,2-Dichloroethene	156-60-5	93
Trichloroethene	79-01-6	91
Vinyl Chloride	75-01-4	102

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	82
4-Bromofluorobenzene	460-00-4	70-130	106
Toluene-d8	2037-26-5	70-130	96

* % Recovery is calculated using unrounded analytical results.

May 6, 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: 1904640
Sample date: 2019-04-24
Report received by CADENA: 2019-05-06
Initial Data Verification completed by CADENA: 2019-05-06

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

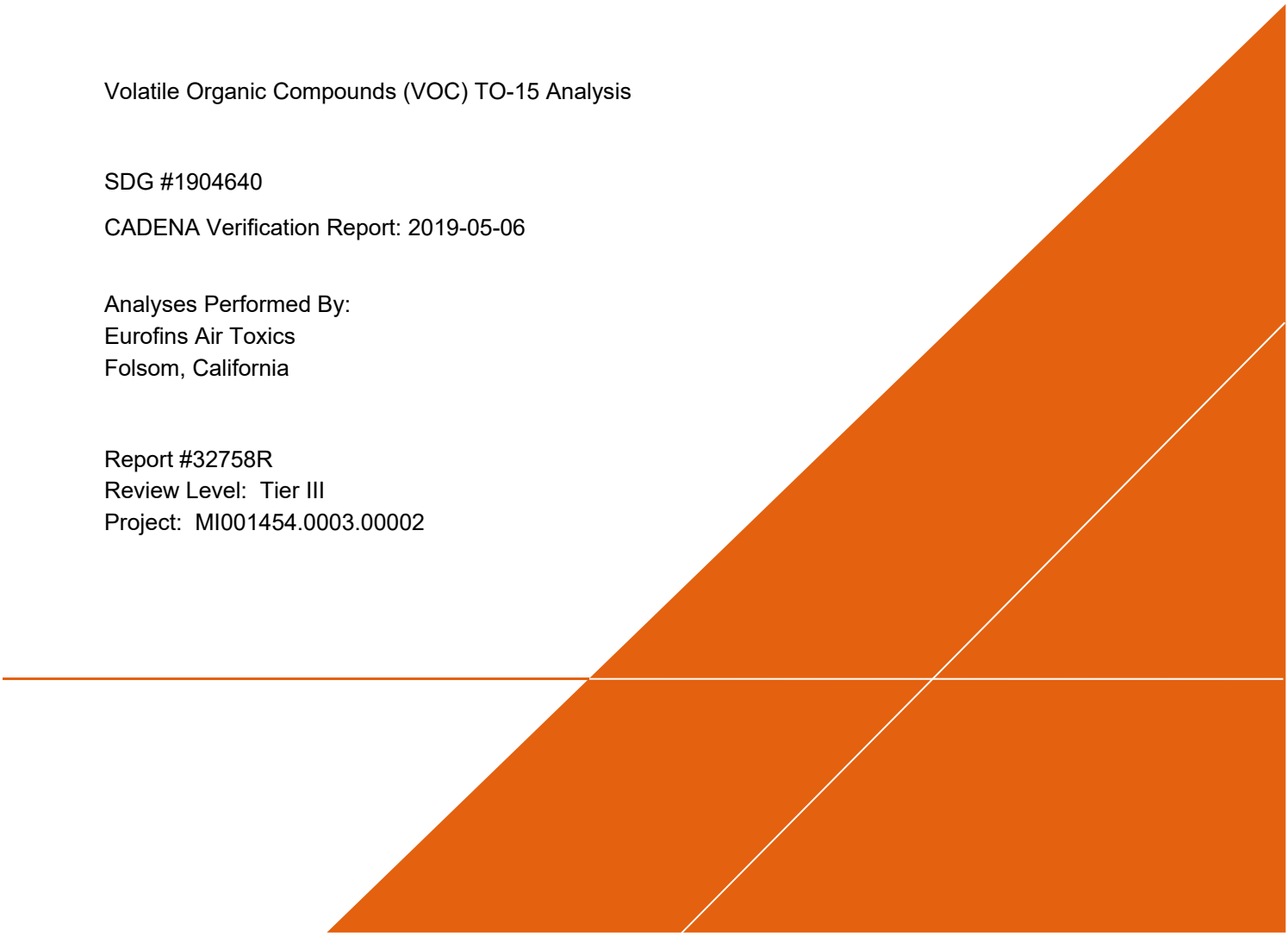
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1904640

CADENA Verification Report: 2019-05-06

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32758R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1904640 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
1904640	DUP-11710BOSTONPOST-02_042319	1904640-01A	Air	4/24/2019	IAF-11710BOSTONPOST-01_042319	X		
	IAF-11710BOSTONPOST-01_042319	1904640-02A	Air	4/24/2019		X		
	IAG-11710BOSTONPOST-01_042319	1904640-03B	Air	4/24/2019		X		
	DUP-11710BOSTONPOST-01_042319	1904640-04B	Air	4/24/2019	AA-11710BOSTONPOST-01_042319	X		
	AA-11710BOSTONPOST-01_042319	1904640-05A	Air	4/24/2019		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) and TO-15-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	Return Canister Pressure
USEPA TO-15 and USEPA TO-15-SIM	Air	30 days from collection to analysis (Canister)	Ambient Temperature	< -2" Hg

All samples were analyzed within the specified holding time and canister return pressure / vacuum criteria.

2. Mass Spectrometer Tuning

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

System performance and column resolution were acceptable.

3. Calibration

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

3.1 Initial Calibration

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

All target compounds associated with the initial calibration standards must exhibit a %RSD less than the control limit (30%) or a correlation coefficient greater than 0.99 and an RRF value greater than control limit (0.05).

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

3.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (30%) and RRF value greater than control limit (0.05).

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

4. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

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.

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
IAF-11710BOSTONPOST-01_042319/ DUP-11710BOSTONPOST-02_042319	All compounds	U	U	AC
AA-11710BOSTONPOST-01_042319/ DUP-11710BOSTONPOST-01_042319	1,4-Dioxane	0.33 J	2.8 U	AC

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) and TO-15 SIM	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:

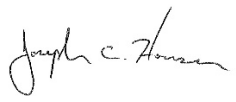
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

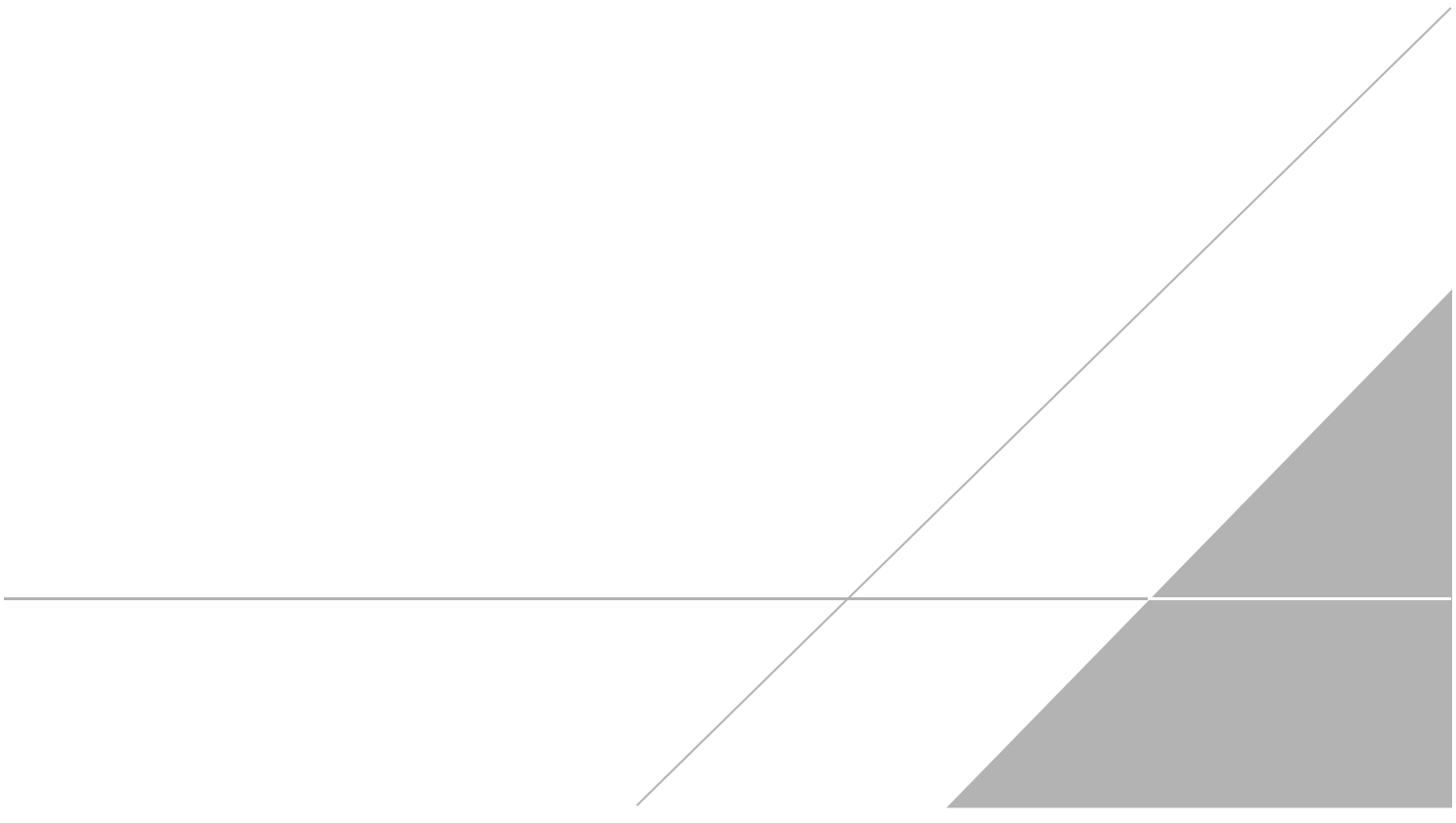
DATE: May 14, 2019

PEER REVIEW: Dennis Capria

DATE: May 15, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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

Client ID:	DUP-11710BOSTONPOST-02_042319		
Lab ID:	1904640-01A	**Date/Time Analyzed:**	5/2/19 05:11 PM
Date/Time Collected:	4/24/19 12:00 AM	**Dilution Factor:**	5.58
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd17.i / 17050212

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	4.9	8.8	11	Not Detected
1,4-Dioxane	123-91-1	21	30	40	Not Detected
cis-1,2-Dichloroethene	156-59-2	3.1	8.8	11	Not Detected
Tetrachloroethene	127-18-4	7.6	15	19	Not Detected
trans-1,2-Dichloroethene	156-60-5	3.3	8.8	11	Not Detected
Trichloroethene	79-01-6	5.4	12	15	Not Detected
Vinyl Chloride	75-01-4	2.8	5.7	7.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	76
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	IAF-11710BOSTONPOST-01_042319		
Lab ID:	1904640-02A	**Date/Time Analyzed:**	5/2/19 05:37 PM
Date/Time Collected:	4/24/19 08:40 AM	**Dilution Factor:**	5.70
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd17.i / 17050213

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	5.0	9.0	11	Not Detected
1,4-Dioxane	123-91-1	22	31	41	Not Detected
cis-1,2-Dichloroethene	156-59-2	3.2	9.0	11	Not Detected
Tetrachloroethene	127-18-4	7.7	15	19	Not Detected
trans-1,2-Dichloroethene	156-60-5	3.4	9.0	11	Not Detected
Trichloroethene	79-01-6	5.5	12	15	Not Detected
Vinyl Chloride	75-01-4	2.9	5.8	7.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	76
4-Bromofluorobenzene	460-00-4	70-130	101
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	IAG-11710BOSTONPOST-01_042319		
Lab ID:	1904640-03A	**Date/Time Analyzed:**	4/30/19 09:02 PM
Date/Time Collected:	4/24/19 08:36 AM	**Dilution Factor:**	8.40
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043015

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.63	1.7	3.3	Not Detected
1,4-Dioxane	123-91-1	0.70	1.5	3.0	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.74	1.7	3.3	Not Detected
Tetrachloroethene	127-18-4	0.34	2.8	5.7	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.52	1.7	3.3	Not Detected
Vinyl Chloride	75-01-4	0.30	1.1	2.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	106
4-Bromofluorobenzene	460-00-4	70-130	87
Toluene-d8	2037-26-5	70-130	107

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

Client ID:	IAG-11710BOSTONPOST-01_042319		
Lab ID:	1904640-03B	**Date/Time Analyzed:**	4/30/19 09:02 PM
Date/Time Collected:	4/24/19 08:36 AM	**Dilution Factor:**	8.40
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043015sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.088	0.36	0.90	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	103

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

Client ID:	DUP-11710BOSTONPOST-01_042319		
Lab ID:	1904640-04A	**Date/Time Analyzed:**	4/30/19 08:02 PM
Date/Time Collected:	4/24/19 12:00 AM	**Dilution Factor:**	7.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043014

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.58	1.5	3.1	Not Detected
1,4-Dioxane	123-91-1	0.65	1.4	2.8	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.68	1.5	3.1	Not Detected
Tetrachloroethene	127-18-4	0.32	2.6	5.2	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.48	1.5	3.1	Not Detected
Vinyl Chloride	75-01-4	0.28	0.99	2.0	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	106
4-Bromofluorobenzene	460-00-4	70-130	88
Toluene-d8	2037-26-5	70-130	106

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

Client ID:	DUP-11710BOSTONPOST-01_042319		
Lab ID:	1904640-04B	**Date/Time Analyzed:**	4/30/19 08:02 PM
Date/Time Collected:	4/24/19 12:00 AM	**Dilution Factor:**	7.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043014sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.081	0.33	0.83	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	102
4-Bromofluorobenzene	460-00-4	70-130	89
Toluene-d8	2037-26-5	70-130	102

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

Client ID:	AA-11710BOSTONPOST-01_042319		
Lab ID:	1904640-05A	**Date/Time Analyzed:**	4/30/19 06:29 PM
Date/Time Collected:	4/24/19 08:44 AM	**Dilution Factor:**	1.61
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd22.i / 22043012

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.32	0.64	Not Detected
1,4-Dioxane	123-91-1	0.13	0.29	0.58	0.33 J
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.64	Not Detected
Tetrachloroethene	127-18-4	0.066	0.55	1.1	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.64	Not Detected
Trichloroethene	79-01-6	0.094	0.43	0.86	Not Detected
Vinyl Chloride	75-01-4	0.059	0.20	0.41	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	116
4-Bromofluorobenzene	460-00-4	70-130	92
Toluene-d8	2037-26-5	70-130	104

1904640

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

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:	C.weaver, H.Ladd		
Site Name:	11710 BOSTON POST		

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	DUP-11710BOSTONPOST-02_042319	6L0942	40297	04/23/2019		04/24/2019		-29	-5.5			X	
02A	IAF-11710 BOSTONPOST-01_042319	6L2399	21245	04/23/2019	09:41	04/24/2019	08:40	-29	-6			X	
03A	IAG-11710 BOSTONPOST-01_042319	6L2404	22847	04/23/2019	09:39	04/24/2019	08:36	-29	-5.5			X	
04A	DUP-11710BOSTONPOST-01_042319	6L0904	20762	04/23/2019		04/24/2019		-29	-4			X	
	DUP-11710BOSTONPOST-03_042319	6L1831	100166	04/23/2019		04/24/2019		-29	-2			Can failure - do not analyze	
05A	AA-11710 BOSTONPOST-01_042319	6L2402	23862	04/23/2019	09:36	04/24/2019	08:44	-29	-6				

Relinquished by: (Signature/Affiliation)	Arcadis	Date 4-25-19	Time 1600	Received by: (Signature/Affiliation)	Date 4/29/19 Time 0925
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:	Custody Seals Intact?	Yes		No	None	
Fed Ex		(Yes)				Good

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

5/6/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP Off-Site Sampling
Project #:
Workorder #: 1904647

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 4/29/2019 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 #: 1904647

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 #**	Ford LTP Off-Site Sampling
DATE RECEIVED:	04/29/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	05/06/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SSMP-11710BOSTONPOST-01_042419	TO-15	5.3 "Hg	15.2 psi
02A	SSMP-11710BOSTONPOST-02_042419	TO-15	5.5 "Hg	14.9 psi
03A	Lab Blank	TO-15	NA	NA
04A	CCV	TO-15	NA	NA
05A	LCS	TO-15	NA	NA
05AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 05/06/19

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# 1904647

Two 1 Liter Summa Canister (100% Certified) samples were received on April 29, 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 Off-Site Sampling

Client ID:	SSMP-11710BOSTONPOST-01_042419		
Lab ID:	1904647-01A	**Date/Time Analyzed:**	5/1/19 01:00 AM
Date/Time Collected:	4/24/19 09:19 AM	**Dilution Factor:**	2.47
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msda.i / a043023

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.5	3.9	4.9	Not Detected
1,4-Dioxane	123-91-1	2.6	13	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.98	3.9	4.9	Not Detected
Tetrachloroethene	127-18-4	1.0	6.7	8.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.9	3.9	4.9	Not Detected
Trichloroethene	79-01-6	0.66	5.3	6.6	1.3 J
Vinyl Chloride	75-01-4	0.63	2.5	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	88
4-Bromofluorobenzene	460-00-4	70-130	105
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	SSMP-11710BOSTONPOST-02_042419		
Lab ID:	1904647-02A	**Date/Time Analyzed:**	5/1/19 01:26 AM
Date/Time Collected:	4/24/19 09:19 AM	**Dilution Factor:**	2.46
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msda.i / a043024

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.5	3.9	4.9	Not Detected
1,4-Dioxane	123-91-1	2.6	13	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.98	3.9	4.9	Not Detected
Tetrachloroethene	127-18-4	1.0	6.7	8.3	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.8	3.9	4.9	Not Detected
Trichloroethene	79-01-6	0.66	5.3	6.6	Not Detected
Vinyl Chloride	75-01-4	0.63	2.5	3.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	88
4-Bromofluorobenzene	460-00-4	70-130	93
Toluene-d8	2037-26-5	70-130	102

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

Client ID:	Lab Blank		
Lab ID:	1904647-03A	**Date/Time Analyzed:**	4/30/19 02:12 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a043006c

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	96
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	101

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

Client ID:	CCV		
Lab ID:	1904647-04A	**Date/Time Analyzed:**	4/30/19 11:44 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a043002

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	110
1,4-Dioxane	123-91-1	93
cis-1,2-Dichloroethene	156-59-2	111
Tetrachloroethene	127-18-4	106
trans-1,2-Dichloroethene	156-60-5	102
Trichloroethene	79-01-6	105
Vinyl Chloride	75-01-4	108

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	104
Toluene-d8	2037-26-5	70-130	99

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

Client ID:	LCS		
Lab ID:	1904647-05A	**Date/Time Analyzed:**	4/30/19 12:29 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a043003

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	113
1,4-Dioxane	123-91-1	92
cis-1,2-Dichloroethene	156-59-2	118
Tetrachloroethene	127-18-4	104
trans-1,2-Dichloroethene	156-60-5	94
Trichloroethene	79-01-6	101
Vinyl Chloride	75-01-4	107

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	92
4-Bromofluorobenzene	460-00-4	70-130	94
Toluene-d8	2037-26-5	70-130	102

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1904647-05AA	**Date/Time Analyzed:**	4/30/19 12:54 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msda.i / a043004

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	111
1,4-Dioxane	123-91-1	96
cis-1,2-Dichloroethene	156-59-2	121
Tetrachloroethene	127-18-4	103
trans-1,2-Dichloroethene	156-60-5	96
Trichloroethene	79-01-6	101
Vinyl Chloride	75-01-4	112

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	91
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	104

* % Recovery is calculated using unrounded analytical results.

May 6, 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: 1904647
Sample date: 2019-04-24
Report received by CADENA: 2019-05-06
Initial Data Verification completed by CADENA: 2019-05-06

2 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

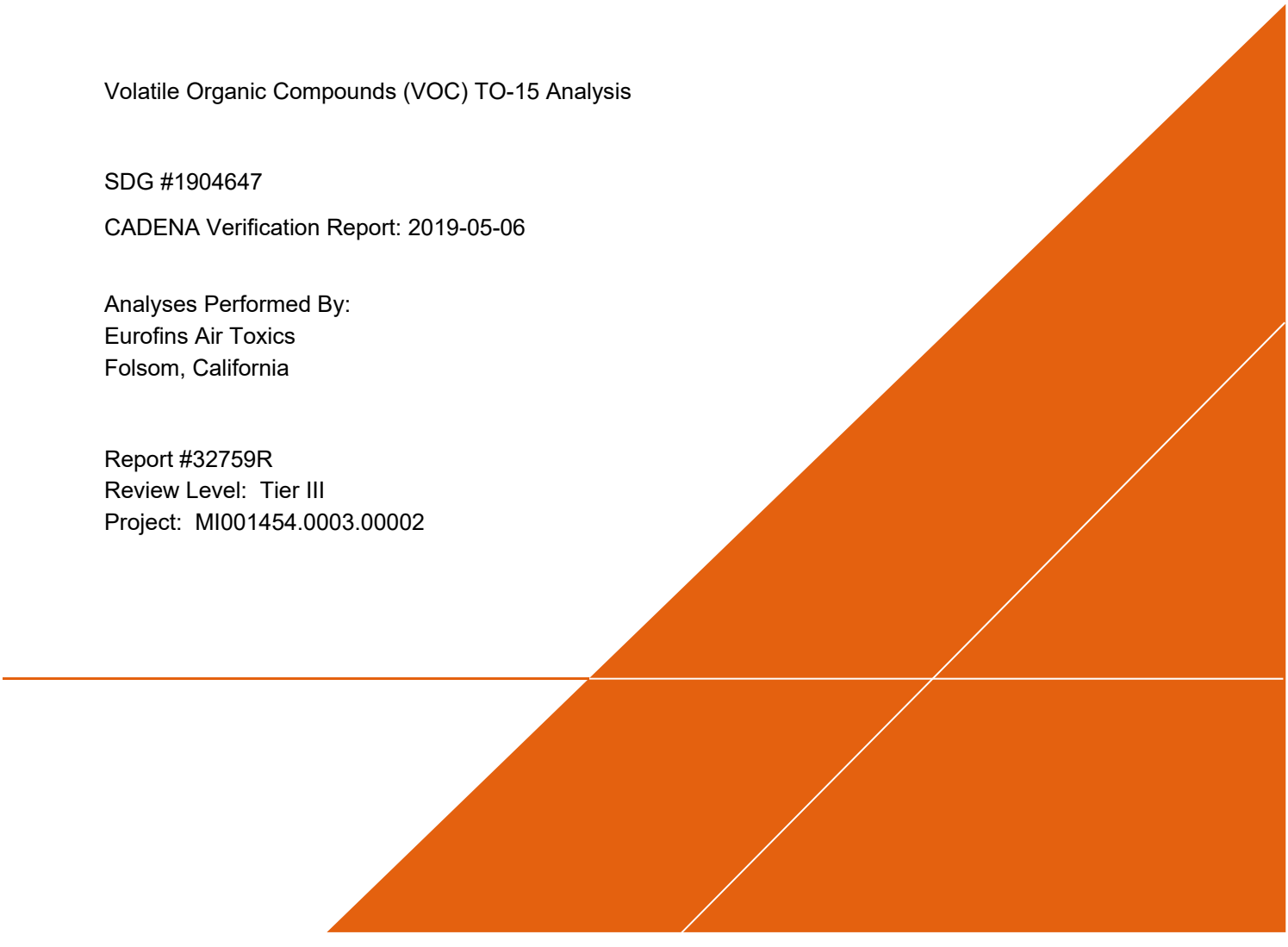
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1904647

CADENA Verification Report: 2019-05-06

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32759R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1904647 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
1904647	SSMP-11710BOSTONPOST-01_042419	1904647-01A	Air	4/24/2019		X		
	SSMP-11710BOSTONPOST-02_042419	1904647-02A	Air	4/24/2019		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 insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

5. Compound Identification

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

All identified compounds met the specified criteria.

6. 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:

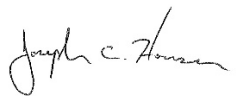
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

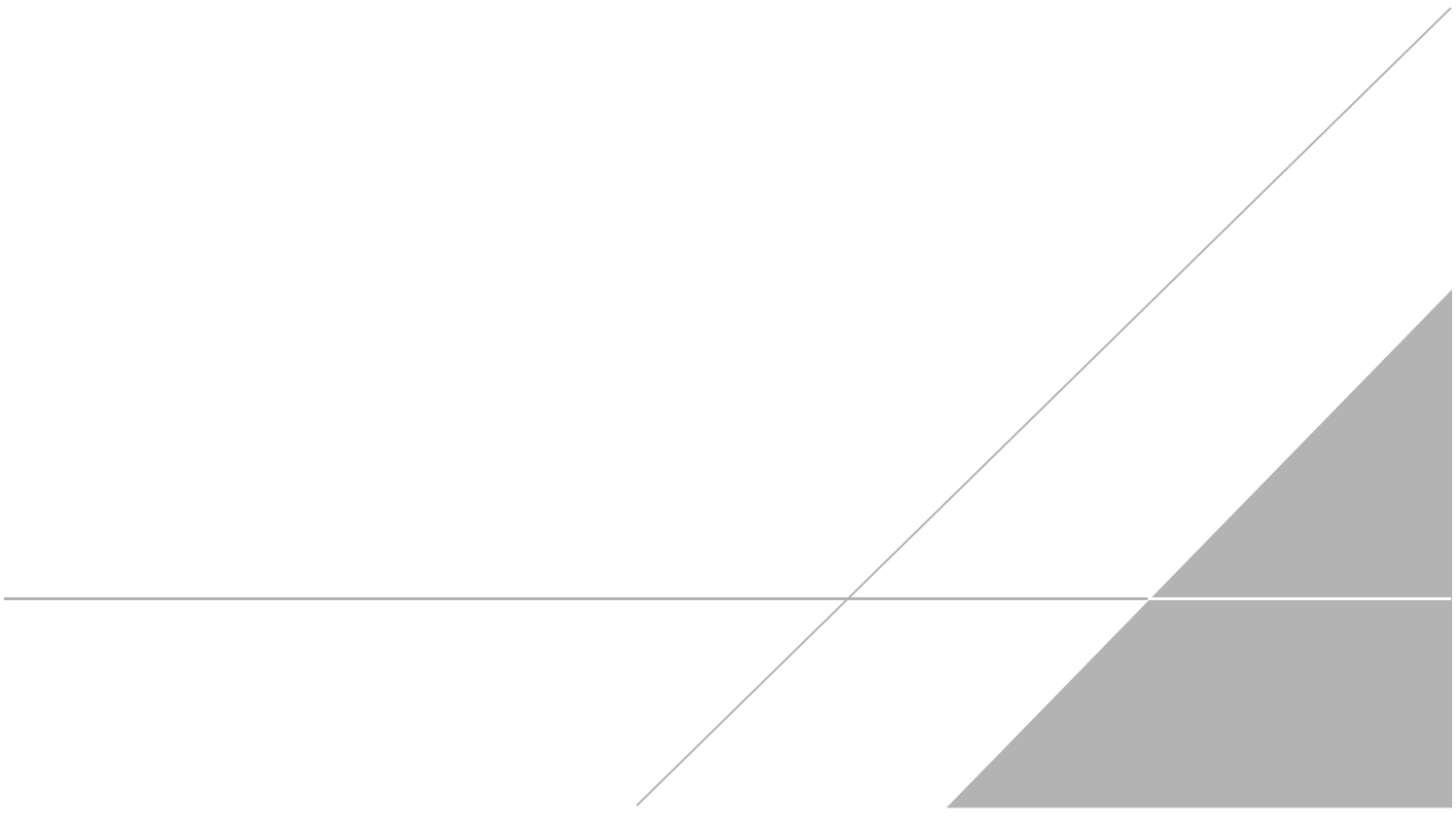
DATE: May 14, 2019

PEER REVIEW: Dennis Capria

DATE: May 15, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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

Client ID:	SSMP-11710BOSTONPOST-01_042419		
Lab ID:	1904647-01A	**Date/Time Analyzed:**	5/1/19 01:00 AM
Date/Time Collected:	4/24/19 09:19 AM	**Dilution Factor:**	2.47
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msda.i / a043023

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.5	3.9	4.9	Not Detected
1,4-Dioxane	123-91-1	2.6	13	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.98	3.9	4.9	Not Detected
Tetrachloroethene	127-18-4	1.0	6.7	8.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.9	3.9	4.9	Not Detected
Trichloroethene	79-01-6	0.66	5.3	6.6	1.3 J
Vinyl Chloride	75-01-4	0.63	2.5	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	88
4-Bromofluorobenzene	460-00-4	70-130	105
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	SSMP-11710BOSTONPOST-02_042419		
Lab ID:	1904647-02A	**Date/Time Analyzed:**	5/1/19 01:26 AM
Date/Time Collected:	4/24/19 09:19 AM	**Dilution Factor:**	2.46
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msda.i / a043024

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.5	3.9	4.9	Not Detected
1,4-Dioxane	123-91-1	2.6	13	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.98	3.9	4.9	Not Detected
Tetrachloroethene	127-18-4	1.0	6.7	8.3	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.8	3.9	4.9	Not Detected
Trichloroethene	79-01-6	0.66	5.3	6.6	Not Detected
Vinyl Chloride	75-01-4	0.63	2.5	3.1	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	88
4-Bromofluorobenzene	460-00-4	70-130	93
Toluene-d8	2037-26-5	70-130	102

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

Workorder # : **1904647**

PID:

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: Hayden L

Site Name: 11710 BOSTON POST

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)
	SSMP-11710 BOSTONPOST-01_042419	1L3159	23691	04/24/2019	09:08	04/24/2019	09:19	-29.5	-6			x
	SSMP-11710 BOSTONPOST-02_042419	1L3099	23501	04/24/2019	09:08	04/24/2019	09:19	-29.5	-6			x

Relinquished by: (Signature/Affiliation) Date 4-25-19 Time 1600 Relinquished by: (Signature/Affiliation) Date Time

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: 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

Custody Seal Intact?

(Y) N None Temp NA

Fed Ex

EATL 4/29/19 0925

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

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

Laboratory Job ID: 240-111627-1
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:
5/7/2019 5:14:13 PM

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Table of Contents

Definitions/Glossary

Client: ARCADIS U.S., Inc.
Job ID: 240-111627-1
Project/Site: Ford LTP Livonia MI - E203631

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
F2	MS/MSD RPD exceeds control limits
U	Indicates the analyte was analyzed for but not detected.
X	Surrogate is outside control limits

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: 240-111627-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-111627-1

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 4/26/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2º C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Samples SUMP-11710BOSTONPOST-01-042419 (240-111627-1) and TRIP BLANK (240-111627-2) were analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 05/06/2019.

1,2-Dichloroethane-d4 (Surr) failed the surrogate recovery criteria high for SUMP-11710BOSTONPOST-01-042419 (240-111627-1), TRIP BLANK (240-111627-2) and MB 240-379777/6. Refer to the QC report for details.

Surrogate recovery for the following samples were outside the upper control limit: SUMP-11710BOSTONPOST-01-042419 (240-111627-1) and TRIP BLANK (240-111627-2). This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

The MSD in this batch is outside QC time by a few minutes but is reported: SUMP-11710BOSTONPOST-01-042419 (240-111627-1) and TRIP BLANK (240-111627-2).

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

Job ID: 240-111627-1 (Continued)

Laboratory: Eurofins TestAmerica, Canton (Continued)

VOLATILE ORGANIC COMPOUNDS (GCMS SIM)

Sample SUMP-11710BOSTONPOST-01-042419 (240-111627-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The samples were analyzed on 04/29/2019.

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: 240-111627-1
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.
Project/Site: Ford LTP Livonia MI - E203631

Job ID: 240-111627-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-111627-1	SUMP-11710BOSTONPOST-01-042419	Water	04/24/19 09:28	04/26/19 09:00
240-111627-2	TRIP BLANK	Water	04/24/19 00:00	04/26/19 09:00

Detection Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-111627-1
Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: SUMP-11710BOSTONPOST-01-042419
Lab Sample ID: 240-111627-1

No Detections.

Client Sample ID: TRIP BLANK
Lab Sample ID: 240-111627-2

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: 240-111627-1

Client Sample ID: SUMP-11710BOSTONPOST-01-042419
Date Collected: 04/24/19 09:28
Date Received: 04/26/19 09:00

Lab Sample ID: 240-111627-1
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			04/29/19 14:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*105*		*63 - 125*		*04/29/19 14:17*	*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			05/06/19 19:41	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			05/06/19 19:41	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			05/06/19 19:41	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			05/06/19 19:41	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			05/06/19 19:41	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			05/06/19 19:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*125*	*X*	*70 - 121*		*05/06/19 19:41*	*1*
4-Bromofluorobenzene (Surr)	*94*		*59 - 120*		*05/06/19 19:41*	*1*
Toluene-d8 (Surr)	*100*		*70 - 123*		*05/06/19 19:41*	*1*
Dibromofluoromethane (Surr)	*106*		*75 - 128*		*05/06/19 19:41*	*1*

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

Job ID: 240-111627-1

Client Sample ID: TRIP BLANK

Date Collected: 04/24/19 00:00
Date Received: 04/26/19 09:00

Lab Sample ID: 240-111627-2

Matrix: Water

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			05/06/19 20:03	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			05/06/19 20:03	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			05/06/19 20:03	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			05/06/19 20:03	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			05/06/19 20:03	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			05/06/19 20:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*122*	*X*	*70 - 121*		*05/06/19 20:03*	*1*
4-Bromofluorobenzene (Surr)	*94*		*59 - 120*		*05/06/19 20:03*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*05/06/19 20:03*	*1*
Dibromofluoromethane (Surr)	*104*		*75 - 128*		*05/06/19 20:03*	*1*

Surrogate Summary

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

Job ID: 240-111627-1

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)
240-111627-1	SUMP-11710BOSTONPOST-01	125 X	94	100	106
240-111627-2	TRIP BLANK	122 X	94	98	104
LCS 240-379777/4	Lab Control Sample	119	110	110	106
MB 240-379777/6	Method Blank	128 X	100	105	110

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)
240-111623-C-4 MS	Matrix Spike	103
240-111623-C-4 MSD	Matrix Spike Duplicate	107
240-111627-1	SUMP-11710BOSTONPOST-01 042419	105
LCS 240-378674/7	Lab Control Sample	99
MB 240-378674/5	Method Blank	104

Surrogate Legend

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

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

Lab Sample ID: MB 240-379777/6
Matrix: Water
Analysis Batch: 379777

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			05/06/19 13:04	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			05/06/19 13:04	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			05/06/19 13:04	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			05/06/19 13:04	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			05/06/19 13:04	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			05/06/19 13:04	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*128*	*X*	*70 - 121*		*05/06/19 13:04*	*1*
4-Bromofluorobenzene (Surr)	*100*		*59 - 120*		*05/06/19 13:04*	*1*
Toluene-d8 (Surr)	*105*		*70 - 123*		*05/06/19 13:04*	*1*
Dibromofluoromethane (Surr)	*110*		*75 - 128*		*05/06/19 13:04*	*1*

Lab Sample ID: LCS 240-379777/4
Matrix: Water
Analysis Batch: 379777

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	10.6		ug/L		106	76 - 128
Tetrachloroethene	10.0	10.1		ug/L		101	74 - 130
trans-1,2-Dichloroethene	10.0	10.7		ug/L		107	78 - 133
Trichloroethene	10.0	9.32		ug/L		93	76 - 125
Vinyl chloride	10.0	11.2		ug/L		112	58 - 143

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*119*		*70 - 121*
4-Bromofluorobenzene (Surr)	*110*		*59 - 120*
Toluene-d8 (Surr)	*110*		*70 - 123*
Dibromofluoromethane (Surr)	*106*		*75 - 128*

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

Lab Sample ID: MB 240-378674/5
Matrix: Water
Analysis Batch: 378674

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			04/29/19 12:09	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*63 - 125*		*04/29/19 12:09*	*1*

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

Lab Sample ID: LCS 240-378674/7
Matrix: Water
Analysis Batch: 378674

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	10.5		ug/L		105	59 - 131		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*99*		*63 - 125*

Lab Sample ID: 240-111623-C-4 MS
Matrix: Water
Analysis Batch: 378674

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		
1,4-Dioxane	2.0	U F2	10.0	9.70		ug/L		97	52 - 129		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*103*		*63 - 125*

Lab Sample ID: 240-111623-C-4 MSD
Matrix: Water
Analysis Batch: 378674

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
1,4-Dioxane	2.0	U F2	10.0	11.4	F2	ug/L		114	52 - 129	16	13

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*107*		*63 - 125*

QC Association Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-111627-1
Project/Site: Ford LTP Livonia MI - E203631

GC/MS VOA

Analysis Batch: 378674

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-111627-1	SUMP-11710BOSTONPOST-01-042419	Total/NA	Water	8260B SIM	
MB 240-378674/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-378674/7	Lab Control Sample	Total/NA	Water	8260B SIM	
240-111623-C-4 MS	Matrix Spike	Total/NA	Water	8260B SIM	
240-111623-C-4 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B SIM	

Analysis Batch: 379777

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-111627-1	SUMP-11710BOSTONPOST-01-042419	Total/NA	Water	8260B	
240-111627-2	TRIP BLANK	Total/NA	Water	8260B	
MB 240-379777/6	Method Blank	Total/NA	Water	8260B	
LCS 240-379777/4	Lab Control Sample	Total/NA	Water	8260B	

Lab Chronicle

Client: ARCADIS U.S., Inc.
Job ID: 240-111627-1
Project/Site: Ford LTP Livonia MI - E203631

Client Sample ID: SUMP-11710BOSTONPOST-01-042419
Lab Sample ID: 240-111627-1

Date Collected: 04/24/19 09:28
Matrix: Water
Date Received: 04/26/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	379777	05/06/19 19:41	LEE	TAL CAN
Total/NA	Analysis	8260B SIM		1	378674	04/29/19 14:17	SAM	TAL CAN

Client Sample ID: TRIP BLANK
Lab Sample ID: 240-111627-2

Date Collected: 04/24/19 00:00
Matrix: Water
Date Received: 04/26/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	379777	05/06/19 20:03	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: 240-111627-1
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
Kansas	NELAP	7	E-10336	04-30-19 *
Kentucky (UST)	State Program	4	58	02-23-20
Kentucky (WW)	State Program	4	98016	12-31-19
Minnesota	NELAP	5	039-999-348	12-31-19 *
Minnesota (Petrofund)	State Program	1	3506	07-31-19
Nevada	State Program	9	OH00048	07-31-19
New Jersey	NELAP	2	OH001	06-30-19
New York	NELAP	2	10975	03-31-20
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-20
Pennsylvania	NELAP	3	68-00340	08-31-19 *
Texas	NELAP	6	T104704517-18-10	08-31-19
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-19
Washington	State Program	10	C971	01-12-20 *
West Virginia DEP	State Program	3	210	12-31-19

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

1.4/G.2

MICHIGAN
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Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other

TestAmerica Laboratories, Inc.

Client Contact			
Company Name: Arcadis	Client Project Manager: Kris Hinskey	Site Contact: ~~Angela DeGrandis~~ CAITLIN O'NEILL	Lab Contact: Mike DelMonico
Address: 28550 Cabot Drive. Suite 500	Telephone: 248-994-2240	Telephone: ~~734-320-0005~~ 248-953-2620	Telephone: 330-497-9396
City/State/Zip: Novi, MI. 48377	Email: kristoffer.hinskey@arcadis.com	Analysis Turnaround Time	
Phone: 248-994-2240		TAT if different from below ☐ 3 weeks ☐ 2 weeks 5 Day ☑ 1 week ☐ 2 days ☐ 1 day	
Project Name: Ford LTP	Method of Shipment/Carrier:		
Project Number: MI001454.0003	Shipping/Tracking No:		
PO # MI001454.0003			

COC No: ____ of ____ COCs

For lab use only
Walk-in client
Lab sampling
Job/SDG 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	Analyses: 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-1710BostonPost-01_042419	4-24-19	0928		X						X					N	G	X	X	X	X	X	X	X	6 VOAs
Trip Blank	4-24-19	—		X						X					N	N/A	X	X	X	X	X	X	X	1 VOA

240-111627 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.

	Company	Date/Time		Company	Date/Time
Relinquished by:	Arcadis	4-24-19 1900	Received by: Novi Cold Storage	Arcadis	4-24-19 1900
Relinquished by:	Arcadis	4-25-19 1330	Received by:	TESTAMERICA	4-25-19 13:30
Relinquished by:	TESTAMERICA	4/25/19 1450	Received in Laboratory by:	TAC	4-26-19 900

TestAmerica Canton Sample Receipt Form/Narrative **Login # : 111627**

Canton Facility

Client Arcadis Site Name _____ Cooler unpacked by:

Cooler Received on 4-26-19 Opened on 4-26-19

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. 1.4 °C Corrected Cooler Temp. 1.2 °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 1	(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 # 55320	(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: M.S.

18. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.

Sample(s) _____ were received in a broken container.

Sample(s) _____ 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: _____

WI-NC-099

DATA VERIFICATION REPORT

May 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
Event Specific Scope of Work References: Sample COC
Laboratory: TestAmerica - North Canton
Laboratory submittal: 111627-1
Sample date: 2019-04-24
Report received by CADENA: 2019-05-07
Initial Data Verification completed by CADENA: 2019-05-08
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 samples -001, trip blank, and method blank SURROGATE recoveries were outliers biased high for 1 surrogate. Associated client sample results were non-detect so qualification was not required based on these high bias QC outliers.

GCMS VOC and 1,4-DIOXANE QC batch clock time exceedance and MS/MSD 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, Blank Contamination and Hold Time Exception were reviewed as part of our verification.

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA 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: 111627-1

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
2401116271	SUMP-11710BOSTONPOST-01-042419	4/24/2019	9:28:00	X	X	
2401116272	TRIP BLANK	4/24/2019	12:00:00	X		

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631
Laboratory: TestAmerica - North Canton
Laboratory Submittal: 111627-1

		Sample Name:	SUMP-11710BOSTONPOST-01-042419			TRIP BLANK			
		Lab Sample ID:	2401116271			2401116272			
		Sample Date:	4/24/2019			4/24/2019			
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	ND	1.0	ug/l	---	ND	1.0	ug/l	---
Tetrachloroethene	127-18-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---
trans-1,2-Dichloroethene	156-60-5	ND	1.0	ug/l	---	ND	1.0	ug/l	---
Trichloroethene	79-01-6	ND	1.0	ug/l	---	ND	1.0	ug/l	---
Vinyl chloride	75-01-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---
OSW-8260BBSim									
1,4-Dioxane	123-91-1	ND	2.0	ug/l	---				

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

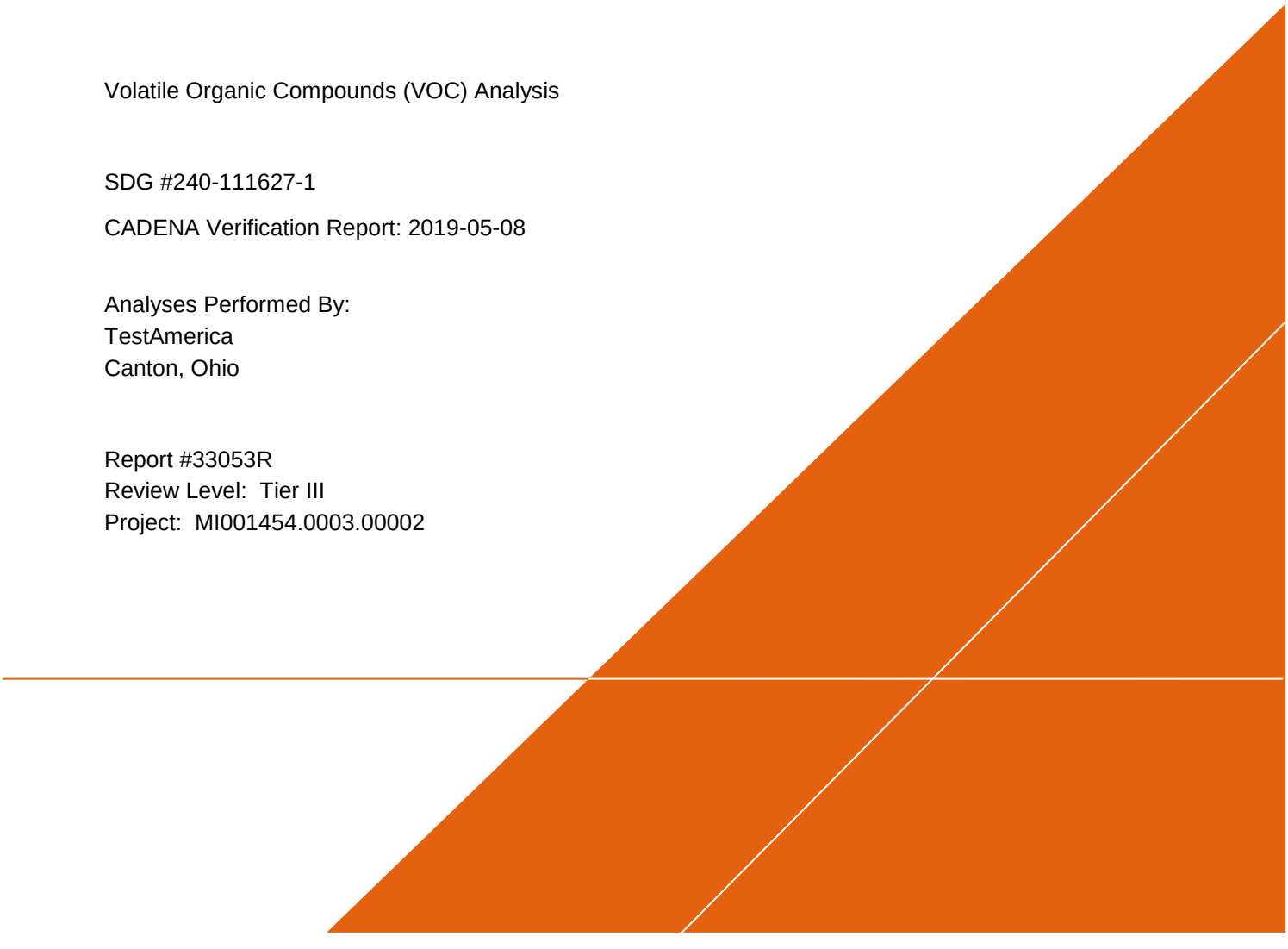
Volatile Organic Compounds (VOC) Analysis

SDG #240-111627-1

CADENA Verification Report: 2019-05-08

Analyses Performed By:
TestAmerica
Canton, Ohio

Report #33053R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-111627-1 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
240-111627-1	SUMP-11710BOSTONPOST-01-042419	240-111627-1	Water	4/24/2019		X	X	
	TRIP BLANK	240-111627-1	Water	4/24/2019		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.

DATA REVIEW

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: 

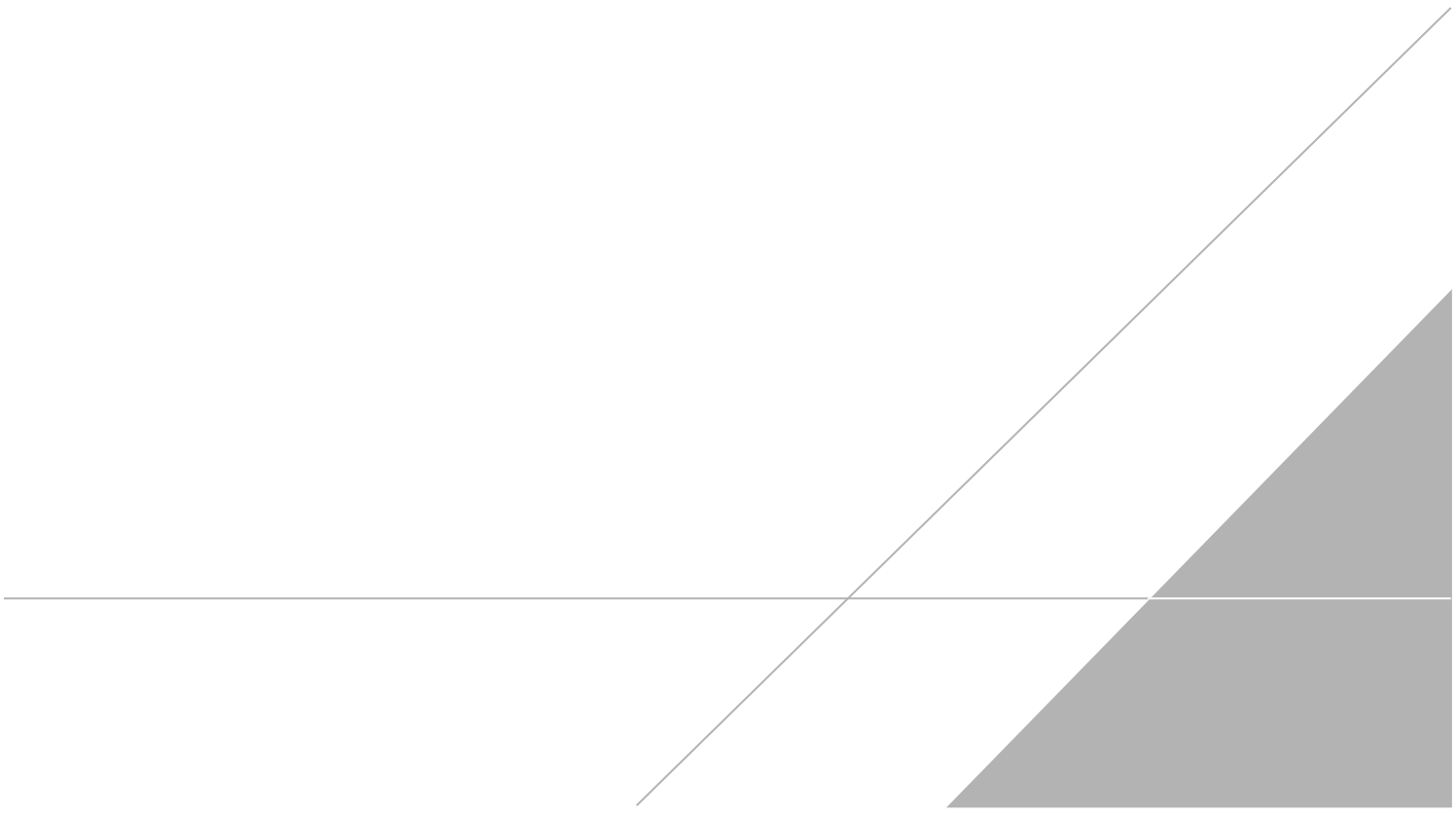
DATE: July 3, 2019

PEER REVIEW: Dennis Capria

DATE: July 3, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



1.4/G.2

MICHIGAN
190

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other

TestAmerica Laboratories, Inc.

Client Contact			
Company Name: Arcadis	Client Project Manager: Kris Hinskey	Site Contact: ~~Angela DeGrandis~~ CAITLIN O'NEILL	Lab Contact: Mike DelMonico
Address: 28550 Cabot Drive. Suite 500	Telephone: 248-994-2240	Telephone: ~~734-320-0005~~ 248-953-2620	Telephone: 330-497-9396
City/State/Zip: Novi, MI. 48377	Email: kristoffer.hinskey@arcadis.com	Analysis Turnaround Time	
Phone: 248-994-2240		TAT if different from below ☐ 3 weeks ☐ 2 weeks 5 Day ☑ 1 week ☐ 2 days ☐ 1 day	
Project Name: Ford LTP	Method of Shipment/Carrier:		
Project Number: MI001454.0003	Shipping/Tracking No:		
PO # MI001454.0003			

COC No: ____ of ____ COCs

For lab use only
Walk-in client
Lab sampling
Job/SDG 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	Analyses: 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-1710BostonPost-01_042419	4-24-19	0928		X						X					N	G	X	X	X	X	X	X	X	6 VOAs
Trip Blank	4-24-19	—		X						X					N	N/A	X	X	X	X	X	X	X	1 VOA

240-111627 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.

	Company	Date/Time		Company	Date/Time
Relinquished by:	Arcadis	4-24-19 1900	Received by: Novi Cold Storage	Arcadis	4-24-19 1900
Relinquished by:	Arcadis	4-25-19 1330	Received by:	TESTAMERICA	4-25-19 13:30
Relinquished by:	TESTAMERICA	4/25/19 1450	Received in Laboratory by:	TAC	4-26-19 900

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

Job ID: 240-111627-1

Client Sample ID: SUMP-11710BOSTONPOST-01-042419
Date Collected: 04/24/19 09:28
Date Received: 04/26/19 09:00

Lab Sample ID: 240-111627-1
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			04/29/19 14:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*105*		*63 - 125*		*04/29/19 14:17*	*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			05/06/19 19:41	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			05/06/19 19:41	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			05/06/19 19:41	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			05/06/19 19:41	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			05/06/19 19:41	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			05/06/19 19:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*125*	*X*	*70 - 121*		*05/06/19 19:41*	*1*
4-Bromofluorobenzene (Surr)	*94*		*59 - 120*		*05/06/19 19:41*	*1*
Toluene-d8 (Surr)	*100*		*70 - 123*		*05/06/19 19:41*	*1*
Dibromofluoromethane (Surr)	*106*		*75 - 128*		*05/06/19 19:41*	*1*

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

Job ID: 240-111627-1

Client Sample ID: TRIP BLANK

Date Collected: 04/24/19 00:00
Date Received: 04/26/19 09:00

Lab Sample ID: 240-111627-2

Matrix: Water

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			05/06/19 20:03	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			05/06/19 20:03	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			05/06/19 20:03	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			05/06/19 20:03	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			05/06/19 20:03	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			05/06/19 20:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*122*	*X*	*70 - 121*		*05/06/19 20:03*	*1*
4-Bromofluorobenzene (Surr)	*94*		*59 - 120*		*05/06/19 20:03*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*05/06/19 20:03*	*1*
Dibromofluoromethane (Surr)	*104*		*75 - 128*		*05/06/19 20:03*	*1*

eurofins | Air Toxics

6/24/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP Off-Site Sampling
Project #: MI001454.0003.00002
Workorder #: 1906309

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 6/17/2019 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

eurofins | Air Toxics

WORK ORDER #: 1906309

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 #**	MI001454.0003.00002 Ford LTP Off-Site Sampling
DATE RECEIVED:	06/17/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	06/24/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA-11710BOSTONPOST-01_061119	Modified TO-15	6.0 "Hg	5 psi
02A	IAG-11710BOSTONPOST-01_061119	Modified TO-15	7.0 "Hg	5 psi
02B	IAG-11710BOSTONPOST-01_061119	Modified TO-15	7.0 "Hg	5 psi
03A	IAF-11710BOSTONPOST-01_061119	Modified TO-15	5.0 "Hg	5 psi
03B	IAF-11710BOSTONPOST-01_061119	Modified TO-15	5.0 "Hg	5 psi
04A	DUP-11710BOSTONPOST-01_061119	Modified TO-15	7.0 "Hg	5 psi
04B	DUP-11710BOSTONPOST-01_061119	Modified TO-15	7.0 "Hg	5 psi
05A	Lab Blank	Modified TO-15	NA	NA
05B	Lab Blank	Modified TO-15	NA	NA
05C	Lab Blank	Modified TO-15	NA	NA
05D	Lab Blank	Modified TO-15	NA	NA
06A	CCV	Modified TO-15	NA	NA
06B	CCV	Modified TO-15	NA	NA
06C	CCV	Modified TO-15	NA	NA
06D	CCV	Modified TO-15	NA	NA
07A	LCS	Modified TO-15	NA	NA
07AA	LCSD	Modified TO-15	NA	NA
07B	LCS	Modified TO-15	NA	NA
07BB	LCSD	Modified TO-15	NA	NA
07C	LCS	Modified TO-15	NA	NA
07CC	LCSD	Modified TO-15	NA	NA
07D	LCS	Modified TO-15	NA	NA
07DD	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 06/24/19

Technical Director

Certification numbers: AZ Licensure AZ0775, FL NELAP - E8 , LA NELAP - 02089, NH NELAP - 209218, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-18-13, UT NELAP CA009332018-10, VA NELAP - 9505, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005-011, Effective date: 10/18/2018, Expiration date: 10/17/2019.
Eurofins Air Toxics LLC. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified TO-15
Arcadis U.S., Inc.
Workorder# 1906309

Four 6 Liter Summa Canister (100% Cert Ambient) samples were received on June 17, 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 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.

Dilution was performed on samples IAG-11710BOSTONPOST-01_061119, IAF-11710BOSTONPOST-01_061119 and DUP-11710BOSTONPOST-01_061119 due to the presence of high level non-target species.

The results for samples IAG-11710BOSTONPOST-01_061119, IAF-11710BOSTONPOST-01_061119 and DUP-11710BOSTONPOST-01_061119 in this report were acquired from two separate data files originating from the same analytical run. The two data files have the same base file name and are differentiated with a "sim" extension on the SIM data file.

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-11710BOSTONPOST-01_061119		
Lab ID:	1906309-01A	**Date/Time Analyzed:**	6/18/19 09:59 PM
Date/Time Collected:	6/12/19 08:46 AM	**Dilution Factor:**	1.68
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061815

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.16	0.60	0.67	Not Detected
1,4-Dioxane	123-91-1	0.49	0.54	0.60	0.95
cis-1,2-Dichloroethene	156-59-2	0.36	0.60	0.67	Not Detected
Tetrachloroethene	127-18-4	0.71	1.0	1.1	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.37	0.60	0.67	Not Detected
Trichloroethene	79-01-6	0.44	0.81	0.90	Not Detected
Vinyl Chloride	75-01-4	0.14	0.39	0.43	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	116
Toluene-d8	2037-26-5	70-130	90

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

Client ID:	IAG-11710BOSTONPOST-01_061119		
Lab ID:	1906309-02A	**Date/Time Analyzed:**	6/19/19 01:45 PM
Date/Time Collected:	6/12/19 08:38 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061908

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.84	3.1	3.5	Not Detected
1,4-Dioxane	123-91-1	2.6	2.8	3.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.9	3.1	3.5	Not Detected
Tetrachloroethene	127-18-4	3.7	5.3	5.9	Not Detected
trans-1,2-Dichloroethene	156-60-5	2.0	3.1	3.5	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	118
Toluene-d8	2037-26-5	70-130	93

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

Client ID:	IAG-11710BOSTONPOST-01_061119		
Lab ID:	1906309-02B	**Date/Time Analyzed:**	6/19/19 01:45 PM
Date/Time Collected:	6/12/19 08:38 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061908sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.092	0.28	0.94	0.094 J
Vinyl Chloride	75-01-4	0.056	0.13	0.22	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	97
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	IAF-11710BOSTONPOST-01_061119		
Lab ID:	1906309-03A	**Date/Time Analyzed:**	6/18/19 11:17 PM
Date/Time Collected:	6/12/19 08:40 AM	**Dilution Factor:**	8.05
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061817

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.77	2.9	3.2	Not Detected
1,4-Dioxane	123-91-1	2.3	2.6	2.9	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.7	2.9	3.2	Not Detected
Tetrachloroethene	127-18-4	3.4	4.9	5.5	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.8	2.9	3.2	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	95
4-Bromofluorobenzene	460-00-4	70-130	112
Toluene-d8	2037-26-5	70-130	90

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

Client ID:	IAF-11710BOSTONPOST-01_061119		
Lab ID:	1906309-03B	**Date/Time Analyzed:**	6/18/19 11:17 PM
Date/Time Collected:	6/12/19 08:40 AM	**Dilution Factor:**	8.05
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061817sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.084	0.26	0.86	Not Detected
Vinyl Chloride	75-01-4	0.052	0.12	0.20	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	94
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	92

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

Client ID:	DUP-11710BOSTONPOST-01_061119		
Lab ID:	1906309-04A	**Date/Time Analyzed:**	6/18/19 10:38 PM
Date/Time Collected:	6/12/19 12:00 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061816

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.84	3.1	3.5	Not Detected
1,4-Dioxane	123-91-1	2.6	2.8	3.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.9	3.1	3.5	Not Detected
Tetrachloroethene	127-18-4	3.7	5.3	5.9	Not Detected
trans-1,2-Dichloroethene	156-60-5	2.0	3.1	3.5	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	94
4-Bromofluorobenzene	460-00-4	70-130	115
Toluene-d8	2037-26-5	70-130	87

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

Client ID:	DUP-11710BOSTONPOST-01_061119		
Lab ID:	1906309-04B	**Date/Time Analyzed:**	6/18/19 10:38 PM
Date/Time Collected:	6/12/19 12:00 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061816sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.092	0.28	0.94	Not Detected
Vinyl Chloride	75-01-4	0.056	0.13	0.22	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	94
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	93

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

Client ID:	Lab Blank		
Lab ID:	1906309-05A	**Date/Time Analyzed:**	6/18/19 11:19 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061805a

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.095	0.36	0.40	Not Detected
1,4-Dioxane	123-91-1	0.29	0.32	0.36	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.21	0.36	0.40	Not Detected
Tetrachloroethene	127-18-4	0.42	0.61	0.68	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.22	0.36	0.40	Not Detected
Trichloroethene	79-01-6	0.26	0.48	0.54	Not Detected
Vinyl Chloride	75-01-4	0.082	0.23	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	98
4-Bromofluorobenzene	460-00-4	70-130	117
Toluene-d8	2037-26-5	70-130	93

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

Client ID:	Lab Blank		
Lab ID:	1906309-05B	**Date/Time Analyzed:**	6/19/19 12:35 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061907c

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.095	0.36	0.40	Not Detected
1,4-Dioxane	123-91-1	0.29	0.32	0.36	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.21	0.36	0.40	Not Detected
Tetrachloroethene	127-18-4	0.42	0.61	0.68	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.22	0.36	0.40	Not Detected
Trichloroethene	79-01-6	0.26	0.48	0.54	Not Detected
Vinyl Chloride	75-01-4	0.082	0.23	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	96
4-Bromofluorobenzene	460-00-4	70-130	112
Toluene-d8	2037-26-5	70-130	93

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

Client ID:	Lab Blank		
Lab ID:	1906309-05C	**Date/Time Analyzed:**	6/18/19 11:19 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061805simc

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.010	0.032	0.11	0.013 J
Vinyl Chloride	75-01-4	0.0065	0.015	0.026	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	99
4-Bromofluorobenzene	460-00-4	70-130	112
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	Lab Blank		
Lab ID:	1906309-05D	**Date/Time Analyzed:**	6/19/19 12:35 PM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061907sima

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.010	0.032	0.11	0.017 J
Vinyl Chloride	75-01-4	0.0065	0.015	0.026	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	100
4-Bromofluorobenzene	460-00-4	70-130	110
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:	1906309-06A	**Date/Time Analyzed:**	6/18/19 08:41 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061802

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	88
1,4-Dioxane	123-91-1	96
cis-1,2-Dichloroethene	156-59-2	92
Tetrachloroethene	127-18-4	103
trans-1,2-Dichloroethene	156-60-5	88
Trichloroethene	79-01-6	97
Vinyl Chloride	75-01-4	72

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	96
4-Bromofluorobenzene	460-00-4	70-130	116
Toluene-d8	2037-26-5	70-130	100

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

Client ID:	CCV		
Lab ID:	1906309-06B	**Date/Time Analyzed:**	6/19/19 09:20 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061903

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	89
1,4-Dioxane	123-91-1	92
cis-1,2-Dichloroethene	156-59-2	92
Tetrachloroethene	127-18-4	96
trans-1,2-Dichloroethene	156-60-5	88
Trichloroethene	79-01-6	91
Vinyl Chloride	75-01-4	71

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	96
4-Bromofluorobenzene	460-00-4	70-130	108
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	CCV		
Lab ID:	1906309-06C	**Date/Time Analyzed:**	6/18/19 08:41 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061802sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	90
Vinyl Chloride	75-01-4	73

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	91
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	99

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

Client ID:	CCV		
Lab ID:	1906309-06D	**Date/Time Analyzed:**	6/19/19 09:20 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061903sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	89
Vinyl Chloride	75-01-4	73

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	91
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	LCS		
Lab ID:	1906309-07A	**Date/Time Analyzed:**	6/18/19 09:35 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061803

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	91
1,4-Dioxane	123-91-1	93
cis-1,2-Dichloroethene	156-59-2	101
Tetrachloroethene	127-18-4	106
trans-1,2-Dichloroethene	156-60-5	76
Trichloroethene	79-01-6	97
Vinyl Chloride	75-01-4	73

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	92
4-Bromofluorobenzene	460-00-4	70-130	109
Toluene-d8	2037-26-5	70-130	98

* % 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:	1906309-07AA	**Date/Time Analyzed:**	6/18/19 10:14 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061804

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	85
1,4-Dioxane	123-91-1	88
cis-1,2-Dichloroethene	156-59-2	94
Tetrachloroethene	127-18-4	104
trans-1,2-Dichloroethene	156-60-5	72
Trichloroethene	79-01-6	94
Vinyl Chloride	75-01-4	70

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	92
4-Bromofluorobenzene	460-00-4	70-130	114
Toluene-d8	2037-26-5	70-130	93

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCS		
Lab ID:	1906309-07B	**Date/Time Analyzed:**	6/19/19 10:10 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061904

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	86
1,4-Dioxane	123-91-1	92
cis-1,2-Dichloroethene	156-59-2	96
Tetrachloroethene	127-18-4	105
trans-1,2-Dichloroethene	156-60-5	73
Trichloroethene	79-01-6	99
Vinyl Chloride	75-01-4	70

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	91
4-Bromofluorobenzene	460-00-4	70-130	116
Toluene-d8	2037-26-5	70-130	95

* % 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:	1906309-07BB	**Date/Time Analyzed:**	6/19/19 10:50 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061905

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	83
1,4-Dioxane	123-91-1	90
cis-1,2-Dichloroethene	156-59-2	94
Tetrachloroethene	127-18-4	102
trans-1,2-Dichloroethene	156-60-5	74
Trichloroethene	79-01-6	94
Vinyl Chloride	75-01-4	71

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	92
4-Bromofluorobenzene	460-00-4	70-130	109
Toluene-d8	2037-26-5	70-130	92

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCS		
Lab ID:	1906309-07C	**Date/Time Analyzed:**	6/18/19 09:35 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061803sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	96
Vinyl Chloride	75-01-4	76

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	98

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1906309-07CC	**Date/Time Analyzed:**	6/18/19 10:14 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061804sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	94
Vinyl Chloride	75-01-4	74

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	109
Toluene-d8	2037-26-5	70-130	98

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCS		
Lab ID:	1906309-07D	**Date/Time Analyzed:**	6/19/19 10:10 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061904sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	95
Vinyl Chloride	75-01-4	76

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	92
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	98

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1906309-07DD	**Date/Time Analyzed:**	6/19/19 10:50 AM
Date/Time Collected:	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd20.i / 20061905sim

Compound	CAS#	%Recovery
Trichloroethene	79-01-6	94
Vinyl Chloride	75-01-4	75

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	109
Toluene-d8	2037-26-5	70-130	97

* % Recovery is calculated using unrounded analytical results.

DATA VERIFICATION REPORT

June 24, 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: Eurofins-California
Laboratory submittal: 1906309
Sample date: 2019-06-12
Report received by CADENA: 2019-06-24
Initial Data Verification completed by CADENA: 2019-06-24
Number of Samples: 4
Sample Matrices: Air
Test Categories: TO-15 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:

> MBK - METHOD BLANKS had detections BELOW the Reporting Limit (RL) for these analytes. The listed client sample results had concentrations LESS than 5X the method blank levels so client sample results reported below the RL are considered non-detect at the RL and qualified with UB flags and results greater than the RL are non-detect at the sample concentration reported and qualified with B flags :
> TO-15 - trichloroethylene - UB flags - samples -002.

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

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

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

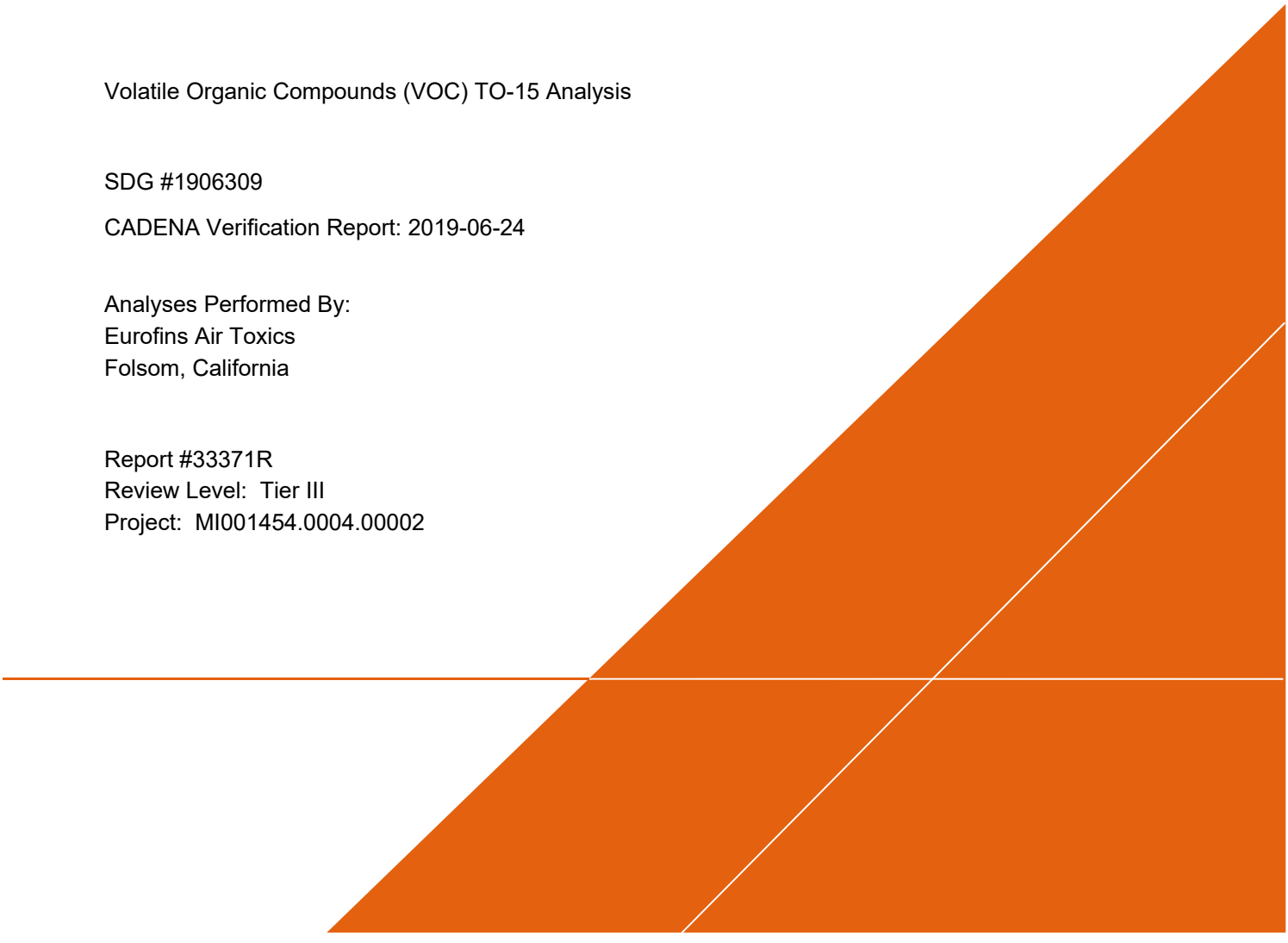
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1906309

CADENA Verification Report: 2019-06-24

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #33371R
Review Level: Tier III
Project: MI001454.0004.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1906309 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
1906309	AA-11710BOSTONPOST-01_061119	1906309-01A	Air	6/12/2019		X		
	IAG-11710BOSTONPOST-01_061119	1906309-02A	Air	6/12/2019		X	X	
	IAF-11710BOSTONPOST-01_061119	1906309-03A	Air	6/12/2019		X	X	
	DUP-11710BOSTONPOST-01_061119	1906309-04A	Air	6/12/2019	IAF-11710BOSTONPOST-01_061119	X	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) and TO-15-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	Return Canister Pressure
USEPA TO-15 and USEPA TO-15-SIM	Air	30 days from collection to analysis (Canister)	Ambient Temperature	< -2" Hg

All samples were analyzed within the specified holding time and canister return pressure / vacuum criteria.

2. Mass Spectrometer Tuning

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

System performance and column resolution were acceptable.

3. Calibration

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

3.1 Initial Calibration

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

All target compounds associated with the initial calibration standards must exhibit a %RSD less than the control limit (30%) or a correlation coefficient greater than 0.99 and an RRF value greater than control limit (0.05).

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

3.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (30%) and RRF value greater than control limit (0.05).

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

4. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria requires the internal standard compounds associated with the VOC exhibit area counts that are not greater than 140% or less than 60% of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

5. Compound Identification

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

All identified compounds met the specified criteria.

6. 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
IAF-11710BOSTONPOST-01_061119/ DUP-11710BOSTONPOST-01_061119	All compounds	U	U	AC

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) and TO-15 SIM	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:

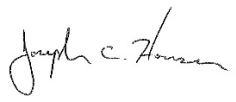
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

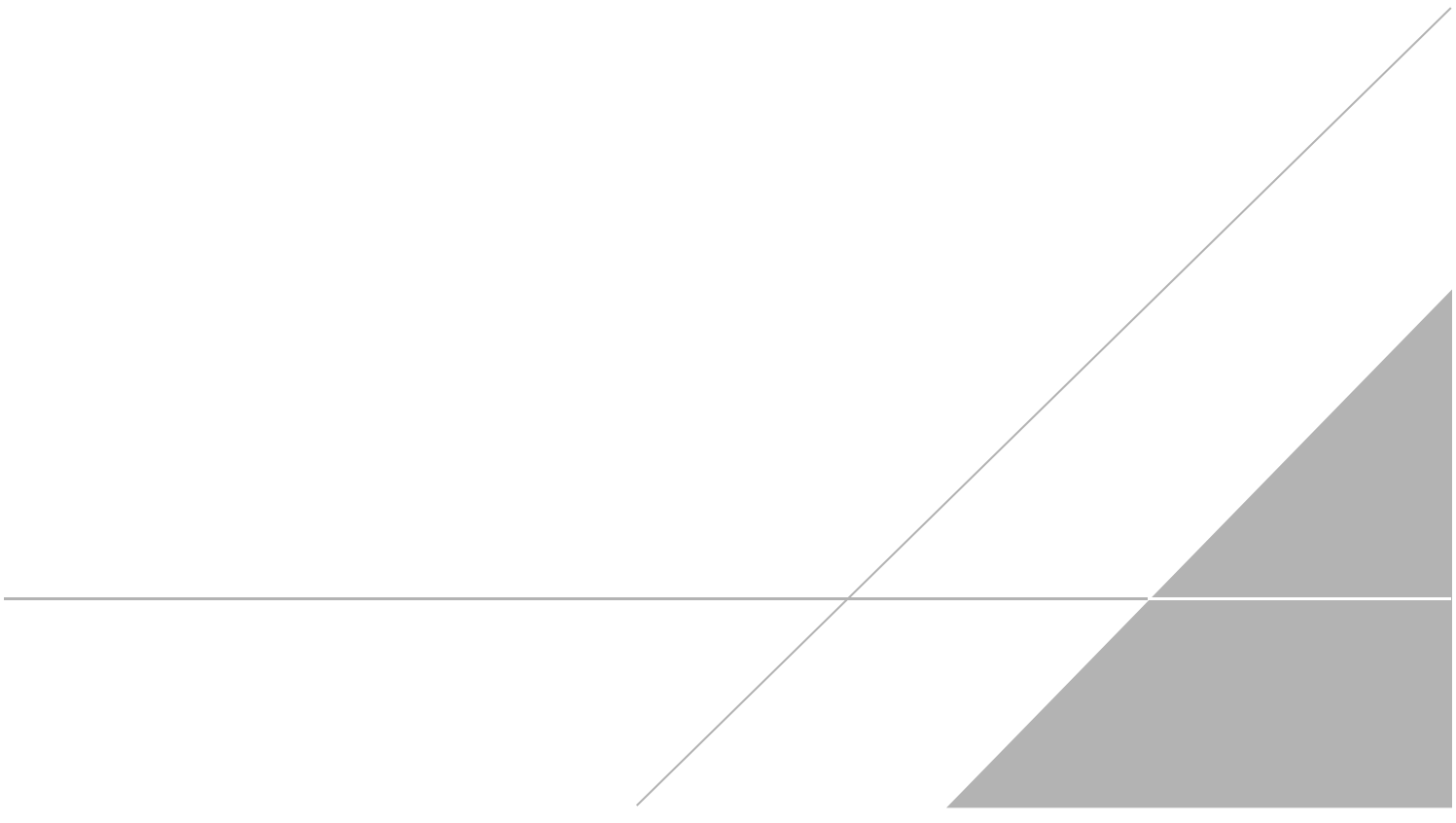
DATE: July 2, 2019

PEER REVIEW: Dennis Capria

DATE: July 3, 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-11710BOSTONPOST-01_061119		
Lab ID:	1906309-01A	**Date/Time Analyzed:**	6/18/19 09:59 PM
Date/Time Collected:	6/12/19 08:46 AM	**Dilution Factor:**	1.68
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061815

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.16	0.60	0.67	Not Detected
1,4-Dioxane	123-91-1	0.49	0.54	0.60	0.95
cis-1,2-Dichloroethene	156-59-2	0.36	0.60	0.67	Not Detected
Tetrachloroethene	127-18-4	0.71	1.0	1.1	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.37	0.60	0.67	Not Detected
Trichloroethene	79-01-6	0.44	0.81	0.90	Not Detected
Vinyl Chloride	75-01-4	0.14	0.39	0.43	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	116
Toluene-d8	2037-26-5	70-130	90

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

Client ID:	IAG-11710BOSTONPOST-01_061119		
Lab ID:	1906309-02A	**Date/Time Analyzed:**	6/19/19 01:45 PM
Date/Time Collected:	6/12/19 08:38 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061908

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.84	3.1	3.5	Not Detected
1,4-Dioxane	123-91-1	2.6	2.8	3.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.9	3.1	3.5	Not Detected
Tetrachloroethene	127-18-4	3.7	5.3	5.9	Not Detected
trans-1,2-Dichloroethene	156-60-5	2.0	3.1	3.5	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	90
4-Bromofluorobenzene	460-00-4	70-130	118
Toluene-d8	2037-26-5	70-130	93

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

Client ID:	IAG-11710BOSTONPOST-01_061119		
Lab ID:	1906309-02B	**Date/Time Analyzed:**	6/19/19 01:45 PM
Date/Time Collected:	6/12/19 08:38 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061908sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.092	0.28	0.94	~~0.094 J~~ UB
Vinyl Chloride	75-01-4	0.056	0.13	0.22	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	97
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	IAF-11710BOSTONPOST-01_061119		
Lab ID:	1906309-03A	**Date/Time Analyzed:**	6/18/19 11:17 PM
Date/Time Collected:	6/12/19 08:40 AM	**Dilution Factor:**	8.05
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061817

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.77	2.9	3.2	Not Detected
1,4-Dioxane	123-91-1	2.3	2.6	2.9	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.7	2.9	3.2	Not Detected
Tetrachloroethene	127-18-4	3.4	4.9	5.5	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.8	2.9	3.2	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	95
4-Bromofluorobenzene	460-00-4	70-130	112
Toluene-d8	2037-26-5	70-130	90

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

Client ID:	IAF-11710BOSTONPOST-01_061119		
Lab ID:	1906309-03B	**Date/Time Analyzed:**	6/18/19 11:17 PM
Date/Time Collected:	6/12/19 08:40 AM	**Dilution Factor:**	8.05
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061817sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.084	0.26	0.86	Not Detected
Vinyl Chloride	75-01-4	0.052	0.12	0.20	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	94
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	92

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

Client ID:	DUP-11710BOSTONPOST-01_061119		
Lab ID:	1906309-04A	**Date/Time Analyzed:**	6/18/19 10:38 PM
Date/Time Collected:	6/12/19 12:00 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061816

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.84	3.1	3.5	Not Detected
1,4-Dioxane	123-91-1	2.6	2.8	3.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.9	3.1	3.5	Not Detected
Tetrachloroethene	127-18-4	3.7	5.3	5.9	Not Detected
trans-1,2-Dichloroethene	156-60-5	2.0	3.1	3.5	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	94
4-Bromofluorobenzene	460-00-4	70-130	115
Toluene-d8	2037-26-5	70-130	87

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

Client ID:	DUP-11710BOSTONPOST-01_061119		
Lab ID:	1906309-04B	**Date/Time Analyzed:**	6/18/19 10:38 PM
Date/Time Collected:	6/12/19 12:00 AM	**Dilution Factor:**	8.75
Media:	6 Liter Summa Canister (100% Cert Ambier	**Instrument/Filename:**	msd20.i / 20061816sim

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	79-01-6	0.092	0.28	0.94	Not Detected
Vinyl Chloride	75-01-4	0.056	0.13	0.22	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	94
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	93

Analysis Request /Canister Chain of Custody 6/17/19

For Laboratory Use Only

PID: _____ Workerorder#: 1906309

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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:	Christina Weaver		
Site Name:	11710 BOSTON POST		

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-11710 BOSTONPOST-01_061119	6L0998	21365	06/11/2019	09:49	06/12/2019	08:46	-29	-6.5			x	
02A	IAG-11710 BOSTONPOST-01_061119	6L1085	21449	06/11/2019	09:47	06/12/2019	08:38	-29	-6.5			x	
03A	IAF-11710 BOSTONPOST-01_061119	6L2459	30831	06/11/2019	09:44	06/12/2019	08:40	-29	-4.5			x	
04A	DUP-11710BOSTONPOST-01_061119	6L2374	22138	06/11/2019	NA	06/12/2019	NA	-29	-7			x	

Relinquished by: (Signature/Affiliation) Arcadis	Date 6-13-19	Time 1200	Received by: (Signature/Affiliation)			Date 6/17/19	Time 0904
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: Fed Ex	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