eurofins | Air Toxics

4/8/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP
Project #: MI001454.0003
Workorder #: 1904041

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 4/2/2019 at Air Toxics Ltd.

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

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

Regards,

Ausha Scott

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1904041

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:	04/02/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	04/08/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SSMP-11701BOSTONPOST-01_032719	TO-15	6.1 "Hg	15.3 psi
02A	SSMP-11701BOSTONPOST-02_032719	TO-15	6.3 "Hg	15.2 psi
03A	Lab Blank	TO-15	NA	NA
04A	CCV	TO-15	NA	NA
05A	LCS	TO-15	NA	NA
05AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 04/08/19

Technical Director

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

LABORATORY NARRATIVE
EPA Method TO-15
Arcadis U.S., Inc.
Workorder# 1904041

Two 1 Liter Summa Canister (100% Certified) samples were received on April 02, 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-11701BOSTONPOST-01_032719		
Lab ID:	1904041-01A	**Date/Time Analyzed:**	4/5/19 06:29 PM
Date/Time Collecte	3/27/19 03:33 PM	**Dilution Factor:**	2.56
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd17.i / 17040512

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	2.2	4.1	5.1	Not Detected
1,4-Dioxane	123-91-1	9.8	14	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.4	4.0	5.1	Not Detected
Tetrachloroethene	127-18-4	3.5	6.9	8.7	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.0	5.1	Not Detected
Trichloroethene	79-01-6	2.5	5.5	6.9	Not Detected
Vinyl Chloride	75-01-4	1.3	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	98
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	106

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

Client ID:	SSMP-11701BOSTONPOST-02_032719		
Lab ID:	1904041-02A	**Date/Time Analyzed:**	4/5/19 06:57 PM
Date/Time Collecte	3/27/19 03:36 PM	**Dilution Factor:**	2.57
Media:	1 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd17.i / 17040513

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	2.2	4.1	5.1	Not Detected
1,4-Dioxane	123-91-1	9.8	14	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.4	4.1	5.1	Not Detected
Tetrachloroethene	127-18-4	3.5	7.0	8.7	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.1	5.1	Not Detected
Trichloroethene	79-01-6	2.5	5.5	6.9	Not Detected
Vinyl Chloride	75-01-4	1.3	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	100
4-Bromofluorobenzene	460-00-4	70-130	90
Toluene-d8	2037-26-5	70-130	107

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

Client ID:	Lab Blank		
Lab ID:	1904041-03A	**Date/Time Analyzed:**	4/5/19 11:40 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17040505c

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.87	1.6	2.0	Not Detected
1,4-Dioxane	123-91-1	3.8	5.4	7.2	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.56	1.6	2.0	Not Detected
Tetrachloroethene	127-18-4	1.4	2.7	3.4	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.59	1.6	2.0	Not Detected
Trichloroethene	79-01-6	0.97	2.1	2.7	Not Detected
Vinyl Chloride	75-01-4	0.51	1.0	1.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	100
4-Bromofluorobenzene	460-00-4	70-130	88
Toluene-d8	2037-26-5	70-130	108

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

Client ID:	CCV		
Lab ID:	1904041-04A	**Date/Time Analyzed:**	4/5/19 09:18 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17040502

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	101
1,4-Dioxane	123-91-1	118
cis-1,2-Dichloroethene	156-59-2	101
Tetrachloroethene	127-18-4	97
trans-1,2-Dichloroethene	156-60-5	112
Trichloroethene	79-01-6	112
Vinyl Chloride	75-01-4	118

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	104
4-Bromofluorobenzene	460-00-4	70-130	90
Toluene-d8	2037-26-5	70-130	110

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

Client ID:	LCS		
Lab ID:	1904041-05A	**Date/Time Analyzed:**	4/5/19 09:46 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17040503

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	105
1,4-Dioxane	123-91-1	120
cis-1,2-Dichloroethene	156-59-2	115
Tetrachloroethene	127-18-4	99
trans-1,2-Dichloroethene	156-60-5	100
Trichloroethene	79-01-6	118
Vinyl Chloride	75-01-4	123

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	103
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	109

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1904041-05AA	**Date/Time Analyzed:**	4/5/19 10:14 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd17.i / 17040504

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	103
1,4-Dioxane	123-91-1	118
cis-1,2-Dichloroethene	156-59-2	115
Tetrachloroethene	127-18-4	98
trans-1,2-Dichloroethene	156-60-5	98
Trichloroethene	79-01-6	116
Vinyl Chloride	75-01-4	120

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	92
Toluene-d8	2037-26-5	70-130	108

* % Recovery is calculated using unrounded analytical results.

April 09, 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: 1904041
Sample date: 2019-03-27
Report received by CADENA: 2019-04-08
Initial Data Verification completed by CADENA: 2019-04-09

2 Air samples were analyzed for TO-15 parameters.

There were no significant QC anomalies or exceptions to report.

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Valid Qualifiers

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

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

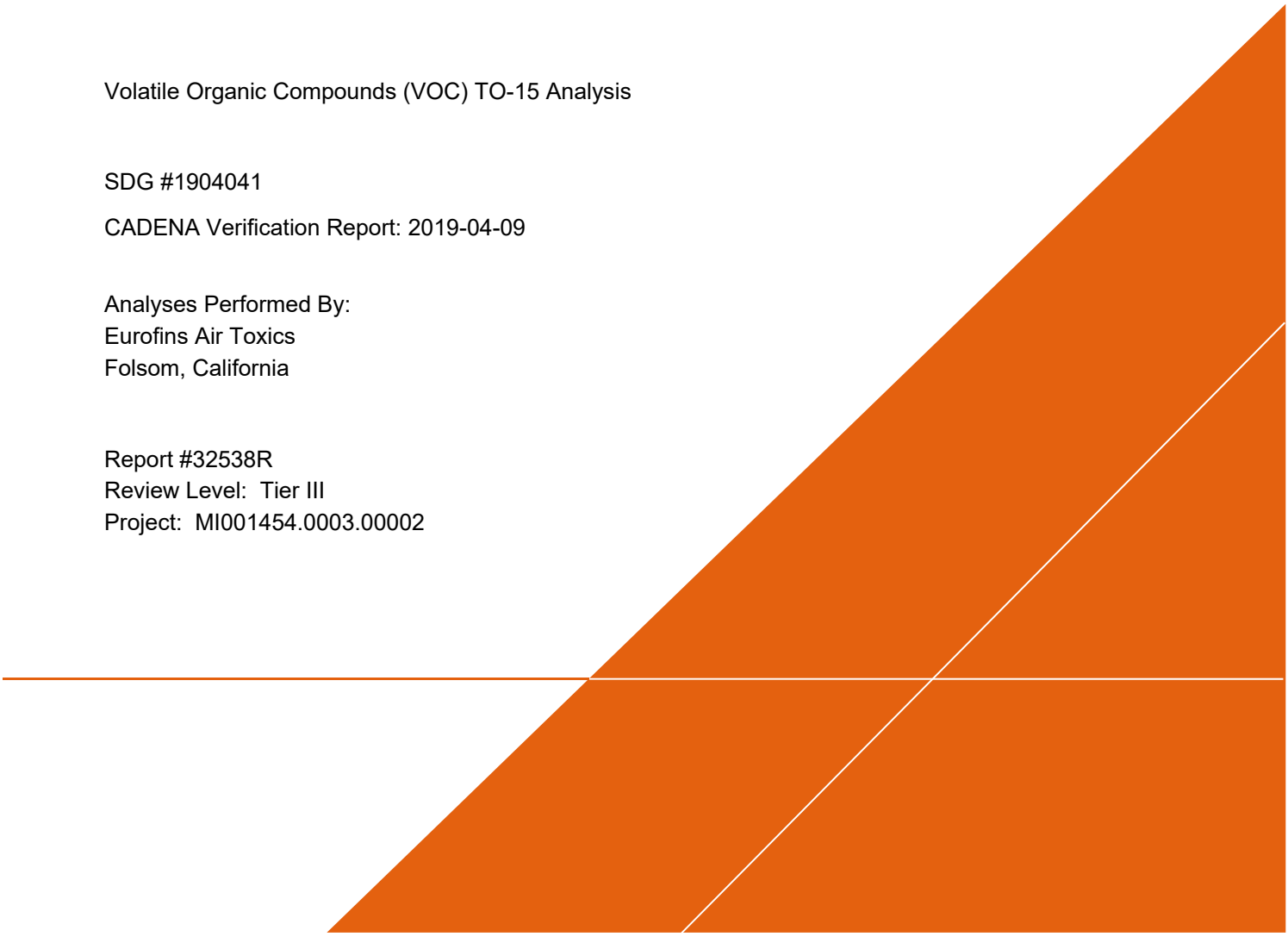
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1904041

CADENA Verification Report: 2019-04-09

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32538R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1904041 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
1904041	SSMP-11701BOSTONPOST-01_032719	1904041-01A	Air	3/27/2019		X		
	SSMP-11701BOSTONPOST-02_032719	1904041-02A	Air	3/27/2019		X		

DATA REVIEW

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

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

DATA REVIEW

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method TO-15 (Full Scan). Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

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

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

- Concentration (C) Qualifiers

  U The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

  UJ The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

  J+ The result is an estimated quantity, but the result may be biased high.

  J- The result is an estimated quantity, but the result may be biased low.

  UB Analyte considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

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

DATA REVIEW

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation	Return Canister Pressure
USEPA TO-15	Air	30 days from collection to analysis (Canister)	Ambient Temperature	< -2" Hg

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

2. Mass Spectrometer Tuning

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

System performance and column resolution were acceptable.

3. Calibration

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

3.1 Initial Calibration

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

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

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

3.2 Continuing Calibration

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

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

4. Internal Standard Performance

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

All internal standard responses were within control limits.

DATA REVIEW

5. Compound Identification

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

All identified compounds met the specified criteria.

6. System Performance and Overall Assessment

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

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: TO-15 (Full Scan)	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Canister return pressure (<-2”Hg)		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

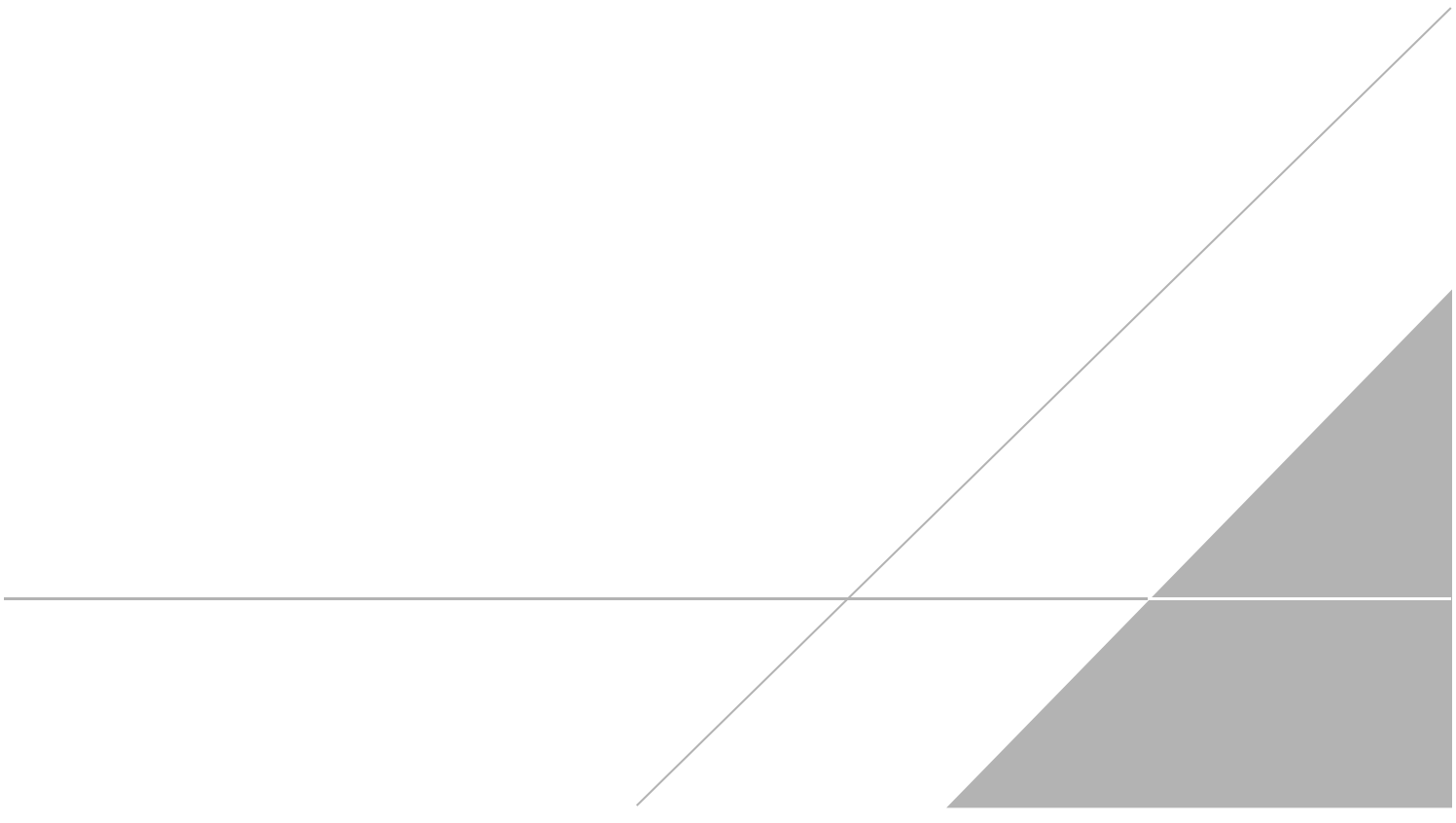
DATE: April 25, 2019

PEER REVIEW: Dennis Capria

DATE: May 7, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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Ford LTP

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1,4-Dioxane	123-91-1	9.8	14	18	Not Detected
cis-1,2-Dichloroethene	156-59-2	1.4	4.0	5.1	Not Detected
Tetrachloroethene	127-18-4	3.5	6.9	8.7	Not Detected
trans-1,2-Dichloroethene	156-60-5	1.5	4.0	5.1	Not Detected
Trichloroethene	79-01-6	2.5	5.5	6.9	Not Detected
Vinyl Chloride	75-01-4	1.3	2.6	3.3	Not Detected

D: Analyte not within the DoD scope of accreditation.

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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	90
Toluene-d8	2037-26-5	70-130	107

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: 1904041

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

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

Client:	Ford	PID:	NA
Project Name:	Ford LTP		
Project Manager:	Kris Hinskey	P.O.#	MI001454.0003
Sampler:	C. Weaver, H. Ladd		
Site Name:	11701 Boston Post		

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

Turnaround Time (Rush surcharges may apply)
5 Day Turnaround Time

Lab ID	Sample Identification	Can #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Canister Vacuum/Pressure		Lab Use Only		Requested Analyses				
				Date	Time	Date	Time	Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N_2 / He	TO-15 (See Special Instructions/Notes)				
01A	SSMP-11701BOSTONPOST-01_032719	1L2740	23777	3/27/19	1523	3/27/19	1533	-29.5	-6			X				
02A	SSMP-11701BOSTONPOST-02_032719	1L2903	24358	3/27/19	1526	3/27/19	1536	-29.5	-6			X				

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Stephanie Weaver / Arcadis	3/29/19	1600	FedEx	4/2/19	1030
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time

Lab Use Only

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

Sample Transportation Notice: Relinquishing signature on this document indicates that samples are shipped in compliance with all applicable local, State, Federal, and international laws, regulations, and ordinances of any kind. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Eurofins Air Toxics against any claim, demand, or action, of any kind, related to the collection, handling, of shipping of samples. D.O.T Hotline (800) 467-4922

eurofins | Air Toxics

4/9/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP
Project #:
Workorder #: 1904044

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 4/2/2019 at Air Toxics Ltd.

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

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

Regards,

Ausha Scott

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1904044

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:	04/02/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	04/09/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA-11701BOSTONPOST-01_032619	Modified TO-15	6.0 "Hg	5 psi
02A(cancelled)	IAF-11701BOSTONPOST-01_032619	Modified TO-15	7.0 "Hg	5 psi
03A	IAF-11701BOSTONPOST-02_032619	Modified TO-15	7.0 "Hg	5 psi
04A	DUP-11701BOSTONPOST-02_032619	Modified TO-15	8.5 "Hg	5 psi
05A	Lab Blank	Modified TO-15	NA	NA
06A	CCV	Modified TO-15	NA	NA
07A	LCS	Modified TO-15	NA	NA
07AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 04/09/19

Technical Director

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

LABORATORY NARRATIVE
Modified TO-15
Arcadis U.S., Inc.
Workorder# 1904044

Four 6 Liter Summa Canister (100% Certified) samples were received on April 02, 2019. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

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

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

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

Receiving Notes

There were no receiving discrepancies.

Sample IAF-11701BOSTONPOST-01_032619 was cancelled on 4/5/19 per client's request.

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-11701BOSTONPOST-01_032619		
Lab ID:	1904044-01A	**Date/Time Analyzed:**	4/4/19 11:15 PM
Date/Time Collecte	3/27/19 02:59 PM	**Dilution Factor:**	1.68
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd21.i / 21040422

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.080	0.33	0.67	Not Detected
1,4-Dioxane	123-91-1	0.090	0.30	0.60	0.86
cis-1,2-Dichloroethene	156-59-2	0.074	0.33	0.67	Not Detected
Tetrachloroethene	127-18-4	0.080	0.57	1.1	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.052	0.33	0.67	Not Detected
Trichloroethene	79-01-6	0.12	0.45	0.90	Not Detected
Vinyl Chloride	75-01-4	0.034	0.21	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	121
4-Bromofluorobenzene	460-00-4	70-130	89
Toluene-d8	2037-26-5	70-130	103

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

Client ID:	IAF-11701BOSTONPOST-02_032619		
Lab ID:	1904044-03A	**Date/Time Analyzed:**	4/5/19 07:52 AM
Date/Time Collecte	3/27/19 03:07 PM	**Dilution Factor:**	1.75
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd21.i / 21040424

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.083	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.094	0.32	0.63	0.24 J
cis-1,2-Dichloroethene	156-59-2	0.077	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.084	0.59	1.2	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.054	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.13	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.035	0.22	0.45	Not Detected

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

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	121
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	DUP-11701BOSTONPOST-02_032619		
Lab ID:	1904044-04A	**Date/Time Analyzed:**	4/5/19 08:27 AM
Date/Time Collecte	3/27/19 12:00 AM	**Dilution Factor:**	1.87
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd21.i / 21040425

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

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	118
4-Bromofluorobenzene	460-00-4	70-130	93
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	Lab Blank		
Lab ID:	1904044-05A	**Date/Time Analyzed:**	4/4/19 01:14 PM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21040406a

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

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	122
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	99

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

Client ID:	CCV		
Lab ID:	1904044-06A	**Date/Time Analyzed:**	4/4/19 09:51 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21040402

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	96
1,4-Dioxane	123-91-1	124
cis-1,2-Dichloroethene	156-59-2	99
Tetrachloroethene	127-18-4	91
trans-1,2-Dichloroethene	156-60-5	102
Trichloroethene	79-01-6	101
Vinyl Chloride	75-01-4	100

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	108
4-Bromofluorobenzene	460-00-4	70-130	114
Toluene-d8	2037-26-5	70-130	111

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

Client ID:	LCS		
Lab ID:	1904044-07A	**Date/Time Analyzed:**	4/4/19 10:58 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21040403

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	92
1,4-Dioxane	123-91-1	116
cis-1,2-Dichloroethene	156-59-2	102
Tetrachloroethene	127-18-4	86
trans-1,2-Dichloroethene	156-60-5	81
Trichloroethene	79-01-6	89
Vinyl Chloride	75-01-4	97

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	107
4-Bromofluorobenzene	460-00-4	70-130	108
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		
Lab ID:	1904044-07AA	**Date/Time Analyzed:**	4/4/19 11:33 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd21.i / 21040404

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	90
1,4-Dioxane	123-91-1	116
cis-1,2-Dichloroethene	156-59-2	99
Tetrachloroethene	127-18-4	83
trans-1,2-Dichloroethene	156-60-5	80
Trichloroethene	79-01-6	92
Vinyl Chloride	75-01-4	94

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	104
4-Bromofluorobenzene	460-00-4	70-130	107
Toluene-d8	2037-26-5	70-130	105

* % Recovery is calculated using unrounded analytical results.

April 09, 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: 1904044
Sample date: 2019-03-27
Report received by CADENA: 2019-04-09
Initial Data Verification completed by CADENA: 2019-04-09

3 Air samples were analyzed for TO-15 parameters.

There were no significant QC anomalies or exceptions to report.

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Valid Qualifiers

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

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

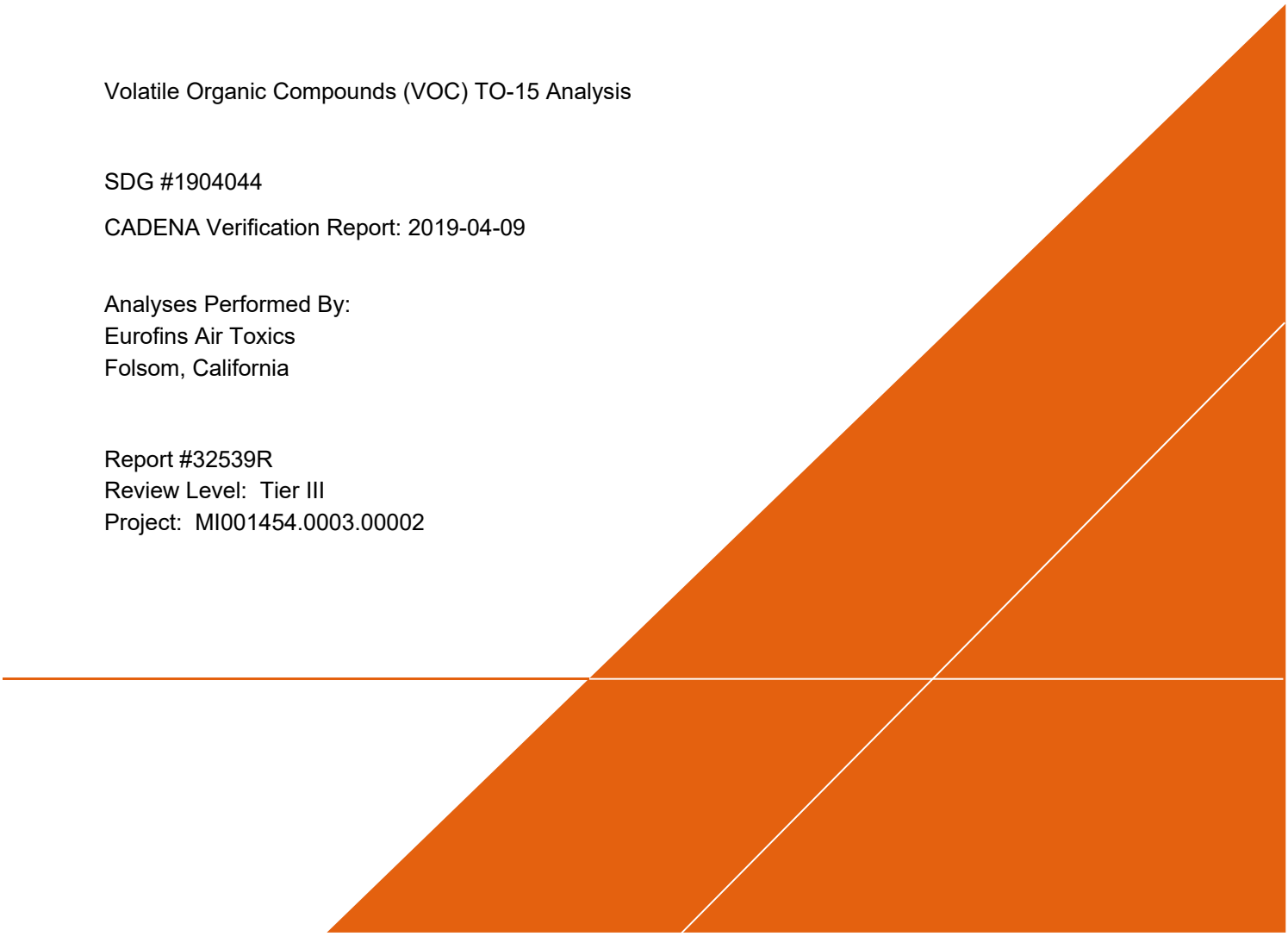
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1904044

CADENA Verification Report: 2019-04-09

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32539R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1904044 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
1904044	AA-11701BOSTONPOST-01_032619	1904044-01A	Air	3/27/2019		X		
	IAF-11701BOSTONPOST-02_032619	1904044-03A	Air	3/27/2019		X		
	DUP-11701BOSTONPOST-02_032619	1904044-04A	Air	3/27/2019	AA-11701BOSTONPOST-01_032619	X		

DATA REVIEW

ANALYTICAL DATA PACKAGE DOCUMENTATION

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

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

DATA REVIEW

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method TO-15 (Full Scan). Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

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

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

- Concentration (C) Qualifiers

  U The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

  UJ The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

  J+ The result is an estimated quantity, but the result may be biased high.

  J- The result is an estimated quantity, but the result may be biased low.

  UB Analyte considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

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

DATA REVIEW

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation	Return Canister Pressure
USEPA TO-15	Air	30 days from collection to analysis (Canister)	Ambient Temperature	< -2" Hg

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

2. Mass Spectrometer Tuning

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

System performance and column resolution were acceptable.

3. Calibration

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

3.1 Initial Calibration

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

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

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

3.2 Continuing Calibration

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

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

4. Internal Standard Performance

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

All internal standard responses were within control limits.

5. Compound Identification

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

All identified compounds met the specified criteria.

6. Field Duplicate Sample Analysis

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

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

Sample ID / Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
AA-11701BOSTONPOST-01_032619/ DUP-11701BOSTONPOST-02_032619	1,4-Dioxane	0.86	0.67 U	AC

AC Acceptable

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

7. System Performance and Overall Assessment

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

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: TO-15 (Full Scan)	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Canister return pressure (<-2"Hg)		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Field Duplicate Sample RPD		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

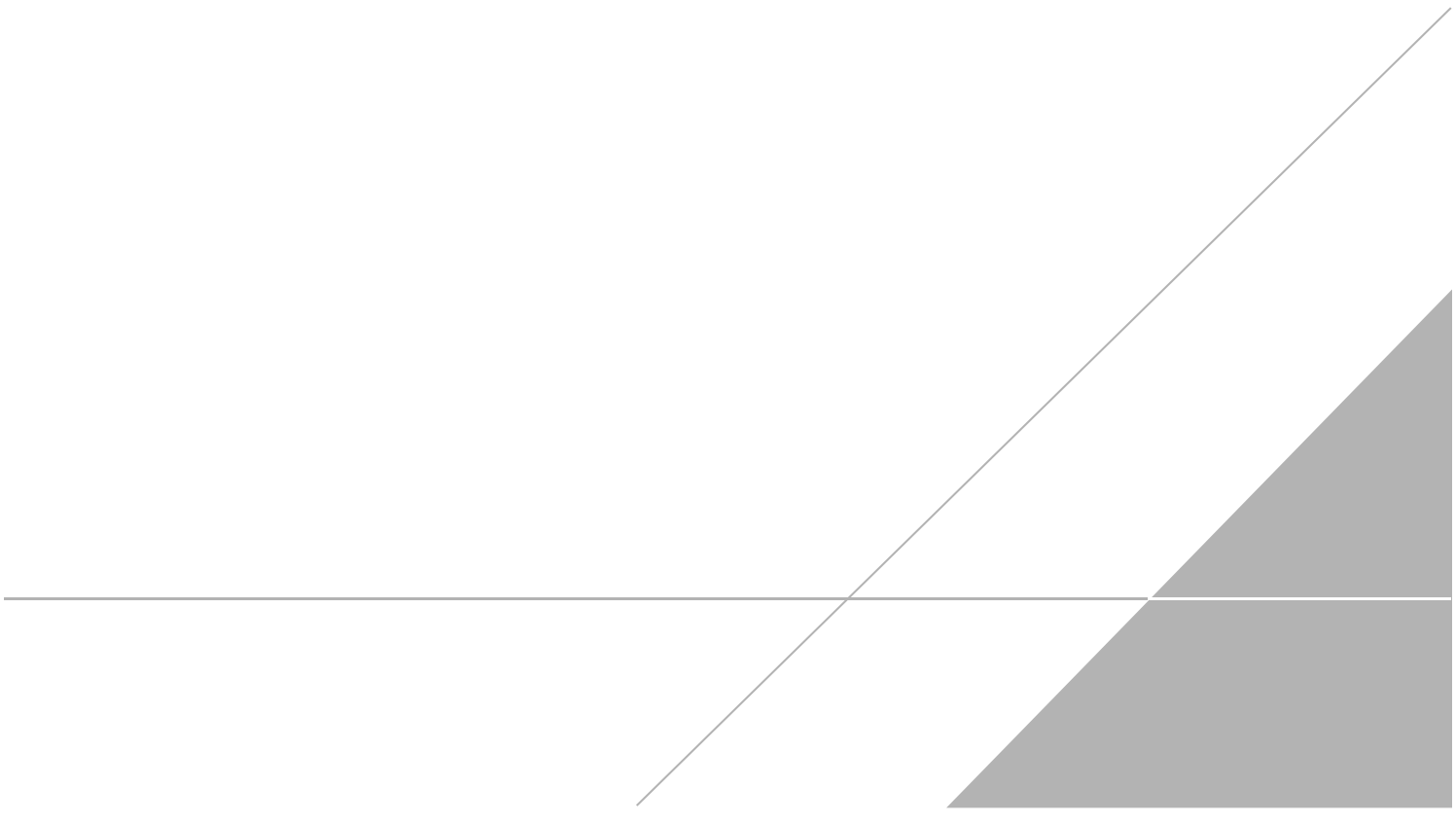
DATE: April 25, 2019

PEER REVIEW: Dennis Capria

DATE: May 7, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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

Client ID:	AA-11701BOSTONPOST-01_032619		
Lab ID:	1904044-01A	**Date/Time Analyzed:**	4/4/19 11:15 PM
Date/Time Collecte	3/27/19 02:59 PM	**Dilution Factor:**	1.68
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd21.i / 21040422

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.080	0.33	0.67	Not Detected
1,4-Dioxane	123-91-1	0.090	0.30	0.60	0.86
cis-1,2-Dichloroethene	156-59-2	0.074	0.33	0.67	Not Detected
Tetrachloroethene	127-18-4	0.080	0.57	1.1	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.052	0.33	0.67	Not Detected
Trichloroethene	79-01-6	0.12	0.45	0.90	Not Detected
Vinyl Chloride	75-01-4	0.034	0.21	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	121
4-Bromofluorobenzene	460-00-4	70-130	89
Toluene-d8	2037-26-5	70-130	103

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

Client ID:	IAF-11701BOSTONPOST-02_032619		
Lab ID:	1904044-03A	**Date/Time Analyzed:**	4/5/19 07:52 AM
Date/Time Collecte	3/27/19 03:07 PM	**Dilution Factor:**	1.75
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd21.i / 21040424

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.083	0.35	0.69	Not Detected
1,4-Dioxane	123-91-1	0.094	0.32	0.63	0.24 J
cis-1,2-Dichloroethene	156-59-2	0.077	0.35	0.69	Not Detected
Tetrachloroethene	127-18-4	0.084	0.59	1.2	Not Detected
trans-1,2-Dichloroethene	156-60-5	0.054	0.35	0.69	Not Detected
Trichloroethene	79-01-6	0.13	0.47	0.94	Not Detected
Vinyl Chloride	75-01-4	0.035	0.22	0.45	Not Detected

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

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	121
4-Bromofluorobenzene	460-00-4	70-130	95
Toluene-d8	2037-26-5	70-130	98

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

Client ID:	DUP-11701BOSTONPOST-02_032619		
Lab ID:	1904044-04A	**Date/Time Analyzed:**	4/5/19 08:27 AM
Date/Time Collecte	3/27/19 12:00 AM	**Dilution Factor:**	1.87
Media:	6 Liter Summa Canister (100% Certified)	**Instrument/Filename:**	msd21.i / 21040425

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

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	118
4-Bromofluorobenzene	460-00-4	70-130	93
Toluene-d8	2037-26-5	70-130	98

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: 1904044

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

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

Client:	Ford	PID:	NA
Project Name:	Ford LTP		
Project Manager:	Kris Hinskey	P.O.#	MI001454.0003
Sampler:	C. Weaver, A. Ladd		
Site Name:	11701 Boston Post		

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

Turnaround Time (Rush surcharges may apply)

5 Day Turnaround Time

Lab ID	Sample Identification	Can #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Canister Vacuum/Pressure		Lab Use Only		Requested Analyses				
				Date	Time	Date	Time	Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N_2 / He	TO-15 (See Special Instructions/Notes)	DO NOT ANALYZE			
01A	AA-11701BOSTONPOST-01_032619	6L0970	22064	3/26/19	1615	3/27/19	1459	-29	-6			X				
02A	IAF-11701BOSTONPOST-01_032619	9221	22689	3/26/19	1607	3/27/19	1543	-29	-6.5			X				
03A	IAF-11701BOSTONPOST-02_032619	6L1617	22123	3/26/19	1610	3/27/19	1507	-29	-6.5			X				
	IAG-11701BOSTONPOST-03_032619	6L1403	22280	3/26/19	1614	3/27/19	1505	-29	-1.5				X			
	DUP-11701BostonPost-01_032619	6L0645	40528	3/26/19	—	3/27/19	—	-29	-0.5				X			
04A	DUP-11701BostonPost-02_032619	6L1335	22868	3/26/19	—	3/27/19	—	-29	-8			X				

Relinquished by: (Signature/Affiliation) Seth Attaway/Arcadis	Date 3/29/19	Time 1600	Received by: (Signature/Affiliation) EAT EAT	Date 4/2/19	Time 1030
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time

Lab Use Only

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

Sample Transportation Notice: Relinquishing signature on this document indicates that samples are shipped in compliance with all applicable local, State, Federal, and international laws, regulations, and ordinances of any kind. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Eurofins Air Toxics against any claim, demand, or action, of any kind, related to the collection, handling, of shipping of samples. D.O.T Hotline (800) 467-4922

eurofins | Air Toxics

4/19/2019
Mr. Jim Tomalia
Arcadis U.S., Inc.
28550 Cabot Dr.
Suite 500
Novi MI 48377

Project Name: Ford LTP
Project #: MI001454.0003
Workorder #: 1904298

Dear Mr. Jim Tomalia

The following report includes the data for the above referenced project for sample(s) received on 4/12/2019 at Air Toxics Ltd.

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

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

Regards,

Ausha Scott

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1904298

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:	04/12/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	04/18/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	IAG-11701BostonPost-03_040819	Modified TO-15	6.3 "Hg	4.5 psi
02A	DUP-11701BostonPost-01_040819	Modified TO-15	4.9 "Hg	5.2 psi
03A	IAF-11701BostonPost-01_040819	Modified TO-15	7.3 "Hg	4.9 psi
04A	DUP-11701BostonPost-02_040819	Modified TO-15	5.3 "Hg	4.9 psi
05A	Lab Blank	Modified TO-15	NA	NA
06A	CCV	Modified TO-15	NA	NA
07A	LCS	Modified TO-15	NA	NA
07AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 04/18/19

Technical Director

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

LABORATORY NARRATIVE
Modified TO-15
Arcadis U.S., Inc.
Workorder# 1904298

Four 6 Liter Summa Canister (100% Cert Ambient) samples were received on April 12, 2019. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

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

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

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

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

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

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:	IAG-11701BostonPost-03_040819		
Lab ID:	1904298-01A	**Date/Time Analyzed:**	4/15/19 02:18 PM
Date/Time Collecte	4/9/19 04:30 PM	**Dilution Factor:**	1.66
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041511

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.33	0.66	Not Detected
1,4-Dioxane	123-91-1	0.14	0.30	0.60	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.33	0.66	Not Detected
Tetrachloroethene	127-18-4	0.068	0.56	1.1	0.088 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.33	0.66	0.97
Trichloroethene	79-01-6	0.096	0.45	0.89	0.43 J
Vinyl Chloride	75-01-4	0.060	0.21	0.42	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	110
4-Bromofluorobenzene	460-00-4	70-130	93
Toluene-d8	2037-26-5	70-130	109

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

Client ID:	DUP-11701BostonPost-01_040819		
Lab ID:	1904298-02A	**Date/Time Analyzed:**	4/15/19 03:01 PM
Date/Time Collecte	4/9/19 12:00 AM	**Dilution Factor:**	1.62
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041512

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.32	0.64	Not Detected
1,4-Dioxane	123-91-1	0.14	0.29	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.64	Not Detected
Tetrachloroethene	127-18-4	0.066	0.55	1.1	0.097 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.64	0.23 J
Trichloroethene	79-01-6	0.094	0.44	0.87	0.14 J
Vinyl Chloride	75-01-4	0.059	0.21	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	115
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	IAF-11701BostonPost-01_040819		
Lab ID:	1904298-03A	**Date/Time Analyzed:**	4/15/19 03:37 PM
Date/Time Collecte	4/9/19 04:35 PM	**Dilution Factor:**	1.76
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041513

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.13	0.35	0.70	Not Detected
1,4-Dioxane	123-91-1	0.15	0.32	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.35	0.70	Not Detected
Tetrachloroethene	127-18-4	0.072	0.60	1.2	0.12 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.35	0.70	0.44 J
Trichloroethene	79-01-6	0.10	0.47	0.94	0.20 J
Vinyl Chloride	75-01-4	0.064	0.22	0.45	Not Detected

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

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	112
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	107

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

Client ID:	DUP-11701BostonPost-02_040819		
Lab ID:	1904298-04A	**Date/Time Analyzed:**	4/15/19 04:13 PM
Date/Time Collecte	4/9/19 12:00 AM	**Dilution Factor:**	1.62
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041514

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.32	0.64	Not Detected
1,4-Dioxane	123-91-1	0.14	0.29	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.64	Not Detected
Tetrachloroethene	127-18-4	0.066	0.55	1.1	0.10 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.64	0.45 J
Trichloroethene	79-01-6	0.094	0.44	0.87	0.18 J
Vinyl Chloride	75-01-4	0.059	0.21	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	112
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	105

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

Client ID:	Lab Blank		
Lab ID:	1904298-05A	**Date/Time Analyzed:**	4/15/19 11:20 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22041507a

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	111
4-Bromofluorobenzene	460-00-4	70-130	100
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	CCV		
Lab ID:	1904298-06A	**Date/Time Analyzed:**	4/15/19 09:01 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22041503

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	88
1,4-Dioxane	123-91-1	100
cis-1,2-Dichloroethene	156-59-2	92
Tetrachloroethene	127-18-4	98
trans-1,2-Dichloroethene	156-60-5	91
Trichloroethene	79-01-6	103
Vinyl Chloride	75-01-4	88

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	96
4-Bromofluorobenzene	460-00-4	70-130	99
Toluene-d8	2037-26-5	70-130	100

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

Client ID:	LCS		
Lab ID:	1904298-07A	**Date/Time Analyzed:**	4/15/19 09:34 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22041504

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	92
1,4-Dioxane	123-91-1	115
cis-1,2-Dichloroethene	156-59-2	105
Tetrachloroethene	127-18-4	102
trans-1,2-Dichloroethene	156-60-5	83
Trichloroethene	79-01-6	102
Vinyl Chloride	75-01-4	97

D: Analyte not within the DoD scope of accreditation.

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	103
4-Bromofluorobenzene	460-00-4	70-130	98
Toluene-d8	2037-26-5	70-130	99

* % Recovery is calculated using unrounded analytical results.

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

Client ID:	LCSD		
Lab ID:	1904298-07AA	**Date/Time Analyzed:**	4/15/19 10:07 AM
Date/Time Collecte	NA - Not Applicable	**Dilution Factor:**	1.00
Media:	NA - Not Applicable	**Instrument/Filename:**	msd22.i / 22041505

Compound	CAS#	%Recovery
1,1-Dichloroethene	75-35-4	92
1,4-Dioxane	123-91-1	116
cis-1,2-Dichloroethene	156-59-2	106
Tetrachloroethene	127-18-4	102
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	105
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	99

* % Recovery is calculated using unrounded analytical results.

April 19, 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: 1904298
Sample date: 2019-04-09
Report received by CADENA: 2019-04-19
Initial Data Verification completed by CADENA: 2019-04-19

4 Air samples were analyzed for TO-15 parameters.

There were no significant QC anomalies or exceptions to report.

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Valid Qualifiers

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

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company – Livonia Transmission Project

DATA REVIEW

Livonia, Michigan

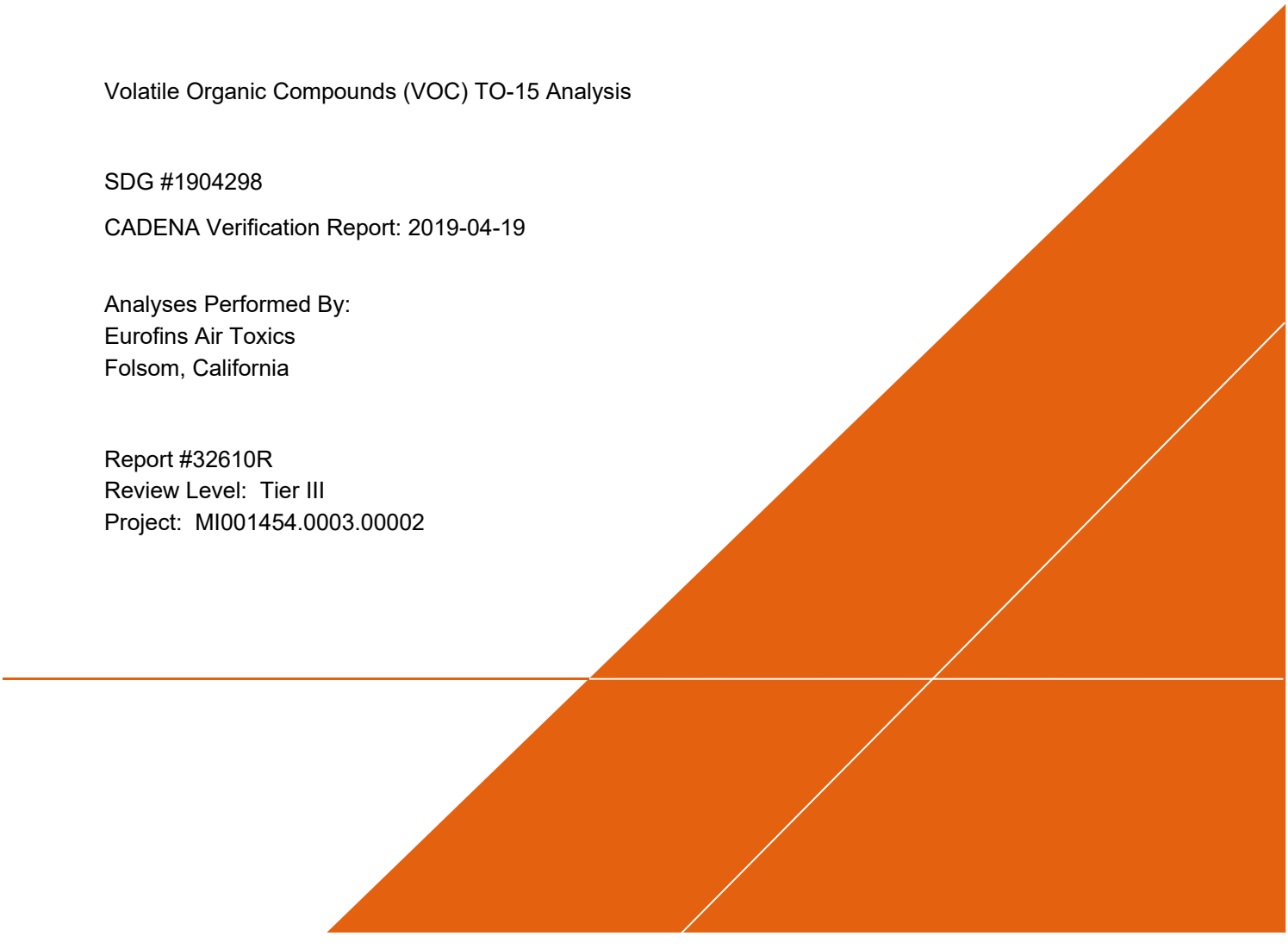
Volatile Organic Compounds (VOC) TO-15 Analysis

SDG #1904298

CADENA Verification Report: 2019-04-19

Analyses Performed By:
Eurofins Air Toxics
Folsom, California

Report #32610R
Review Level: Tier III
Project: MI001454.0003.00002



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 1904298 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
1904298	IAG-11701BOSTONPOST-03_040819	1904298-01A	Air	4/9/2019		X		
	DUP-11701BOSTONPOST-01_040819	1904298-02A	Air	4/9/2019	IAG-11701BOSTONPOST-03_040819	X		
	IAF-11701BOSTONPOST-01_040819	1904298-03A	Air	4/9/2019		X		
	DUP-11701BOSTONPOST-02_040819	1904298-04A	Air	4/9/2019	IAF-11701BOSTONPOST-01_040819	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. Field Duplicate Sample Analysis

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

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

Sample ID / Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
IAG-11701BOSTONPOST-03_040819/ DUP-11701BOSTONPOST-01_040819	Tetrachloroethene	0.088 J	0.097 J	AC
	trans-1,2-Dichloroethene	0.97	0.23 J	AC
	Trichloroethene	0.43 J	0.14 J	AC
IAF-11701BOSTONPOST-01_040819/ DUP-11701BOSTONPOST-02_040819	Tetrachloroethene	0.12 J	0.10 J	AC
	trans-1,2-Dichloroethene	0.44 J	0.45 J	AC
	Trichloroethene	0.20 J	0.18 J	AC

Notes:
AC Acceptable

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

7. System Performance and Overall Assessment

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

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: TO-15 (Full Scan)	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Canister return pressure (<-2”Hg)		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Field Duplicate Sample RPD		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

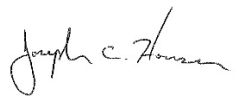
%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Joseph C. Houser

SIGNATURE: 

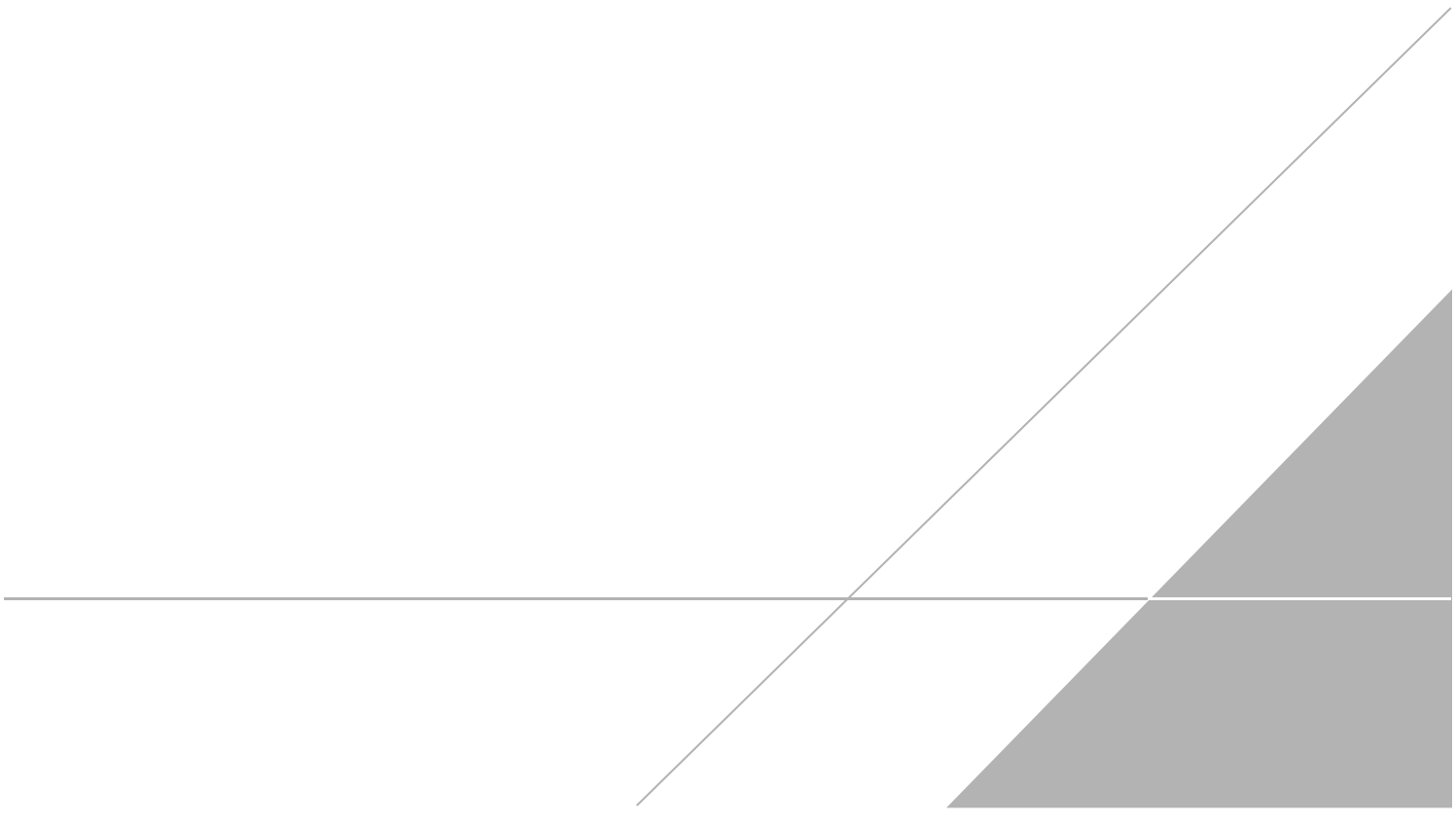
DATE: April 29, 2019

PEER REVIEW: Dennis Capria

DATE: April 30, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



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

Client ID:	IAG-11701BostonPost-03_040819		
Lab ID:	1904298-01A	**Date/Time Analyzed:**	4/15/19 02:18 PM
Date/Time Collecte	4/9/19 04:30 PM	**Dilution Factor:**	1.66
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041511

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.33	0.66	Not Detected
1,4-Dioxane	123-91-1	0.14	0.30	0.60	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.33	0.66	Not Detected
Tetrachloroethene	127-18-4	0.068	0.56	1.1	0.088 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.33	0.66	0.97
Trichloroethene	79-01-6	0.096	0.45	0.89	0.43 J
Vinyl Chloride	75-01-4	0.060	0.21	0.42	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	110
4-Bromofluorobenzene	460-00-4	70-130	93
Toluene-d8	2037-26-5	70-130	109

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

Client ID:	DUP-11701BostonPost-01_040819		
Lab ID:	1904298-02A	**Date/Time Analyzed:**	4/15/19 03:01 PM
Date/Time Collecte	4/9/19 12:00 AM	**Dilution Factor:**	1.62
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041512

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.32	0.64	Not Detected
1,4-Dioxane	123-91-1	0.14	0.29	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.64	Not Detected
Tetrachloroethene	127-18-4	0.066	0.55	1.1	0.097 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.64	0.23 J
Trichloroethene	79-01-6	0.094	0.44	0.87	0.14 J
Vinyl Chloride	75-01-4	0.059	0.21	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	115
4-Bromofluorobenzene	460-00-4	70-130	91
Toluene-d8	2037-26-5	70-130	104

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

Client ID:	IAF-11701BostonPost-01_040819		
Lab ID:	1904298-03A	**Date/Time Analyzed:**	4/15/19 03:37 PM
Date/Time Collecte	4/9/19 04:35 PM	**Dilution Factor:**	1.76
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041513

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.13	0.35	0.70	Not Detected
1,4-Dioxane	123-91-1	0.15	0.32	0.63	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.15	0.35	0.70	Not Detected
Tetrachloroethene	127-18-4	0.072	0.60	1.2	0.12 J
trans-1,2-Dichloroethene	156-60-5	0.11	0.35	0.70	0.44 J
Trichloroethene	79-01-6	0.10	0.47	0.94	0.20 J
Vinyl Chloride	75-01-4	0.064	0.22	0.45	Not Detected

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

Surrogates	CAS#	Limits	%Recovery
1,2-Dichloroethane-d4	17060-07-0	70-130	112
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	107

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

Client ID:	DUP-11701BostonPost-02_040819		
Lab ID:	1904298-04A	**Date/Time Analyzed:**	4/15/19 04:13 PM
Date/Time Collecte	4/9/19 12:00 AM	**Dilution Factor:**	1.62
Media:	6 Liter Summa Canister (100% Cert Ambie	**Instrument/Filename:**	msd22.i / 22041514

Compound	CAS#	MDL (ug/m3)	LOD (ug/m3)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethene	75-35-4	0.12	0.32	0.64	Not Detected
1,4-Dioxane	123-91-1	0.14	0.29	0.58	Not Detected
cis-1,2-Dichloroethene	156-59-2	0.14	0.32	0.64	Not Detected
Tetrachloroethene	127-18-4	0.066	0.55	1.1	0.10 J
trans-1,2-Dichloroethene	156-60-5	0.10	0.32	0.64	0.45 J
Trichloroethene	79-01-6	0.094	0.44	0.87	0.18 J
Vinyl Chloride	75-01-4	0.059	0.21	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	112
4-Bromofluorobenzene	460-00-4	70-130	96
Toluene-d8	2037-26-5	70-130	105

eurofins | Air Toxics

Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: 1904298

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

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

Client: Ford PID: —
Project Name: Ford LTP
Project Manager: Kris Hinskey P.O.# MI001454.0003
Sampler: A. Ladd ; D. Craig
Site Name: 11701 Boston Post

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

Turnaround Time (Rush surcharges may apply): 5 day

Lab ID	Sample Identification	Can #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Canister Vacuum/Pressure		Lab Use Only		Requested Analyses			
				Date	Time	Date	Time	Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N_2 / He	TO-15 (See Special Instructions/Notes)			
01A	IAG-11701BostonPost-05_040819	6L0976	22837	4-8-19	1705	4-9-19	1630	-29	-5.5			X			
02A	DUP-11701BostonPost-01_040819	6L0928	22691	4-8-19	—	4-9-19	—	-29	-4.5			X			
03A	IAF-11701BostonPost-01_040819	6L2346	22857	4-8-19	1743	4-9-19	1635	-29	-6			X			
04A	DUP-11701BostonPost-02_040819	6L2323	40559	4-8-19	—	4-9-19	—	-29	-4.5			X			

Relinquished by: (Signature/Affiliation)	Date 4-10-19	Time 1600	Received by: (Signature/Affiliation)	Date 4/12/19 Time 1010
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date Time
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date Time

Lab Use Only

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

Sample Transportation Notice: Relinquishing signature on this document indicates that samples are shipped in compliance with all applicable local, State, Federal, and international laws, regulations, and ordinances of any kind. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Eurofins Air Toxics against any claim, demand, or action, of any kind, related to the collection, handling, of shipping of samples. D.O.T Hotline (800) 467-4922