FINAL REPORT

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FCA US LLC

DETROIT, MICHIGAN

STERLING HEIGHTS ASSEMBLY PLANT (SHAP): SOUTH PAINT SHOP (BOX) SOURCE TESTING PROGRAM RTO AND OBSERVATION ZONES

RWDI #2306854

January 5, 2024

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI USA LLC (RWDI) was retained by FCA US LLC (FCA) to complete the emission sampling program at their Sterling Heights Assembly Plant (SHAP) located at 38111 Van Dyke, Sterling Heights, Michigan. SHAP operates an automobile assembly plant that produces Ram trucks and operates a North Paint Shop (NPS) and a South Paint Shop (SPS). SHAP operates under the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) MI-ROP-B7248-2020a, this Source Testing Report covers the required testing under the South Paint Shop Flexible Groups FG-TOPCOAT-SOUTH and FG-RTO-SOUTH&POWDER-OVEN-PM. The following outlines the sources and source groups as outlined in the ROP:

- PM, PM_{10} and $PM_{2.5}$ testing for SV-BASE COAT OBSV 1
- PM, PM_{10} and $PM_{2.5}$ testing for SV-BASE COAT OBSV 2
- PM, PM_{10} and $PM_{2.5}$ testing for SV-CLEAR COAT OBSV 1
- PM, PM_{10} and $PM_{2.5}$ testing for SV-CLEAR COAT OBSV 2
- PM, PM_{10} and $PM_{2.5}$ testing for the SV-RTO-SOUTH
- Destruction Efficiency for the SV-RTO-SOUTH
  - 3 RTO Inlets – Topcoat Booth, Topcoat Ovens, and E-Coat Oven
  - 1 RTO Outlet
- Verification of inward flow into enclosure for EU-E-COAT-SOUTH

The test program included measurements of Total Hydrocarbons (THC), Methane and Non-methane organic compounds (NMOC) for Destruction Efficiency (DE) verification, as well as Particulate (PM, PM_{10} and $PM_{2.5}$) for several sources, and inward flow into enclosure for EU-E-COAT-SOUTH. RWDI also completed flue gas velocity measurements and moisture content measurements for each Particulate (PM, PM_{10} and $PM_{2.5}$) tests completed. RWDI utilized the methods outlined by the United States Environmental Protection Agency (U.S. EPA) Methods 1, 2, 3, 4, 5, 25A, 201A and 202.

RTO

For RTO DE tests, three (3) 60-minute tests were completed on the RTO (SV-RTO).

For RTO Particulate (PM, PM_{10} and $PM_{2.5}$), three (3) 120-minute test runs were completed following USEPA Method 5/202 for the following source:

- SV-RTO-SOUTH

Other Particulate Sources

Three (3) 120-minute test runs were initially completed in November of 2023 following USEPA Method 5 for the remaining Particulate (PM, PM_{10} and $PM_{2.5}$) sources in this test program:

- SV-BASE COAT OBSV 1
- SV-BASE COAT OBSV 2
- SV-CLEAR COAT OBSV 1
- SV-CLEAR COAT OBSV 2

USEPA Method 5/202 was selected for Particulate ($PM/PM_{10}/PM_{2.5}$) testing in November 2023 testing. Method 5 conservatively assumed that the total particulate results (via USEPA Method 5) would be equivalent to PM_{10} and $PM_{2.5}$ fractions of particulate. After review of the November 2023 PM_{10} and $PM_{2.5}$ test results, re-testing of SV-BASE COAT OBSV 1 and SV-CLEAR COAT OBSV 2 using USEPA Method 201A was completed to accurately characterize PM10 and PM2.5 fractions. The re-testing was completed in December, 2023. Notification of re-testing was provided to the Technical Program Unit (TPU) of EGLE, on December 14th, 2023 and an updated Source Testing Plan for the re-test was provided to TPU and Michigan EGLE District Office on December 15th, 2023. For the re-test, three (3) 240-minute PM_{10} and $PM_{2.5}$ test runs were completed following USEPA Method 201A on December 21st and 22nd of 2023 for the following sources:

- SV-BASE COAT OBSV 1
- SV-CLEAR COAT OBSV 2

E-Coat Oven

For verification of inward flow, a single smoke test at each of the entrance and exit points for EU-ECOAT-SOUTH was conducted.

Production Data

SHAP recorded the production rate of vehicles processed for each particulate test from each applicable process. In addition, for the destruction efficiency testing, SHAP also recorded the RTO combustion chamber temperature during each of the destruction efficiency tests.

Executive Table i: Average Emission Data – PM, $PM_{2.5}$, and PM_{10}

Source	Parameter	Emission Rate			
		Run 1	Run 2	Run 3	Average
SV-RTO-SOUTH	PM (lb/1000 lb wet)	0.0029	0.0016	0.0023	0.0022
	PM_{10} & $PM_{2.5}$ (lb/hr)	1.61	0.90	1.26	1.26
SV-BASE COAT OBSV 1	PM (lb/1000 lb wet)	0.0030	0.0011	0.0002	0.0014
	PM_{10} (lb/hr)	0.039	0.038	0.040	0.039
	$PM_{2.5}$ (lb/hr)	0.027	0.026	0.027	0.027
SV-BASE COAT OBSV 2	PM (lb/1000 lb wet)	0.0011	0.0014	0.0003	0.0010
	PM_{10} & $PM_{2.5}$ (lb/hr)	0.11	0.15	0.03	0.10
SV-CLEAR COAT OBSV 1	PM (lb/1000 lb wet)	0.0008	0.0010	0.0007	0.0008
	PM_{10} & $PM_{2.5}$ (lb/hr)	0.14	0.17	0.12	0.15
SV-CLEAR COAT OBSV 2	PM (lb/1000 lb wet)	0.0011	0.0014	0.008	0.0011
	PM_{10} (lb/hr)	0.19	0.089	0.084	0.12
	$PM_{2.5}$ (lb/hr)	0.17	0.057	0.057	0.093

Executive Table ii: Average Emission Data – Destruction Efficiency

Parameter	Emission Rate (ppmvd/ lb/hr & % Destruction)			
	Run 1	Run 2	Run 3	Average
NMOC Inlet (Booth)	33.0 ppmvd 19.5 lb/hr	42.9 ppmvd 25.6 lb/hr	36.2 ppmvd 22.9 lb/hr	37.4 ppmvd 22.7 lb/hr
NMOC Inlet (Ovens)	51.8 ppmvd 8.87 lb/hr	79.7 ppmvd 14.7 lb/hr	73.9 ppmvd 14.0 lb/hr	68.4 ppmvd 12.5 lb/hr
NMOC Inlet (E-Coat Dip Tank)	3.95 ppmvd 0.14 lb/hr	4.11 ppmvd 0.14 lb/hr	2.06 ppmvd 0.07 lb/hr	3.38 ppmvd 0.12 lb/hr
NMOC Inlets Combined	28.6 lb/hr	40.4 lb/hr	37.0 lb/hr	35.3 lb/hr
NMOC RTO Outlet	0.68 ppmv 0.57 lb/hr	0.58 ppmv 0.50 lb/hr	0.51 ppmv 0.44 lb/hr	0.59 ppmv 0.50 lb/hr
Destruction Efficiency (NMOC)	98.0 %	98.8 %	98.8 %	98.5 %
RTO Temperature (°F)	1498	1501	1500	1500

TABLE OF CONTENTS

LIST OF TABLES

(Found Within the Report Text)

LIST OF TABLES

(Found After the Report Text)

LIST OF FIGURES

LIST OF GRAPHS

1 INTRODUCTION

RWDI USA LLC (RWDI) was retained by FCA US LLC (FCA) to complete the emission sampling program at their Sterling Heights Assembly Plant (SHAP) located at 38111 Van Dyke, Sterling Heights, Michigan. SHAP operates an automobile assembly plant that produces Ram trucks and operates a North Paint Shop (NPS) and a South Paint Shop (SPS). SHAP operates under the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) MI-ROP-B7248-2020a, this Source Testing Report covers the required testing under the South Paint Shop Flexible Groups FG-TOPCOAT-SOUTH and FG-RTO-SOUTH&POWDER-OVEN-PM. The following outlines the sources and source groups as outlined in the ROP:

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- PM, PM_{10} and $PM_{2.5}$ testing for SV-BASE COAT OBSV 2
- PM, PM_{10} and $PM_{2.5}$ testing for SV-CLEAR COAT OBSV 1
- PM, PM_{10} and $PM_{2.5}$ testing for SV-CLEAR COAT OBSV 2
- PM, PM_{10} and $PM_{2.5}$ testing for the SV-RTO-SOUTH
- Destruction Efficiency for the SV-RTO-SOUTH
    - 3 RTO Inlets – Topcoat Booth, Topcoat Ovens, and E-Coat Oven
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The test program included measurements of Total Hydrocarbons (THC), Methane and Non-methane organic compounds (NMOC) for Destruction Efficiency (DE) verification, as well as Particulate (PM, PM_{10} and $PM_{2.5}$) for several sources, and inward flow into enclosure for EU-E-COAT-SOUTH. RWDI also completed flue gas velocity measurements and moisture content measurements for each Particulate (PM, PM_{10} and $PM_{2.5}$) tests completed. RWDI utilized the methods outlined by the United States Environmental Protection Agency (U.S. EPA) Methods 1, 2, 3, 4, 5, 25A, 201A and 202.

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- SV-BASE COAT OBSV 1
- SV-CLEAR COAT OBSV 2

E-Coat Oven

For verification of inward flow, a single smoke test at each of the entrance and exit points for EU-ECOAT-SOUTH was conducted.

Production Data

This Source Testing Report provides the results of the tests that measured the exhaust VOC concentration and destruction efficiency (DE) of SV-RTO-SOUTH as well as the particulate matter emission rates of SV-BASE COAT 1, SV-BASE COAT 2, SV-CLEAR COAT 1, and SV-CLEAR COAT 2.

1.1 Location and Dates of Testing

The test program was completed on November 7th and 8th of 2023 and December 21st and 22nd, 2023 at the FCA SHAP facility.

1.2 Purpose of Testing

The source tests for FG-TOPCOAT-SOUTH and FG-RTO-SOUTH&POWDER-OVEN-PM, are required under MI-ROP-B7248-2020a.

1.3 Description of Source

SHAP operates an automobile assembly plant that produces Light Duty Trucks for FCA US LLC. Under Flexible Groups: FG-TOPCOAT SOUTH, FG-RTO-SOUTH&POWDER-OVEN-PM, these systems exhaust from the South Paint Shop (SPS). Truck boxes are produced in the SPS.

Table 1.3.1: Summary of Sampling Program – SV-RTO-SOUTH

SV-RTO-SOUTH	
Emission Unit Description [Including Process Equipment & Control Device(s)]	FG-TOPCOAT-SOUTH (BOX): A color preparation sanding booth (topcoat sand), followed by 2 parallel topcoat lines, each consisting of: a water-borne basecoat application followed by a solvent born clearcoat. All paint applications are performed by robotic and bell applicators (except in emergency back-up situations). A heated flash zone separates the basecoat and clearcoat operations. Once the clearcoat application is complete, the light duty truck box proceeds the main bake oven. VOCs emissions from the water-borne basecoat booths, the heated flash zone, the clearcoat spray booths and topcoat cure oven are controlled by the Regenerative Thermal Oxidizer (RTO-SOUTH). FG-RTO-SOUTH&POWDER-OVEN-PM (Box): Powdercoat oven emissions from EU-POWDERCOAT-SOUTH are also routed to RTO-SOUTH. EU-E-COAT-SOUTH (BOX.): SV-RTO-SOUTH RTO controls the E-Coat dip tank emissions and E-Coat Cure Oven emissions.
Parameter Tested	VOC Destruction Efficiency and particulate matter, in addition to Stack Gas Velocity, Stack gas composition, and Moisture
Testing Monitoring Methods	• USEPA Methods: 1, 2, 3, 4, 5, 25A, 201A and 202 • The outlet sampling location for the RTO met the USEPA Method 1 criteria. Therefore, the outlet sampling location was used for stack gas velocity, stack gas composition and moisture. • For the VOC compliance testing, three (3) 1-hour tests were run concurrently at the three (3) inlets and outlet for the destruction efficiency testing. Stack gas velocity, gas composition and moisture were taken during each of the tests at the three inlets and the single outlet location. • The sampling train for VOC and NMOC consisted of an analyzer as described in USEPA Method 25A continuously sampling via heated sample line from both the three inlets and outlet of the RTO simultaneously. • Particulate testing consisted of three (3) 120-minute tests at the outlet only.
Modifications	• Nitrogen purges were not completed post sample to remove sulphates for any of the sampling. Sulfur dioxide exposure was not expected to be an issue at this source location.

Table 1.3.2: Summary of Sampling Program – Basecoat and Clearcoat Observation Zones

SV-BASE COAT OBSV and SV-CLEAR COAT OBSV	
Emission Unit Description [Including Process Equipment & Control Device(s)]	FG-TOPCOAT-SOUTH (BOX): For each of the Color Booth lines, the booth systems are equipped with observation zones in the basecoat and clearcoat sections. There is no painting that occurs in these sections of the booth. The observation zones are exhausted separately from the remainder of the ventilation system through uncontrolled exhaust stacks.
Parameter Tested	Particulate matter, in addition to Stack Gas Velocity, Stack gas composition, and Moisture
Testing Monitoring Methods	• USEPA Methods: 1, 2, 3, 4, and 5. Additionally, Method 201A was completed on SV-BASE COAT OBSV 1 and SV-CLEAR COAT OBSV 2 in a separate sampling event in December. • Total Particulate Testing consisted of three (3) 120-minute Method 5 tests. • PM_{10} and $PM_{2.5}$ Testing consisted of three (3) 240-minute 201A tests.
Modifications	• The stack gas and filtration temperature did not exceed 85°F, therefore, the impingers were only be used for moisture determination.

Table 1.3.3: Summary of Sampling Program – EU-E-COAT-SOUTH

EU-E-COAT SOUTH (BOX)	
Emission Unit Description [Including Process Equipment & Control Device(s)]	EU-E-COAT-SOUTH (BOX): An electrodeposition coating process (E-coat) consisting of a series of dip tanks, rinses, followed by a curing oven and a sanding booth. Small amounts of flash (spot) prime may be used to repair defects in the E-coat in the sand booth. Emissions from the E-coat tanks are directed to the oven. VOC emissions from the oven are controlled by a Regenerative Thermal Oxidizer (RTO-SOUTH or south RTO).
Parameter Tested	Verification of positive inward flow of air into the enclosure(s),
Testing Monitoring Methods	• Visualization test (smoke test) applied to the entrance and exit points of the E-Coat Dip Tank and Oven.
Modifications	• None

1.4 Personnel Involved in Testing

Details with respect to the key individuals involved with the stack sampling survey are provided below:

Table 1.4.1: Testing Personnel

Thomas Caltrider Corporate Environmental Programs Thomas.Caltrider@stellantis.com	**FCA US LLC** CIMS 450-09-00 38111 Van Dyke Ave. Sterling Heights, 48312	(248) 882-7169
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Kate Strang Field Technician Kate.Strang@rwdi.com		

2 SUMMARY OF RESULTS

2.1 Operating Data

Operational data collected during the testing includes the number of vehicles produced and the combustion chamber temperatures from SV-RTO-SOUTH during each test. For the Base Coat and Clear Coat sources, the number of vehicles produced were collected. This information can be found in **Appendix A**.

2.2 Applicable Permit Number

State of Michigan Renewable Operating Permit (ROP) MI-ROP-B7248-2020a

3 SOURCE DESCRIPTION

3.1 Description of Process and Emission Control Equipment

A color preparation sanding booth (topcoat sand), followed by 2 parallel topcoat lines, each consisting of: a water-borne basecoat application followed by a solvent born clearcoat. All paint applications are performed by robotic and bell applicators (except in emergency back-up situations). A heated flash zone separates the basecoat and clearcoat operations. Once the clearcoat application is complete, the light duty truck box proceeds the main bake oven. VOCs emissions from the water-borne basecoat booths, the heated flash zone, the clearcoat spray booths and topcoat cure oven are controlled by the Regenerative Thermal Oxidizer (RTO).

SV-RTO-SOUTH also controls the E-Coat dip tank emissions and E-Coat Cure Oven. These units are permitted under (EU-E- COAT BOX). Additionally, Powdercoat Oven emissions (permitted in EU-POWDERCOAT-SOUTH (BOX) and addressed in FG-RTO-SOUTH&POWDER-OVEN-PM (BOX)) are routed to SV-RTO-SOUTH.

For each of the Color Booth lines, the booth systems are equipped with observation zones in both the basecoat and clearcoat sections. There is no painting that occurs in these sections of the booth. The observation zones are exhausted separately from the remainder of the ventilation system through uncontrolled exhaust stacks.

3.2 Process Flow Sheet or Diagram

SV-RTO-SOUTH has three inlets and one outlet. The base coat and clear coat zones have an outlet for each line. Figures can be found in the **Figure Section**.

3.3 Type and Quantity of Raw and Finished Materials

Various raw materials are used for the assembly of vehicles. For the clearcoat operations, the vehicles are sprayed (by robot) with a clear topcoat material to complete the coating process of the vehicles. A similar process occurs on the base coat operations.

3.4 Normal Rated Capacity of Process

SHAP was operating under normal representative production rates. Process data is provided in **Appendix A**.

3.5 Process Instrumentation Monitored During the Test

Vehicle counts and RTO combustion chamber temperatures (during the applicable tests) were recorded and monitored during the testing event. Data is provided in **Appendix A**.

4 SAMPLING AND ANALYTICAL PROCEDURES

The emission test program utilized the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- **Method 1** – Sample and Velocity Traverses for Stationary Sources
- **Method 2** – Determination of Stack Gas Velocity and Volumetric Flowrate
- **Method 3** – Determination of Molecular Weight of Dry Stack Gases
- **Method 4** – Determination of Moisture Content
- **Method 5** – Determination of Particulate Matter
- **Method 201A** – Determination of Particulate Matter
- **Method 25A** – Determination of Total Gaseous Organic Concentrations using a Flame Ionization Analyzer
- **Method 202** – Determination of Condensable Particulate Matter

4.1 Stack Velocity, Temperature, and Volumetric Flow Rate

The exhaust velocities and flow rates were determined following U.S. EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)". Velocity measurements were taken with a pre-calibrated S-Type pitot tube and incline manometer or digital manometer. Volumetric flow rates were determined following the equal area method as outlined in U.S. EPA Method 2. Temperature measurements were made simultaneously with the velocity measurements and were conducted using a chromel-alumel type "k" thermocouple in conjunction with a calibrated digital temperature indicator.

The dry molecular weight of the stack gas from SV-RTO-SOUTH inlets and outlet were determined following calculations outlined in U.S. EPA Method 3/3A, "Gas Analysis for the Determination of Dry Molecular Weight (Instrumental). RWDI collected integrated sample bags for each of SV-RTO-SOUTH inlet and outlet using the orsat pump from the sampling consoles or manual pump. The integrated bag samples were collected over the duration of each test period. The bag samples were delivered to a continuous monitoring system for CO_2 and O_2 measurements. The CO_2 and O_2 analyzers were operated according to USEPA Method 3A. Prior to testing, a 3-point analyzer calibration error check was conducted using USEPA protocol gases.

The calibration error check was performed by introducing zero, mid and high-level calibration gases directly into the analyzer. The calibration error check was performed to confirm that the analyzer response is within ±2% of the certified calibration gas introduced. Prior to each test run, a system-bias test was performed where known concentrations of calibration gases were introduced at the probe tip to measure if the analyzers response was within ±5% of the introduced calibration gas concentrations. At the conclusion of each set of bag samples a system-bias check was performed to evaluate the percent drift from pre and post-test system bias checks. The system bias checks were used to confirm that the analyzer did not drift greater than ±3% throughout a test run.

Zero and upscale calibration checks were conducted both before and after each set of bag samples in order to quantify measurement system calibration drift and sampling system bias. Upscale is either the mid- or high-range gas, whichever most closely approximates the flue gas level. During these checks, the calibration gases were introduced into the sampling system at a conjunction where the sample bag would be introduced to ensure that system was working properly. The analyzers were calibrated on-site using EPA Protocol No. 1 certified calibration mixtures.

For the SV-RTO-SOUTH Booth Inlet and E-Coat Dip Tank Inlet, the dry molecular weight of the stack gas was determined following US EPA Method 2 – Section 8.6. "For processes emitting essentially air, an analysis need not be conducted, use a dry molecular weight of 29.0".

For the December Testing for SV-BASE COAT OBSV 1 and SV-CLEAR COAT OBSV 2, the dry molecular weight of the stack gas was determined following calculations outlined in U.S. EPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight" using a Fyrite.

Stack moisture content was determined through wet-bulb dry-bulb testing and according to U.S. EPA Method 4, "Determination of Moisture Content of Stack Gases". A schematic of the Method 2 and 4 sampling train are provided in **Figure Section**.

4.2 Total Hydrocarbon, Methane and Non-Methane Organic Compounds (NMOC)

THC and CH_4 concentrations were recorded simultaneously at the three (3) inlets (Booths, Ovens and E-Coat Dip Tank) and outlet of SV-RTO-SOUTH during each test. The measurements were taken continuously following USEPA Method 25A on the inlets and outlet using a Flame Ionization Detector (FID) analyzer with a dual FID for concurrent measurements of THC and CH_4. As outlined in Method 25A, the measurement location was taken at the centroid of each source.

Each test consisted of three (3) 60-minute tests. Regular performance checks on the CEMS were conducted by zero and span calibration checks using USEPA Protocol calibration gases. The response of the monitor to pollutant-free air and the corresponding sensitivity to the span gases was reviewed frequently as an ongoing indication of analyzer performance.

Prior to testing, a 4-point analyzer calibration error check was conducted using USEPA protocol gases. The calibration error check was performed by introducing zero, low, mid, and high-level calibration gases up the heated line to the probe tip. The calibration error check was performed to confirm that the analyzer response is within ±5% of the certified calibration gas introduced. At the conclusion of each test run a system-bias check was performed to evaluate the percent drift from pre- and post-test system bias checks. The system bias check was used to confirm that the analyzer did not drift greater than ±3% throughout a test run.

Zero and mid gas calibration checks were conducted both before and after each test run to quantify measurement system calibration drift and sampling system bias. During these checks, the calibration gases were introduced into the sampling system at the probe tip so that the calibration gases were analyzed in the same manner as the flue gas samples.

A gas sample was continuously extracted from the stack and delivered to the gas analyzer, which measures the pollutant or diluent concentrations in the gas. The probe tip was equipped with a sintered stainless-steel filter for particulate removal. The end of the probe was connected to a heated Teflon sample line, which delivered the sample gases from the stack to the CEM system. The heated sample line was designed to maintain the gas temperature above 250°F to prevent condensation of stack gas moisture within the line.

To determine the non-methane organic compound (NMOC) concentrations, the methane concentration was subtracted from THC. The methane was converted from methane as methane to methane as propane and then subtracted from the THC concentration. The methane response factor (RF) was determined each test by introducing a known methane concentration to the analyzer and dividing the methane channel response by the THC channel response. Dividing methane by the RF provides methane as propane and was then subtracted from the THC concentration. Results were reported as Non-Methane Organic Compounds (NMOC). A schematic of the USEPA Method 25A is provided in **Figures Section**.

4.3 Gas Dilution System

Calibration gases were mixed using an Environics 4040 Gas Dilution System. The mass flow controllers are factory calibrated using a primary flow standard traceable to the United States National Institute of Standards and Technology (NIST). Each flow controller utilizes an 11-point calibration table with linear interpolation, to increase accuracy and reduce flow controller nonlinearity. The calibration is done yearly, and the records are included in the Source Testing Report. A multi-point EPA Method 205 check was executed in the field prior to testing.

The gas dilution system consists of calibrated orifices or mass flow controllers and dilutes a high-level calibration gas to within ±2% of predicted values. The gas divider is capable of diluting gases at set increments and were evaluated for accuracy in the field in accordance with US EPA Method 205 "*Verification of Gas Dilution Systems for Field Instrument Calibrations*". The gas divider dilutions were measured to evaluate that the responses are within ±2% of predicted values. In addition, a certified mid-level calibration gas within ±10% of one of the tested dilution gases was introduced into an analyzer to ensure the response of the gas calibration is within ±2% of gas divider dilution concentration.

4.4 Particulate Matter (PM, PM_{10} and $PM_{2.5}$)

Particulate matter (PM/PM_{10}/$PM_{2.5}$) was sampled following procedures outlined in U.S. EPA Method 5 and Method 202 (Condensable Particulate Matter) for all sources.

As stated in Method 202, the impinger portion would only be recovered and included as PM if the filtration temperature exceeds 85°F. For all sources except for SV-RTO-SOUTH, the stack gas and filtration temperature did not exceed 85°F, therefore, the impingers were only be used for moisture determination. For the RTO, Method 202 was followed for recovery of condensable. In addition, nitrogen purges were not conducted post sample to remove sulphates for any of the sampling. Sulfur dioxide exposure was not expected to be an issue at this source location.

4.5 PM_{10} and $PM_{2.5}$

For USEPA Method 201A, to measure PM_{10} and $PM_{2.5}$, a sample of gas is collected at a predetermined constant flow rate through an in-stack sizing device. The particle-sizing device separates particles with nominal aerodynamic diameters of 10 micrometers and 2.5 micrometers. After a sample is obtained, uncombined water was removed from the particulate, then gravimetric analysis was used to determine the particulate mass for each size fraction.

4.6 Verification of Inward Flow

Sampling of inward flow is intrusive to the production as the testing obstructs the flow of vehicles into the E-Coat area. Therefore, for the verification of inward flow was completed when no vehicles were entering the system, however all ventilation systems and oven were operating normally (simulating normal, representative production conditions).

Verification of inward flow included a visualization test (smoke test). Smoke was applied to the entrance and exit points of the Dip Tank and Oven. Each location was tested separately under normal ventilation scenario. Given that the visualization testing demonstrated that the smoke (or air flow) was flowing into the Dip Tank/Oven and therefore into the control system (RTO), the capture efficiency is assumed to be 100%.

4.7 Description of Recovery and Analytical Procedures

US EPA Methods 5, 201A and 202 samples were recovered according to methods for each of the noted sources. VOC testing on SV-RTO-SOUTH was conducted using real time analyzers which requires no sample recovery.

4.8 Sampling Port Description

All sampling ports meet USEPA Method 1 locations and can be found in the **Figure Section**.

5 TEST RESULTS AND DISCUSSION

5.1 Detailed Results

Table 5.1.1: Average Emission Data – PM, PM_{10}, and $PM_{2.5}$

Source	Parameter	Emission Rate			
		Run 1	Run 2	Run 3	Average
SV-RTO SOUTH	PM (lb/1000 lb wet)	0.0029	0.0016	0.0023	0.0022
	PM_{10} & $PM_{2.5}$ (lb/hr)	1.61	0.90	1.26	1.26
SV-BASE COAT OBSV 1	PM (lb/1000 lb wet)	0.0030	0.0011	0.0002	0.0014
	PM_{10} (lb/hr)	0.039	0.038	0.040	0.039
	$PM_{2.5}$ (lb/hr)	0.027	0.026	0.027	0.027
SV-BASE COAT OBSV 2	PM (lb/1000 lb wet)	0.0011	0.0014	0.0003	0.0010
	PM_{10} & $PM_{2.5}$ (lb/hr)	0.11	0.15	0.03	0.10
SV-CLEAR COAT OBSV 1	PM (lb/1000 lb wet)	0.0008	0.0010	0.0007	0.0008
	PM_{10} & $PM_{2.5}$ (lb/hr)	0.14	0.17	0.12	0.15
SV-CLEAR COAT OBSV 2	PM (lb/1000 lb wet)	0.0011	0.0014	0.008	0.0011
	PM_{10} (lb/hr)	0.19	0.089	0.084	0.12
	$PM_{2.5}$ (lb/hr)	0.17	0.057	0.057	0.093

Table 5.1.2: Average Emission Data – Destruction Efficiency

Parameter	Emission Rate (ppmvd/ lb/hr & % Destruction)			
	Run 1	Run 2	Run 3	Average
NMOC Inlet (Booth)	33.0 ppmvd 19.5 lb/hr	42.9 ppmvd 25.6 lb/hr	36.2 ppmvd 22.9 lb/hr	37.4 ppmvd 22.7 lb/hr
NMOC Inlet (Ovens)	51.8 ppmvd 8.87 lb/hr	79.7 ppmvd 14.7 lb/hr	73.9 ppmvd 14.0 lb/hr	68.4 ppmvd 12.5 lb/hr
NMOC Inlet (E-Coat Dip Tank)	3.95 ppmvd 0.14 lb/hr	4.11 ppmvd 0.14 lb/hr	2.06 ppmvd 0.07 lb/hr	3.38 ppmvd 0.12 lb/hr
NMOC Inlets Combined	28.6 lb/hr	40.4 lb/hr	37.0 lb/hr	35.3 lb/hr
NMOC RTO Outlet	0.68 ppmv 0.57 lb/hr	0.58 ppmv 0.50 lb/hr	0.51 ppmv 0.44 lb/hr	0.59 ppmv 0.50 lb/hr
Destruction Efficiency (NMOC)	98.0 %	98.8 %	98.8 %	98.5 %
RTO Temperature (°F)	1498	1501	1500	1500

Table 5.1.3: Verification of Inward Flow – EU-ECOAT-SOUTH

Parameter	Source			
	E-Coat Dip Tank Entrance	E-Coat Dip Tank Exit	E-Coat Oven Entrance	E-Coat Oven Exit
Direction of Smoke (Inward or Outward)	Inward	Inward	Inward	Inward

Detailed testing results can be found in **Appendices B through D**.

5.2 Variations in Testing Procedures

The clearcoat and basecoat sources utilized an unheated variation of Method 5 since their temperatures all remained below 85°F. This modification was noted in the Source Testing Plan prior to testing and the method did not deviate from the original proposal.

5.3 Process Upset Conditions During Testing

There were normal process breaks during production.

5.4 Maintenance Performed in Last Three Months

Cleaning and routine maintenance was performed on the machinery within the last three months.

5.5 Re-Test

After review of the November 2023 PM_{10} and $PM_{2.5}$ test results, re-testing of SV-BASE COAT OBSV 1 and SV-CLEAR COAT OBSV 2 using USEPA Method 201A was completed to accurately measure PM10 and PM2.5 fractions on December 21st and 22nd, 2023.

5.6 Audit Samples

This test did not require any audit samples.

5.7 Process Data

Process data can be found in **Appendix A**.

5.8 Measurement Results

Data from the testing can be in **Appendices B, C, and D**.

5.9 Flows and Moisture

Flow and moisture determination results can be found in **Appendix C**.

5.10 Field Notes

Field notes can be found in **Appendix E**.

5.11 Calibration Data

Calibration data can be found in **Appendix F**.

5.12 Example Calculations

Example calculations can be found in **Appendix G**.

5.13 Laboratory Data

Laboratory Data can be found in **Appendix H**

6 CONCLUSION

The testing of all applicable sources included in Flexible Group FG-TOPCOAT-SOUTH and FG-RTO-SOUTH&POWDER-OVEN-PM was successfully completed between November 7th and 8th of 2023 and December 21st and 22nd, 2023. Testing followed the methodology outlined in the Source Testing Plan approved by EGLE.

TABLES

Table 1: Summary of Sampling Parameters and Methodology

Source Location	No. of Tests	Sampling Parameter	Sampling Method
SV-RTO SOUTH	3	Velocity, Temperature and Flow Rate (Outlet)	U.S. EPA[1] Method 1-4
	3	Velocity, Temperature and Flow Rate (Inlet)	U.S. EPA Method 1-4
	3	Total Hydrocarbon (Inlet & Outlet)	U.S. EPA Method 25A
	3	Particulate Matter (Outlet)	U.S. EPA Method 5 and 202
	N/A	Gas Dilution (Inlet & Outlet)	U.S. EPA Method 205
SV-BASE COAT OBS-1	3	Velocity, Temperature and Flow Rate	U.S. EPA Method 1-4
	3	Particulate Matter	U.S. EPA Method 5[2]
	3	PM10 & PM2.5	U.S. EPA Method 201A
SV-BASE COAT OBS-2	3	Velocity, Temperature and Flow Rate	U.S. EPA Method 1-4
	3	Particulate Matter	U.S. EPA Method 5[2]
SV-CLEAR COAT OBS-1	3	Velocity, Temperature and Flow Rate	U.S. EPA Method 1-4
	3	Particulate Matter	U.S. EPA Method 5[2]
SV-CLEAR COAT OBS-2	3	Velocity, Temperature and Flow Rate	U.S. EPA Method 1-4
	3	Particulate Matter	U.S. EPA Method 5[2]
	3	PM10 & PM2.5	U.S. EPA Method 201A
EU-ECOAT-SOUTH	1	Smoke Test and Velocity Measurements	

Notes:

[1] U.S. EPA - United States Environmental Protection Agency

[2] Modified Method 5 with unheated probe and filter

Table 2: Sampling Summary and Sample Log

Source and Test #	Sampling Date	Start Time	End Time	Filter ID
SV-RTO SOUTH + Blank				
Test #1	7-Nov-23	8:37	10:56	A-364
Test #2	7-Nov-23	11:42	13:57	A-365
Test #3	7-Nov-23	14:34	6:50	A-363
Blank	7-Nov-23	---	---	A-386
SV-BASE COAT OBSV 1				
Test #1 - PM Test	8-Nov-23	8:32	10:36	A-369
Test #2 - PM Test	8-Nov-23	11:39	13:43	A-356
Test #3 - PM Test	8-Nov-23	14:27	16:30	A-368
Test #1 - PM10 & PM2.5 Test	21-Dec-23	7:57	13:10	47.217
Test #2 - PM10 & PM2.5 Test	21-Dec-23	13:24	17:37	47.215
Test #3 - PM10 & PM2.5 Test	22-Dec-23	7:35	11:47	026034
SV-BASE COAT OBSV 2				
Test #1	8-Nov-23	8:32	10:38	A-362
Test #2	8-Nov-23	11:45	13:47	A-357
Test #3	8-Nov-23	14:26	16:30	A-370
SV-CLEAR COAT OBSV 1				
Test #1	8-Nov-23	8:22	10:26	A-361
Test #2	8-Nov-23	11:18	13:32	A-359
Test #3	8-Nov-23	14:13	16:17	A-355
SV-CLEAR COAT OBSV 2				
Test #1	8-Nov-23	8:25	10:28	A-349
Test #2	8-Nov-23	11:17	13:20	A-358
Test #3	8-Nov-23	14:13	16:16	A-335
Test #1 - PM10 & PM2.5 Test	21-Dec-23	7:57	12:46	026037
Test #2 - PM10 & PM2.5 Test	21-Dec-23	13:09	16:58	026041
Test #3 - PM10 & PM2.5 Test	22-Dec-23	7:33	11:19	026246
Clear Coat and Base Coat Observation Blank				
Blank - November	8-Nov-23	--	--	A-367
Blank - December	22-Dec-23	--	--	026038

Table 3A: Sampling Summary - Flow Characteristics

SV-RTO SOUTH

Stack Gas Parameter		Test No. 1	Test No. 2	Test No. 3	Average	Test No. 1	Test No. 2	Test No. 3	Average
		TPM [1]				Destruction Efficiency			
Testing Date		7-Nov-23	7-Nov-23	7-Nov-23		7-Nov-23	7-Nov-23	7-Nov-23	
Stack Temperature	°F	252	252	256	**253**	252	251	253	**252**
	°R	711	711	715	**713**	711	711	713	**712**
Moisture	%	2.3%	1.5%	2.0%	**1.9%**	2.3%	1.5%	2.0%	**1.9%**
Velocity	ft/s	55.4	55.9	55.5	**55.6**	55.3	56.3	56.2	**55.9**
Referenced Flow Rate[2]	dscfm	122,679	124,702	122,663	**123,348**	122,433	125,785	124,513	**124,244**
Sampling Isokinetic Rate	%	101.3	100.1	100.0	**100.5**	--	--	--	**--**

Notes:

[1] TPM = Sampling for total particulate matter

[2] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendices C and D

Table 3B: Sampling Summary - Flow Characteristics

SV-RTO Booth Inlet

Stack Gas Parameter		Test No. 1	Test No. 2	Test No. 3	Average
		Destruction Efficiency Testing			
	Testing Date	7-Nov-23	7-Nov-23	7-Nov-23	
Stack Temperature	°F	89	89	89	**89**
	°R	548	548	548	**548**
Moisture	%	2.0%	1.8%	1.9%	**1.9%**
Velocity	ft/s	55.9	56.3	59.6	**57.3**
Referenced Flow Rate[1]	dscfm	86,413	87,134	92,312	**88,620**

Notes:

[1] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix C

Table 3C: Sampling Summary - Flow Characteristics

SV-RTO Ovens Inlet

Stack Gas Parameter		Test No. 1	Test No. 2	Test No. 3	Average
		Destruction Efficiency Testing			
	Testing Date	7-Nov-23	7-Nov-23	7-Nov-23	
Stack Temperature	°F	305	305	306	**305**
	°R	765	765	765	**765**
Moisture	%	1.5%	1.7%	2.0%	**1.7%**
Velocity	ft/s	46.1	49.7	51.2	**49.0**
Referenced Flow Rate[1]	dscfm	24,975	26,844	27,610	**26,476**

Notes:

[1] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix C

Table 3D: Sampling Summary - Flow Characteristics

SV-RTO E-Coat Dip Tank Inlet

Stack Gas Parameter		Test No. 1	Test No. 2	Test No. 3	Average
		Destruction Efficiency Testing			
	Testing Date	7-Nov-23	7-Nov-23	7-Nov-23	
Stack Temperature	°F	70	71	70	**70**
	°R	530	530	530	**530**
Moisture	%	1.2%	1.2%	1.2%	**1.2%**
Velocity	ft/s	36.1	36.3	35.5	**36.0**
Referenced Flow Rate[1]	dscfm	5,015	5,034	4,924	**4,991**

Notes:

[1] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix C

Table 3E: Sampling Summary - Flow Characteristics

SV-BASE COAT OBSV 1

Stack Gas Parameter		Test No. 1 TPM [1]	Test No. 2 TPM [1]	Test No. 3 TPM [1]	Average	Test No. 1 PM10 & PM2.5	Test No. 2 PM10 & PM2.5	Test No. 3 PM10 & PM2.5	Average
Testing Date		**8-Nov-23**	**8-Nov-23**	**8-Nov-23**		**21-Dec-23**	**21-Dec-23**	**22-Dec-23**	
Stack Temperature	°F	80	80	80	**80**	81	80	79	**80**
	°R	540	540	540	**540**	541	540	538	**540**
Moisture	%	1.4%	0.9%	0.8%	**1.0%**	0.9%	0.9%	0.8%	**0.9%**
Velocity	ft/s	49.7	51.1	49.1	**50.0**	44.4	43.9	43.5	**43.9**
Referenced Flow Rate[2]	dscfm	23,394	24,176	23,383	**23,651**	21,758	21,540	21,353	**21,550**
Sampling Isokinetic Rate	%	98.6	100.4	99.0	**99.3**	88	89	89	**89**

Notes:

[1] TPM = Sampling for total particulate matter

[2] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix D

Table 3F: Sampling Summary - Flow Characteristics

SV-BASE COAT OBSV 2

Stack Gas Parameter		Test No. 1 TPM [1]	Test No. 2 TPM [1]	Test No. 3 TPM [1]	Average
	Testing Date	8-Nov-23	8-Nov-23	8-Nov-23	
Stack Temperature	°F	84	84	84	**84**
	°R	544	544	544	**544**
Moisture	%	1.4%	1.3%	1.4%	**1.4%**
Velocity	ft/s	45.7	48.5	46.8	**47.0**
Referenced Flow Rate[2]	dscfm	21,371	22,722	21,891	**21,995**
Sampling Isokinetic Rate	%	100.1	100.6	100.7	**100.5**

Notes:

[1] TPM = Sampling for total particulate matter

[2] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix D

Table 3G: Sampling Summary - Flow Characteristics

SV-CLEAR COAT OBSV 1

Stack Gas Parameter		Test No. 1 TPM [1]	Test No. 2 TPM [1]	Test No. 3 TPM [1]	Average
	Testing Date	**8-Nov-23**	**8-Nov-23**	**8-Nov-23**	
Stack Temperature	°F	74	74	74	**74**
	°R	533	534	533	**533**
Moisture	%	2.2%	1.6%	0.9%	**1.6%**
Velocity	ft/s	40.3	40.2	39.5	**40.0**
Referenced Flow Rate[2]	dscfm	38,802	38,954	38,579	**38,778**
Sampling Isokinetic Rate	%	100.0	99.9	99.2	**99.7**

Notes:

[1] TPM = Sampling for total particulate matter

[2] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix D

Table 3H: Sampling Summary - Flow Characteristics

SV-CLEAR COAT OBSV 2

Stack Gas Parameter		Test No. 1 TPM [1]	Test No. 2 TPM [1]	Test No. 3 TPM [1]	Average	Test No. 1 PM10 & PM2.5	Test No. 2 PM10 & PM2.5	Test No. 3 PM10 & PM2.5	Average
	Testing Date	**8-Nov-23**	**8-Nov-23**	**8-Nov-23**		**21-Dec-23**	**21-Dec-23**	**22-Dec-23**	
Stack Temperature	°F	75	77	75	**76**	78	79	79	**78**
	°R	535	536	535	**535**	537	538	538	**538**
Moisture	%	2.6%	1.5%	0.9%	**1.7%**	1.7%	2.4%	1.8%	**2.0%**
Velocity	ft/s	45.4	45.4	42.5	**44.4**	41.6	41.9	41.9	**41.8**
Referenced Flow Rate[2]	dscfm	42,409	42,846	40,437	**41,897**	40,497	40,386	40,522	**40,468**
Sampling Isokinetic Rate	%	102.5	102.6	102.8	**102.6**	105	106	104	**105**

Notes:

[1] TPM = Sampling for total particulate matter

[2] All Referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix D

Table 4: DESTRUCTION EFFICIENCY EMISSIONS TABLE - THC / Methane / NMOC

Source: SHAP South RTO
RWDI Project # 2306854

Parameter	Test 1	Test 2	Test 3	Average
Date	7-Nov-23	7-Nov-23	7-Nov-23	--
Start Time:	8:38	11:02	12:42	--
Stop Time:	9:37	12:01	13:41	--
Duration (mins):	60	60	60	--
Average Production Number (E-Oven):	39	52	40	44
Average Production Number (Powder Oven):	47	62	49	53
Average Production Number (Basecoat):	63	64	75	67
Average Production Number (Clearcoat):	62	75	73	70
Average Temperature for RTO (°F):	1498	1501	1500	1500
Inlet TC Booth VOC Concentration (as propane) (ppm$_w$):	33.0	43.2	36.7	37.6
Inlet TC Booth VOC Concentration (as propane) (ppm$_d$):	33.7	44.0	37.4	38.4
Inlet TC Booth VOC Concentration (as propane) (mg/m^3_d):	61.7	80.7	68.5	70.3
Inlet TC Booth THC Concentration (as propane) (lb/hr$_d$):	20.0	26.3	23.7	23.3
Inlet TC Booth Methane Correction Factor	2.17	2.17	2.18	2.17
Inlet TC Booth CH4 Concentration (as methane) (ppm$_w$):	1.80	3.39	2.48	2.55
Inlet TC Booth CH4 Concentration (as Methane) (ppm$_d$):	1.84	3.45	2.52	2.60
Inlet TC Booth CH4 Concentration (as Propane) (ppm$_d$):	0.85	1.59	1.16	1.20
Inlet TC Booth CH4 Concentration (as propane) (mg/m^3_d):	1.55	2.91	2.12	2.20
Inlet TC Booth CH4 Concentration (as propane) (lb/hr$_d$):	0.50	0.95	0.73	0.73
Inlet TC Booth NMOC Concentration (as Propane) (ppm$_d$):	32.8	42.4	36.2	37.2
Inlet TC Booth NMOC Concentration (as propane) (mg/m^3_d):	60.2	77.8	66.4	68.1
Inlet TC BoothNMOC Concentration (as propane) (lb/hr$_d$):	19.5	25.4	22.9	22.6
Inlet TC Booth Flow Rate (dscfm):	86,413	87,134	92,312	88,620
Inlet TC Booth Flow Rate (dm^3/s):	40.77	41.11	43.55	41.81
Inlet TC Booth Moisture:	2.0%	1.8%	1.9%	1.9%
Inlet TC Oven/E-Coat Oven VOC Concentration (as propane) (ppm$_w$):	52.3	79.4	73.7	68.5
Inlet TC Oven/E-Coat Oven VOC Concentration (as propane) (ppm$_d$):	53.0	80.8	75.2	69.7
Inlet TC Oven/E-Coat Oven VOC Concentration (as propane) (mg/m^3_d):	97.2	148.1	137.8	127.7
Inlet TC Oven/E-Coat Oven THC Concentration (as propane) (lb/hr$_d$):	9.08	14.9	14.2	12.7
Inlet TC Oven/E-Coat Oven Methane Correction Factor	2.46	2.43	2.51	2.47
Inlet TC Oven/E-Coat Oven CH4 Concentration (as methane) (ppm$_w$):	3.03	2.68	3.24	2.98
Inlet TC Oven/E-Coat Oven CH4 Concentration (as Methane) (ppm$_d$):	3.07	2.72	3.30	3.03
Inlet TC Oven/E-Coat Oven CH4 Concentration (as Propane) (ppm$_d$):	1.25	1.12	1.31	1.23
Inlet TC Oven/E-Coat Oven CH4 Concentration (as propane) (mg/m^3_d):	2.29	2.06	2.41	2.25
Inlet TC Oven/E-Coat Oven CH4 Concentration (as propane) (lb/hr$_d$):	0.21	0.21	0.25	0.22
Inlet TC Oven/E-Coat Oven NMOC Concentration (as Propane) (ppm$_d$):	51.8	79.7	73.9	68.4
Inlet TC Oven/E-Coat Oven NMOC Concentration (as propane) (mg/m^3_d):	94.9	146.1	135.4	125.5
Inlet TC Oven/E-Coat Oven NMOC Concentration (as propane) (lb/hr$_d$):	8.87	14.7	14.0	12.5
Inlet TC Oven/E-Coat Oven Flow Rate (dscfm):	24,975	26,844	27,610	26,476
Inlet TC Oven/E-Coat Oven Flow Rate (dm^3/s):	11.78	12.66	13.03	12.49
Inlet TC Oven/E-Coat Oven Moisture:	1.5%	1.7%	2.0%	1.7%
Inlet E-Coat Dip Tank VOC Concentration (as propane) (ppm$_w$):	4.96	5.22	3.24	4.47
Inlet E-Coat Dip Tank VOC Concentration (as propane) (ppm$_d$):	5.02	5.28	3.28	4.52
Inlet E-Coat Dip Tank VOC Concentration (as propane) (mg/m^3_d):	9.20	9.68	6.00	8.29
Inlet E-Coat Dip Tank THC Concentration (as propane) (lb/hr$_d$):	0.17	0.18	0.11	0.16
Inlet E-Coat Dip Tank Methane Correction Factor	2.38	2.31	2.26	2.32
Inlet E-Coat Dip Tank CH4 Concentration (as methane) (ppm$_w$):	2.52	2.66	2.70	2.63
Inlet E-Coat Dip Tank CH4 Concentration (as Methane) (ppm$_d$):	2.55	2.70	2.74	2.66
Inlet E-Coat Dip Tank CH4 Concentration (as Propane) (ppm$_d$):	1.07	1.17	1.21	1.15
Inlet E-Coat Dip Tank CH4 Concentration (as propane) (mg/m^3_d):	1.96	2.14	2.22	2.11
Inlet E-Coat Dip Tank CH4 Concentration (as propane) (lb/hr$_d$):	0.037	0.040	0.041	0.039
Inlet E-Coat Dip Tank NMOC Concentration (as Propane) (ppm$_d$):	3.95	4.11	2.06	3.38
Inlet E-Coat Dip Tank NMOC Concentration (as propane) (mg/m^3_d):	7.24	7.54	3.78	6.19
Inlet E-Coat Dip Tank NMOC Concentration (as propane) (lb/hr$_d$):	0.14	0.14	0.07	0.12
Inlet ECOAT Dip Tank Flow Rate (dscfm):	5,015	5,034	4,924	4,991
Inlet ECOAT Dip Tank Flow Rate (dm^3/s):	2.37	2.37	2.32	2.37
Inlet ECOAT Dip Tank Moisture:	1.2%	1.2%	1.2%	1.2%
Total NMOC Inlet (lb/hr)	28.5	40.2	37.0	35.2
Total THC Inlet (lb/hr)	29.21	41.36	38.02	36.2
Outlet Flow Rate (dscfm):	122,433	125,785	124,513	124,244
Outlet Flow Rate (dm^3/s):	57.76	59.34	58.74	58.61
Moisture:	2.3%	1.5%	2.0%	1.9%
Outlet THC Concentration (as propane) (ppm$_w$):	0.76	0.61	0.55	0.64
Outlet THC Concentration (as propane) (ppm$_d$):	0.78	0.62	0.57	0.65
Outlet THC Concentration (as propane) (mg/m^3_d):	1.43	1.14	1.04	1.20
Outlet THC Concentration (as propane) (lb/hr$_d$):	0.65	0.53	0.48	0.56
Outlet Methane Correction Factor	2.52	2.52	2.40	2.48
Outlet CH4 Concentration (as methane) (ppm$_w$):	0.24	0.11	0.13	0.16
Outlet CH4 Concentration (as Methane) (ppm$_d$):	0.24	0.11	0.13	0.16
Outlet CH4 Concentration (as Propane) (ppm$_d$):	0.10	0.04	0.06	0.06
Outlet CH4 Concentration (as propane) (mg/m^3_d):	0.18	0.08	0.10	0.12
Outlet CH4 Concentration (as propane) (lb/hr$_d$):	0.080	0.037	0.048	0.055
Outlet NMOC Concentration (as Propane) (ppm$_d$):	0.68	0.58	0.51	0.59
Outlet NMOC Concentration (as propane) (mg/m^3_d):	1.25	1.06	0.93	1.08
OutletNMOC Concentration (as propane) (lb/hr$_d$):	0.57	0.50	0.44	0.50
Destruction Efficiency (THC) (%):	97.8%	98.7%	98.7%	98.4%
Destruction Efficiency (NMOC) (%):	98.0%	98.8%	98.8%	98.5%

Note: "d" indicated based on dry conditions

Table 5: Total Particulate Matter (PM), PM10 and PM2.5 - Averaged Results

Source	Parameter	Concentration	Emission Rate	ROP Limit
--	--	(gr/dscf)	--	--
SV-RTO SOUTH	PM	0.0012	0.0022 lb/1000 lb Exhaust Gas (wet)	0.0034 lb/1,000lb Exhaust Gas (wet)
	PM2.5		1.26 lb/hr	1.68 lb/hr
	PM10		1.26 lb/hr	1.68 lb/hr
SV-BASE COAT OBSV 1	PM	0.0007	0.0014 lb/1000 lb Exhaust Gas (wet)	0.0031 lb/1,000lb Exhaust Gas (wet)
	PM2.5 - November		0.15 lb/hr	0.11 lb/hr
	PM10 - November		0.15 lb/hr	0.11 lb/hr
	PM2.5 - December Re-Test	0.0002	0.027 lb/hr	0.11 lb/hr
	PM10 - December Re-Test	0.0002	0.039 lb/hr	0.11 lb/hr
SV-BASE COAT OBSV 2	PM	0.0005	0.0010 lb/1000 lb Exhaust Gas (wet)	0.0031 lb/1,000lb Exhaust Gas (wet)
	PM2.5		0.10 lb/hr	0.11 lb/hr
	PM10		0.10 lb/hr	0.11 lb/hr
SV-CLEAR COAT OBSV 1	PM	0.0004	0.0008 lb/1000 lb Exhaust Gas (wet)	0.0031 lb/1,000lb Exhaust Gas (wet)
	PM2.5		0.15 lb/hr	0.19 lb/hr
	PM10		0.15 lb/hr	0.19 lb/hr
SV-CLEAR COAT OBSV 2	PM	0.0006	0.0011 lb/1000 lb Exhaust Gas (wet)	0.0031 lb/1,000lb Exhaust Gas (wet)
	PM2.5 - November		0.21 lb/hr	0.19 lb/hr
	PM10 - November		0.21 lb/hr	0.19 lb/hr
	PM2.5 - December Re-Test	0.0003	0.093	0.19 lb/hr
	PM10 - December Re-Test	0.0004	0.12	0.19 lb/hr

Notes:

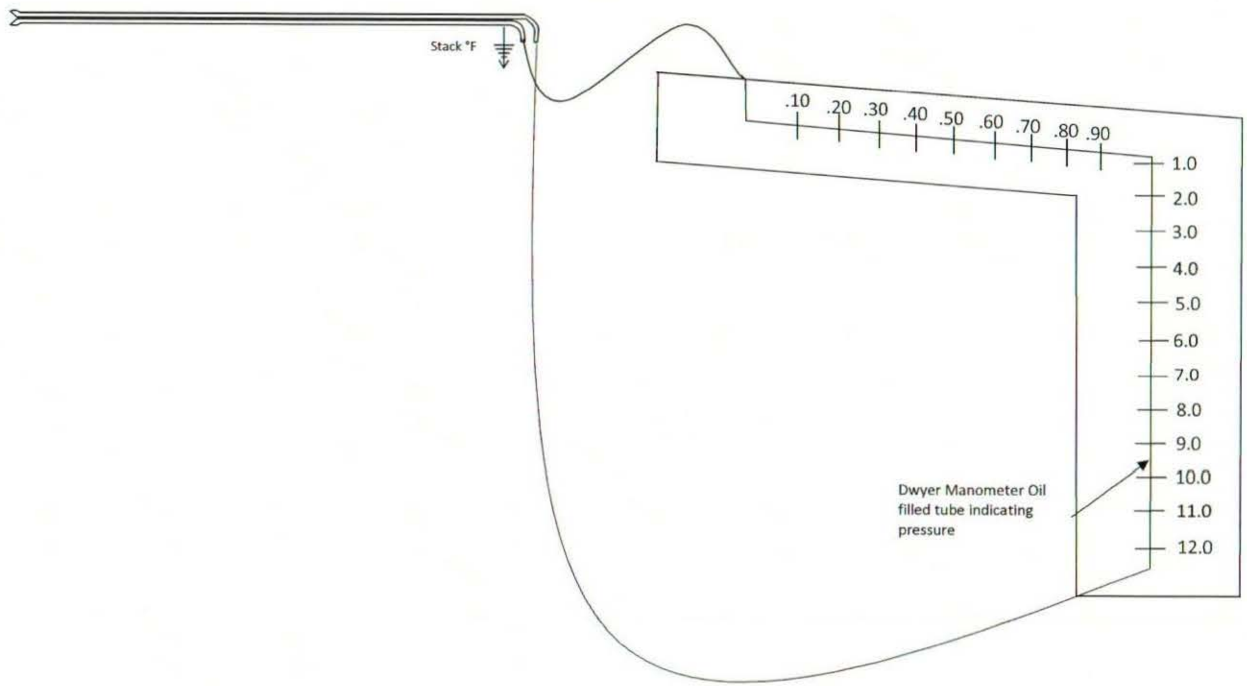
-Sampling followed U.S. EPA Method 5 (TPM); average of three tests

- All referenced concentration values are expressed at 68°F, 29.92 in. Hg and Actual Oxygen

Detailed sampling results including individual test results can be found in Appendix D

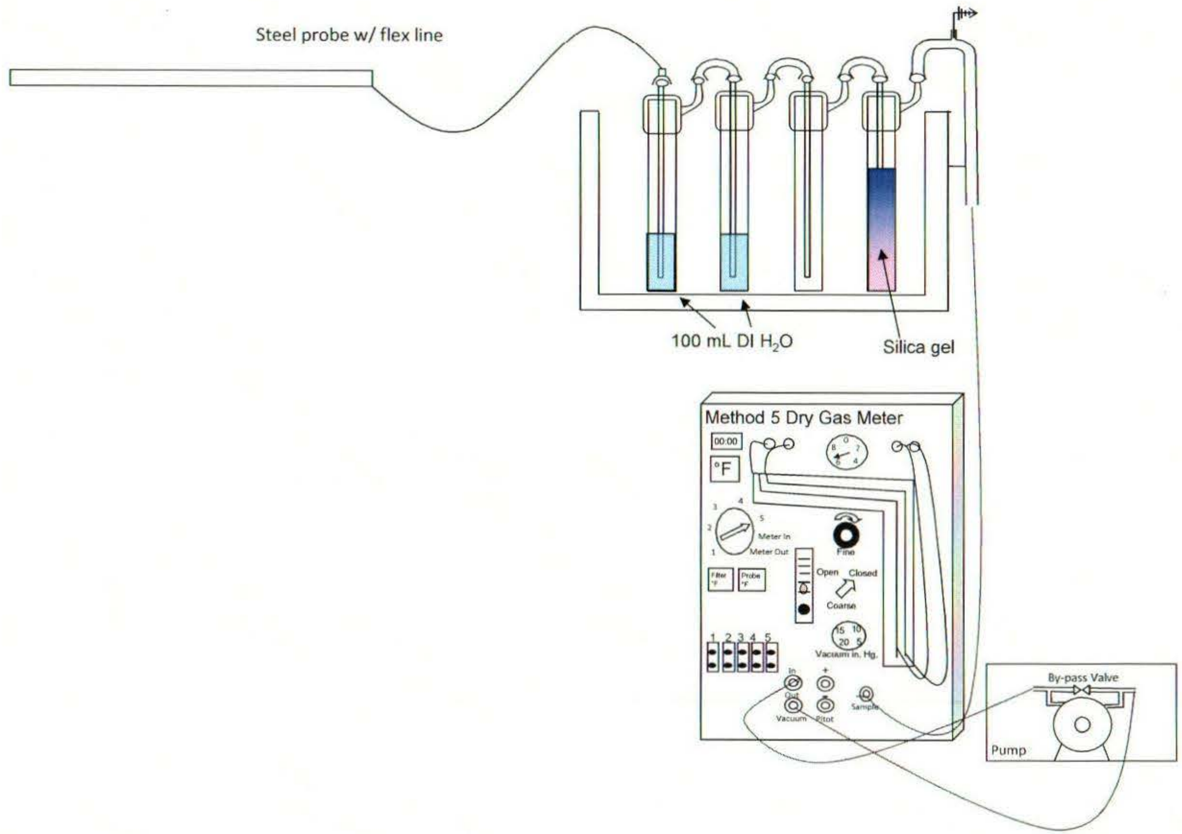
FIGURES

Figure No. #1: Schematic of USEPA Method 2



USEPA Method 2 **FCA US LLC** Sterling Heights Assembly Plant (SHAP) Sterling Heights, Michigan Project #2306854	**Date: November 7 & 8, 2023 & December 21 & 22, 2023**	

Figure No. #2: Schematic of US EPA Method 4



USEPA Method 4

FCA US LLC

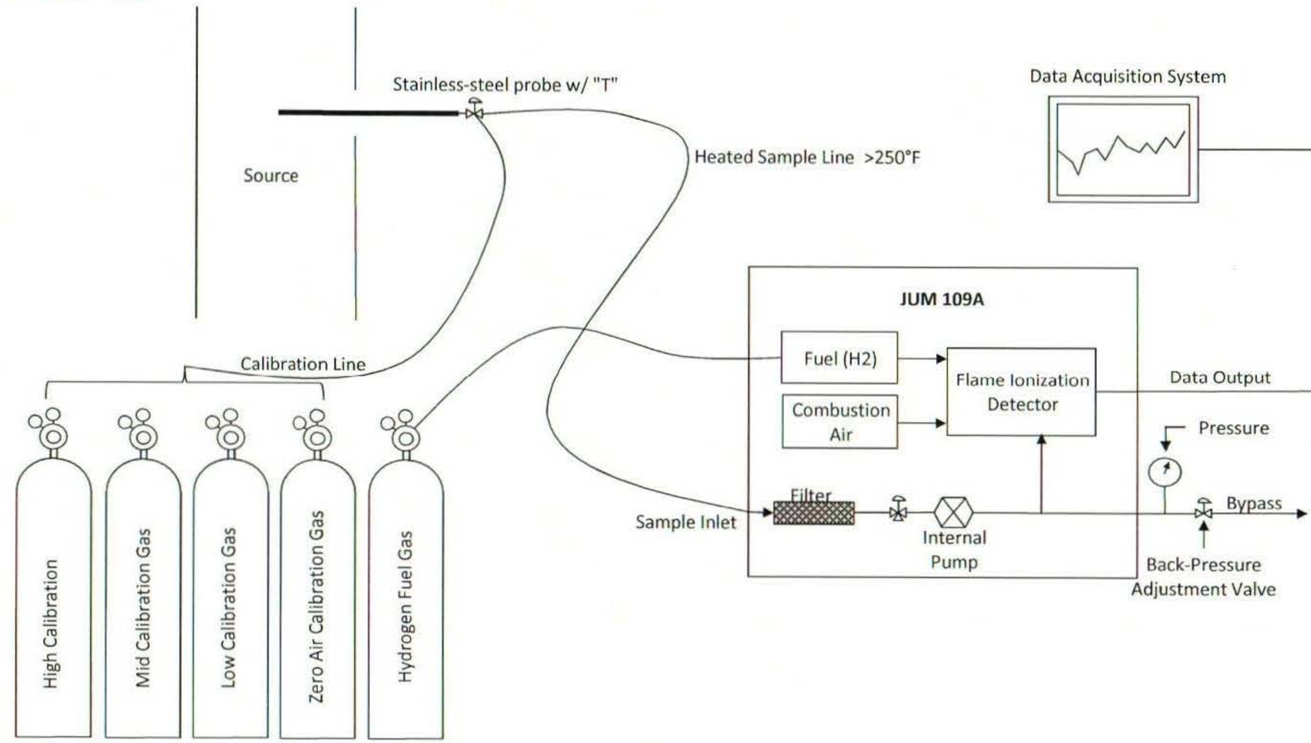
Sterling Heights Assembly Plant (SHAP)

Sterling Heights, Michigan

Project# 2306854

Date: November 7 & 8, 2023 and December 21 & 22, 2023

Figure No. 3: USEPA Method 25A Schematic



USEPA Method 25A

FCA US LLC

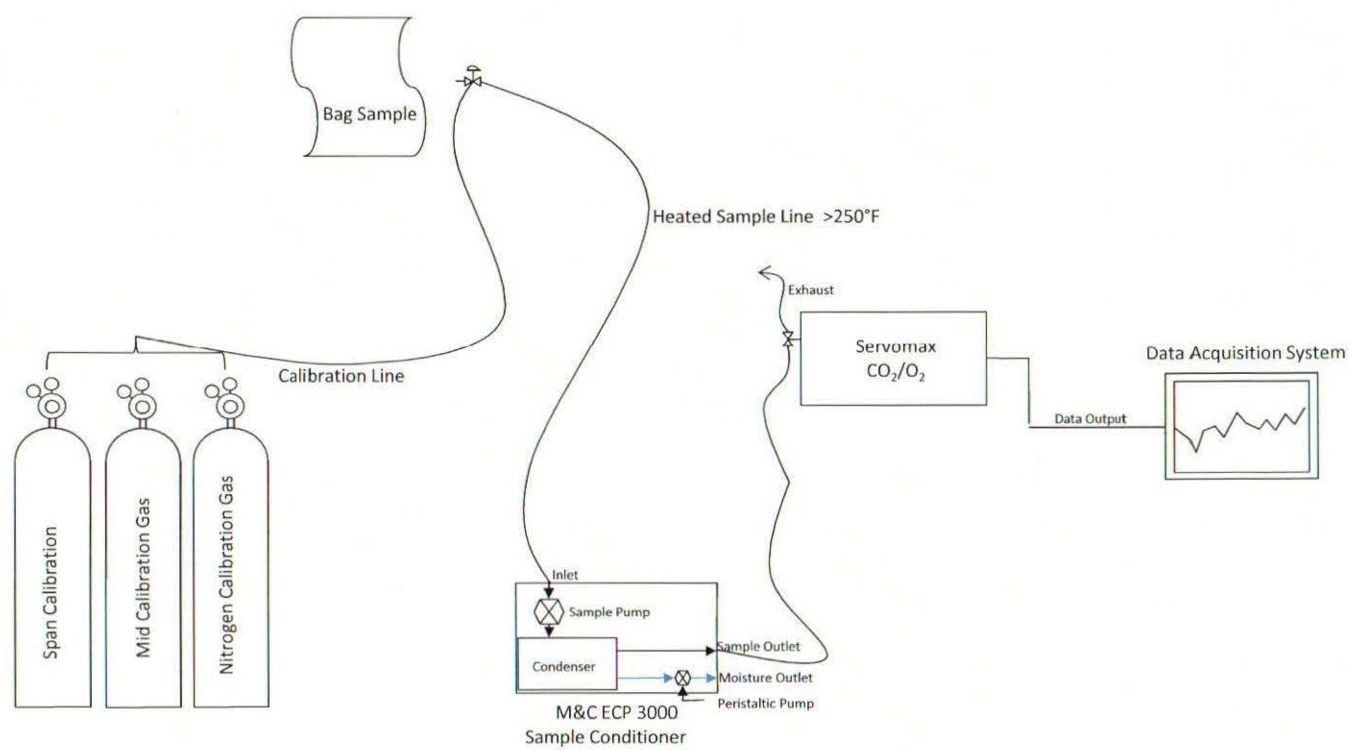
Sterling Heights Assembly Plant (SHAP)

Stelring Heights, Michigan

Project# 2306854

Date: November 7, 2023

Figure No. 4: USEPA Method 3A Schematic



USEPA Method 3A (Bag Sample)

FCA US LLC

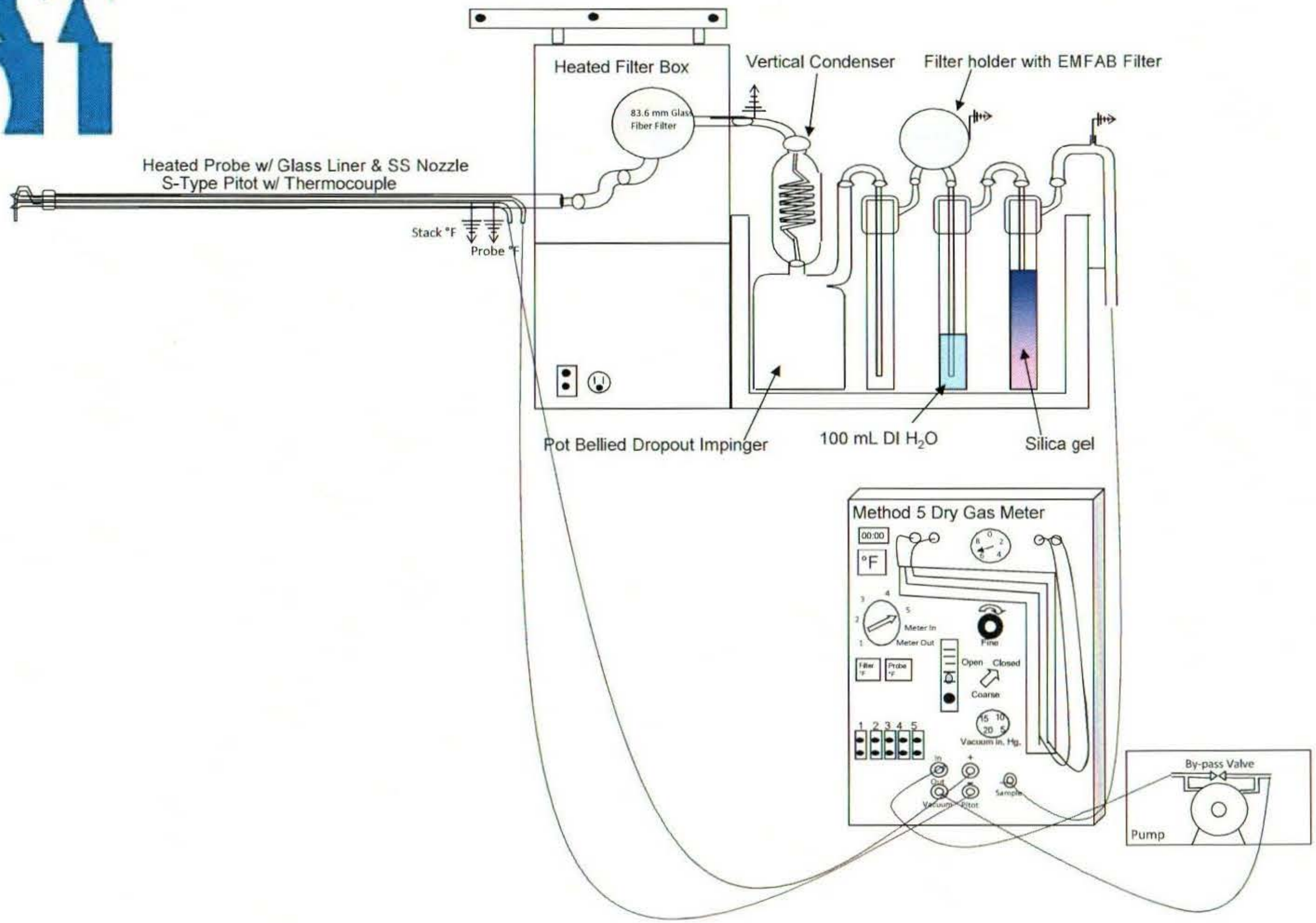
Sterling Heights Assembly Plant (SHAP)

Sterling Heights, MI

Project# 2306854

Date: November 7 & 8, 2023

Figure No. #6 Schematic of USEPA Method 5-202



USEPA Method 5/202

FCA US LLC

Sterling Heights Assembly Plant (SHAP)

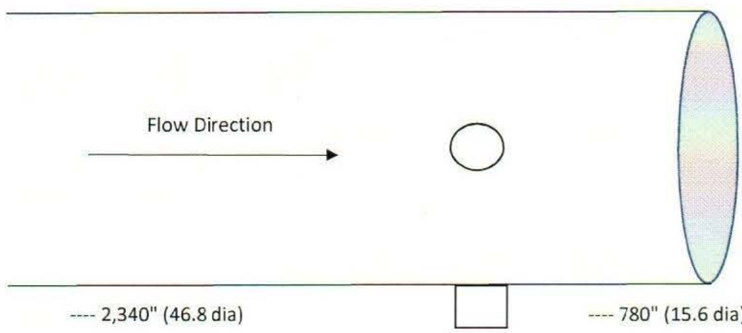
Sterling Heights, Michigan

Project #2306854

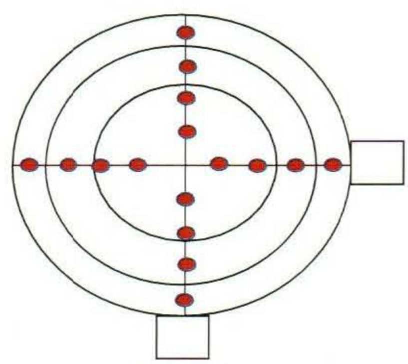
Date: November 7, 2023

Figure 8: Ovens (RTO Inlet)

Diameter: 50



Sampling Points (in.)	
1	2.2
2	7.3
3	14.8
4	35.2
5	42.7
6	47.8



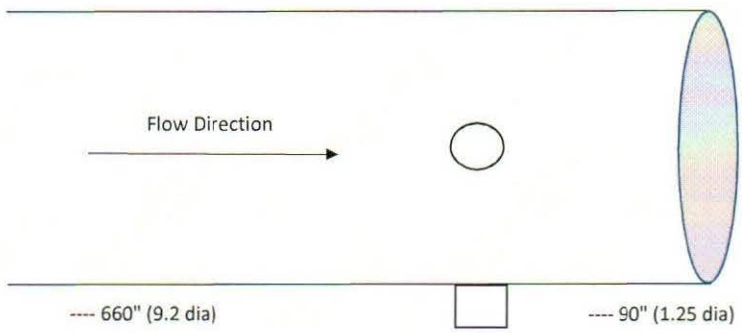
Not to scale

Ovens (RTO Inlet)
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

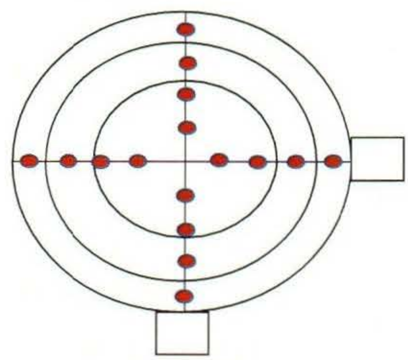
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 9: Booth (RTO Inlet)

Diameter: 72



Sampling Points (in.)	
1	2.3
2	7.6
3	14.0
4	23.3
5	47.7
6	58.0
7	64.4
8	69.7



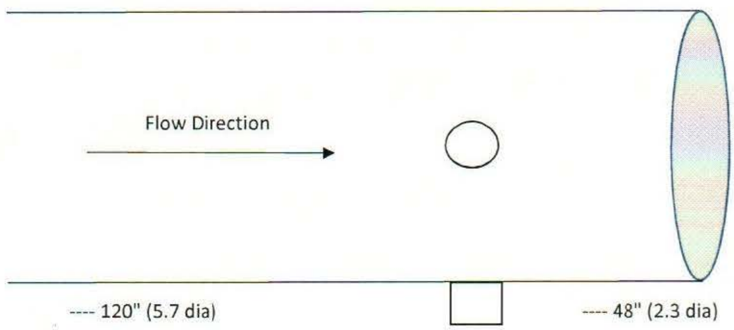
Not to scale

Booth (RTO Inlet)
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

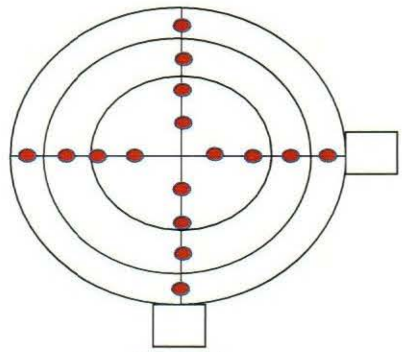
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 10: E-Coat Dip Tank (RTO Inlet)

Diameter: 21



Sampling Points (in.)	
1	0.7
2	2.2
3	4.1
4	6.8
5	14.2
6	16.9
7	18.8
8	20.3

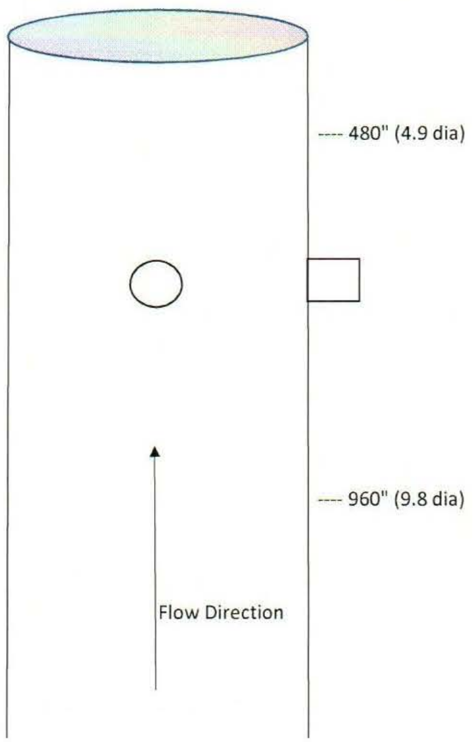


Not to scale

E-Coat Dip Tank (RTO Inlet)
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

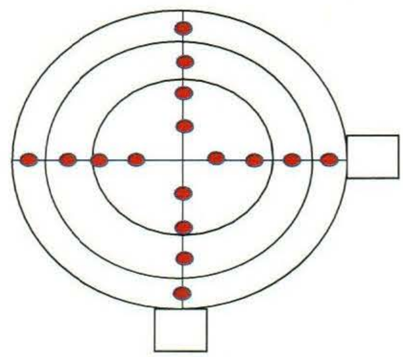
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 11: SV-RTO SOUTH Outlet



Diameter: 98 inches

Sample Points (in.)		
1	3.1	2.1
2	10.3	6.6
3	19.0	11.6
4	31.7	17.4
5	66.4	24.5
6	79.0	34.9
7	87.7	63.1
8	94.9	73.5
9		80.7
10		86.4
11		91.4
12		95.9



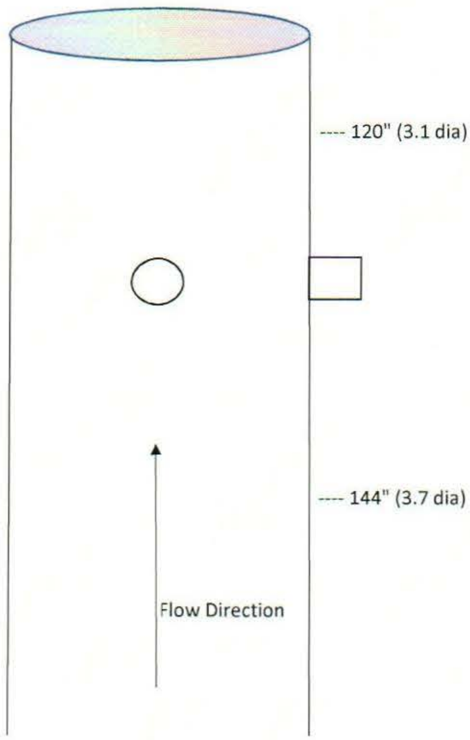
Not to scale

SV-RTO SOUTH
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

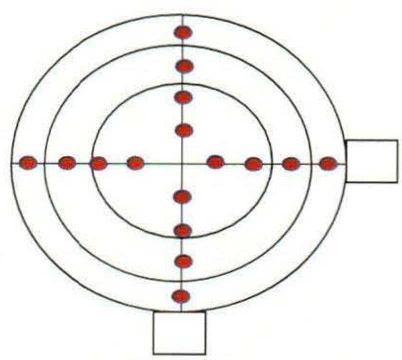
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 12: SV-BASE COAT OBSV 1 - USEPA Method 5

Diameter: 39 inches



Sampling Points (in.)	
1	0.8
2	2.6
3	4.6
4	6.9
5	9.8
6	13.9
7	25.1
8	29.3
9	32.1
10	34.4
11	36.4
12	38.2

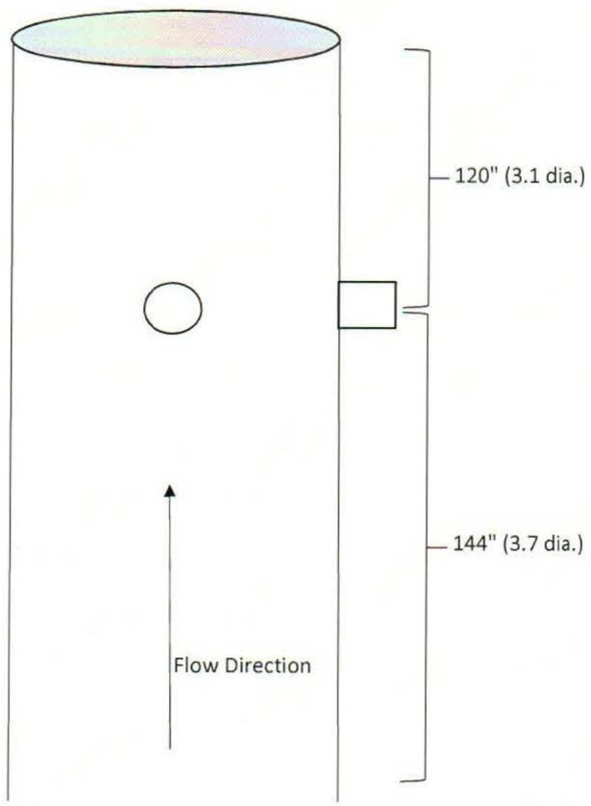


Not to scale

SV-BASE COAT OBSV 1 - US EPA Method 5
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

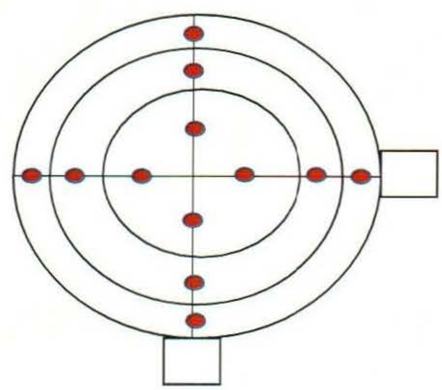
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure No. 13: SV-BASE COAT OBSV 1 Sampling Location and Traverse Points - US EPA Method 201A



Diameter: 39 inches

Sampling Points (in.)	
1	1.72
2	5.69
3	11.54
4	27.46
5	33.31
6	37.28



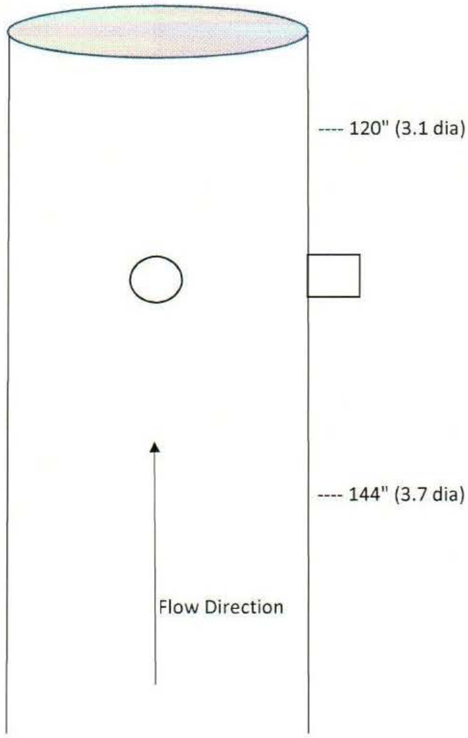
Not to scale

SV-BASE COAT OBSV 1 - USEPA Method 201A
FCA US LLC
Sterling Heights Assembly Plant (SHAP)
Sterling Heights, MI

Date:
December 21st and 22nd, 2023

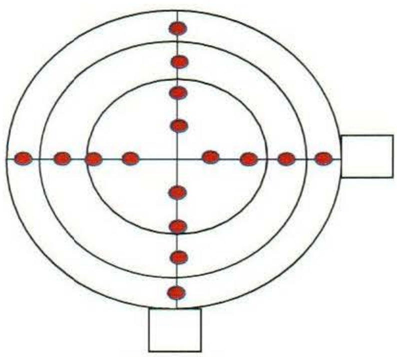
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 14: SV-BASE COAT OBSV 2



Diameter: 39 inches

Sampling Points (in.)	
1	0.8
2	2.6
3	4.6
4	6.9
5	9.8
6	13.9
7	25.1
8	29.3
9	32.1
10	34.4
11	36.4
12	38.2

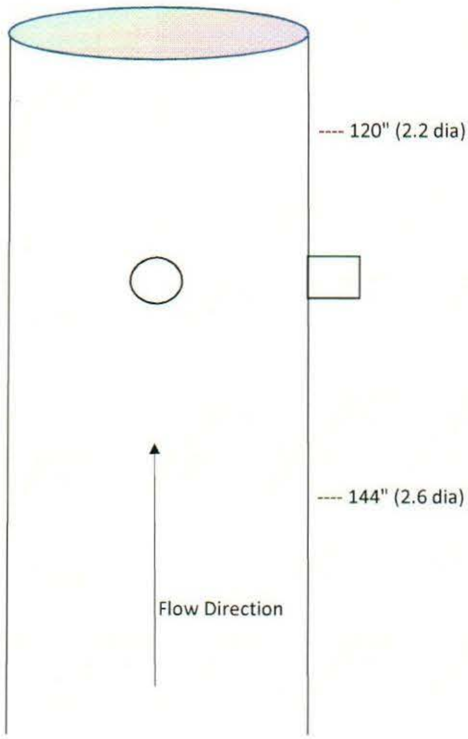


Not to scale

SV-BASE COAT OBSV 2
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

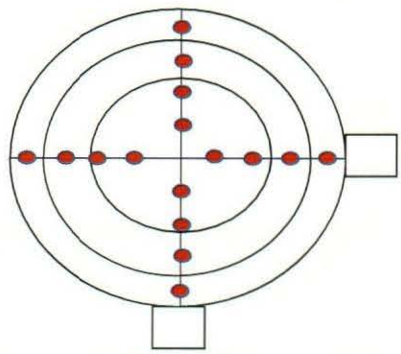
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 15: SV-CLEAR COAT OBSV 2



Diameter: 55 inches

Sampling Points (in.)	
1	1.2
2	3.7
3	6.5
4	9.7
5	13.8
6	19.6
7	35.4
8	41.3
9	45.3
10	48.5
11	51.3
12	53.9

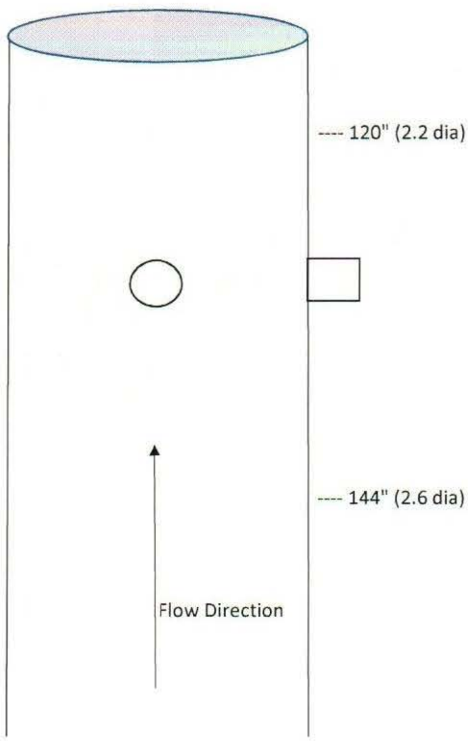


Not to scale

SV-CLEAR COAT OBSV 2
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

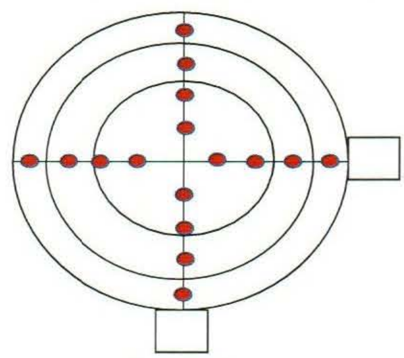
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure 16: SV-CLEAR COAT OBSV 2 - US EPA Method 5



Diameter: 55 inches

Sampling Points (in.)	
1	1.2
2	3.7
3	6.5
4	9.7
5	13.8
6	19.6
7	35.4
8	41.3
9	45.3
10	48.5
11	51.32
12	53.9

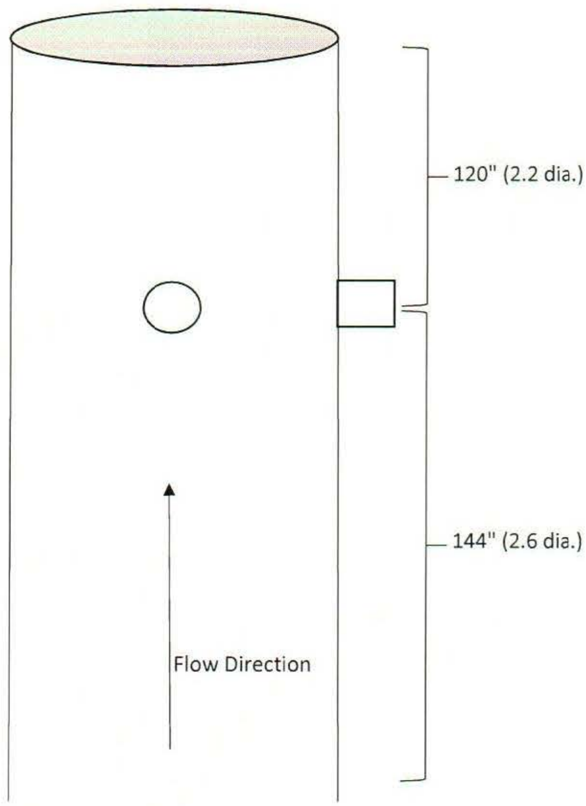


Not to scale

SV-CLEAR COAT OBSV 2 - US EPA Method 5
FCA US LLC
Sterling Heights Assemly Plant (SHAP)
Sterling Heights, Michigan

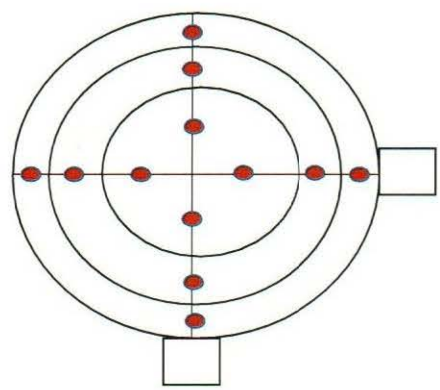
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure No. 17: SV-CLEAR COAT OBSV 2 Sampling Location and Traverse Points - US EPA Method 201A



Diameter: 55 inches

Sampling Points (in.)	
1	2.42
2	8.03
3	16.28
4	38.72
5	46.97
6	52.58



Not to scale

SV-CLEAR COAT OBSV 2 - USEPA Method 201A
FCA US LLC
Sterling Heights Assembly Plant (SHAP)
Sterling Heights, MI

Date:
December 21st and 22nd, 2023

RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309