TRANSMITTAL LETTER

ARCADIS Design & Consultancy for natural and built assets

To:
Brandon Alger
Michigan Department of Environment, Great Lakes & Energy
27700 Donald Court
Warren, MI 48092

From:
Kris Hinskey

Arcadis U.S., Inc.
28550 Cabot Drive
Suite 500
Novi
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Tel 248 994 2240
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Copies:

Date:
August 8, 2019

Subject:
Livonia Transmission Plant
Response Activity Plan – Utility Corridor Evaluation

Arcadis Project No.:
MI001454.0007

We are sending you hard copies:

☒ **Attached** ☐ **Under Separate Cover Via _____ the Following Items:**

☐ Shop Drawings ☐ Plans ☐ Specifications ☐ Change Order
☐ Prints ☐ Samples ☐ Copy of Letter ☒ Reports
☐ Other:

Copies	Date	Drawing No.	Rev.	Description	Action*
1	8/8/2019			Response Activity Plan – Utility Corridor Evaluation	

Action*
☐ A Approved ☐ CR Correct and Resubmit ☐ Resubmit _____ Copies
☐ AN Approved As Noted ☐ F File ☐ Return _____ Copies
☐ AS As Requested ☐ FA For Approval ☐ Review and Comment
☒ Other: As Requested per the Consent Decree

Mailing Method
☐ U.S. Postal Service 1st Class ☐ Courier/Hand Delivery ☐ FedEx Priority Overnight ☐ FedEx 2-Day Delivery
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☐ Other:

ARCADIS Design & Consultancy for natural and built assets

Ford Motor Company

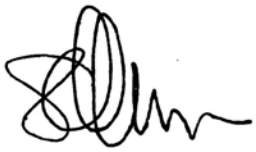
RESPONSE ACTIVITY PLAN – UTILITY CORRIDOR EVALUATION

Livonia Transmission Plant

This document is a DRAFT document that has not received approval from the Michigan Department of Environmental, Great Lakes, and Energy(EGLE). This document was prepared pursuant to a court Consent Decree. The opinions, findings, and conclusions expressed are those of the authors and not those of the EGLE.

August 8, 2019

Kristoffer Hinskey
Certified Project Manager



Joseph A. Quinnan, PG, PE
Senior Vice President

RESPONSE ACTIVITY PLAN – UTILITY CORRIDOR EVALUATION

Livonia Transmission Plant
Area of Concern
Court Case: No. 2:1712372-GAD-RSW

Prepared for:

Ford Motor Company
Environmental Quality office
Fairlane Plaza North
290 Town Center Drive, Suite 800
Dearborn, MI 48126

Prepared by:

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28550 Cabot Drive
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Novi
Michigan 48377
Tel 248 994 2240
Fax 248 994 2241

Our Ref.:

3001652 (MI001454.0007)

Date:

August 8, 2019

CONTENTS

FIGURES

ATTACHMENT

ACRONYMS AND ABBREVIATIONS

CCTV	closed-circuit television
cDCE	cis-1,2-dichloroethene
COC	constituent of concern
CSM	conceptual site model
DCE	dichloroethane
EDC	Eastern Diversion Chamber
GLWA	Great Lakes Water Authority
GSI	groundwater/surface water interface
LTP	Livonia Transmission Plant
µg/L	microgram per liter
EGLE	Michigan Department of Environmental, Great Lakes, and Environment
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
QAPP	Quality Assurance Project Plan
RespAP	Response Activity Plan
RI	Remedial Investigation
TCE	trichloroethene
tDCE	trans-1,2-dichloroethene
TDL	target detection limit
VC	vinyl chloride
WDC	Western Diversion Chamber

1 INTRODUCTION

Arcadis of Michigan LLC (Arcadis) has prepared the following revised Utility Corridor Response Activity Plan (RespAP) on behalf of Ford Motor Company (Ford) for the Livonia Transmission Plant (LTP) site (the site). The site layout is included as **Figure 1**. This document describes the Remedial Investigation (RI) activities that will be used to comprehensively assess the potential exposure pathway via the utility corridors in accordance with the Consent Decree effective July 27, 2017 (No: 2:1712372-GAD-RSW) and satisfies Section 6.7a response activity plan for conducting an RI.

The proposed response activities will address the comments provided by the Michigan Department of Environmental, Great Lakes, and Energy (EGLE) in the letters dated August 30, 2018 and July 9, 2019 Response Activity Plan-Remedial Investigation. The scope of work outlined within this RespAP will systematically assess the potential exposure pathway related to the utility corridors on-site and off-site. Additional phases of investigation might be required based on the first phase of activities outlined in this RespAP.

This RespAP is organized to describe on-site and off-site RI activities. On-site activities will include:

- Rehabilitation of the Remaining Eastern Storm Sewer System and Monitoring of On-site Groundwater
- Compliance Point SL-2 Monitoring and Eastern Diversion Chamber Compliance Determination
- Eastern and Western Diversion Chamber Sediment Sampling
- Preferential Migration Pathways and On-site Sewer Sampling

Additional off-site RI activities include:

- Survey Results and Offsite Sampling

The constituents of concern (COCs) for the site, as defined by the Consent Decree (CD), include:

- Trichloroethene (TCE)
- Tetrachloroethene (PCE)
- 1,1-dichloroethene (DCE)
- Cis-1,2-dichloroethene (cDCE)
- Trans-1,2-dichoroethene (tDCE)
- Vinyl chloride (VC)
- 1,4-Dioxane.

The target detection limits (TDLs) for COCs in soil, groundwater, and vapor are also defined in the Consent Decree. Due to analytical limitations, a separate RespAP requesting a TDL change for TCE and VC in residential groundwater was submitted to the EGLE on November 21, 2017 and approved on December 20, 2017. Therefore, the goal of off-site groundwater criteria for TCE and VC was changed to a TDL of 1.0 microgram per liter (µg/L).

This document provides a framework for the proposed RI activities. Investigation sampling, routine monitoring, and laboratory analyses methodology to be employed during the RI are presented in two Quality Assurance Project Plans (QAPPs; Arcadis 2017b, Arcadis 2017c), prepared and submitted to the EGLE in August 2017. QAPP addenda may be prepared and submitted to EGLE for review and approval should an investigation method require additional description.

Schedule

The additional activities proposed that were not included in the RI RespAP submitted to the EGLE on April 13, 2018 but are described herein will begin upon approval from the EGLE. A schedule is provided below to show the approximate duration of the proposed response activities. The status of previous activities discussed in the RespAP is also provided below.

Scope Define Below	Duration	Status
Onsite		
Comprehensive Storm and Sanitary Sewer Systems Sampling	July 2017	Completed
Closed-Circuit Televised Sanitary Sewer System	August and September 2017	Completed
Closed-Circuit Televised Remaining Eastern Storm Sewer System	March and April 2018	Completed
Manhole, Invert, and Sump Survey	December 2018-January 2019	Completed
Sediment Sampling – Eastern and Western Diversion Chamber	Quarterly	Ongoing
Monthly Compliance Sampling – Sample Location 2	Monthly	Ongoing
On-site Remaining Eastern Storm Sewer System Rehabilitation	August 2019	Ongoing
Compliance Determination for the EDC	October 2019-December 2019	Pending
Post Sampling - Eastern Storm Sewer System Rehabilitation – sediment, baseflow conditions, and vapor sampling.	October 2019	Pending
Off Site		
Manhole, Invert, and Sump Survey	December 2018	Completed
Shallow Monitoring Well Installation and Groundwater Sampling	1Q2019	Completed
Sediment, baseflow conditions, and vapor sampling of select offsite sewers	October 2019	Pending

2 ON-SITE REMEDIAL INVESTIGATIONS

On-Site Utility Corridors

Rehabilitation of the Remaining Eastern Storm Sewer System and Monitoring of Groundwater Impacts

From October 2016 to July 2017, Arcadis oversaw the rehabilitation of more than 95% of the eastern storm sewer system on-site, as documented in the conceptual site model (CSM; Arcadis 2017a). In July 2017, water and sediment samples were collected during and after the rehabilitation to evaluate the presence or absence of chlorinated VOCs and polychlorinated biphenyls (PCBs) within the storm system. In addition, water and sediment samples were collected within the sanitary sewers and process waste lines for the same purpose (Arcadis 2017a).

In August and September 2017, a portion of the sanitary sewer system and the WDC were jetted and cleaned as described in the Third Quarter 2017 Progress Report.

Additional closed-circuit television (CCTV) survey work and a survey of manhole structures were completed in March and April 2018 for the remainder of the eastern storm sewer systems where COC impacts have been identified. The CCTV was used to determine if additional pipe rehabilitation is warranted. In December 2018 and January 2019, Arcadis surveyed the additional manhole rims, inverts, and sumps associated with the remaining eastern storm sewer system in an effort to understand the relationship between depth of storm sewers to elevation of groundwater on-site. The findings of the storm and sanitary sewer survey indicate that a majority of the infrastructure piping is submerged and/or in contact with groundwater. Subsequently, Ford is currently rehabilitating the remaining ~4,200 linear feet of storm sewer and subsequent manholes, identified on **Figure 2** and is expected to be completed with that work by the end of August 2019 A detailed survey of the on-site sewer systems is provided on **Figure 1** and groundwater elevations across the site are provided on **Figure 3**.

In the July 8, 2019 letter, EGLE requested that Ford identify what measures have been implemented to prevent groundwater onsite to migrate offsite. The hydraulic control system (HCS) was installed to intercept groundwater and mitigate the potential for impacted groundwater to continue to migrate east of the HCS. Ford began operation of the HCS on March 15, 2017. The system is designed to extract groundwater via four horizontal wells (ESD-1, ESD-2, ESD-3, and ESD-4; refer to the 2Q2019 Progress Report), each equipped with a groundwater extraction pump. The extraction well screens are 400 to 600 feet long; the combined length of the four wells extends across approximately 2,000 linear feet on a line approximately perpendicular to groundwater flow.

The performance of the HCS is evaluated in general accordance with USEPA guidance – A Systematic Approach for Evaluation of Capture Zone at Pump and Treat Systems (USEPA 2008) to demonstrate that the system is capturing groundwater as designed and mitigating additional migration of impacted groundwater to the east of the HCS. Three lines of evidence are used to evaluate system performance:

- Groundwater elevation and horizontal gradient
- Hydraulic response to pumping
- Downgradient groundwater analytical trends.

Aquifer response to pumping has been consistent while the HCS has been in operation. Gradient maps illustrating groundwater horizontal gradient and calculated groundwater flow direction east of the HCS system and detailed performance data are included in every Quarterly Progress Report submitted to EGLE.

Site perimeter monitoring well screens along Plymouth Road are generally set between 13-18 (ft) below ground surface (bgs), 18-23 ft bgs, and 25-30 ft bgs on average. Based on recent surveys the approximate depth of the sanitary sewers that exit the facility are generally ~12 to 18 ft bgs, The storm sewers vary in depth, but ultimately discharge to the EDC and western diversion chamber (WDC), which are approximately ~30 to 35 ft bgs. Eight rounds of perimeter groundwater sampling have occurred along Plymouth Road and no detections of COCs have been identified. Arcadis will complete a thorough review of the current monitoring well network onsite as it relates to the depth of the current sewers that exit the facility and determine if additional monitoring wells are necessary to evaluate the migration pathway.

Compliance Point SL-2 Monitoring and Eastern Diversion Chamber Compliance Determination

It is important to note that the storm sewers discharge to the EDC and the WDC (see **Figure 1** for the locations) and discharge during base flow conditions to the Great Lakes Water Authority (GLWA) treatment facility. The GLWA just recently extended the discharge permit allowing Ford to discharge to the GLWA until September 1, 2022. As part of this permit, Ford is required to sample at location SL-2 (located in Plymouth Road right of way) which is comprised of sanitary, industrial wastewater, remediated groundwater, and stormwater. Compliance point SL-2 is sampled monthly and results are provided to the GLWA on a monthly basis. To date, discharge from the Ford facility has not exceeded the allowable discharge of total toxic organic compounds, which is 2.13 µg/L.

In the July 8, 2019 letter, EGLE requested additional information regarding potential contaminant migration during non-base flow conditions, specifically downgradient of the onsite diversion chambers. A robust monthly data set has been accumulated pre and post rehabilitation of the eastern storm sewer system. Ford and Arcadis propose to provide EGLE with a compliance option per the *2018 Groundwater Surface Water Interface Pathway Compliance Options Guidance Document* under separate cover at a later date. Vapor within the EDC will also be evaluated to determine if COCs are present. Results of the compliance option and the vapor results will be provided to EGLE in 4Q2019 under a separate memorandum.

Eastern and Western Diversion Chamber Sediment Sampling

In addition to the monthly SL-2 compliance sampling, three rounds of sediment samples have been collected from both the eastern and western diversion chambers. No detections of the COCs were present in the 4Q2018 event, one detection of trichloroethylene (50 J ug/kg) was present in 1Q2019, and no detections were present in the 2Q2019 event. The final round of sediment sampling is scheduled to be conducted in the 3Q2019.The analytical reports are located in **Attachment 1**.

Preferential Migration Pathways and On-site Sewer Sampling

The focus of the additional evaluation will be to sample sediment, storm sewer water under baseflow conditions, and vapor in the offsite sewers at the same depths as the impacted water. This will aid in determining if impacted groundwater is interacting with the offsite sewers. A comprehensive review will occur once all groundwater delineation monitoring wells have been installed as part of the RI RespAP.

Following the rehabilitation of the remaining eastern storm sewer system samples will be collected from select manholes for the following: sediment, base flow water, and vapor samples. All media will be analyzed for the seven COCs as identified in the Consent Decree. A meeting will be requested with EGLE to discuss the sampling methodology prior to implementation.

Groundwater elevations from existing monitoring well locations will be compared to the elevations of adjacent sanitary and storm sewer system pipes and manholes to determine if existing wells are appropriate for monitoring groundwater adjacent to site utilities. The geology at the LTP site consists of 8 to 12 feet of ablation till with a hydraulic conductivity ranging from 20 to 80 feet per day (ft/day), followed by interbedded fine sands with hydraulic conductivities ranging from 1 to 10 ft/day. These permeabilities are likely similar to, or higher than, fill material placed around the sewers. Typically, sewers are backfilled with the native material, or at most a poorly sorted gravelly sand. Multiple investigations have occurred on-site and, numerus soil boring logs have been reviewed to understand the geology on-site. Based on the soil boring logs and data collected from the hydraulic profiling tool the fill material will not have a great enough contrast in hydraulic conductivity to affect groundwater flow and contaminant transport in a significant way. Transport along sewer bedding is most common in low permeability settings where native materials consist of clayey soils with orders of magnitude lower permeability than the bedding material. In addition, the high-resolution-site characterization has not shown a deflection of the groundwater impacts or groundwater contours related to the location/depth of the sewers. The distribution of groundwater impacts is consistent with ambient groundwater flow patterns that have been documented in detail at the LTP site. Further characterization of the fill material placed around sewers poses a risk of a utility strike and is not warranted given the documented site conditions.

Off-Site Utility Corridors

Survey Results and Offsite Sampling

In December 2018, Arcadis surveyed 105 storm and sanitary sewer system manholes located off site to the east of the site to determine the depths of manhole rims, inverts, and sumps located in Alden Village, Belden Court, Rosati Avenue, and Stark Road. The survey will aid in the evaluation of the off-site sewer network in relation to shallow groundwater. As shown on **Figure 5**, the survey elevations show sewer invert depths range between 5 and 12 feet below grade. Offsite geology is similar to the geology observed at the LTP site with a permeable ablation till present to a depth of 5 to 10 feet below grade. Multiple investigations have occurred off-site and numerus soil boring logs have been reviewed to understand the geology. Based on the soil boring logs and data collected from the hydraulic profiling tool it is unlikely the fill material around the sewers would be significantly higher than native material and capable of affecting contaminant migration.

Groundwater samples continue to be collected quarterly from the offsite shallow monitoring wells, with results from previous quarters indicating that vinyl chloride is present in the shallow zone. A combined sewer system is present within Alden village, with average depth to inverts between 5 and 12 ft bgs. Based on these depths the storm sewers offsite are in contact with groundwater. Offsite concentrations observed thus far do not exceed groundwater surface water (GSI) interface criteria for VC, but do warrant additional investigation that will include sediment, baseflow water, and vapor sampling of a select number of manholes that directly interface with offsite impacted groundwater. If COC vapors are

present, Ford will discuss next steps with EGLE prior to implementation. Once the initial sampling event is completed a meeting will be coordinated to discuss the results with EGLE.

3 CLOSING

The goal of the RespAP outlined above is to document how Ford will address the data gaps identified in the CSM (Arcadis 2017a), address the EGLE comments to the RI RespAP, address comments provided in the July 8, 2019 letter, and complete other activities that will be required for a comprehensive RI report in accordance with the Consent Decree. The work will be completed in phases to provide the appropriate data for decision making in accordance with the RI schedule contained herein. Quarterly progress and RI report(s) will be submitted to EGLE throughout the RI process.

4 REFERENCES

Arcadis of Michigan LLC (Arcadis). 2017a. Conceptual Site Model. Livonia Transmission Plant. August.

Arcadis. 2017b. Quality Assurance Project Plan – On-Site. Livonia Transmission Plant, Livonia, Michigan. August.

Arcadis. 2017c. Quality Assurance Project Plan – Off-Site. Livonia Transmission Plant, Livonia, Michigan. August.

FIGURES

CITY: Novi DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY PROJECT NUMBER: MI001322.0001 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
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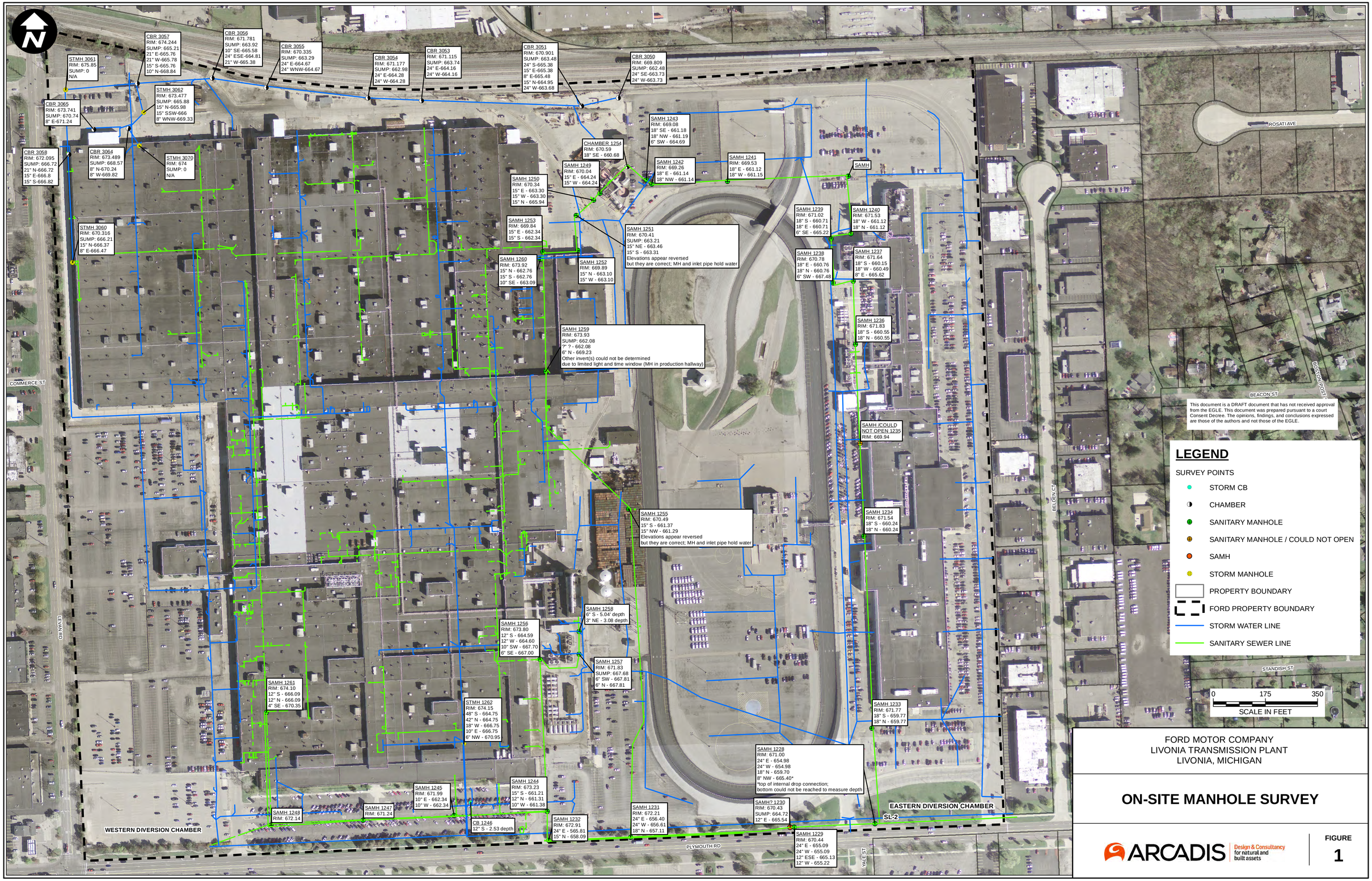

This document is a DRAFT document that has not received approval from the EGLE. This document was prepared pursuant to a court Consent Decree. The opinions, findings, and conclusions expressed are those of the authors and not those of the EGLE.

LEGEND

SURVEY POINTS

- STORM CB
- CHAMBER
- SANITARY MANHOLE
- SANITARY MANHOLE / COULD NOT OPEN
- SAMH
- STORM MANHOLE
- PROPERTY BOUNDARY
- FORD PROPERTY BOUNDARY
- STORM WATER LINE
- SANITARY SEWER LINE

FORD MOTOR COMPANY
LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

ON-SITE MANHOLE SURVEY

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FIGURE 1

FORD MOTOR COMPANY
LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

ONSITE REMAINING EASTERN STORM SEWER REHABILITATION

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FIGURE
2

CITY: Novi DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY PROJECT NUMBER: MI001322.0001 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
Z:\GIS\Projects_ENV\NoviBrighton_MI\Ford\LivoniaGIS\docs\2019-02\Manhole_Zoom_Onsite.mxd PLOTTED: 2/27/2019 8:26:58 AM BY: msmiller

CITY: Novi DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY PROJECT NUMBER: MI001322.0001 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
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LEGEND

- OFFSITE MONITORING WELL
- ONSITE MONITORING WELLS
- PIEZOMETER
- ESD VAULT LOCATIONS
- GROUNDWATER ELEVATION CONTOUR (DASH WHERE INFERRED)
- HYDRAULIC CONTROL SYSTEM PATH LINE
- WELL SCREEN (4-INCH SDR-11 HDPE, CUSTOM SLOTTED)
- FORD PROPERTY BOUNDARY
- PROPERTY BOUNDARY
- * WELL NOT GAUGED
- *A WELL NOT GAUGED - ACCESS ISSUES
- *E WELL GAUGED BUT NOT USED IN CONTOUR CALCULATIONS - SUSPECTED ERROR DURING GAUGING
- APPARENT GROUNDWATER FLOW DIRECTION

NOTES:
1. WHERE NESTED WELLS ARE PRESENT, THE SHALLOW WELL IS USED FOR CONTOURING
2. GROUNDWATER ELEVATIONS MEASURED IN ON JUNE 14,2019
3. ALL ELEVATIONS ARE REFERENCED TO A MEAN SEA LEVEL DATUM AND ARE IN UNITS OF FEET ABOVE SEA LEVEL
4. * MONITORING WELL GAUGING DATA NOT USED IN CONTOUR CALCULATIONS DUE TO POSSIBLE ERROR IN GAUGING
5. HDPE - HIGH DENSITY POLYETHYLENE
6. NA = ALL OF THE MOST RECENT GAUGING DATA IS SHOWN, AND THAT ANY MISSING GWES ARE THE RESULT OF ACCESS ISSUES OR THAT THOSE WELLS COULD NOT BE LOCATED.

0 400 800
SCALE IN FEET

FORD MOTOR COMPANY
LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

SITE-WIDE GROUNDWATER ELEVATION CONTOUR MAP UNDER PUMPING CONDITIONS JUNE 2019

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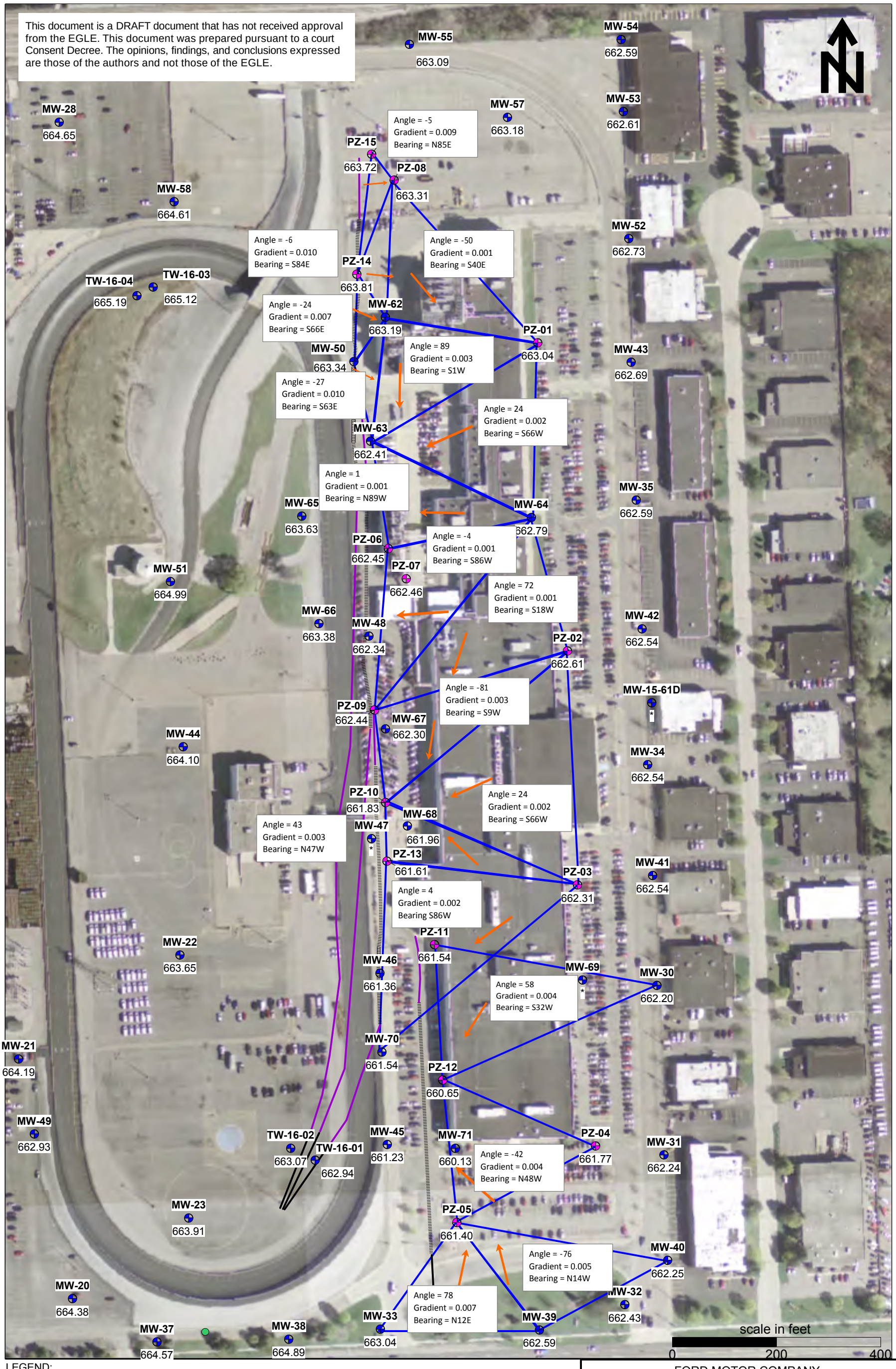
FIGURE 3

CITY: Novi DIV: ENV DB: JB PM: K. HINSKEY PROJECT NUMBER: MI001489.0007.0004 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2133 Feet
G:\COMMON\Ford\Livonia\03 Notes and Data_Engineering\HCS\4_HCS Performance Monitoring\Gradient Maps & GWEC Figures BY: jbarker



LEGEND:

MW-32	LOCATION ID
	MONITORING WELL
	PIEZOMETER
661.63	GROUNDWATER ELEVATION (ft amsl)
	WELL TRIPLET PLANE WITH HYDRAULIC GRADIENT DIRECTION
	WELL SCREEN (4-INCH SDR-11 HDPE, CUSTOM SLOTTED)
	WELL BLANK CASING (4-INCH HDPE)
	WELL BLANK CASING (6-INCH HDPE)

Notes:
1. All elevations collected on June 14, 2019 and measured from top of well casing.
2. All elevations are referenced to a mean sea level datum and are in units of feet above sea level (ft amsl).
3. NM - not measured
4. HDPE - high density polyethylene
5. * - well not gauged

FORD MOTOR COMPANY
LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

HYDRAULIC GRADIENT MAP
JUNE 2019

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FIGURE 4

ROSATI AVE
CONCORD ST
CONCORD ST
STARK RD
BEACON ST
BELDEN CT
WADSWORTH S
BOSTON POST S
BREWSTER ST
WADSWORTH ST
STANDISH ST
PRISCILLA LN
PRISCILLA LN
PLYMOUTH RD
STARK RD
WAYNE RD
ST

0 175 350
SCALE IN FEET

LEGEND

APPROXIMATE SAMPLING LOCATION

SURVEY POINTS
- STORM CB
- SANITARY MANHOLE
- STORM MANHOLE

PROPERTY BOUNDARY
FORD PROPERTY BOUNDARY

COMBINED STORM/SANITARY SEWER LINE
SANITARY SEWER LINE
STORM WATER LINE

VC - GROUNDWATER
- 1 - 2 µg/L
- 2 - 10 µg/L
- 10 - 100 µg/L

FORD MOTOR COMPANY
LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

OFFSITE MANHOLE SAMPLING LOCATIONS

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FIGURE 5

CITY: Novi DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY PROJECT NUMBER: MI001322.0001 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
Z:\GISProjects_ENV\NoviBrighton_MI\Ford\Livonia\GIS\docs\2019-011Meeting\Manhole_Survey_D_VC_Offsite.mxd PLOTTED: 1/7/2019 2:38:17 PM BY: msmiller

ATTACHMENT 1

Eastern and Western Diversion Chamber Sediment Analytical Reports

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 240-105951-1
Client Project/Site: Ford LTP Livonia MI - E203631
Revision: 1

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

Attn: Kristoffer Hinskey

Authorized for release by:
1/3/2019 10:48:23 AM
John McFadden, Project Manager I
(330)497-9396
john.mcfadden@testamericainc.com

Designee for

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

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

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

Table of Contents

Definitions/Glossary

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

TestAmerica Job ID: 240-105951-1

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)

Job ID: 240-105951-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-105951-1
Revised

Revised 1/3/19. Per the client request the Trip Blank sample results will be removed from the report.

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.

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

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

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

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

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

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

RECEIPT

The samples were received on 12/18/2018 8:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.9º C.

VOLATILE ORGANIC COMPOUNDS

Samples EDC_SEDIMENT_121418 (240-105951-1) and WDC_SEDIMENT_121418 (240-105951-2) were analyzed for volatile organic compounds in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 12/25/2018.

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

PERCENT SOLIDS

Samples EDC_SEDIMENT_121418 (240-105951-1) and WDC_SEDIMENT_121418 (240-105951-2) were analyzed for percent solids in accordance with ASTM Method D2216-80. The samples were analyzed on 12/19/2018.

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

Job ID: 240-105951-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

Method Summary

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

TestAmerica Job ID: 240-105951-1

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

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

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

TestAmerica Job ID: 240-105951-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-105951-1	EDC_SEDIMENT_121418	Solid	12/14/18 09:54	12/18/18 08:45
240-105951-2	WDC_SEDIMENT_121418	Solid	12/14/18 10:37	12/18/18 08:45

Detection Summary

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

TestAmerica Job ID: 240-105951-1

Client Sample ID: EDC_SEDIMENT_121418 **Lab Sample ID: 240-105951-1**

No Detections.

Client Sample ID: WDC_SEDIMENT_121418 **Lab Sample ID: 240-105951-2**

No Detections.

This Detection Summary does not include radiochemical test results.

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

TestAmerica Job ID: 240-105951-1

Client Sample ID: EDC_SEDIMENT_121418
Date Collected: 12/14/18 09:54
Date Received: 12/18/18 08:45

Lab Sample ID: 240-105951-1
Matrix: Solid
Percent Solids: 81.9

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	57	U	57	23	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1
1,4-Dioxane	18000	U	18000	1600	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1
cis-1,2-Dichloroethene	57	U	57	13	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1
Tetrachloroethene	57	U	57	26	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1
trans-1,2-Dichloroethene	57	U	57	14	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1
Trichloroethene	57	U	57	16	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1
Vinyl chloride	46	U	46	17	ug/Kg	☼	12/24/18 15:31	12/25/18 15:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*72*		*53 - 155*	*12/24/18 15:31*	*12/25/18 15:12*	*1*
4-Bromofluorobenzene (Surr)	*74*		*48 - 151*	*12/24/18 15:31*	*12/25/18 15:12*	*1*
Dibromofluoromethane (Surr)	*72*		*49 - 138*	*12/24/18 15:31*	*12/25/18 15:12*	*1*
Toluene-d8 (Surr)	*76*		*49 - 147*	*12/24/18 15:31*	*12/25/18 15:12*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**81.9**		0.1	0.1	%			12/19/18 15:43	1
Percent Moisture	**18.1**		0.1	0.1	%			12/19/18 15:43	1

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

TestAmerica Job ID: 240-105951-1

Client Sample ID: WDC_SEDIMENT_121418
Date Collected: 12/14/18 10:37
Date Received: 12/18/18 08:45

Lab Sample ID: 240-105951-2
Matrix: Solid
Percent Solids: 80.9

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	57	U	57	23	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1
1,4-Dioxane	18000	U	18000	1500	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1
cis-1,2-Dichloroethene	57	U	57	13	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1
Tetrachloroethene	57	U	57	25	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1
trans-1,2-Dichloroethene	57	U	57	14	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1
Trichloroethene	57	U	57	16	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1
Vinyl chloride	45	U	45	17	ug/Kg	☼	12/24/18 15:31	12/25/18 15:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*67*		*53 - 155*	*12/24/18 15:31*	*12/25/18 15:35*	*1*
4-Bromofluorobenzene (Surr)	*70*		*48 - 151*	*12/24/18 15:31*	*12/25/18 15:35*	*1*
Dibromofluoromethane (Surr)	*67*		*49 - 138*	*12/24/18 15:31*	*12/25/18 15:35*	*1*
Toluene-d8 (Surr)	*71*		*49 - 147*	*12/24/18 15:31*	*12/25/18 15:35*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**80.9**		0.1	0.1	%			12/19/18 15:43	1
Percent Moisture	**19.1**		0.1	0.1	%			12/19/18 15:43	1

Surrogate Summary

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

TestAmerica Job ID: 240-105951-1

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

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(53-155)	(48-151)	(49-138)	(49-147)
240-105951-1	EDC_SEDIMENT_121418	72	74	72	76
240-105951-2	WDC_SEDIMENT_121418	67	70	67	71
240-105951-2 MS	WDC_SEDIMENT_121418	71	75	73	74
240-105951-2 MSD	WDC_SEDIMENT_121418	80	86	81	82
LCS 240-361585/2-A	Lab Control Sample	71	77	71	74
MB 240-361585/1-A	Method Blank	75	81	75	79

Surrogate Legend

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

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

Lab Sample ID: MB 240-361585/1-A
Matrix: Solid
Analysis Batch: 361592

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 361585

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	40	U	40	16	ug/Kg		12/24/18 15:31	12/25/18 14:06	1
1,4-Dioxane	13000	U	13000	1100	ug/Kg		12/24/18 15:31	12/25/18 14:06	1
cis-1,2-Dichloroethene	40	U	40	9.0	ug/Kg		12/24/18 15:31	12/25/18 14:06	1
Tetrachloroethene	40	U	40	18	ug/Kg		12/24/18 15:31	12/25/18 14:06	1
trans-1,2-Dichloroethene	40	U	40	10	ug/Kg		12/24/18 15:31	12/25/18 14:06	1
Trichloroethene	40	U	40	11	ug/Kg		12/24/18 15:31	12/25/18 14:06	1
Vinyl chloride	32	U	32	12	ug/Kg		12/24/18 15:31	12/25/18 14:06	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*75*		*53 - 155*	*12/24/18 15:31*	*12/25/18 14:06*	*1*
4-Bromofluorobenzene (Surr)	*81*		*48 - 151*	*12/24/18 15:31*	*12/25/18 14:06*	*1*
Dibromofluoromethane (Surr)	*75*		*49 - 138*	*12/24/18 15:31*	*12/25/18 14:06*	*1*
Toluene-d8 (Surr)	*79*		*49 - 147*	*12/24/18 15:31*	*12/25/18 14:06*	*1*

Lab Sample ID: LCS 240-361585/2-A
Matrix: Solid
Analysis Batch: 361592

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 361585

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	1000	929		ug/Kg		93	57 - 139
1,4-Dioxane	20000	20300		ug/Kg		102	51 - 140
cis-1,2-Dichloroethene	1000	780		ug/Kg		78	74 - 123
Tetrachloroethene	1000	793		ug/Kg		79	76 - 120
trans-1,2-Dichloroethene	1000	734		ug/Kg		73	71 - 133
Trichloroethene	1000	815		ug/Kg		81	73 - 126
Vinyl chloride	1000	799		ug/Kg		80	52 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*71*		*53 - 155*
4-Bromofluorobenzene (Surr)	*77*		*48 - 151*
Dibromofluoromethane (Surr)	*71*		*49 - 138*
Toluene-d8 (Surr)	*74*		*49 - 147*

Lab Sample ID: 240-105951-2 MS
Matrix: Solid
Analysis Batch: 361592

Client Sample ID: WDC_SEDIMENT_121418
Prep Type: Total/NA
Prep Batch: 361585

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	57	U	1180	1010		ug/Kg	☼	86	36 - 150
1,4-Dioxane	18000	U	23500	25400		ug/Kg	☼	108	62 - 158
cis-1,2-Dichloroethene	57	U	1180	963		ug/Kg	☼	82	50 - 128
Tetrachloroethene	57	U	1180	928		ug/Kg	☼	79	20 - 151
trans-1,2-Dichloroethene	57	U	1180	850		ug/Kg	☼	72	44 - 141
Trichloroethene	57	U	1180	976		ug/Kg	☼	83	25 - 148
Vinyl chloride	45	U	1180	893		ug/Kg	☼	76	31 - 148

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

Lab Sample ID: 240-105951-2 MS
Matrix: Solid
Analysis Batch: 361592

Client Sample ID: WDC_SEDIMENT_121418
Prep Type: Total/NA
Prep Batch: 361585

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*71*		*53 - 155*
4-Bromofluorobenzene (Surr)	*75*		*48 - 151*
Dibromofluoromethane (Surr)	*73*		*49 - 138*
Toluene-d8 (Surr)	*74*		*49 - 147*

Lab Sample ID: 240-105951-2 MSD
Matrix: Solid
Analysis Batch: 361592

Client Sample ID: WDC_SEDIMENT_121418
Prep Type: Total/NA
Prep Batch: 361585

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	57	U	1190	1170		ug/Kg	☼	98	36 - 150	15	40
1,4-Dioxane	18000	U	23800	23900		ug/Kg	☼	100	62 - 158	6	40
cis-1,2-Dichloroethene	57	U	1190	1060		ug/Kg	☼	89	50 - 128	9	40
Tetrachloroethene	57	U	1190	1050		ug/Kg	☼	88	20 - 151	12	40
trans-1,2-Dichloroethene	57	U	1190	978		ug/Kg	☼	82	44 - 141	14	40
Trichloroethene	57	U	1190	1110		ug/Kg	☼	94	25 - 148	13	40
Vinyl chloride	45	U	1190	1020		ug/Kg	☼	86	31 - 148	14	37

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*80*		*53 - 155*
4-Bromofluorobenzene (Surr)	*86*		*48 - 151*
Dibromofluoromethane (Surr)	*81*		*49 - 138*
Toluene-d8 (Surr)	*82*		*49 - 147*

Method: Moisture - Percent Moisture

Lab Sample ID: 240-105885-A-11 DU
Matrix: Solid
Analysis Batch: 360876

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Solids	97.4			97.5		%				0.09	20
Percent Moisture	2.6			2.5		%				3	20

QC Association Summary

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

TestAmerica Job ID: 240-105951-1

GC/MS VOA

Prep Batch: 361585

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-105951-1	EDC_SEDIMENT_121418	Total/NA	Solid	5030B	
240-105951-2	WDC_SEDIMENT_121418	Total/NA	Solid	5030B	
MB 240-361585/1-A	Method Blank	Total/NA	Solid	5030B	
LCS 240-361585/2-A	Lab Control Sample	Total/NA	Solid	5030B	
240-105951-2 MS	WDC_SEDIMENT_121418	Total/NA	Solid	5030B	
240-105951-2 MSD	WDC_SEDIMENT_121418	Total/NA	Solid	5030B	

Analysis Batch: 361592

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-105951-1	EDC_SEDIMENT_121418	Total/NA	Solid	8260B MI	361585
240-105951-2	WDC_SEDIMENT_121418	Total/NA	Solid	8260B MI	361585
MB 240-361585/1-A	Method Blank	Total/NA	Solid	8260B MI	361585
LCS 240-361585/2-A	Lab Control Sample	Total/NA	Solid	8260B MI	361585
240-105951-2 MS	WDC_SEDIMENT_121418	Total/NA	Solid	8260B MI	361585
240-105951-2 MSD	WDC_SEDIMENT_121418	Total/NA	Solid	8260B MI	361585

General Chemistry

Analysis Batch: 360876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-105951-1	EDC_SEDIMENT_121418	Total/NA	Solid	Moisture	
240-105951-2	WDC_SEDIMENT_121418	Total/NA	Solid	Moisture	
240-105885-A-11 DU	Duplicate	Total/NA	Solid	Moisture	

Lab Chronicle

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

TestAmerica Job ID: 240-105951-1

Client Sample ID: EDC_SEDIMENT_121418
Lab Sample ID: 240-105951-1
Date Collected: 12/14/18 09:54
Matrix: Solid
Date Received: 12/18/18 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	360876	12/19/18 15:43	ACR	TAL CAN

Client Sample ID: EDC_SEDIMENT_121418
Lab Sample ID: 240-105951-1
Date Collected: 12/14/18 09:54
Matrix: Solid
Date Received: 12/18/18 08:45
Percent Solids: 81.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			361585	12/24/18 15:31	LAM	TAL CAN
Total/NA	Analysis	8260B MI		1	361592	12/25/18 15:12	TJL1	TAL CAN

Client Sample ID: WDC_SEDIMENT_121418
Lab Sample ID: 240-105951-2
Date Collected: 12/14/18 10:37
Matrix: Solid
Date Received: 12/18/18 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	360876	12/19/18 15:43	ACR	TAL CAN

Client Sample ID: WDC_SEDIMENT_121418
Lab Sample ID: 240-105951-2
Date Collected: 12/14/18 10:37
Matrix: Solid
Date Received: 12/18/18 08:45
Percent Solids: 80.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			361585	12/24/18 15:31	LAM	TAL CAN
Total/NA	Analysis	8260B MI		1	361592	12/25/18 15:35	TJL1	TAL CAN

Laboratory References:

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

Accreditation/Certification Summary

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

TestAmerica Job ID: 240-105951-1

Laboratory: TestAmerica Canton

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

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

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

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

MICHIGAN
190

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: RACHEL STERN	Lab PM: DelMonico, Michael	Carrier Tracking No(s):	COC No: 240-56785-24377.1
Client Contact: Angela DeGrandis	Phone: 248-946-6331	E-Mail: michael.delmonico@testamericainc.com		Page: Page 1 of 1
Company: ARCADIS U.S., Inc.				Job #:
Address: 28550 Cabot Drive Suite 500	Due Date Requested:			
City: Novi	TAT Requested (days): STANDARD			
State, Zip: MI, 48377				
Phone:	PO #: MI001454.0008, VOCs			
Email: angela.degrandis@arcadis-us.com	WO #: Cadena #: E203631			
Project Name: Ford LTP Livonia MI - E203631	Project #: 24015353			
Site: LIVONIA, MI	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Wate	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Moisture - Local Method	8260B_MI - VOCs (Short List)	8260B - VOCs (Short List)	1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, PCE, TCE, VC	1,4 Dioxane	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	N	N	A	X	X	X	
EDC-Sediment_121418	12/14/18	0954	G	Solid	N	N				1	1		
WDC-Sediment-121418	12/14/18	1037	G	Solid	N	N				1	1		
TRIP BLANKS	—	—	—	Water									

240-105951 Chain of Custody

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

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

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
RACHEL STERN / [illegible] / ARCADIS	12/14/2018 15:15	ARCADIS	NOVI COLD STORAGE	12/14/2018 15:15	ARCADIS
Christian Weaver / [illegible] / Arcadis	12/17/2018 14:33	Arcadis	[illegible]	12/17/18 1433	TA
[illegible]	12/17/18 1518	TA	[illegible]	12/18/18 845	TA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 08/04/2016

TestAmerica Canton Sample Receipt Form/Narrative **Login # :** 165951
Canton Facility

Client Arcadis Site Name

Cooler Received on 12/18/18 Opened on 12/18/18

Cooler unpacked by:

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

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

TestAmerica Cooler # NA Foam Box Client Cooler Box Other

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

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-8 (CF **-0.2** °C) Observed Cooler Temp. °C Corrected Cooler Temp. °C
   IR GUN #36 (CF **+0**°C) Observed Cooler Temp. 0.9 °C Corrected Cooler Temp. 0.9 °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1 (Yes) No
   -Were the seals on the outside of the cooler(s) signed & dated? (Yes) No NA
   -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes (No)
   -Were tamper/custody seals intact and uncompromised? (Yes) No NA
3. Shippers' packing slip attached to the cooler(s)? (Yes) No
4. Did custody papers accompany the sample(s)? (Yes) No
5. Were the custody papers relinquished & signed in the appropriate place? (Yes) No
6. Was/were the person(s) who collected the samples clearly identified on the COC? (Yes) No
7. Did all bottles arrive in good condition (Unbroken)? (Yes) No
8. Could all bottle labels be reconciled with the COC? (Yes) No
9. Were correct bottle(s) used for the test(s) indicated? (Yes) No
10. Sufficient quantity received to perform indicated analyses? (Yes) No
11. Are these work share samples? Yes (No)
    If yes, Questions 12-16 have been checked at the originating laboratory.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No (NA) pH Strip Lot# **HC854592**
13. Were VOAs on the COC? (Yes) No
14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes (No) NA
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # N/A (Yes) No
16. Was a LL Hg or Me Hg trip blank present? Yes (No)

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM Date by via Verbal Voice Mail Other

Concerning

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: RC

18. SAMPLE CONDITION

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

19. SAMPLE PRESERVATION

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

January 03, 2019

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

CADENA project ID: E203631
Project: Ford Livonia Transmission Project - OFF-SITE - Soil Gas and Groundwater
Project number: MI001454.0002/3/4.00002/2B/3B
Client project scope reference: Sample COC only was used to define project analytical requirements.
Laboratory: TestAmerica - North Canton
Laboratory submittal: 105951-1
Sample date: 2018-12-14
Report received by CADENA: 2019-01-03
Initial Data Verification completed by CADENA: 2019-01-03

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.

2 Soil sample(s) were analyzed for GCMS VOC parameter(s).

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Valid Qualifiers

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

SAMPLING AND ANALYSIS SUMMARY

CADENA Project ID: E203631
Laboratory: TestAmerica-North Canton
Laboratory Submittal: 105951-1

Lab Sample ID	Sample ID	Collection Date (mm/yy/dd)	Collection Time (hh:mm:ss)	Volatile Organics by GCMS	Comment
2401059511	EDC_SEDIMENT_121418	12/14/2018	9:54:00	X	
2401059512	WDC_SEDIMENT_121418	12/14/2018	10:37:00	X	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631
Laboratory: TestAmerica - North Canton
Laboratory Submittal: 105951-1

		Sample Name:	EDC_SEDIMENT_121418				WDC_SEDIMENT_121418			
		Lab Sample ID:	2401059511				2401059512			
		Sample Date:	12/14/2018				12/14/2018			
Analyte	Cas No.	Result	Report Limit	Units	Valid Qualifier	Result	Report Limit	Units	Valid Qualifier
GC/MS VOC									
OSW-8260B									
1,1-Dichloroethene	75-35-4	ND	57	ug/kg	---	ND	57	ug/kg	---
1,4-Dioxane	123-91-1	ND	18000	ug/kg	---	ND	18000	ug/kg	---
cis-1,2-Dichloroethene	156-59-2	ND	57	ug/kg	---	ND	57	ug/kg	---
Tetrachloroethene	127-18-4	ND	57	ug/kg	---	ND	57	ug/kg	---
trans-1,2-Dichloroethene	156-60-5	ND	57	ug/kg	---	ND	57	ug/kg	---
Trichloroethene	79-01-6	ND	57	ug/kg	---	ND	57	ug/kg	---
Vinyl chloride	75-01-4	ND	46	ug/kg	---	ND	45	ug/kg	---

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 240-109366-1
Client Project/Site: Ford LTP Livonia MI - E203631

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

Attn: Kristoffer Hinskey

Authorized for release by:
3/27/2019 3:42:49 PM

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

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

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

Table of Contents

Definitions/Glossary

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

TestAmerica Job ID: 240-109366-1

Qualifiers

GC/MS VOA

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

Glossary

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

Job ID: 240-109366-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203631

Report Number: 240-109366-1

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.

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

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

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

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

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

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

RECEIPT

The samples were received on 3/14/2019 8:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.4° C.

VOLATILE ORGANIC COMPOUNDS

Samples EDC-SEDIMENT-031219 (240-109366-1) and WDC-SEDIMENT-031219 (240-109366-2) were analyzed for volatile organic compounds in accordance with EPA SW-846 Method 8260B. The samples were prepared on 03/18/2019 and analyzed on 03/20/2019.

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

PERCENT SOLIDS

Samples EDC-SEDIMENT-031219 (240-109366-1) and WDC-SEDIMENT-031219 (240-109366-2) were analyzed for percent solids in accordance with ASTM Method D2216-80. The samples were analyzed on 03/15/2019.

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

Method Summary

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

TestAmerica Job ID: 240-109366-1

Method	Method Description	Protocol	Laboratory
8260B MI	Volatile Organic Compounds (GC/MS)	SW846	TAL CAN
Moisture	Percent Moisture	EPA	TAL CAN
5035	Closed System Purge and Trap	SW846	TAL CAN

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

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

TestAmerica Job ID: 240-109366-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-109366-1	EDC-SEDIMENT-031219	Solid	03/12/19 10:00	03/14/19 08:05
240-109366-2	WDC-SEDIMENT-031219	Solid	03/12/19 10:45	03/14/19 08:05

Detection Summary

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

TestAmerica Job ID: 240-109366-1

Client Sample ID: EDC-SEDIMENT-031219 — Lab Sample ID: 240-109366-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	50	J	60	16	ug/Kg	1	☼	8260B MI	Total/NA

Client Sample ID: WDC-SEDIMENT-031219 — Lab Sample ID: 240-109366-2

No Detections.

This Detection Summary does not include radiochemical test results.

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

TestAmerica Job ID: 240-109366-1

Client Sample ID: EDC-SEDIMENT-031219
Date Collected: 03/12/19 10:00
Date Received: 03/14/19 08:05

Lab Sample ID: 240-109366-1
Matrix: Solid
Percent Solids: 77.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	60	U	60	24	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1
cis-1,2-Dichloroethene	60	U	60	13	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1
Tetrachloroethene	60	U	60	27	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1
trans-1,2-Dichloroethene	60	U	60	15	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1
Trichloroethene	**50**	**J**	60	16	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1
Vinyl chloride	48	U	48	18	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1
1,4-Dioxane	19000	U	19000	1600	ug/Kg	☼	03/18/19 13:59	03/20/19 20:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*53 - 155*	*03/18/19 13:59*	*03/20/19 20:32*	*1*
4-Bromofluorobenzene (Surr)	*88*		*48 - 151*	*03/18/19 13:59*	*03/20/19 20:32*	*1*
Toluene-d8 (Surr)	*88*		*49 - 147*	*03/18/19 13:59*	*03/20/19 20:32*	*1*
Dibromofluoromethane (Surr)	*93*		*49 - 138*	*03/18/19 13:59*	*03/20/19 20:32*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**77.7**		0.1	0.1	%			03/15/19 13:16	1
Percent Moisture	**22.3**		0.1	0.1	%			03/15/19 13:16	1

Client Sample ID: WDC-SEDIMENT-031219
Date Collected: 03/12/19 10:45
Date Received: 03/14/19 08:05

Lab Sample ID: 240-109366-2
Matrix: Solid
Percent Solids: 73.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	68	U	68	27	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1
cis-1,2-Dichloroethene	68	U	68	15	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1
Tetrachloroethene	68	U	68	30	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1
trans-1,2-Dichloroethene	68	U	68	17	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1
Trichloroethene	68	U	68	19	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1
Vinyl chloride	54	U	54	20	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1
1,4-Dioxane	21000	U	21000	1800	ug/Kg	☼	03/18/19 13:59	03/20/19 20:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*94*		*53 - 155*	*03/18/19 13:59*	*03/20/19 20:56*	*1*
4-Bromofluorobenzene (Surr)	*84*		*48 - 151*	*03/18/19 13:59*	*03/20/19 20:56*	*1*
Toluene-d8 (Surr)	*85*		*49 - 147*	*03/18/19 13:59*	*03/20/19 20:56*	*1*
Dibromofluoromethane (Surr)	*87*		*49 - 138*	*03/18/19 13:59*	*03/20/19 20:56*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**73.7**		0.1	0.1	%			03/15/19 13:16	1
Percent Moisture	**26.3**		0.1	0.1	%			03/15/19 13:16	1

Surrogate Summary

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

TestAmerica Job ID: 240-109366-1

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

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(53-155)	(48-151)	(49-147)	(49-138)
240-109366-1	EDC-SEDIMENT-031219	98	88	88	93
240-109366-2	WDC-SEDIMENT-031219	94	84	85	87
LCS 240-372065/2-A	Lab Control Sample	94	86	88	98
LCSD 240-372065/3-A	Lab Control Sample Dup	94	84	87	97
MB 240-372065/1-A	Method Blank	96	83	86	92

Surrogate Legend

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

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

Lab Sample ID: MB 240-372065/1-A
Matrix: Solid
Analysis Batch: 372463

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 372065

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	40	U	40	16	ug/Kg		03/18/19 13:59	03/20/19 19:17	1
cis-1,2-Dichloroethene	40	U	40	9.0	ug/Kg		03/18/19 13:59	03/20/19 19:17	1
Tetrachloroethene	40	U	40	18	ug/Kg		03/18/19 13:59	03/20/19 19:17	1
trans-1,2-Dichloroethene	40	U	40	10	ug/Kg		03/18/19 13:59	03/20/19 19:17	1
Trichloroethene	40	U	40	11	ug/Kg		03/18/19 13:59	03/20/19 19:17	1
Vinyl chloride	32	U	32	12	ug/Kg		03/18/19 13:59	03/20/19 19:17	1
1,4-Dioxane	13000	U	13000	1100	ug/Kg		03/18/19 13:59	03/20/19 19:17	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*53 - 155*	*03/18/19 13:59*	*03/20/19 19:17*	*1*
4-Bromofluorobenzene (Surr)	*83*		*48 - 151*	*03/18/19 13:59*	*03/20/19 19:17*	*1*
Toluene-d8 (Surr)	*86*		*49 - 147*	*03/18/19 13:59*	*03/20/19 19:17*	*1*
Dibromofluoromethane (Surr)	*92*		*49 - 138*	*03/18/19 13:59*	*03/20/19 19:17*	*1*

Lab Sample ID: LCS 240-372065/2-A
Matrix: Solid
Analysis Batch: 372463

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 372065

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	1000	1130		ug/Kg		113	57 - 139
cis-1,2-Dichloroethene	1000	1100		ug/Kg		110	74 - 123
Tetrachloroethene	1000	1020		ug/Kg		102	76 - 120
trans-1,2-Dichloroethene	1000	1130		ug/Kg		113	71 - 133
Trichloroethene	1000	1110		ug/Kg		111	73 - 126
Vinyl chloride	1000	923		ug/Kg		92	52 - 130
1,4-Dioxane	20000	20100		ug/Kg		101	51 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*94*		*53 - 155*
4-Bromofluorobenzene (Surr)	*86*		*48 - 151*
Toluene-d8 (Surr)	*88*		*49 - 147*
Dibromofluoromethane (Surr)	*98*		*49 - 138*

Lab Sample ID: LCSD 240-372065/3-A
Matrix: Solid
Analysis Batch: 372463

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 372065

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	1000	1090		ug/Kg		109	57 - 139	3	40
cis-1,2-Dichloroethene	1000	1070		ug/Kg		107	74 - 123	3	40
Tetrachloroethene	1000	984		ug/Kg		98	76 - 120	3	40
trans-1,2-Dichloroethene	1000	1100		ug/Kg		110	71 - 133	3	40
Trichloroethene	1000	1100		ug/Kg		110	73 - 126	0	40
Vinyl chloride	1000	927		ug/Kg		93	52 - 130	0	40
1,4-Dioxane	20000	19600		ug/Kg		98	51 - 140	3	40

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

Lab Sample ID: LCSD 240-372065/3-A
Matrix: Solid
Analysis Batch: 372463

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 372065

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*94*		*53 - 155*
4-Bromofluorobenzene (Surr)	*84*		*48 - 151*
Toluene-d8 (Surr)	*87*		*49 - 147*
Dibromofluoromethane (Surr)	*97*		*49 - 138*

Method: Moisture - Percent Moisture

Lab Sample ID: 240-109381-D-1 DU
Matrix: Solid
Analysis Batch: 371807

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Solids	96.1			96.3		%				0.2	20
Percent Moisture	3.9			3.7		%				4	20

QC Association Summary

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

TestAmerica Job ID: 240-109366-1

GC/MS VOA

Prep Batch: 372065

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109366-1	EDC-SEDIMENT-031219	Total/NA	Solid	5035	
240-109366-2	WDC-SEDIMENT-031219	Total/NA	Solid	5035	
MB 240-372065/1-A	Method Blank	Total/NA	Solid	5035	
LCS 240-372065/2-A	Lab Control Sample	Total/NA	Solid	5035	
LCSD 240-372065/3-A	Lab Control Sample Dup	Total/NA	Solid	5035	

Analysis Batch: 372463

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109366-1	EDC-SEDIMENT-031219	Total/NA	Solid	8260B MI	372065
240-109366-2	WDC-SEDIMENT-031219	Total/NA	Solid	8260B MI	372065
MB 240-372065/1-A	Method Blank	Total/NA	Solid	8260B MI	372065
LCS 240-372065/2-A	Lab Control Sample	Total/NA	Solid	8260B MI	372065
LCSD 240-372065/3-A	Lab Control Sample Dup	Total/NA	Solid	8260B MI	372065

General Chemistry

Analysis Batch: 371807

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109366-1	EDC-SEDIMENT-031219	Total/NA	Solid	Moisture	
240-109366-2	WDC-SEDIMENT-031219	Total/NA	Solid	Moisture	
240-109381-D-1 DU	Duplicate	Total/NA	Solid	Moisture	

Lab Chronicle

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

TestAmerica Job ID: 240-109366-1

Client Sample ID: EDC-SEDIMENT-031219
Lab Sample ID: 240-109366-1
Date Collected: 03/12/19 10:00
Matrix: Solid
Date Received: 03/14/19 08:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	371807	03/15/19 13:16	JMB	TAL CAN

Client Sample ID: EDC-SEDIMENT-031219
Lab Sample ID: 240-109366-1
Date Collected: 03/12/19 10:00
Matrix: Solid
Date Received: 03/14/19 08:05
Percent Solids: 77.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			372065	03/18/19 13:59	LAM	TAL CAN
Total/NA	Analysis	8260B MI		1	372463	03/20/19 20:32	HMB	TAL CAN

Client Sample ID: WDC-SEDIMENT-031219
Lab Sample ID: 240-109366-2
Date Collected: 03/12/19 10:45
Matrix: Solid
Date Received: 03/14/19 08:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	371807	03/15/19 13:16	JMB	TAL CAN

Client Sample ID: WDC-SEDIMENT-031219
Lab Sample ID: 240-109366-2
Date Collected: 03/12/19 10:45
Matrix: Solid
Date Received: 03/14/19 08:05
Percent Solids: 73.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			372065	03/18/19 13:59	LAM	TAL CAN
Total/NA	Analysis	8260B MI		1	372463	03/20/19 20:56	HMB	TAL CAN

Laboratory References:

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

Accreditation/Certification Summary

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

TestAmerica Job ID: 240-109366-1

Laboratory: TestAmerica Canton

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

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

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

1.6 | C1.4

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # ____ OF ____

MICHIGAN 190

108398

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Angela DeGrandis
COMPANY: Arcadis
ADDRESS: 28550 Cabot Drive Ste #500
CITY: Novi STATE: ZIP CODE:
PHONE NO.: 248-994-2240 FAX NO.: 248-994-2241 P.O. NO.: MI001454.08.01
E-MAIL ADDRESS: angela.degrandis@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: Ford LTP Livonia, MI
SAMPLER(S) PLEASE PRINT/SIGN NAME: Kory Pearson

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS X STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,1-DCE, cis-1,2-DCE, PCE, TCE, VC	1,4 Dioxane
	3/12/19	1000	EDC_SEDIMENT_031219	S	2	X							1	1
	↓	1045	WDC_SEDIMENT_031219	S	2	X							1	1
			TRIP BLANK	W	1									

240-109366 Chain of Custody

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] X Sampler	DATE: 3/12/19	TIME: 1900	
RECEIVED BY: SIGNATURE/ORGANIZATION: NOVI OFFICE COLD STORAGE	DATE:	TIME: 1800	
RELINQUISHED BY: SIGNATURE/ORGANIZATION: Jen Heyl TR	DATE: 3/13/19	TIME: 1230	
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature]	DATE: 3-14-19	TIME: 805 TAC	

RELINQUISHED BY: SIGNATURE/ORGANIZATION: CAITLYN ONEILL Caitlyn ONeill ARCADIS	DATE: 3/13/19	TIME: 11:10	
RECEIVED BY: SIGNATURE/ORGANIZATION: Jen Heyl TR	DATE: 3/13/19	TIME: 11:10	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	NOTES: TEMP. ON ARRIVAL:
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

3/27/2019

TestAmerica Canton Sample Receipt Form/Narrative **Login # : 109366**
Canton Facility

Client Arcadis Site Name _____ Cooler unpacked by: MJ/AT

Cooler Received on 3-14-19 Opened on 3-14-19

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

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

TestAmerica Cooler # TA Foam Box Client Cooler Box Other _____

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

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-8 (CF **-0.2** °C) Observed Cooler Temp. 1.6 °C Corrected Cooler Temp. 1.4 °C
   IR GUN #36 (CF **+0.7**°C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1 (Yes) No
   -Were the seals on the outside of the cooler(s) signed & dated? (Yes) No NA
   -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes (No)
   -Were tamper/custody seals intact and uncompromised? (Yes) No NA
3. Shippers' packing slip attached to the cooler(s)? (Yes) No
4. Did custody papers accompany the sample(s)? (Yes) No
5. Were the custody papers relinquished & signed in the appropriate place? (Yes) No
6. Was/were the person(s) who collected the samples clearly identified on the COC? (Yes) No
7. Did all bottles arrive in good condition (Unbroken)? (Yes) No
8. Could all bottle labels be reconciled with the COC? (Yes) No
9. Were correct bottle(s) used for the test(s) indicated? (Yes) No
10. Sufficient quantity received to perform indicated analyses? (Yes) No
11. Are these work share samples? Yes (No)
    If yes, Questions 12-16 have been checked at the originating laboratory.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No (NA) pH Strip Lot# **HC861525**
13. Were VOAs on the COC? Yes (No)
14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes No (NA)
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #_____ Yes (No)
16. Was a LL Hg or Me Hg trip blank present? _____ Yes (No)

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

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

Concerning _____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES Samples processed by: M.S/BC

no trip blank received in cooler

18. SAMPLE CONDITION

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

19. SAMPLE PRESERVATION

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

VOA Sample Preservation - Date/Time VOAs Frozen: _____

March 27, 2019

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

CADENA project ID: E203631
Project: Ford Livonia Transmission Project - OFF-SITE - Soil Gas and Groundwater
Project number: MI001454.0002/3/4.00002/2B/3B
Client project scope reference: Sample COC only was used to define project analytical requirements.
Laboratory: TestAmerica - North Canton
Laboratory submittal: 109366-1
Sample date: 2019-03-12
Report received by CADENA: 2019-03-27
Initial Data Verification completed by CADENA: 2019-03-27

There were no significant QC anomalies or exceptions to report.

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

2 Soil sample(s) were analyzed for GCMS VOC parameter(s).

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

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Valid Qualifiers

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

SAMPLING AND ANALYSIS SUMMARY

CADENA Project ID: E203631
Laboratory: TestAmerica-North Canton
Laboratory Submittal: 109366-1

Lab Sample ID	Sample ID	Collection Date (mm/yy/dd)	Collection Time (hh:mm:ss)	Volatile Organics by GCMS	Comment
2401093661	EDC-SEDIMENT-031219	3/12/2019	10:00:00	X	
2401093662	WDC-SEDIMENT-031219	3/12/2019	10:45:00	X	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203631
Laboratory: TestAmerica - North Canton
Laboratory Submittal: 109366-1

		Sample Name:	EDC-SEDIMENT-031219				WDC-SEDIMENT-031219			
		Lab Sample ID:	2401093661				2401093662			
		Sample Date:	3/12/2019				3/12/2019			
Analyte	Cas No.	Result	Report Limit	Units	Valid Qualifier	Result	Report Limit	Units	Valid Qualifier
GC/MS VOC									
OSW-8260B									
1,1-Dichloroethene	75-35-4	ND	60	ug/kg	---	ND	68	ug/kg	---
1,4-Dioxane	123-91-1	ND	19000	ug/kg	---	ND	21000	ug/kg	---
cis-1,2-Dichloroethene	156-59-2	ND	60	ug/kg	---	ND	68	ug/kg	---
Tetrachloroethene	127-18-4	ND	60	ug/kg	---	ND	68	ug/kg	---
trans-1,2-Dichloroethene	156-60-5	ND	60	ug/kg	---	ND	68	ug/kg	---
Trichloroethene	79-01-6	50	60	ug/kg	J	ND	68	ug/kg	---
Vinyl chloride	75-01-4	ND	48	ug/kg	---	ND	54	ug/kg	---

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

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

Laboratory Job ID: 240-115068-1
Client Project/Site: Ford LTP Livonia MI - E203971

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

Attn: Kristoffer Hinskey

Authorized for release by:
7/11/2019 11:39:22 AM

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

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

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

Table of Contents

Definitions/Glossary

Client: ARCADIS U.S., Inc.
Job ID: 240-115068-1
Project/Site: Ford LTP Livonia MI - E203971

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)

Job ID: 240-115068-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

CASE NARRATIVE

Client: ARCADIS U.S., Inc.

Project: Ford LTP Livonia MI - E203971

Report Number: 240-115068-1

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

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

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

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

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

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

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

RECEIPT

The samples were received on 6/27/2019 8:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.7° C.

VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample TRIP BLANKS (240-115068-3) was analyzed for volatile organic compounds (GCMS) in accordance with EPA SW-846 Method 8260B. The sample was analyzed on 07/02/2019.

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

VOLATILE ORGANIC COMPOUNDS

Samples EDC_SEDIMENT_062119 (240-115068-1) and WDC_SEDIMENT_062119 (240-115068-2) were analyzed for volatile organic compounds in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 07/01/2019.

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

PERCENT SOLIDS

Samples EDC_SEDIMENT_062119 (240-115068-1) and WDC_SEDIMENT_062119 (240-115068-2) were analyzed for percent solids in accordance with ASTM Method D2216-80. The samples were analyzed on 07/01/2019.

Job ID: 240-115068-1 (Continued)

Laboratory: Eurofins TestAmerica, Canton (Continued)

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

Method Summary

Client: ARCADIS U.S., Inc.
Project/Site: Ford LTP Livonia MI - E203971

Job ID: 240-115068-1

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

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

Client: ARCADIS U.S., Inc.
Project/Site: Ford LTP Livonia MI - E203971

Job ID: 240-115068-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-115068-1	EDC_SEDIMENT_062119	Solid	06/21/19 09:20	06/27/19 08:50	
240-115068-2	WDC_SEDIMENT_062119	Solid	06/21/19 09:50	06/27/19 08:50	
240-115068-3	TRIP BLANKS	Water	06/21/19 00:00	06/27/19 08:50	

Detection Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-115068-1
Project/Site: Ford LTP Livonia MI - E203971

Client Sample ID: EDC_SEDIMENT_062119 — Lab Sample ID: 240-115068-1

No Detections.

Client Sample ID: WDC_SEDIMENT_062119 — Lab Sample ID: 240-115068-2

No Detections.

Client Sample ID: TRIP BLANKS — Lab Sample ID: 240-115068-3

No Detections.

This Detection Summary does not include radiochemical test results.

Client: ARCADIS U.S., Inc.
Project/Site: Ford LTP Livonia MI - E203971

Job ID: 240-115068-1

Client Sample ID: EDC_SEDIMENT_062119

Date Collected: 06/21/19 09:20
Date Received: 06/27/19 08:50

Lab Sample ID: 240-115068-1

Matrix: Solid
Percent Solids: 75.9

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	65	U	65	26	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1
1,4-Dioxane	20000	U	20000	1800	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1
cis-1,2-Dichloroethene	65	U	65	15	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1
Tetrachloroethene	65	U	65	29	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1
trans-1,2-Dichloroethene	65	U	65	16	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1
Trichloroethene	65	U	65	18	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1
Vinyl chloride	52	U	52	19	ug/Kg	☼	07/01/19 14:14	07/01/19 23:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*53 - 155*	*07/01/19 14:14*	*07/01/19 23:32*	*1*
4-Bromofluorobenzene (Surr)	*86*		*48 - 151*	*07/01/19 14:14*	*07/01/19 23:32*	*1*
Dibromofluoromethane (Surr)	*87*		*49 - 138*	*07/01/19 14:14*	*07/01/19 23:32*	*1*
Toluene-d8 (Surr)	*97*		*49 - 147*	*07/01/19 14:14*	*07/01/19 23:32*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**75.9**		0.1	0.1	%			07/01/19 10:11	1
Percent Moisture	**24.1**		0.1	0.1	%			07/01/19 10:11	1

Client: ARCADIS U.S., Inc.
Project/Site: Ford LTP Livonia MI - E203971

Job ID: 240-115068-1

Client Sample ID: WDC_SEDIMENT_062119

Date Collected: 06/21/19 09:50
Date Received: 06/27/19 08:50

Lab Sample ID: 240-115068-2

Matrix: Solid
Percent Solids: 78.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	58	U	58	23	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1
1,4-Dioxane	18000	U	18000	1600	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1
cis-1,2-Dichloroethene	58	U	58	13	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1
Tetrachloroethene	58	U	58	26	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1
trans-1,2-Dichloroethene	58	U	58	14	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1
Trichloroethene	58	U	58	16	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1
Vinyl chloride	46	U	46	17	ug/Kg	☼	07/01/19 14:14	07/01/19 23:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*86*		*53 - 155*	*07/01/19 14:14*	*07/01/19 23:54*	*1*
4-Bromofluorobenzene (Surr)	*84*		*48 - 151*	*07/01/19 14:14*	*07/01/19 23:54*	*1*
Dibromofluoromethane (Surr)	*79*		*49 - 138*	*07/01/19 14:14*	*07/01/19 23:54*	*1*
Toluene-d8 (Surr)	*93*		*49 - 147*	*07/01/19 14:14*	*07/01/19 23:54*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**78.6**		0.1	0.1	%			07/01/19 10:11	1
Percent Moisture	**21.4**		0.1	0.1	%			07/01/19 10:11	1

Client: ARCADIS U.S., Inc.
Project/Site: Ford LTP Livonia MI - E203971

Job ID: 240-115068-1

Client Sample ID: TRIP BLANKS

Lab Sample ID: 240-115068-3

Date Collected: 06/21/19 00:00

Matrix: Water

Date Received: 06/27/19 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			07/02/19 15:23	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			07/02/19 15:23	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			07/02/19 15:23	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			07/02/19 15:23	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			07/02/19 15:23	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			07/02/19 15:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*70 - 121*		*07/02/19 15:23*	*1*
4-Bromofluorobenzene (Surr)	*68*		*59 - 120*		*07/02/19 15:23*	*1*
Toluene-d8 (Surr)	*79*		*70 - 123*		*07/02/19 15:23*	*1*
Dibromofluoromethane (Surr)	*99*		*75 - 128*		*07/02/19 15:23*	*1*

Surrogate Summary

Client: ARCADIS U.S., Inc.
Project/Site: Ford LTP Livonia MI - E203971

Job ID: 240-115068-1

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

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(70-121)	(59-120)	(70-123)	(75-128)
240-114826-C-32 MS	Matrix Spike	86	95	94	88
240-114826-C-32 MSD	Matrix Spike Duplicate	85	97	92	86
240-115068-3	TRIP BLANKS	99	68	79	99
LCS 240-389340/4	Lab Control Sample	81	96	91	82
MB 240-389340/6	Method Blank	95	69	79	92

Surrogate Legend

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

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

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(53-155)	(48-151)	(49-138)	(49-147)
240-114901-B-1-A MS	Matrix Spike	83	82	79	90
240-114901-C-1-A MSD	Matrix Spike Duplicate	86	85	83	91
240-115068-1	EDC_SEDIMENT_062119	96	86	87	97
240-115068-2	WDC_SEDIMENT_062119	86	84	79	93
LCS 240-389229/2-A	Lab Control Sample	85	87	85	95
LCSD 240-389229/3-A	Lab Control Sample Dup	87	86	83	93
MB 240-389229/1-A	Method Blank	84	81	81	92

Surrogate Legend

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

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

Lab Sample ID: MB 240-389340/6
Matrix: Water
Analysis Batch: 389340

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			07/02/19 11:00	1
cis-1,2-Dichloroethene	1.0	U	1.0	0.16	ug/L			07/02/19 11:00	1
Tetrachloroethene	1.0	U	1.0	0.15	ug/L			07/02/19 11:00	1
trans-1,2-Dichloroethene	1.0	U	1.0	0.19	ug/L			07/02/19 11:00	1
Trichloroethene	1.0	U	1.0	0.10	ug/L			07/02/19 11:00	1
Vinyl chloride	1.0	U	1.0	0.20	ug/L			07/02/19 11:00	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*70 - 121*		*07/02/19 11:00*	*1*
4-Bromofluorobenzene (Surr)	*69*		*59 - 120*		*07/02/19 11:00*	*1*
Toluene-d8 (Surr)	*79*		*70 - 123*		*07/02/19 11:00*	*1*
Dibromofluoromethane (Surr)	*92*		*75 - 128*		*07/02/19 11:00*	*1*

Lab Sample ID: LCS 240-389340/4
Matrix: Water
Analysis Batch: 389340

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	8.22		ug/L		82	65 - 139
cis-1,2-Dichloroethene	10.0	8.57		ug/L		86	76 - 128
Tetrachloroethene	10.0	8.27		ug/L		83	74 - 130
trans-1,2-Dichloroethene	10.0	8.82		ug/L		88	78 - 133
Trichloroethene	10.0	8.02		ug/L		80	76 - 125
Vinyl chloride	10.0	8.12		ug/L		81	58 - 143

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*81*		*70 - 121*
4-Bromofluorobenzene (Surr)	*96*		*59 - 120*
Toluene-d8 (Surr)	*91*		*70 - 123*
Dibromofluoromethane (Surr)	*82*		*75 - 128*

Lab Sample ID: 240-114826-C-32 MS
Matrix: Water
Analysis Batch: 389340

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	5.0	U	50.0	42.2		ug/L		84	53 - 140
cis-1,2-Dichloroethene	0.89	J	50.0	42.8		ug/L		84	64 - 130
Tetrachloroethene	5.0	U	50.0	39.3		ug/L		79	51 - 136
trans-1,2-Dichloroethene	5.0	U	50.0	44.5		ug/L		89	68 - 133
Trichloroethene	54		50.0	83.9		ug/L		60	55 - 131
Vinyl chloride	5.0	U	50.0	42.8		ug/L		86	43 - 154

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*86*		*70 - 121*
4-Bromofluorobenzene (Surr)	*95*		*59 - 120*
Toluene-d8 (Surr)	*94*		*70 - 123*

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

Lab Sample ID: 240-114826-C-32 MS
Matrix: Water
Analysis Batch: 389340

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

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Dibromofluoromethane (Surr)	*88*		*75 - 128*

Lab Sample ID: 240-114826-C-32 MSD
Matrix: Water
Analysis Batch: 389340

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	5.0	U	50.0	46.5		ug/L		93	53 - 140	10	35
cis-1,2-Dichloroethene	0.89	J	50.0	45.0		ug/L		88	64 - 130	5	21
Tetrachloroethene	5.0	U	50.0	44.2		ug/L		88	51 - 136	12	23
trans-1,2-Dichloroethene	5.0	U	50.0	47.5		ug/L		95	68 - 133	6	24
Trichloroethene	54		50.0	86.0		ug/L		64	55 - 131	2	23
Vinyl chloride	5.0	U	50.0	47.6		ug/L		95	43 - 154	11	29

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*85*		*70 - 121*
4-Bromofluorobenzene (Surr)	*97*		*59 - 120*
Toluene-d8 (Surr)	*92*		*70 - 123*
Dibromofluoromethane (Surr)	*86*		*75 - 128*

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

Lab Sample ID: MB 240-389229/1-A
Matrix: Solid
Analysis Batch: 389254

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 389229

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	40	U	40	16	ug/Kg		07/01/19 14:14	07/01/19 18:39	1
1,4-Dioxane	13000	U	13000	1100	ug/Kg		07/01/19 14:14	07/01/19 18:39	1
cis-1,2-Dichloroethene	40	U	40	9.0	ug/Kg		07/01/19 14:14	07/01/19 18:39	1
Tetrachloroethene	40	U	40	18	ug/Kg		07/01/19 14:14	07/01/19 18:39	1
trans-1,2-Dichloroethene	40	U	40	10	ug/Kg		07/01/19 14:14	07/01/19 18:39	1
Trichloroethene	40	U	40	11	ug/Kg		07/01/19 14:14	07/01/19 18:39	1
Vinyl chloride	32	U	32	12	ug/Kg		07/01/19 14:14	07/01/19 18:39	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*84*		*53 - 155*	*07/01/19 14:14*	*07/01/19 18:39*	*1*
4-Bromofluorobenzene (Surr)	*81*		*48 - 151*	*07/01/19 14:14*	*07/01/19 18:39*	*1*
Dibromofluoromethane (Surr)	*81*		*49 - 138*	*07/01/19 14:14*	*07/01/19 18:39*	*1*
Toluene-d8 (Surr)	*92*		*49 - 147*	*07/01/19 14:14*	*07/01/19 18:39*	*1*

Lab Sample ID: LCS 240-389229/2-A
Matrix: Solid
Analysis Batch: 389254

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 389229

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	1000	1110		ug/Kg		111	57 - 139
1,4-Dioxane	20000	20100		ug/Kg		100	51 - 140

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

Lab Sample ID: LCS 240-389229/2-A
Matrix: Solid
Analysis Batch: 389254

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 389229

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
cis-1,2-Dichloroethene	1000	1010		ug/Kg		101	74 - 123
Tetrachloroethene	1000	930		ug/Kg		93	76 - 120
trans-1,2-Dichloroethene	1000	1060		ug/Kg		106	71 - 133
Trichloroethene	1000	901		ug/Kg		90	73 - 126
Vinyl chloride	1000	856		ug/Kg		86	52 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*85*		*53 - 155*
4-Bromofluorobenzene (Surr)	*87*		*48 - 151*
Dibromofluoromethane (Surr)	*85*		*49 - 138*
Toluene-d8 (Surr)	*95*		*49 - 147*

Lab Sample ID: LCSD 240-389229/3-A
Matrix: Solid
Analysis Batch: 389254

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 389229

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	1000	1080		ug/Kg		108	57 - 139	2	40
1,4-Dioxane	20000	20000		ug/Kg		100	51 - 140	0	40
cis-1,2-Dichloroethene	1000	988		ug/Kg		99	74 - 123	2	40
Tetrachloroethene	1000	878		ug/Kg		88	76 - 120	6	40
trans-1,2-Dichloroethene	1000	1040		ug/Kg		104	71 - 133	2	40
Trichloroethene	1000	888		ug/Kg		89	73 - 126	1	40
Vinyl chloride	1000	873		ug/Kg		87	52 - 130	2	40

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*87*		*53 - 155*
4-Bromofluorobenzene (Surr)	*86*		*48 - 151*
Dibromofluoromethane (Surr)	*83*		*49 - 138*
Toluene-d8 (Surr)	*93*		*49 - 147*

Lab Sample ID: 240-114901-B-1-A MS
Matrix: Solid
Analysis Batch: 389254

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 389229

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	52	U	1110	1060		ug/Kg	☼	96	36 - 150
cis-1,2-Dichloroethene	52	U	1110	1010		ug/Kg	☼	91	50 - 128
Tetrachloroethene	52	U	1110	933		ug/Kg	☼	84	20 - 151
trans-1,2-Dichloroethene	52	U	1110	1080		ug/Kg	☼	97	44 - 141
Trichloroethene	52	U	1110	918		ug/Kg	☼	83	25 - 148
Vinyl chloride	41	U	1110	885		ug/Kg	☼	80	31 - 148

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*83*		*53 - 155*
4-Bromofluorobenzene (Surr)	*82*		*48 - 151*
Dibromofluoromethane (Surr)	*79*		*49 - 138*
Toluene-d8 (Surr)	*90*		*49 - 147*

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

Lab Sample ID: 240-114901-C-1-A MSD
Client Sample ID: Matrix Spike Duplicate
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 389254
Prep Batch: 389229

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	52	U	1160	1190		ug/Kg	☼	103	36 - 150	11	40
cis-1,2-Dichloroethene	52	U	1160	1170		ug/Kg	☼	101	50 - 128	15	40
Tetrachloroethene	52	U	1160	1020		ug/Kg	☼	88	20 - 151	9	40
trans-1,2-Dichloroethene	52	U	1160	1220		ug/Kg	☼	106	44 - 141	13	40
Trichloroethene	52	U	1160	1050		ug/Kg	☼	90	25 - 148	13	40
Vinyl chloride	41	U	1160	937		ug/Kg	☼	81	31 - 148	6	37

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*86*		*53 - 155*
4-Bromofluorobenzene (Surr)	*85*		*48 - 151*
Dibromofluoromethane (Surr)	*83*		*49 - 138*
Toluene-d8 (Surr)	*91*		*49 - 147*

Method: Moisture - Percent Moisture

Lab Sample ID: 240-115110-A-44 DU
Client Sample ID: Duplicate
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 389176

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Solids	90.9			91.8		%				1	20
Percent Moisture	9.1			8.2		%				11	20

QC Association Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-115068-1
Project/Site: Ford LTP Livonia MI - E203971

GC/MS VOA

Prep Batch: 389229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-115068-1	EDC_SEDIMENT_062119	Total/NA	Solid	5030B	
240-115068-2	WDC_SEDIMENT_062119	Total/NA	Solid	5030B	
MB 240-389229/1-A	Method Blank	Total/NA	Solid	5030B	
LCS 240-389229/2-A	Lab Control Sample	Total/NA	Solid	5030B	
LCSD 240-389229/3-A	Lab Control Sample Dup	Total/NA	Solid	5030B	
240-114901-B-1-A MS	Matrix Spike	Total/NA	Solid	5030B	
240-114901-C-1-A MSD	Matrix Spike Duplicate	Total/NA	Solid	5030B	

Analysis Batch: 389254

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-115068-1	EDC_SEDIMENT_062119	Total/NA	Solid	8260B MI	389229
240-115068-2	WDC_SEDIMENT_062119	Total/NA	Solid	8260B MI	389229
MB 240-389229/1-A	Method Blank	Total/NA	Solid	8260B MI	389229
LCS 240-389229/2-A	Lab Control Sample	Total/NA	Solid	8260B MI	389229
LCSD 240-389229/3-A	Lab Control Sample Dup	Total/NA	Solid	8260B MI	389229
240-114901-B-1-A MS	Matrix Spike	Total/NA	Solid	8260B MI	389229
240-114901-C-1-A MSD	Matrix Spike Duplicate	Total/NA	Solid	8260B MI	389229

Analysis Batch: 389340

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-115068-3	TRIP BLANKS	Total/NA	Water	8260B	
MB 240-389340/6	Method Blank	Total/NA	Water	8260B	
LCS 240-389340/4	Lab Control Sample	Total/NA	Water	8260B	
240-114826-C-32 MS	Matrix Spike	Total/NA	Water	8260B	
240-114826-C-32 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B	

General Chemistry

Analysis Batch: 389176

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-115068-1	EDC_SEDIMENT_062119	Total/NA	Solid	Moisture	
240-115068-2	WDC_SEDIMENT_062119	Total/NA	Solid	Moisture	
240-115110-A-44 DU	Duplicate	Total/NA	Solid	Moisture	

Lab Chronicle

Client: ARCADIS U.S., Inc.
Job ID: 240-115068-1
Project/Site: Ford LTP Livonia MI - E203971

Client Sample ID: EDC_SEDIMENT_062119
Lab Sample ID: 240-115068-1
Date Collected: 06/21/19 09:20
Matrix: Solid
Date Received: 06/27/19 08:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	389176	07/01/19 10:11	AJO	TAL CAN

Client Sample ID: EDC_SEDIMENT_062119
Lab Sample ID: 240-115068-1
Date Collected: 06/21/19 09:20
Matrix: Solid
Date Received: 06/27/19 08:50
Percent Solids: 75.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			389229	07/01/19 14:14	LAM	TAL CAN
Total/NA	Analysis	8260B MI		1	389254	07/01/19 23:32	TJL1	TAL CAN

Client Sample ID: WDC_SEDIMENT_062119
Lab Sample ID: 240-115068-2
Date Collected: 06/21/19 09:50
Matrix: Solid
Date Received: 06/27/19 08:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	389176	07/01/19 10:11	AJO	TAL CAN

Client Sample ID: WDC_SEDIMENT_062119
Lab Sample ID: 240-115068-2
Date Collected: 06/21/19 09:50
Matrix: Solid
Date Received: 06/27/19 08:50
Percent Solids: 78.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			389229	07/01/19 14:14	LAM	TAL CAN
Total/NA	Analysis	8260B MI		1	389254	07/01/19 23:54	TJL1	TAL CAN

Client Sample ID: TRIP BLANKS
Lab Sample ID: 240-115068-3
Date Collected: 06/21/19 00:00
Matrix: Water
Date Received: 06/27/19 08:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	389340	07/02/19 15:23	LEE	TAL CAN

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

Accreditation/Certification Summary

Client: ARCADIS U.S., Inc.
Job ID: 240-115068-1
Project/Site: Ford LTP Livonia MI - E203971

Laboratory: Eurofins TestAmerica, Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State		2927	02-23-20
California	State Program	9	2927	02-23-20
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-20
Illinois	NELAP	5	200004	07-31-19 *
Illinois	NELAP		004498	07-31-19
Iowa	State Program	7	421	06-01-21
Kansas	NELAP	7	E-10336	04-30-20
Kentucky (UST)	State Program	4	58	02-23-20
Kentucky (WW)	State Program	4	98016	12-31-19
Minnesota	NELAP	5	039-999-348	12-31-19 *
Minnesota (Petrofund)	State Program	1	3506	07-31-19 *
Nevada	State Program	9	OH00048	07-31-19
New Jersey	NELAP	2	OH001	06-30-20
New Jersey	NELAP		OH001	06-30-20
New York	NELAP	2	10975	03-31-20
New York	NELAP		10975	03-31-20
Ohio VAP	State Program	5	CL0024	06-05-21
Oregon	NELAP	10	4062	02-23-20
Oregon	NELAP		4062	02-23-20
Pennsylvania	NELAP	3	68-00340	08-31-19 *
Pennsylvania	NELAP		68-00340	08-31-19
Texas	NELAP	6	T104704517-18-10	08-31-19 *
Texas	NELAP		T104704517-18-10	08-31-19
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-19 *
Virginia	NELAP		010101	09-14-19
Washington	State		C971	01-12-20
Washington	State Program	10	C971	01-12-20 *
West Virginia DEP	State		210	12-31-19
West Virginia DEP	State Program	3	210	12-31-19

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

Eurofins TestAmerica, Canton
4101 Shuffel Street NW

North Canton, OH 44720-6900
phone 330.497.9396 fax 330.497.0772

MICHIGAN 190

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: KRIS HINSKEY	Site Contact: K. PEARSON	Date: 6/21/19	COC No:
Your Company Name here ARCADIS	Email: KRIS.HINSKEY@ARCADIS.COM	Lab Contact: M. DELMONICO	Carrier:	1 of 1 COCs
Address 28550 CABOT DR STE 500	Tel/Fax: 248-994-2240			Sampler:
City/State/Zip NOVI, MI 48377	**Analysis Turnaround Time**			**For Lab Use Only:**
(248) 994-2240 Phone	☒ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client:
(248) 994-2241 Fax	TAT if different from Below _____			Lab Sampling:
Project Name: FORD LTP	☒ 2 weeks			
Site: LIVONIA HES	☐ 1 week			Job / SDG No.:
PO# E203631 / 2401535 3	☐ 2 days			
MI001454.0008.00001	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	1,1-DCE, cis-1,2-DCE, trans-1,2 DCE, PCE, TCE, VC	1,4 Dioxane	Sample Specific Notes:
EDC-SEDIMENT-062119	6/21/19	0920	G	SOLID	2	N	N			
WDC-SEDIMENT-062119	6/21/19	0952	G	SOLID	2	N	N			
TRIP BLANKS	—	—	—	W	1 (2)	N	N			

240-115068 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

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

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

~~ESDD~~ (RW) E203971

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: _____ Corr'd: _____		Therm ID No.: _____
Relinquished by:	Company: ARCADIS	Date/Time: 6/21/19 1450	Received by: RACHEL WISMAN	Company: ARCADIS	Date/Time: 06/21/19 1452
Relinquished by: RACHEL WISMAN	Company: ARCADIS	Date/Time: 06/21/19 1530	Received by: NOVI COLD STORAGE	Company: ARCADIS	Date/Time: 06/21/19 1535
Relinquished by: NOVI COLD STORAGE	Company: ARCADIS	Date/Time: 06/26/19 9:40	Received in Laboratory by:	Company: ETA	Date/Time: 6-26-19 0940

7-2 | ETA | 06-26-19 1005 | ETA

Eurofins TestAmerica Canton Sample Receipt Form/Narrative **Login # : 115668**
Canton Facility

Client Arcadis Site Name _____ Cooler unpacked by: Ryan Gribley

Cooler Received on 6-27-19 Opened on 6-27-19 850

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

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

TestAmerica Cooler # 7A Foam Box Client Cooler Box Other _____

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

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-8 (CF **+0.1** °C) Observed Cooler Temp. 2.6 °C Corrected Cooler Temp. 2.7 °C
   IR GUN #36 (CF **+0.6**°C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1 (Yes) No
   -Were the seals on the outside of the cooler(s) signed & dated? (Yes) No NA
   -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes (No)
   -Were tamper/custody seals intact and uncompromised? (Yes) No NA
3. Shippers' packing slip attached to the cooler(s)? (Yes) No
4. Did custody papers accompany the sample(s)? (Yes) No
5. Were the custody papers relinquished & signed in the appropriate place? (Yes) No
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes (No)
7. Did all bottles arrive in good condition (Unbroken)? (Yes) No
8. Could all bottle labels be reconciled with the COC? (Yes) No
9. Were correct bottle(s) used for the test(s) indicated? (Yes) No
10. Sufficient quantity received to perform indicated analyses? (Yes) No
11. Are these work share samples? Yes (No)
    If yes, Questions 12-16 have been checked at the originating laboratory.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No (NA) pH Strip Lot# **HC984738**
13. Were VOAs on the COC? (Yes) No
14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes (No) NA
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # 583170VB (Yes) No
16. Was a LL Hg or Me Hg trip blank present? _____ Yes (No)

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

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

Concerning _____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: RC

18. SAMPLE CONDITION

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

19. SAMPLE PRESERVATION

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

VOA Sample Preservation - Date/Time VOAs Frozen: _____

WI-NC-099

DATA VERIFICATION REPORT

July 11, 2019

Kris Hinksey
Arcadis
28550 Cabot Drive
Suite 550
Novi, MI 48377

CADENA project ID: E203971
Project: Ford Livonia - Compliance Sampling
Project number: MI001372,1427,1466.0001,1454.0005/6
Event Specific Scope of Work References: Sample COC
Laboratory: TestAmerica - North Canton
Laboratory submittal: 115068-1
Sample date: 2019-06-21
Report received by CADENA: 2019-07-11
Initial Data Verification completed by CADENA: 2019-07-11
Number of Samples:2
Sample Matrices:Soil
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, LCS/LCD RPD, Blank Contamination and Hold Time Exception were reviewed as part of our verification.

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

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

Please contact me if you have any questions.

Sincerely,

Jim Tomalia

Project Scientist

CADENA Valid Qualifiers

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

SAMPLING AND ANALYSIS SUMMARY

CADENA Project ID: E203971
Laboratory: TestAmerica-North Canton
Laboratory Submittal: 115068-1

Lab Sample ID	Sample ID	Collection Date (mm/yy/dd)	Collection Time (hh:mm:ss)	Volatile Organics by GCMS	Comment
2401150681	EDC_SEDIMENT_062119	6/21/2019	9:20:00	X	
2401150682	WDC_SEDIMENT_062119	6/21/2019	9:50:00	X	
2401150683	TRIP BLANKS	6/21/2019	12:00:00	X	

Analytical Results Summary

Reportable Results Only

CADENA Project ID: E203971
Laboratory: TestAmerica - North Canton
Laboratory Submittal: 115068-1

		Sample Name:	EDC_SEDIMENT_062119				WDC_SEDIMENT_062119				TRIP BLANKS			
		Lab Sample ID:	2401150681				2401150682				2401150683			
		Sample Date:	6/21/2019				6/21/2019				6/21/2019			
Analyte	Cas No.		Result	Report Limit	Units	Valid Qualifier	Result	Report Limit	Units	Valid Qualifier	Result	Report Limit	Units	Valid Qualifier
GC/MS VOC														
OSW-8260B														
1,1-Dichloroethene	75-35-4		ND	65	ug/kg	---	ND	58	ug/kg	---	ND	1.0	ug/l	---
1,4-Dioxane	123-91-1		ND	20000	ug/kg	---	ND	18000	ug/kg	---				
cis-1,2-Dichloroethene	156-59-2		ND	65	ug/kg	---	ND	58	ug/kg	---	ND	1.0	ug/l	---
Tetrachloroethene	127-18-4		ND	65	ug/kg	---	ND	58	ug/kg	---	ND	1.0	ug/l	---
trans-1,2-Dichloroethene	156-60-5		ND	65	ug/kg	---	ND	58	ug/kg	---	ND	1.0	ug/l	---
Trichloroethene	79-01-6		ND	65	ug/kg	---	ND	58	ug/kg	---	ND	1.0	ug/l	---
Vinyl chloride	75-01-4		ND	52	ug/kg	---	ND	46	ug/kg	---	ND	1.0	ug/l	---

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