

## ANALYTICAL REPORT

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

Laboratory Job ID: 240-126486-1  
Client Project/Site: Ford LTP Off Site

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

Attn: Kristoffer Hinskey



Authorized for release by:  
3/3/2020 10:10:08 AM

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

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*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 Off Site

Job ID: 240-126486-1

## Qualifiers

### GC/MS VOA

Qualifier	Qualifier Description
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 Off Site

Job ID: 240-126486-1

**Job ID: 240-126486-1**

**Laboratory: Eurofins TestAmerica, Canton**

**Narrative**

## CASE NARRATIVE

**Client: ARCADIS U.S., Inc.**

**Project: Ford LTP Off Site**

**Report Number: 240-126486-1**

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

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

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

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

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

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

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

### **RECEIPT**

The samples were received on 2/19/2020 8:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.1° C.

### **VOLATILE ORGANIC COMPOUNDS (GCMS)**

Samples TRIP BLANK (240-126486-1) and MW-181S\_021720 (240-126486-2) were analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 02/24/2020.

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

### **VOLATILE ORGANIC COMPOUNDS (GCMS SIM)**

Sample MW-181S\_021720 (240-126486-2) was analyzed for volatile organic compounds (GCMS SIM) in accordance with EPA SW-846 Method 8260B SIM. The sample was analyzed on 02/27/2020.

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 Off Site

Job ID: 240-126486-1

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

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# Sample Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-126486-1	TRIP BLANK	Water	02/17/20 00:00	02/19/20 08:50	
240-126486-2	MW-181S_021720	Water	02/17/20 14:30	02/19/20 08:50	

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# Detection Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

**Client Sample ID: TRIP BLANK**

**Lab Sample ID: 240-126486-1**

No Detections.

**Client Sample ID: MW-181S\_021720**

**Lab Sample ID: 240-126486-2**

No Detections.

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This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Canton

# Client Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

**Client Sample ID: TRIP BLANK**

**Lab Sample ID: 240-126486-1**

**Date Collected: 02/17/20 00:00**

**Matrix: Water**

**Date Received: 02/19/20 08:50**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 16:38	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			02/24/20 16:38	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			02/24/20 16:38	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 16:38	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			02/24/20 16:38	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			02/24/20 16:38	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	88		75 - 130		02/24/20 16:38	1
4-Bromofluorobenzene (Surr)	67		47 - 134		02/24/20 16:38	1
Toluene-d8 (Surr)	85		69 - 122		02/24/20 16:38	1
Dibromofluoromethane (Surr)	94		78 - 129		02/24/20 16:38	1



# Client Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

**Client Sample ID: MW-181S\_021720**

**Lab Sample ID: 240-126486-2**

Date Collected: 02/17/20 14:30

Matrix: Water

Date Received: 02/19/20 08:50

**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			02/27/20 14:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	89		70 - 133					02/27/20 14:49	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			02/24/20 17:00	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			02/24/20 17:00	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			02/24/20 17:00	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 17:00	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			02/24/20 17:00	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			02/24/20 17:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	84		75 - 130					02/24/20 17:00	1
4-Bromofluorobenzene (Surr)	62		47 - 134					02/24/20 17:00	1
Toluene-d8 (Surr)	81		69 - 122					02/24/20 17:00	1
Dibromofluoromethane (Surr)	87		78 - 129					02/24/20 17:00	1

# Surrogate Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

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

Matrix: Water

Prep Type: Total/NA

### Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCA	BFB	TOL	DBFM
		(75-130)	(47-134)	(69-122)	(78-129)
240-126478-E-2 MSD	Matrix Spike Duplicate	79	81	92	89
240-126478-H-2 MS	Matrix Spike	79	80	89	89
240-126486-1	TRIP BLANK	88	67	85	94
240-126486-2	MW-181S_021720	84	62	81	87
LCS 240-423965/4	Lab Control Sample	83	87	95	92
MB 240-423965/7	Method Blank	88	73	89	92

#### Surrogate Legend

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

BFB = 4-Bromofluorobenzene (Surr)

TOL = Toluene-d8 (Surr)

DBFM = Dibromofluoromethane (Surr)

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

Matrix: Water

Prep Type: Total/NA

### Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCA
		(70-133)
240-126478-K-2 MS	Matrix Spike	88
240-126478-K-2 MSD	Matrix Spike Duplicate	89
240-126486-2	MW-181S_021720	89
LCS 240-424537/4	Lab Control Sample	88
MB 240-424537/5	Method Blank	88

#### Surrogate Legend

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

# QC Sample Results

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

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

**Lab Sample ID: MB 240-423965/7**  
**Matrix: Water**  
**Analysis Batch: 423965**

**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			02/24/20 12:54	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			02/24/20 12:54	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			02/24/20 12:54	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 12:54	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			02/24/20 12:54	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			02/24/20 12:54	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	88		75 - 130		02/24/20 12:54	1
4-Bromofluorobenzene (Surr)	73		47 - 134		02/24/20 12:54	1
Toluene-d8 (Surr)	89		69 - 122		02/24/20 12:54	1
Dibromofluoromethane (Surr)	92		78 - 129		02/24/20 12:54	1

**Lab Sample ID: LCS 240-423965/4**  
**Matrix: Water**  
**Analysis Batch: 423965**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	10.0	10.5		ug/L		105	73 - 129
cis-1,2-Dichloroethene	10.0	10.2		ug/L		102	75 - 124
Tetrachloroethene	10.0	11.7		ug/L		117	70 - 125
trans-1,2-Dichloroethene	10.0	10.1		ug/L		101	74 - 130
Trichloroethene	10.0	10.0		ug/L		100	71 - 121
Vinyl chloride	10.0	6.62		ug/L		66	61 - 134

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	83		75 - 130
4-Bromofluorobenzene (Surr)	87		47 - 134
Toluene-d8 (Surr)	95		69 - 122
Dibromofluoromethane (Surr)	92		78 - 129

**Lab Sample ID: 240-126478-E-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 423965**

**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	9.82		ug/L		98	64 - 132	4	35
cis-1,2-Dichloroethene	1.0	U	10.0	8.97		ug/L		90	68 - 121	4	35
Tetrachloroethene	1.0	U	10.0	10.7		ug/L		107	52 - 129	6	35
trans-1,2-Dichloroethene	1.0	U	10.0	9.15		ug/L		92	69 - 126	2	35
Trichloroethene	1.0	U	10.0	8.80		ug/L		88	56 - 124	4	35
Vinyl chloride	1.0	U	10.0	7.07		ug/L		71	49 - 136	2	35

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	79		75 - 130
4-Bromofluorobenzene (Surr)	81		47 - 134
Toluene-d8 (Surr)	92		69 - 122

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# QC Sample Results

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

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

**Lab Sample ID: 240-126478-E-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 423965**

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

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Dibromofluoromethane (Surr)	89		78 - 129

**Lab Sample ID: 240-126478-H-2 MS**  
**Matrix: Water**  
**Analysis Batch: 423965**

**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	9.42		ug/L		94	64 - 132
cis-1,2-Dichloroethene	1.0	U	10.0	8.64		ug/L		86	68 - 121
Tetrachloroethene	1.0	U	10.0	10.1		ug/L		101	52 - 129
trans-1,2-Dichloroethene	1.0	U	10.0	8.93		ug/L		89	69 - 126
Trichloroethene	1.0	U	10.0	8.47		ug/L		85	56 - 124
Vinyl chloride	1.0	U	10.0	6.92		ug/L		69	49 - 136

  

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	79		75 - 130
4-Bromofluorobenzene (Surr)	80		47 - 134
Toluene-d8 (Surr)	89		69 - 122
Dibromofluoromethane (Surr)	89		78 - 129

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

**Lab Sample ID: MB 240-424537/5**  
**Matrix: Water**  
**Analysis Batch: 424537**

**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			02/27/20 12:13	1

  

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	88		70 - 133		02/27/20 12:13	1

**Lab Sample ID: LCS 240-424537/4**  
**Matrix: Water**  
**Analysis Batch: 424537**

**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	11.4		ug/L		114	80 - 135

  

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	88		70 - 133

**Lab Sample ID: 240-126478-K-2 MS**  
**Matrix: Water**  
**Analysis Batch: 424537**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dioxane	2.0	U	10.0	10.6		ug/L		106	46 - 170

Eurofins TestAmerica, Canton

# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

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

<i>Surrogate</i>	<i>MS</i> <i>%Recovery</i>	<i>MS</i> <i>Qualifier</i>	<i>Limits</i>
1,2-Dichloroethane-d4 (Surr)	88		70 - 133

**Lab Sample ID: 240-126478-K-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 424537**

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

<i>Analyte</i>	<i>Sample</i> <i>Result</i>	<i>Sample</i> <i>Qualifier</i>	<i>Spike</i> <i>Added</i>	<i>MSD</i> <i>Result</i>	<i>MSD</i> <i>Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec.</i> <i>Limits</i>	<i>RPD</i>	<i>RPD</i> <i>Limit</i>
1,4-Dioxane	2.0	U	10.0	11.3		ug/L		113	46 - 170	7	26

<i>Surrogate</i>	<i>MSD</i> <i>%Recovery</i>	<i>MSD</i> <i>Qualifier</i>	<i>Limits</i>
1,2-Dichloroethane-d4 (Surr)	89		70 - 133

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# QC Association Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

## GC/MS VOA

### Analysis Batch: 423965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-126486-1	TRIP BLANK	Total/NA	Water	8260B	
240-126486-2	MW-181S_021720	Total/NA	Water	8260B	
MB 240-423965/7	Method Blank	Total/NA	Water	8260B	
LCS 240-423965/4	Lab Control Sample	Total/NA	Water	8260B	
240-126478-E-2 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	
240-126478-H-2 MS	Matrix Spike	Total/NA	Water	8260B	

### Analysis Batch: 424537

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-126486-2	MW-181S_021720	Total/NA	Water	8260B SIM	
MB 240-424537/5	Method Blank	Total/NA	Water	8260B SIM	
LCS 240-424537/4	Lab Control Sample	Total/NA	Water	8260B SIM	
240-126478-K-2 MS	Matrix Spike	Total/NA	Water	8260B SIM	
240-126478-K-2 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B SIM	

# Lab Chronicle

Client: ARCADIS U.S., Inc.  
Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

**Client Sample ID: TRIP BLANK**

**Lab Sample ID: 240-126486-1**

**Date Collected: 02/17/20 00:00**

**Matrix: Water**

**Date Received: 02/19/20 08:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	423965	02/24/20 16:38	LEE	TAL CAN

**Client Sample ID: MW-181S\_021720**

**Lab Sample ID: 240-126486-2**

**Date Collected: 02/17/20 14:30**

**Matrix: Water**

**Date Received: 02/19/20 08:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	423965	02/24/20 17:00	LEE	TAL CAN
Total/NA	Analysis	8260B SIM		1	424537	02/27/20 14:49	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 Off Site

Job ID: 240-126486-1

## Laboratory: Eurofins TestAmerica, Canton

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

Authority	Program	Identification Number	Expiration Date
N/A	N/A	None on record.	

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<b>Eurofins TestAmerica Canton Sample Receipt Form/Narrative</b>				Login # : <u>126486</u>	
<b>Canton Facility</b>					
Client <u>Arcadis</u>		Site Name _____		Cooler unpacked by: <u>Ryan C</u>	
Cooler Received on <u>2-19-20</u>		Opened on <u>2-19-20 850</u>			
FedEx: 1 <sup>st</sup> <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"/>					
<b>Receipt After-hours: Drop-off Date/Time</b>				<b>Storage Location</b>	
TestAmerica Cooler # <u>7A</u>		Foam Box <input type="checkbox"/> Client Cooler <input type="checkbox"/> Box <input type="checkbox"/> Other _____			
Packing material used: <input checked="" type="checkbox"/> Bubble Wrap <input checked="" type="checkbox"/> Foam <input checked="" type="checkbox"/> Plastic Bag <input type="checkbox"/> None <input type="checkbox"/> Other _____					
COOLANT: <input checked="" type="checkbox"/> Wet Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> Dry Ice <input type="checkbox"/> Water <input type="checkbox"/> None					
1. Cooler temperature upon receipt		<input type="checkbox"/> See Multiple Cooler Form			
IR GUN# IR-10 (CF +0.7 °C) Observed Cooler Temp. <u>2.4</u> °C Corrected Cooler Temp. <u>3.1</u> °C					
IR GUN #IR-11 (CF +0.9 °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>		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
-Were the seals on the outside of the cooler(s) signed & dated?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA			
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
-Were tamper/custody seals intact and uncompromised?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA			
3. Shippers' packing slip attached to the cooler(s)?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
4. Did custody papers accompany the sample(s)?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
5. Were the custody papers relinquished & signed in the appropriate place?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
6. Was/were the person(s) who collected the samples clearly identified on the COC?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
7. Did all bottles arrive in good condition (Unbroken)?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
8. Could all bottle labels be reconciled with the COC?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
9. Were correct bottle(s) used for the test(s) indicated?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
10. Sufficient quantity received to perform indicated analyses?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
11. Are these work share samples?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, Questions 12-16 have been checked at the originating laboratory.					
12. Were all preserved sample(s) at the correct pH upon receipt?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA		pH Strip Lot# <u>HC995364</u>	
13. Were VOAs on the COC?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
14. Were air bubbles >6 mm in any VOA vials?  Larger than this.		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA			
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # <u>59072</u>		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
16. Was a LL Hg or Me Hg trip blank present?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other _____					
Concerning _____					

Tests that are not checked for pH by Receiving:

VOAs  
Oil and Grease  
TOC

<b>17. CHAIN OF CUSTODY &amp; SAMPLE DISCREPANCIES</b>	Samples processed by: _____
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
<b>18. SAMPLE CONDITION</b>	
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)	
<b>19. SAMPLE PRESERVATION</b>	
Sample(s) _____ were further preserved in the laboratory.	
Time preserved: _____ Preservative(s) added/Lot number(s): _____	
VOA Sample Preservation - Date/Time VOAs Frozen: _____	

# DATA VERIFICATION REPORT



March 03, 2020

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: 30042006.0402.02 off site  
Event Specific Scope of Work References: Sample COC  
Laboratory: TestAmerica - North Canton  
Laboratory submittal: 126486-1  
Sample date: 2020-02-17  
Report received by CADENA: 2020-03-03  
Initial Data Verification completed by CADENA: 2020-03-03  
Number of Samples:2  
Sample Matrices:Water  
Test Categories:GCMS VOC

**Please see attached criteria report or sample result/qualified analytical result summary for qualifier flags assigned to sample data.**

There were no significant QC anomalies or exceptions to report.

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist



## CADENA 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:** 126486-1

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
2401264861	TRIP BLANK	2/17/2020	12:00:00	X		
2401264862	MW-181S_021720	2/17/2020	2:30:00	X	X	

# Analytical Results Summary

## Reportable Results Only

CADENA Project ID: E203631

Laboratory: TestAmerica - North Canton

Laboratory Submittal: 126486-1

Sample Name: TRIP BLANK MW-181S\_021720  
Lab Sample ID: 2401264861 2401264862  
Sample Date: 2/17/2020 2/17/2020

Analyte	Cas No.	Report		Units	Valid Qualifier	Report		Units	Valid Qualifier	
		Result	Limit			Result	Limit			
<b>GC/MS VOC</b>										
<u>OSW-8260B</u>										
1,1-Dichloroethene	75-35-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---	
cis-1,2-Dichloroethene	156-59-2	ND	1.0	ug/l	---	ND	1.0	ug/l	---	
Tetrachloroethene	127-18-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---	
trans-1,2-Dichloroethene	156-60-5	ND	1.0	ug/l	---	ND	1.0	ug/l	---	
Trichloroethene	79-01-6	ND	1.0	ug/l	---	ND	1.0	ug/l	---	
Vinyl chloride	75-01-4	ND	1.0	ug/l	---	ND	1.0	ug/l	---	
<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 # 240-126486-1

CADENA Verification Report: 2020-03-03

Analyses Performed By:

TestAmerica

Edison, New Jersey

Report #36144R

Review Level: Tier III

Project: 30042006.0402.02

## DATA REVIEW

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 240-126486-1 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
240-126486-1	TRIP BLANK	240-126486-1	Water	2/17/2020		X		
	MW-181S_021720	240-126486-2	Water	2/17/2020		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/8260B-SIM	Water	14 days from collection to analysis	Cool to < 6 °C; pH < 2 with HCl

All samples were analyzed within the specified holding time criteria.

#### 2. Mass Spectrometer Tuning

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

System performance and column resolution were acceptable.

#### 3. Calibration

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

##### 3.1 Initial Calibration

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

All target compounds associated with the initial calibration standards must exhibit a %RSD less than the control limit (20%) or a correlation coefficient greater than 0.99 and an RRF value greater than control limit (0.05).

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

##### 3.2 Continuing Calibration

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

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

#### 4. Internal Standard Performance

Internal standard performance criteria ensure 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. Field Duplicate Analysis**

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water 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 less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

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

### **6. Compound Identification**

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

No compounds were detected in the samples within this SDG.

### **7. System Performance and Overall Assessment**

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

## DATA REVIEW

### DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 8260B/8260B-SIM	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)</b>					
<b>Tier II Validation</b>					
Holding times/Preservation		X		X	
<b>Tier III Validation</b>					
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	
Field Duplicate RPD		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: March 16, 2020

PEER REVIEW: Dennis Capria

DATE: March 18, 2020



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



**NO CORRECTIONS/QUALIFIERS ADDED  
TO SAMPLE ANALYSIS DATA SHEETS**





Chain of Custody Record

TestAmerica Laboratory location: Brighton --- 10448 Citation Drive, Suite 200 / Brighton, MI 48116 / 810-229-2763

<b>Client Contact</b> Company Name: Arcadis Address: 28550 Cabot Drive, Suite 500 City/State/Zip: Novi, MI, 48377 Phone: 248-994-2240		<b>Regulatory program:</b> DW NPDES RCRA Other	
<b>Client Project Manager:</b> Kris Hinskey Telephone: 248-994-2240 Email: kristoffer.hinskey@arcadis.com		<b>Lab Contact:</b> Mike DeMonico Telephone: 330-497-9396	
<b>Sampler Name:</b> S. HINSKEY Method of Shipment/Carrier: Shipping/Tracking No:		<b>Analysis Turnaround Time</b> TAT (different from below) 10 day <input checked="" type="checkbox"/> 3 weeks 1 week <input type="checkbox"/> 2 weeks 2 days <input type="checkbox"/> 1 week 1 day <input type="checkbox"/> 2 days	
<b>Sample Identification</b> TRIP BLANK MW-1815-021726		<b>Containers &amp; Preservatives</b> H2SO4 HNO3 HCl NaOH ZnAc NaOH Other:	
<b>Matrix</b> Air Aqueous Sediment Solid Other:		<b>Filtered Sample (Y/N)</b> Composite=C / Grab=G 1,1-DCE 8260B Cis-1,2-DCE 8260B Trans-1,2-DCE 8260B PCE 8260B TCE 8260B Vinyl Chloride 8260B 1,4-Dioxane 8260B SIM	
<b>Sample Date</b> 2/17/20 1430		<b>Analyses</b> Walk-in client Lab sampling Job/SDG No:	
<b>Sample Time</b> ---		Date/Time: 2/17/20 1600 Date/Time: 2/18/20 1055 Date/Time: 2-19-20 830	
<b>Possible Hazard Identification</b> <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown		<b>Special Instructions/OC Requirements &amp; Comments:</b> Submit all results through Cadena at jtomalia@cadenaco.com, Cadena #E203631 Level IV Reporting requested	
Relinquished by: [Signature] Relinquished by: John Higgins Relinquished by: Nelly Yuzonow		Received by: Neli Cold Storage Received by: Nelly Yuzonow Received in Laboratory by: [Signature]	
Company: Arcadis Company: Arcadis Company: ETAL-MI		Company: ARCADIS Company: ETAL-MI Company: ETAL	



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# Client Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

**Client Sample ID: TRIP BLANK**

**Lab Sample ID: 240-126486-1**

**Date Collected: 02/17/20 00:00**

**Matrix: Water**

**Date Received: 02/19/20 08:50**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 16:38	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			02/24/20 16:38	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			02/24/20 16:38	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 16:38	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			02/24/20 16:38	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			02/24/20 16:38	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	88		75 - 130		02/24/20 16:38	1
4-Bromofluorobenzene (Surr)	67		47 - 134		02/24/20 16:38	1
Toluene-d8 (Surr)	85		69 - 122		02/24/20 16:38	1
Dibromofluoromethane (Surr)	94		78 - 129		02/24/20 16:38	1

# Client Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Ford LTP Off Site

Job ID: 240-126486-1

**Client Sample ID: MW-181S\_021720**

**Lab Sample ID: 240-126486-2**

Date Collected: 02/17/20 14:30

Matrix: Water

Date Received: 02/19/20 08:50

**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			02/27/20 14:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	89		70 - 133					02/27/20 14:49	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			02/24/20 17:00	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			02/24/20 17:00	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			02/24/20 17:00	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			02/24/20 17:00	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			02/24/20 17:00	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			02/24/20 17:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	84		75 - 130					02/24/20 17:00	1
4-Bromofluorobenzene (Surr)	62		47 - 134					02/24/20 17:00	1
Toluene-d8 (Surr)	81		69 - 122					02/24/20 17:00	1
Dibromofluoromethane (Surr)	87		78 - 129					02/24/20 17:00	1