

4/1/2019

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

Project Name: Ford LTP
Project #:
Workorder #: 1903618

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 3/26/2019 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

WORK ORDER #: 1903618

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:	03/26/2019	CONTACT:	Ausha Scott
DATE COMPLETED:	04/01/2019		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	AA-11775BOSTONPOST-01_032119	Modified TO-15	6.3 "Hg	5 psi
02A	IAB-11775BOSTONPOST-06_032119	Modified TO-15	7.8 "Hg	5 psi
03A	IAF-11775BOSTONPOST-02_032119	Modified TO-15	4.9 "Hg	5 psi
04A	IAG-11775BOSTONPOST-03_032119	Modified TO-15	6.3 "Hg	5.1 psi
05A	DUP-11775BOSTONPOST-01_032119	Modified TO-15	3.3 "Hg	4.9 psi
06A	Lab Blank	Modified TO-15	NA	NA
07A	CCV	Modified TO-15	NA	NA
08A	LCS	Modified TO-15	NA	NA
08AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY:



Technical Director

DATE: 04/01/19

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# 1903618

Five 6 Liter Summa Canister (100% Certified) samples were received on March 26, 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.

<i>Requirement</i>	<i>TO-15</i>	<i>ATL Modifications</i>
Initial Calibration	$\leq 30\%$ RSD with 2 compounds allowed out to $< 40\%$ RSD	$\leq 30\%$ 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.

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-11775BOSTONPOST-01_032119	Date/Time Analyzed:	3/29/19 02:49 PM
Lab ID:	1903618-01A	Dilution Factor:	1.70
Date/Time Collected:	3/22/19 09:04 AM	Instrument/Filename:	msd22.i / 22032911
Media:	6 Liter Summa Canister (100% Certified)		

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	0.67	Not Detected
1,4-Dioxane	123-91-1	0.14	0.31	0.61	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.34	0.67	Not Detected
Tetrachloroethene	127-18-4	0.070	0.58	1.2	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.11	0.34	0.67	Not Detected
Trichloroethene	79-01-6	0.099	0.46	0.91	Not Detected
Vinyl Chloride	75-01-4	0.062	0.22	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	100
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	97

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

Client ID:	IAB-11775BOSTONPOST-06_032119	Date/Time Analyzed:	3/29/19 03:25 PM
Lab ID:	1903618-02A	Dilution Factor:	1.81
Date/Time Collected:	3/22/19 11:00 AM	Instrument/Filename:	msd22.i / 22032912
Media:	6 Liter Summa Canister (100% Certified)		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.14	0.36	0.72	Not Detected
1,4-Dioxane	123-91-1	0.15	0.33	0.65	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.16	0.36	0.72	Not Detected
Tetrachloroethene	127-18-4	0.074	0.61	1.2	0.50 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.36	0.72	Not Detected
Trichloroethene	79-01-6	0.10	0.49	0.97	Not Detected
Vinyl Chloride	75-01-4	0.066	0.23	0.46	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	99
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:	IAF-11775BOSTONPOST-02_032119	Date/Time Analyzed:	3/29/19 04:06 PM
Lab ID:	1903618-03A	Dilution Factor:	1.60
Date/Time Collected:	3/22/19 10:58 AM	Instrument/Filename:	msd22.i / 22032913
Media:	6 Liter Summa Canister (100% Certified)		

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	0.63	Not Detected
1,4-Dioxane	123-91-1	0.13	0.29	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.63	Not Detected
Tetrachloroethene	127-18-4	0.066	0.54	1.1	0.81 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.63	Not Detected
Trichloroethene	79-01-6	0.093	0.43	0.86	2.3
Vinyl Chloride	75-01-4	0.058	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	98
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	IAG-11775BOSTONPOST-03_032119	Date/Time Analyzed:	3/29/19 04:43 PM
Lab ID:	1903618-04A	Dilution Factor:	1.71
Date/Time Collected:	3/22/19 11:04 AM	Instrument/File name:	msd22.i / 22032914
Media:	6 Liter Summa Canister (100% Certified)		

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	0.68	Not Detected
1,4-Dioxane	123-91-1	0.14	0.31	0.62	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.34	0.68	Not Detected
Tetrachloroethene	127-18-4	0.070	0.58	1.2	2.7
trans-1,2-Dichloroethene	156-60-5	0.11	0.34	0.68	Not Detected
Trichloroethene	79-01-6	0.099	0.46	0.92	Not Detected
Vinyl Chloride	75-01-4	0.062	0.22	0.44	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	103
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	DUP-11775BOSTONPOST-01_032119	Date/Time Analyzed:	3/29/19 05:20 PM
Lab ID:	1903618-05A	Dilution Factor:	1.50
Date/Time Collected:	3/22/19 12:00 AM	Instrument/Filename:	msd22.i / 22032915
Media:	6 Liter Summa Canister (100% Certified)		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.11	0.30	0.59	Not Detected
1,4-Dioxane	123-91-1	0.12	0.27	0.54	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.13	0.30	0.59	Not Detected
Tetrachloroethene	127-18-4	0.062	0.51	1.0	2.5
trans-1,2-Dichloroethene	156-60-5	0.094	0.30	0.59	Not Detected
Trichloroethene	79-01-6	0.087	0.40	0.81	Not Detected
Vinyl Chloride	75-01-4	0.055	0.19	0.38	Not Detected

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	103
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	Lab Blank	Date/Time Analyzed:	3/29/19 11:47 AM
Lab ID:	1903618-06A	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/Filename:	msd22.i / 22032906a
Media:	NA - Not Applicable		

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	98
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	CCV	Date/Time Analyzed:	3/29/19 08:53 AM
Lab ID:	1903618-07A	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/File name:	msd22.i / 22032902
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	88
1,4-Dioxane	123-91-1	111
cis-1,2-Dichloroethene	156-59-2	94
Tetrachloroethene	127-18-4	97
trans-1,2-Dichloroethene	156-60-5	93
Trichloroethene	79-01-6	98
Vinyl Chloride	75-01-4	92

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	103

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

Client ID:	LCS	Date/Time Analyzed:	3/29/19 09:54 AM
Lab ID:	1903618-08A	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/File name:	msd22.i / 22032903
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	92
1,4-Dioxane	123-91-1	116
cis-1,2-Dichloroethene	156-59-2	104
Tetrachloroethene	127-18-4	99
trans-1,2-Dichloroethene	156-60-5	84
Trichloroethene	79-01-6	101
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	86
4-Bromofluorobenzene	460-00-4	70-130	107
Toluene-d8	2037-26-5	70-130	106

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD	Date/Time Analyzed:	3/29/19 10:29 AM
Lab ID:	1903618-08AA	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/Filename:	msd22.i / 22032904
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	95
1,4-Dioxane	123-91-1	113
cis-1,2-Dichloroethene	156-59-2	108
Tetrachloroethene	127-18-4	100
trans-1,2-Dichloroethene	156-60-5	84
Trichloroethene	79-01-6	99
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	88
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	104

* % Recovery is calculated using unrounded analytical results.



April 02, 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: 1903618
Sample date: 2019-03-22
Report received by CADENA: 2019-04-01
Initial Data Verification completed by CADENA: 2019-04-02

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 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 contaminants) 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 contaminants) the blank concentration and is considered non-detect at the RDL. For Inorganic methods the sample concentration was less than the RDL and less than 10x the blank concentration and is considered non-detect at the RDL.
UJ	The analyte / compound was not detected above the reported sample Quantitation limit. However, the Quantitation limit is considered to be approximate due to associated quality assurance results and may or may not represent the actual limit of Quantitation to accurately and precisely report the analyte in the sample.

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1903618

CADENA Verification Report: 2019-04-02

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32364R
Review Level: Tier III
Project: MI001454.0003.00002



DATA REVIEW

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1903618 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
1903618	AA-11775BOSTONPOST-01_032119	1903618-01A	Air	3/22/2019		X		
	IAB-11775BOSTONPOST-06_032119	1903618-02A	Air	3/22/2019		X		
	IAF-11775BOSTONPOST-02_032119	1903618-03A	Air	3/22/2019		X		
	IAG-11775BOSTONPOST-03_032119	1903618-04A	Air	3/22/2019		X		
	DUP-11775BOSTONPOST-01_032119	1903618-05A	Air	3/22/2019	IAG-11775BOSTONPOST-03_032119	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 REVIEW

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

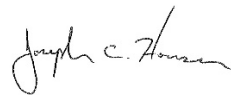
%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE:



DATE: April 11, 2019

PEER REVIEW: Dennis Capria

DATE: April 15, 2019



**CHAIN OF CUSTODY
CORRECTED SAMPLE ANALYSIS DATA
SHEETS**



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

Client ID:	AA-11775BOSTONPOST-01_032119	Date/Time Analyzed:	3/29/19 02:49 PM
Lab ID:	1903618-01A	Dilution Factor:	1.70
Date/Time Collected:	3/22/19 09:04 AM	Instrument/Filename:	msd22.i / 22032911
Media:	6 Liter Summa Canister (100% Certified)		

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	0.67	Not Detected
1,4-Dioxane	123-91-1	0.14	0.31	0.61	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.34	0.67	Not Detected
Tetrachloroethene	127-18-4	0.070	0.58	1.2	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.11	0.34	0.67	Not Detected
Trichloroethene	79-01-6	0.099	0.46	0.91	Not Detected
Vinyl Chloride	75-01-4	0.062	0.22	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	100
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	97

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

Client ID:	IAB-11775BOSTONPOST-06_032119	Date/Time Analyzed:	3/29/19 03:25 PM
Lab ID:	1903618-02A	Dilution Factor:	1.81
Date/Time Collected:	3/22/19 11:00 AM	Instrument/Filename:	msd22.i / 22032912
Media:	6 Liter Summa Canister (100% Certified)		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.14	0.36	0.72	Not Detected
1,4-Dioxane	123-91-1	0.15	0.33	0.65	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.16	0.36	0.72	Not Detected
Tetrachloroethene	127-18-4	0.074	0.61	1.2	0.50 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.36	0.72	Not Detected
Trichloroethene	79-01-6	0.10	0.49	0.97	Not Detected
Vinyl Chloride	75-01-4	0.066	0.23	0.46	Not Detected

J = Estimated value.

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	99
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:	IAF-11775BOSTONPOST-02_032119	Date/Time Analyzed:	3/29/19 04:06 PM
Lab ID:	1903618-03A	Dilution Factor:	1.60
Date/Time Collected:	3/22/19 10:58 AM	Instrument/Filename:	msd22.i / 22032913
Media:	6 Liter Summa Canister (100% Certified)		

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	0.63	Not Detected
1,4-Dioxane	123-91-1	0.13	0.29	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.63	Not Detected
Tetrachloroethene	127-18-4	0.066	0.54	1.1	0.81 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.63	Not Detected
Trichloroethene	79-01-6	0.093	0.43	0.86	2.3
Vinyl Chloride	75-01-4	0.058	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	98
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	IAG-11775BOSTONPOST-03_032119	Date/Time Analyzed:	3/29/19 04:43 PM
Lab ID:	1903618-04A	Dilution Factor:	1.71
Date/Time Collected:	3/22/19 11:04 AM	Instrument/File name:	msd22.i / 22032914
Media:	6 Liter Summa Canister (100% Certified)		

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	0.68	Not Detected
1,4-Dioxane	123-91-1	0.14	0.31	0.62	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.34	0.68	Not Detected
Tetrachloroethene	127-18-4	0.070	0.58	1.2	2.7
trans-1,2-Dichloroethene	156-60-5	0.11	0.34	0.68	Not Detected
Trichloroethene	79-01-6	0.099	0.46	0.92	Not Detected
Vinyl Chloride	75-01-4	0.062	0.22	0.44	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	103
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	DUP-11775BOSTONPOST-01_032119	Date/Time Analyzed:	3/29/19 05:20 PM
Lab ID:	1903618-05A	Dilution Factor:	1.50
Date/Time Collected:	3/22/19 12:00 AM	Instrument/Filename:	msd22.i / 22032915
Media:	6 Liter Summa Canister (100% Certified)		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.11	0.30	0.59	Not Detected
1,4-Dioxane	123-91-1	0.12	0.27	0.54	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.13	0.30	0.59	Not Detected
Tetrachloroethene	127-18-4	0.062	0.51	1.0	2.5
trans-1,2-Dichloroethene	156-60-5	0.094	0.30	0.59	Not Detected
Trichloroethene	79-01-6	0.087	0.40	0.81	Not Detected
Vinyl Chloride	75-01-4	0.055	0.19	0.38	Not Detected

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	103
Toluene-d8	2037-26-5	70-130	95

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

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

PID: _____ Workorder #: 1903618

Click links below to view:

[Canister Sampling Guide](#)

[Helium Shroud Video](#)

Client: <u>Ford</u>		PID: <u>NA</u>		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)							
Project Name: <u>Ford LTP</u>		P.O.# <u>MI001454.0003</u>						5 Day Turnaround Time							
Project Manager: <u>Kris Hinskey</u>								Canister Vacuum/Pressure				Requested Analyses			
Sampler: <u>Wald E. Cathcart</u>								Lab Use Only							
Site Name: <u>11775 Boston Post</u>															
Lab ID	Sample Identification	Can #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N ₂ / He	TO-15 (See Special Instructions/Notes)	Do not analyze		
				Date	Time	Date	Time								
01A	AA-11775BOSTONPOST-01_032119	6L0790	7341	3-21-19	1243	3-22-19	0904	-29	-7			X			
02A	IAB-11775BOSTONPOST-06_032119	6L1700	7425	3-21-19	1231	3-22-19	1100	-29	-7			X			
	IAF-11775BOSTONPOST-01_032119	6L0602	21243	3-21-19	1225	3-22-19	1135	-29	-15				X		
03A	IAF-11775BOSTONPOST-02_032119	6L0859	22842	3-21-19	1228	3-22-19	1058	-29	-5			X			
04A	IAG-11775BOSTONPOST-03_032119	6L1375	8806	3-21-19	1241	3-22-19	1104	-29	-6.5			X			
05A	DUP-11775BostonPost-01-032119	6L0992	8759	3-21-19	12	3-22-19	—	-29	-4			X			
	DUP-11775BostonPost-02-032119	6L1139	958077	3-21-19	—	3-22-19	—	-29	-21				X		
Relinquished by: (Signature/Affiliation)				Date		Time		Received by: (Signature/Affiliation)				Date		Time	
<u>[Signature]</u>				3-22-19		1600		<u>[Signature]</u>				03/26/19		1013	
Relinquished by: (Signature/Affiliation)				Date		Time		Received by: (Signature/Affiliation)				Date		Time	
Relinquished by: (Signature/Affiliation)				Date		Time		Received by: (Signature/Affiliation)				Date		Time	
<div style="display: flex; justify-content: space-between;"> Shipper Name: <u>Teddy</u> Custody Seals Intact? <u>Yes</u> </div>															
<div style="display: flex; justify-content: space-between;"> 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 </div>															

4/2/2019

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

Project Name: Ford LTP
Project #:
Workorder #: 1903617

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 3/26/2019 at Air Toxics Ltd.

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

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

Regards,



Ausha Scott
Project Manager

WORK ORDER #: 1903617

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:	03/26/2019	CONTACT:	Ausha Scott
DATE COMPLETED:	04/02/2019		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SSMP-11775BOSTONPOST-01_032219	TO-15	5.5 "Hg	15 psi
02A	Lab Blank	TO-15	NA	NA
03A	CCV	TO-15	NA	NA
04A	LCS	TO-15	NA	NA
04AA	LCSD	TO-15	NA	NA

CERTIFIED BY:



Technical Director

DATE: 04/02/19

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.

Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

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

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# 1903617

One 1 Liter Summa Canister (100% Certified) sample was received on March 26, 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-11775BOSTONPOST-01_032219	Date/Time Analyzed:	3/28/19 11:08 PM
Lab ID:	1903617-01A	Dilution Factor:	2.47
Date/Time Collected:	3/22/19 11:30 AM	Instrument/Filename:	msd3.i / 3032820
Media:	1 Liter Summa Canister (100% Certified)		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.8	3.9	4.9	Not Detected
1,4-Dioxane	123-91-1	1.6	8.9	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.1	3.9	4.9	Not Detected
Tetrachloroethene	127-18-4	1.7	6.7	8.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	3.9	4.9	Not Detected
Trichloroethene	79-01-6	1.1	5.3	6.6	Not Detected
Vinyl Chloride	75-01-4	1.8	2.5	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	109
4-Bromofluorobenzene	460-00-4	70-130	106
Toluene-d8	2037-26-5	70-130	94

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

Client ID:	Lab Blank	Date/Time Analyzed:	3/28/19 01:31 PM
Lab ID:	1903617-02A	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/Filename:	msd3.i / 3032805c
Media:	NA - Not Applicable		

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	105
4-Bromofluorobenzene	460-00-4	70-130	103
Toluene-d8	2037-26-5	70-130	96

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

Client ID:	CCV	Date/Time Analyzed:	3/28/19 10:32 AM
Lab ID:	1903617-03A	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/Filename:	msd3.i / 3032802
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	108
1,4-Dioxane	123-91-1	91
cis-1,2-Dichloroethene	156-59-2	103
Tetrachloroethene	127-18-4	107
trans-1,2-Dichloroethene	156-60-5	105
Trichloroethene	79-01-6	101
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	105
4-Bromofluorobenzene	460-00-4	70-130	105
Toluene-d8	2037-26-5	70-130	97

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

Client ID:	LCS	Date/Time Analyzed:	3/28/19 11:39 AM
Lab ID:	1903617-04A	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/File name:	msd3.i / 3032803
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	104
1,4-Dioxane	123-91-1	90
cis-1,2-Dichloroethene	156-59-2	111
Tetrachloroethene	127-18-4	107
trans-1,2-Dichloroethene	156-60-5	89
Trichloroethene	79-01-6	102
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	101
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	101

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD	Date/Time Analyzed:	3/28/19 01:04 PM
Lab ID:	1903617-04AA	Dilution Factor:	1.00
Date/Time Collected:	NA - Not Applicable	Instrument/Filename:	msd3.i / 3032804
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	105
1,4-Dioxane	123-91-1	91
cis-1,2-Dichloroethene	156-59-2	111
Tetrachloroethene	127-18-4	109
trans-1,2-Dichloroethene	156-60-5	89
Trichloroethene	79-01-6	103
Vinyl Chloride	75-01-4	106

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	103
Toluene-d8	2037-26-5	70-130	98

* % Recovery is calculated using unrounded analytical results.



April 02, 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: 1903617
Sample date: 2019-03-22
Report received by CADENA: 2019-04-02
Initial Data Verification completed by CADENA: 2019-04-02

1 Air sample was analyzed for TO-15 parameters.

There were no significant QC anomalies or exceptions to report.

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Inc, 1099 Highland Drive, Suite E, Ann Arbor, MI 48108 517-819-0356

CADENA Valid Qualifiers

Valid Qualifiers	Description
<	Less than the reported concentration.
>	Greater than the reported concentration.
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 contaminants) 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 contaminants) the blank concentration and is considered non-detect at the RDL. For Inorganic methods the sample concentration was less than the RDL and less than 10x the blank concentration and is considered non-detect at the RDL.
UJ	The analyte / compound was not detected above the reported sample Quantitation limit. However, the Quantitation limit is considered to be approximate due to associated quality assurance results and may or may not represent the actual limit of Quantitation to accurately and precisely report the analyte in the sample.

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1903617

CADENA Verification Report: 2019-04-02

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32363R
Review Level: Tier III
Project: MI001454.0003.00002



DATA REVIEW

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1903617 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
1903617	SSMP-11775BOSTONPOST-01_032219	1903617-01A	Air	3/22/2019		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 REVIEW

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 11, 2019

PEER REVIEW: Dennis Capria

DATE: April 15, 2019



**CHAIN OF CUSTODY
CORRECTED SAMPLE ANALYSIS DATA
SHEETS**



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

Client ID:	SSMP-11775BOSTONPOST-01_032219	Date/Time Analyzed:	3/28/19 11:08 PM
Lab ID:	1903617-01A	Dilution Factor:	2.47
Date/Time Collected:	3/22/19 11:30 AM	Instrument/Filename:	msd3.i / 3032820
Media:	1 Liter Summa Canister (100% Certified)		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	1.8	3.9	4.9	Not Detected
1,4-Dioxane	123-91-1	1.6	8.9	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.1	3.9	4.9	Not Detected
Tetrachloroethene	127-18-4	1.7	6.7	8.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	3.9	4.9	Not Detected
Trichloroethene	79-01-6	1.1	5.3	6.6	Not Detected
Vinyl Chloride	75-01-4	1.8	2.5	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	109
4-Bromofluorobenzene	460-00-4	70-130	106
Toluene-d8	2037-26-5	70-130	94

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: _____ 1903617

Click links below to view:

Canister Sampling Guide

Helium Shroud Video

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

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

[illegible]

ANALYTICAL REPORT

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

Laboratory Job ID: 240-109900-1

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:
4/4/2019 3:02:53 PM

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

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

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



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Definitions/Glossary

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

Job ID: 240-109900-1

Qualifiers

GC/MS VOA

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

Glossary

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

Case Narrative

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

Job ID: 240-109900-1

Job ID: 240-109900-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-109900-1

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

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

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

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

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

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

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

RECEIPT

The sample was received on 3/26/2019 8:10 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2° C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample SUMP1-11775BOSTONPOST_032119 (240-109900-1) was analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The sample was analyzed on 04/01/2019.

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

VOLATILE ORGANIC COMPOUNDS (GCMS SIM)

Sample SUMP1-11775BOSTONPOST_032119 (240-109900-1) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. 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.

Method Summary

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

Job ID: 240-109900-1

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 = 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

TestAmerica Job ID: 240-109900-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-109900-1	SUMP1-11775BOSTONPOST_032119	Water	03/21/19 12:35	03/26/19 08:10

Detection Summary

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

Job ID: 240-109900-1

Client Sample ID: SUMP1-11775BOSTONPOST_032119

Lab Sample ID: 240-109900-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.64	J	1.0	0.16	ug/L	1			8260B	Total/NA
Trichloroethene	0.10	J	1.0	0.10	ug/L	1			8260B	Total/NA
Vinyl chloride	0.24	J	1.0	0.20	ug/L	1			8260B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Canton

Client Sample Results

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

Job ID: 240-109900-1

Client Sample ID: SUMP1-11775BOSTONPOST_032119

Lab Sample ID: 240-109900-1

Date Collected: 03/21/19 12:35

Matrix: Water

Date Received: 03/26/19 08:10

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	-		03/27/19 18:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	102		63 - 125					03/27/19 18:41	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	-		04/01/19 20:51	1
cis-1,2-Dichloroethene	0.64	J	1.0	0.16	ug/L			04/01/19 20:51	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			04/01/19 20:51	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			04/01/19 20:51	1
Trichloroethene	0.10	J	1.0	0.10	ug/L			04/01/19 20:51	1
Vinyl chloride	0.24	J	1.0	0.20	ug/L			04/01/19 20:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	92		70 - 121					04/01/19 20:51	1
4-Bromofluorobenzene (Surr)	65		59 - 120					04/01/19 20:51	1
Toluene-d8 (Surr)	73		70 - 123					04/01/19 20:51	1
Dibromofluoromethane (Surr)	100		75 - 128					04/01/19 20:51	1

Surrogate Summary

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

Job ID: 240-109900-1

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

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)			
		DCA (70-121)	BFB (59-120)	TOL (70-123)	DBFM (75-128)
240-109718-E-51 MSD	Matrix Spike Duplicate	85	87	83	99
240-109718-H-51 MS	Matrix Spike	76	80	79	89
240-109900-1	SUMP1-11775BOSTONPOST_(32119	92	65	73	100
LCS 240-374139/4	Lab Control Sample	80	84	82	92
MB 240-374139/6	Method Blank	81	64	72	87

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

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)			
		DCA (63-125)			
240-109900-1	SUMP1-11775BOSTONPOST_(102			
240-109900-1 MS	SUMP1-11775BOSTONPOST_(32119	101			
240-109900-1 MSD	SUMP1-11775BOSTONPOST_(32119	104			
LCS 240-373528/4	Lab Control Sample	96			
MB 240-373528/5	Method Blank	96			

Surrogate Legend

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

QC Sample Results

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

Job ID: 240-109900-1

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

Lab Sample ID: MB 240-374139/6

Matrix: Water

Analysis Batch: 374139

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			04/01/19 12:25	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			04/01/19 12:25	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			04/01/19 12:25	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			04/01/19 12:25	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			04/01/19 12:25	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			04/01/19 12:25	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	81		70 - 121		04/01/19 12:25	1
4-Bromofluorobenzene (Surr)	64		59 - 120		04/01/19 12:25	1
Toluene-d8 (Surr)	72		70 - 123		04/01/19 12:25	1
Dibromofluoromethane (Surr)	87		75 - 128		04/01/19 12:25	1

Lab Sample ID: LCS 240-374139/4

Matrix: Water

Analysis Batch: 374139

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	9.90		ug/L		99	65 - 139
cis-1,2-Dichloroethene	10.0	11.7		ug/L		117	76 - 128
Tetrachloroethene	10.0	11.1		ug/L		111	74 - 130
trans-1,2-Dichloroethene	10.0	12.1		ug/L		121	78 - 133
Trichloroethene	10.0	10.5		ug/L		105	76 - 125
Vinyl chloride	10.0	10.1		ug/L		101	58 - 143

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	80		70 - 121
4-Bromofluorobenzene (Surr)	84		59 - 120
Toluene-d8 (Surr)	82		70 - 123
Dibromofluoromethane (Surr)	92		75 - 128

Lab Sample ID: MRL 240-374139/5

Matrix: Water

Analysis Batch: 374139

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Vinyl chloride	0.00100	0.00115		ng/uL		115	10 - 150

Lab Sample ID: 240-109718-E-51 MSD

Matrix: Water

Analysis Batch: 374139

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	9.89		ug/L		99	53 - 140	7	35
cis-1,2-Dichloroethene	1.0	U	10.0	11.4		ug/L		114	64 - 130	10	21
Tetrachloroethene	1.0	U	10.0	10.6		ug/L		106	51 - 136	7	23
trans-1,2-Dichloroethene	1.0	U	10.0	12.3		ug/L		123	68 - 133	9	24
Trichloroethene	1.0	U	10.0	10.3		ug/L		103	55 - 131	9	23

Eurofins TestAmerica, Canton

QC Sample Results

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

Job ID: 240-109900-1

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

Lab Sample ID: 240-109718-E-51 MSD

Matrix: Water

Analysis Batch: 374139

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
Vinyl chloride	1.0	U	10.0	11.2		ug/L	-	112	43 - 154	11	29
Surrogate	MSD %Recovery	MSD Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	85		70 - 121								
4-Bromofluorobenzene (Surr)	87		59 - 120								
Toluene-d8 (Surr)	83		70 - 123								
Dibromofluoromethane (Surr)	99		75 - 128								

Lab Sample ID: 240-109718-H-51 MS

Matrix: Water

Analysis Batch: 374139

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	9.25		ug/L	-	92	53 - 140		
cis-1,2-Dichloroethene	1.0	U	10.0	10.3		ug/L		103	64 - 130		
Tetrachloroethene	1.0	U	10.0	9.89		ug/L		99	51 - 136		
trans-1,2-Dichloroethene	1.0	U	10.0	11.3		ug/L		113	68 - 133		
Trichloroethene	1.0	U	10.0	9.39		ug/L		94	55 - 131		
Vinyl chloride	1.0	U	10.0	10.1		ug/L		101	43 - 154		
Surrogate	MS %Recovery	MS Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	76		70 - 121								
4-Bromofluorobenzene (Surr)	80		59 - 120								
Toluene-d8 (Surr)	79		70 - 123								
Dibromofluoromethane (Surr)	89		75 - 128								

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

Lab Sample ID: MB 240-373528/5

Matrix: Water

Analysis Batch: 373528

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	-		03/27/19 12:18	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	96		63 - 125					03/27/19 12:18	1

Lab Sample ID: LCS 240-373528/4

Matrix: Water

Analysis Batch: 373528

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
1,4-Dioxane	10.0	11.0		ug/L	-	110	59 - 131		
Surrogate	LCS %Recovery	LCS Qualifier	Limits						
1,2-Dichloroethane-d4 (Surr)	96		63 - 125						

Eurofins TestAmerica, Canton

QC Sample Results

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

Job ID: 240-109900-1

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

Lab Sample ID: 240-109900-1 MS

Matrix: Water

Analysis Batch: 373528

Client Sample ID: SUMP1-11775BOSTONPOST_032119

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dioxane	2.0	U	10.0	11.2		ug/L		112	52 - 129
Surrogate	MS %Recovery	MS Qualifier	Limits						
1,2-Dichloroethane-d4 (Surr)	101		63 - 125						

Lab Sample ID: 240-109900-1 MSD

Matrix: Water

Analysis Batch: 373528

Client Sample ID: SUMP1-11775BOSTONPOST_032119

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	10.0	11.2		ug/L		112	52 - 129	0	13
Surrogate	MSD %Recovery	MSD Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	104		63 - 125								

QC Association Summary

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

Job ID: 240-109900-1

GC/MS VOA

Analysis Batch: 373528

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109900-1	SUMP1-11775BOSTONPOST_032119	Total/NA	Water	8260B SIM	
MB 240-373528/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-373528/4	Lab Control Sample	Total/NA	Water	8260B SIM	
240-109900-1 MS	SUMP1-11775BOSTONPOST_032119	Total/NA	Water	8260B SIM	
240-109900-1 MSD	SUMP1-11775BOSTONPOST_032119	Total/NA	Water	8260B SIM	

Analysis Batch: 374139

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109900-1	SUMP1-11775BOSTONPOST_032119	Total/NA	Water	8260B	
MB 240-374139/6	Method Blank	Total/NA	Water	8260B	
LCS 240-374139/4	Lab Control Sample	Total/NA	Water	8260B	
MRL 240-374139/5	Lab Control Sample	Total/NA	Water	8260B	
240-109718-E-51 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
240-109718-H-51 MS	Matrix Spike	Total/NA	Water	8260B	

Lab Chronicle

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

Job ID: 240-109900-1

Client Sample ID: SUMP1-11775BOSTONPOST_032119

Lab Sample ID: 240-109900-1

Date Collected: 03/21/19 12:35

Matrix: Water

Date Received: 03/26/19 08:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	374139	04/01/19 20:51	LEE	TAL CAN
Total/NA	Analysis	8260B SIM		1	373528	03/27/19 18:41	SAM	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.
Project/Site: Ford LTP Livonia MI - E203631

Job ID: 240-109900-1

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	03-31-19 *
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.

Eurofins TestAmerica, Canton

1.4/C1.2

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratory location: N. Canton, OH 44101 Shuffel Street NW North Canton, OH 44720 / 330-497-9396

Regulatory program:

☐ DW

☐ NPDES

☐ RCRA

☐ Other

Lab Contact: Mike DelMonico

Telephone: 330-497-9396

COC No:

TestAmerica Laboratories, Inc.

For lab use only

of COCs

Walk-in client

Lab sampling

Job/SDG No:

Sample Specific Notes / Special Instructions:

Client Project Manager: Kris Hinkey

Site Contact: Angela DeGrandis

Telephone: 734-320-0065

Analysis Turnaround Time

TAT if different from below

☐ 3 weeks

☐ 2 weeks

☒ 1 week

☐ 2 days

☐ 1 day

5 Day

Filtered Sample (Y/N)

Composite C / Grab C

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

Containers & Preservatives

Other:

Unpres

NaOH

NaOH

HCl

HNO3

H2SO4

Other:

Solid

Sediment

Aqueous

Sample Time

Sample Date

Shipping/Tracking No:

Method of Shipment/Carrier:

Location: 11775 Boston Post

Project Name: Ford LTP

Project Number: MI001454.0003

Phone: 248-994-2240

City/State/Zip: Novi, MI, 48377

Address: 28550 Cabot Drive, Suite 500

Company Name: Arcadis

Sample Identification

3-21-19 1235

3-21-19

11775 Boston Post-032119

240-109900 Chain of Custody

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client

☒ Disposal By Lab

☐ Archive For

Months

Relinquished by:

Relinquished by:

Relinquished by:

Company:

Company:

Company:

Date/Time:

Date/Time:

Date/Time:

3-21-19 1425

03/25/19 1059

3/25/19 1100

ARCADIS

ARCADIS

TR

NOVA LOW STORAGE

TA

TA

3-26-19 810

Submit all results through Cadena at jim.tomalia@cadena.com, Cadena #E203631

Level IV Reporting.

Special Instructions/QC Requirements & Comments:

Relinquished by:

Relinquished by:

Relinquished by:

Company:

Company:

Company:

Date/Time:

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Level IV Reporting.

Special Instructions/QC Requirements & Comments:

Relinquished by:

Relinquished by:

Relinquished by:

TestAmerica Canton Sample Receipt Form/Narrative				Login # : <u>109900</u>
Canton Facility				
Client <u>ArcaDis</u>		Site Name _____		Cooler unpacked by: <u>Ryan Cribler</u>
Cooler Received on <u>3-26-19</u>		Opened on <u>3-26-19</u> <u>810</u>		
FedEx: 1 st <input checked="" type="checkbox"/> Grd <input type="checkbox"/> Exp <input type="checkbox"/> UPS <input type="checkbox"/> FAS <input type="checkbox"/> Clipper <input type="checkbox"/> Client Drop Off <input type="checkbox"/> TestAmerica Courier <input type="checkbox"/> Other <input type="checkbox"/>				
Receipt After-hours: Drop-off Date/Time _____			Storage Location _____	
TestAmerica Cooler # <u>TA</u> Foam Box <input type="checkbox"/> Client Cooler <input type="checkbox"/> Box <input type="checkbox"/> Other <input type="checkbox"/> Packing material used: <u>Bubble Wrap</u> <input checked="" type="checkbox"/> <u>Foam</u> <input checked="" type="checkbox"/> <u>Plastic Bag</u> <input checked="" type="checkbox"/> None <input type="checkbox"/> Other <input type="checkbox"/> COOLANT: <u>Wet Ice</u> <input checked="" type="checkbox"/> Blue Ice <input type="checkbox"/> Dry Ice <input type="checkbox"/> Water <input type="checkbox"/> None <input type="checkbox"/>				
1. Cooler temperature upon receipt <input type="checkbox"/> See Multiple Cooler Form IR GUN# IR-8 (CF <u>-0.2</u> °C) Observed Cooler Temp. <u>1.4</u> °C Corrected Cooler Temp. <u>1.2</u> °C IR GUN #36 (CF <u>+0.7</u> °C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C				
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity <u>1</u> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> -Were the seals on the outside of the cooler(s) signed & dated? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> -Were tamper/custody seals intact and uncompromised? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>				
3. Shippers' packing slip attached to the cooler(s)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
4. Did custody papers accompany the sample(s)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
5. Were the custody papers relinquished & signed in the appropriate place? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
7. Did all bottles arrive in good condition (Unbroken)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
8. Could all bottle labels be reconciled with the COC? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
9. Were correct bottle(s) used for the test(s) indicated? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
10. Sufficient quantity received to perform indicated analyses? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
11. Are these work share samples? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
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 <input type="checkbox"/> No <input checked="" type="checkbox"/> NA <input type="checkbox"/> pH Strip Lot# <u>HC861525</u>				
13. Were VOAs on the COC? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>				
14. Were air bubbles >6 mm in any VOA vials?  <input checked="" type="checkbox"/> Larger than this. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>				
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____ Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
16. Was a LL Hg or Me Hg trip blank present? _____ Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other _____				
Concerning _____				

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES 	Samples processed by: <u>RC</u>
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: _____	



April 04, 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: 109900-1
Sample date: 2019-03-21
Report received by CADENA: 2019-04-04
Initial Data Verification completed by CADENA: 2019-04-04

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Inc, 1099 Highland Drive, Suite E, Ann Arbor, MI 48108 517-819-0356

CADENA Valid Qualifiers

Valid Qualifiers	Description
<	Less than the reported concentration.
>	Greater than the reported concentration.
B	The analyte / compound was detected in the associated blank. For Organic methods the sample concentration was greater than the RDL and less than 5x (or 10x for common lab contaminants) 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 contaminants) 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: 109900-1

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
2401099001	SUMP1-11775BOSTONPOST_032119	3/21/2019	12:35:00	X	X	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631

Laboratory: TestAmerica - North Canton

Laboratory Submittal: 109900-1

Sample Name: SUMP1-11775BOSTONPOST_032119

Lab Sample ID: 2401099001

Sample Date: 3/21/2019

Analyte	Cas No.	Result	Report Limit	Units	Valid Qualifier
GC/MS VOC					
<u>OSW-8260B</u>					
1,1-Dichloroethene	75-35-4	ND	1.0	ug/l	---
cis-1,2-Dichloroethene	156-59-2	0.64	1.0	ug/l	J
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	0.10	1.0	ug/l	J
Vinyl chloride	75-01-4	0.24	1.0	ug/l	J
<u>OSW-8260BBSim</u>					
1,4-Dioxane	123-91-1	ND	2.0	ug/l	---

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) Analysis

SDG #240-109900-1

CADENA Verification Report: 2019-04-04

Analyses Performed By:
TestAmerica
Canton, Ohio

Report #32472R
Review Level: Tier III
Project: MI001454.0003.00002



DATA REVIEW

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-109900-1 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
240-109900-1	SUMP1-11775BOSTONPOST_032119	240-109900-1	Water	3/21/2019		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 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 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.

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 criteria defined in the analytical method.

6. System Performance and Overall Assessment

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

DATA REVIEW

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 8260B/8260B-SIM	Reported		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: April 22, 2019

PEER REVIEW: Dennis Capria

DATE: April 23, 2019



**CHAIN OF CUSTODY
CORRECTED SAMPLE ANALYSIS DATA
SHEETS**



1.4/C1.2

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratory location: N. Canton, OH 44101 Shuffel Street NW North Canton, OH 44720 / 330-497-9396

Regulatory program:

☐ DW

☐ NPDES

☐ RCRA

☐ Other

Lab Contact: Mike DelMonico

Telephone: 330-497-9396

COC No:

TestAmerica Laboratories, Inc.

Client Project Manager: Kris Hinkey

Site Contact: Angela DeGrandis

Telephone: 734-320-0065

For lab use only

COCs

City/State/Zip: Novi, MI, 48377

Telephone: 734-320-0065

Analyses

Walk-in client

Lab sampling

Phone: 248-994-2240

Analysis Turnaround Time

Filtered Sample (Y/N)

Job/SDG No.

Project Name: Ford LTP

TAT if different from below

Composite C / Grab C

Sample Specific Notes / Special Instructions:

Project Number: MI001454.0003

5 Day

1,1-DCE 8260B

1,4-Dioxane 8260B SIM

PO # MI001454.0003

1 week

Trans-1,2-DCE 8260B

Vinyl Chloride 8260B

Shipping/Tracking No:

2 days

cis-1,2-DCE 8260B

PCE 8260B

Method of Shipment/Carrier:

1 day

1,1-DCE 8260B

1,4-Dioxane 8260B SIM

Sample Date

Containers & Preservatives

Composite C / Grab C

Sample Specific Notes / Special Instructions:

Sample Time

Matrix

Filtered Sample (Y/N)

Sample Specific Notes / Special Instructions:

Sample Date

Containers & Preservatives

Filtered Sample (Y/N)

Sample Specific Notes / Special Instructions:

Sample Time

Matrix

Filtered Sample (Y/N)

Sample Specific Notes / Special Instructions:

Sample Date

Containers & Preservatives

Filtered Sample (Y/N)

Sample Specific Notes / Special Instructions:

Sample Time

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Sample Specific Notes / Special Instructions:

Sample Time

Matrix

Filtered Sample (Y/N)

Sample Specific Notes / Special Instructions:

Sample Date

Containers & Preservatives

Filtered Sample (Y/N)

Sample Specific Notes / Special Instructions:

Client Sample Results

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

Job ID: 240-109900-1

Client Sample ID: SUMP1-11775BOSTONPOST_032119

Lab Sample ID: 240-109900-1

Date Collected: 03/21/19 12:35

Matrix: Water

Date Received: 03/26/19 08:10

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	-		03/27/19 18:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	102		63 - 125					03/27/19 18:41	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	-		04/01/19 20:51	1
cis-1,2-Dichloroethene	0.64	J	1.0	0.16	ug/L			04/01/19 20:51	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			04/01/19 20:51	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			04/01/19 20:51	1
Trichloroethene	0.10	J	1.0	0.10	ug/L			04/01/19 20:51	1
Vinyl chloride	0.24	J	1.0	0.20	ug/L			04/01/19 20:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	92		70 - 121					04/01/19 20:51	1
4-Bromofluorobenzene (Surr)	65		59 - 120					04/01/19 20:51	1
Toluene-d8 (Surr)	73		70 - 123					04/01/19 20:51	1
Dibromofluoromethane (Surr)	100		75 - 128					04/01/19 20:51	1

4/12/2019

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

Project Name: Ford LTP
Project #: MI001454.0003
Workorder #: 1904128

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 4/5/2019 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

WORK ORDER #: 1904128

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:	04/05/2019	CONTACT:	Ausha Scott
DATE COMPLETED:	04/12/2019		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	IAF-11775BostonPost-02_040119	Modified TO-15	4.7 "Hg	5.2 psi
02A	Lab Blank	Modified TO-15	NA	NA
03A	CCV	Modified TO-15	NA	NA
04A	LCS	Modified TO-15	NA	NA
04AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY:



Technical Director

DATE: 04/12/19

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.

Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

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

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# 1904128

One 6 Liter Summa Canister (100% Cert Ambient) sample was received on April 05, 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.

<i>Requirement</i>	<i>TO-15</i>	<i>ATL Modifications</i>
Initial Calibration	$\leq 30\%$ RSD with 2 compounds allowed out to $< 40\%$ RSD	$\leq 30\%$ 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.

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:	IAF-11775BostonPost-02_040119	Date/Time Analyzed:	4/9/19 03:45 PM
Lab ID:	1904128-01A	Dilution Factor:	1.60
Date/Time Collecte	4/2/19 12:52 PM	Instrument/File name:	msd20.i / 20040908
Media:	6 Liter Summa Canister (100% Cert Ambie		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.15	0.57	0.63	Not Detected
1,4-Dioxane	123-91-1	0.47	0.52	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.34	0.57	0.63	Not Detected
Tetrachloroethene	127-18-4	0.67	0.98	1.1	0.70 J
trans-1,2-Dichloroethene	156-60-5	0.36	0.57	0.63	Not Detected
Trichloroethene	79-01-6	0.42	0.77	0.86	Not Detected
Vinyl Chloride	75-01-4	0.13	0.37	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	101
4-Bromofluorobenzene	460-00-4	70-130	108
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	Lab Blank	Date/Time Analyzed:	4/9/19 12:39 PM
Lab ID:	1904128-02A	Dilution Factor:	1.00
Date/Time Collecte	NA - Not Applicable	Instrument/Filename:	msd20.i / 20040905a
Media:	NA - Not Applicable		

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	119
4-Bromofluorobenzene	460-00-4	70-130	104
Toluene-d8	2037-26-5	70-130	95

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

Client ID:	CCV	Date/Time Analyzed:	4/9/19 09:02 AM
Lab ID:	1904128-03A	Dilution Factor:	1.00
Date/Time Collecte	NA - Not Applicable	Instrument/Filename:	msd20.i / 20040902
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	98
1,4-Dioxane	123-91-1	114
cis-1,2-Dichloroethene	156-59-2	104
Tetrachloroethene	127-18-4	109
trans-1,2-Dichloroethene	156-60-5	100
Trichloroethene	79-01-6	99
Vinyl Chloride	75-01-4	95

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	107
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	LCS	Date/Time Analyzed:	4/9/19 10:22 AM
Lab ID:	1904128-04A	Dilution Factor:	1.00
Date/Time Collecte	NA - Not Applicable	Instrument/File name:	msd20.i / 20040903
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	105
1,4-Dioxane	123-91-1	117
cis-1,2-Dichloroethene	156-59-2	116
Tetrachloroethene	127-18-4	116
trans-1,2-Dichloroethene	156-60-5	91
Trichloroethene	79-01-6	121
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	95
4-Bromofluorobenzene	460-00-4	70-130	110
Toluene-d8	2037-26-5	70-130	100

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD	Date/Time Analyzed:	4/9/19 11:33 AM
Lab ID:	1904128-04AA	Dilution Factor:	1.00
Date/Time Collecte	NA - Not Applicable	Instrument/File name:	msd20.i / 20040904
Media:	NA - Not Applicable		

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	109
1,4-Dioxane	123-91-1	119
cis-1,2-Dichloroethene	156-59-2	122
Tetrachloroethene	127-18-4	113
trans-1,2-Dichloroethene	156-60-5	93
Trichloroethene	79-01-6	120
Vinyl Chloride	75-01-4	105

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	104
Toluene-d8	2037-26-5	70-130	101

* % Recovery is calculated using unrounded analytical results.



April 12, 2019

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

CADENA project ID: E203631
Project: Ford Livonia Transmission Project - OFF-SITE - Soil Gas and Groundwater
Project number: MI001454.0002/3/4.00002/2B/3B
Client project scope reference: Sample COC only was used to define project analytical requirements.
Laboratory: Eurofins Air Toxics - Folsom
Laboratory submittal: 1904128
Sample date: 2019-04-01
Report received by CADENA: 2019-04-12
Initial Data Verification completed by CADENA: 2019-04-12

1 Air sample was analyzed for TO-15 parameters.

There were no significant QC anomalies or exceptions to report.

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Inc, 1099 Highland Drive, Suite E, Ann Arbor, MI 48108 517-819-0356

CADENA Valid Qualifiers

Valid Qualifiers	Description
<	Less than the reported concentration.
>	Greater than the reported concentration.
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 contaminants) 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 contaminants) the blank concentration and is considered non-detect at the RDL. For Inorganic methods the sample concentration was less than the RDL and less than 10x the blank concentration and is considered non-detect at the RDL.
UJ	The analyte / compound was not detected above the reported sample Quantitation limit. However, the Quantitation limit is considered to be approximate due to associated quality assurance results and may or may not represent the actual limit of Quantitation to accurately and precisely report the analyte in the sample.

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1904128

CADENA Verification Report: 2019-04-12

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32473R
Review Level: Tier III
Project: MI001454.0003.00002



DATA REVIEW

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1904128 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
1904128	IAF-11775BOSTONPOST-02_040119	1904128-01A	Air	4/2/2019		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 REVIEW

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

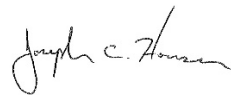
%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE:



DATE: April 20, 2019

PEER REVIEW: Dennis Capria

DATE: April 23, 2019



**CHAIN OF CUSTODY
CORRECTED SAMPLE ANALYSIS DATA
SHEETS**



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

Client ID:	IAF-11775BostonPost-02_040119	Date/Time Analyzed:	4/9/19 03:45 PM
Lab ID:	1904128-01A	Dilution Factor:	1.60
Date/Time Collecte	4/2/19 12:52 PM	Instrument/File name:	msd20.i / 20040908
Media:	6 Liter Summa Canister (100% Cert Ambie		

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.15	0.57	0.63	Not Detected
1,4-Dioxane	123-91-1	0.47	0.52	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.34	0.57	0.63	Not Detected
Tetrachloroethene	127-18-4	0.67	0.98	1.1	0.70 J
trans-1,2-Dichloroethene	156-60-5	0.36	0.57	0.63	Not Detected
Trichloroethene	79-01-6	0.42	0.77	0.86	Not Detected
Vinyl Chloride	75-01-4	0.13	0.37	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	101
4-Bromofluorobenzene	460-00-4	70-130	108
Toluene-d8	2037-26-5	70-130	98

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: **1904128**

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: <u>Ford</u>		PID: <u>NA</u>		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)								
Project Name: <u>Ford LTP</u>		P.O.# <u>MI001454.0003</u>						5 Day Turnaround Time								
Project Manager: <u>Kris Hinskey</u>								Canister Vacuum/Pressure		Requested Analyses						
Sampler: <u>J. Just M. Chender</u>								Lab Use Only		TO-15 (See Special Instructions/Notes)						
Site Name: <u>11775 Boston Post</u>																
Lab ID	Sample Identification	Can #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N ₂ / He					
				Date	Time	Date	Time									
	AA-11775BOSTONPOST-01															
	IAE-11775BOSTONPOST-00															
	IAF-11775BOSTONPOST-01															
	IAF-11775BOSTONPOST-02															
	IAO-11775BOSTONPOST-03															
	DOR-11775BOSTONPOST-01-040119															
OLA	IAF-11775BostonPost-02-040119	6L0767	22188	4/1/19	1408	4/2/19	1252	-28.5	-5			X				
Relinquished by: (Signature/Affiliation)				Date		Time		Received by: (Signature/Affiliation)				Date		Time		
				4-3-19		1600						4/5/19		1005		
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: <u>76017</u>		Custody Seals Intact? <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> None														
<p>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</p>																