FINAL REPORT

FCA US LLC

STERLING HEIGHTS, MICHIGAN

STERLING HEIGHTS ASSEMBLY PLANT: SOUTH PAINT SHOP

RWDI #1804652

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SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI AIR Inc. (RWDI) has been retained by Fiat Chrysler Automobiles (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). Under Permit to Install (PTI) 27-17B, the Source Testing Program completes the testing required for the South Paint Shop. The following outlines the sources and source groups as outlined in the PTI that were included in the program:

Flexible Group FG-TOPCOAT BOX:

- Particulate (including PM, PM_{10} and $PM_{2.5}$) testing for Observation Zone (Basecoat and Clearcoat); and
- Destruction Efficiency for the RTO.

Flexible Group FG-REPAIR BOX:

- Particulate (PM, PM_{10} and $PM_{2.5}$) testing for Spot Repair Booths

Flexible Group FG-RTO and POWDER OVEN PM:

- Particulate (PM (assumed equivalent to PM_{10} and $PM_{2.5}$) testing for RTO; and
- Particulate (PM, PM_{10} and $PM_{2.5}$) testing for Powder Ovens

As approved in the Source Testing Plan, FCA completed the sampling on one (1) line only of each of the basecoat and clearcoat observation zones. As noted in the PTI, there are four (4) exhaust stacks related to the observation zone. Testing was completed on basecoat line "2" or "South" line (SV-BASE COAT OBSV 2 BOX) and on clearcoat line "2" or "South" Line (SV-CLEAR COAT OBSV 2 BOX).

Please note that the original Source Testing Plan included EU-HEAVY REPAIR BOX as a source to be included in the program. As noted in the PTI, EU-HEAVY REPAIR BOX "the exhaust gases from the EU-HEAVY REPAIR BOX portion of FG-REPAIR BOX into the general in-plant environment". Therefore, this report does not include any emissions related to EU-HEAVY REPAIR BOX.

Similarly, since each of the powdercoat oven lines is identical, testing was completed on one (1) line only of powdercoat oven. Testing was completed on Powdercoat Oven Line "2" or "South" line (SV-POWDERCOAT CURE OVEN 2 BOX).

The test program included measurements of Particulate (PM, PM_{10} and $PM_{2.5}$) and Total Hydrocarbons (THC). The testing was completed to fulfill the requirements from the Michigan Department of Environmental Quality (MDEQ) under the Permit to Install (PTI) (Permit # 27-17B).

RWDI 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, 3a, 4, 5, 25A, 201a and 202.

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

For Particulate (PM, PM_{10} and $PM_{2.5}$), three (3) 120-minute test runs were completed on the RTO (SV-RTO) following USEPA Method 5 and three (3) 120-minute runs (USEPA Method 201A) will be completed on the following:

- Basecoat Observation Zone Stack (SV-BASE COAT OBSV 2 BOX);
- Clearcoat Observation Zone Stack (SV-CLEAR COAT OBSV 2 BOX);
- Powder Oven Stack (SV-POWDERCOAT CURE OVEN 2 BOX); and,
- Combined stack for Spot Repair (EU-SPOT REPAIR 1 BOX SPOT REPAIR 2 BOX).

Testing on the RTO was completed during the period of November 7th to 9th, 2018. Testing for all remaining sources noted above was completed on November 13th to 16th, 2018.

Testing was successfully completed on the process lines while all process equipment was operating under normal maximum operating conditions. A total of three test runs were completed for this testing program for each source.

Detailed information on individual tests runs can be found in the **'Appendices'** section. The summary of the results for Destruction Efficiency and PM, PM_{10} and $PM_{2.5}$ for source is provided in the **'Tables'** section.

The Results of the sampling program are outlined in the table below. Results of individual tests are presented in the Appendices.

SV-RTO – Summary of Results – Destruction Efficiency Based on Concentration

Test ID	Date	Start	End	TO Combustion Chamber Temperature (°F)	Inlet THC (ppmv) (as propane)	Outlet NMOC (ppmv) (as Propane)	Destruction Efficiency [1]
1	2018-11-08	07:04	08:03	1400	80.4	1.2	98.5%
2	2018-11-08	15:00	15:59	1400	89.4	1.2	98.7%
3	2018-11-09	07:31	08:30	1400	101.4	1.0	98.8%

Notes: [1] Destruction Efficiency is calculated based on Total Hydrocarbon concentration
ppmv- parts per million by volume
NMOC – Non-Methane Organic Compounds (Total Hydrocarbon minus the Methane portion)

SV-RTO – Summary of Results – Particulate Matter (PM, PM_{10}, $PM_{2.5}$)

Parameter	Average Results (3 Tests)		
	lb/1000 lb of exhaust gas	gr/dscf	lb/hr
Total Particulate	0.0003	0.00012	0.147
PM_{10} (includes condensable fraction)	Not Applicable	0.0018	1.67
$PM_{2.5}$ (includes condensable fraction)	Not Applicable	0.0018	1.67

Notes: lb/hr – pounds per hour
gr/dscf – grains/ dry standard cubic foot
lb/1000 lbs of exhaust gas – pounds per 1000 pounds of exhaust gas

SV-BASE COAT OBSV 2 BOX – Summary of Results – Particulate Matter (PM, PM_{10}, $PM_{2.5}$)

Parameter	Average Results (3 Tests)		
	lb/1000 lb of exhaust gas	gr/dscf	lb/hr
Total Particulate	0.0004	0.0002	0.046
PM_{10}	Not Applicable	0.0002	0.037
$PM_{2.5}$	Not Applicable	0.0001	0.017

Notes: lb/hr – pounds per hour
gr/dscf – grains/ dry standard cubic foot
lb/1000 lbs of exhaust gas – pounds per 1000 pounds of exhaust gas

SV-CLEAR COAT OBSV 2 BOX – Summary of Results – Particulate Matter (PM, PM_{10}, $PM_{2.5}$)

Parameter	Average Results (3 Tests)		
	lb/1000 lb of exhaust gas	gr/dscf	lb/hr
Total Particulate	0.0017	0.0009	0.359
PM_{10}	Not Applicable	0.0003	0.126
$PM_{2.5}$	Not Applicable	0.0002	0.066

Notes: lb/hr – pounds per hour
gr/dscf – grains/ dry standard cubic foot
lb/1000 lbs of exhaust gas – pounds per 1000 pounds of exhaust gas

SV-POWDERCOAT CURE OVEN 2 BOX – Summary of Results – Particulate Matter (PM, PM_{10}, $PM_{2.5}$)

Parameter	Average Results (3 Tests)		
	lb/1000 lb of exhaust gas	gr/dscf	lb/hr
Total Particulate	0.0009	0.0005	0.031
PM_{10} (includes condensable fraction)	Not Applicable	0.0247	1.62
$PM_{2.5}$ (includes condensable fraction)	Not Applicable	0.0246	1.60

Notes: lb/hr – pounds per hour
gr/dscf – grains/ dry standard cubic foot
lb/1000 lbs of exhaust gas – pounds per 1000 pounds of exhaust gas

EU-SPOT REPAIR 1 BOX / SPOT REPAIR 2 BOX – Summary of Results – Particulate Matter (PM, PM_{10}, $PM_{2.5}$)

Parameter	Average Results (3 Tests)		
	lb/1000 lb of exhaust gas	gr/dscf	lb/hr
Total Particulate	0.0003	0.0002	0.098
PM_{10}	Not Applicable	0.0001	0.052
$PM_{2.5}$	Not Applicable	0.0001	0.035

Notes: lb/hr – pounds per hour
gr/dscf – grains/ dry standard cubic foot
lb/1000 lbs of exhaust gas – pounds per 1000 pounds of exhaust gas

Testing was successfully completed under normal maximum operating conditions between November 7th and November 16th, 2018. All parameters were tested in accordance with USEPA referenced methodologies.

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1 INTRODUCTION

RWDI AIR Inc. (RWDI) has been retained by Fiat Chrysler Automobiles (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). Under Permit to Install (PTI) 27-17B, the Source Testing Program completes the testing required for the South Paint Shop. The following outlines the sources and source groups as outlined in the PTI that were included in the program:

Flexible Group FG-TOPCOAT BOX:

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- Destruction Efficiency for the RTO.

Flexible Group FG-REPAIR BOX:

- Particulate (PM, PM_{10} and $PM_{2.5}$) testing for Spot Repair Booths

Flexible Group FG-RTO and POWDER OVEN PM:

- Particulate (PM (assumed equivalent to PM_{10} and $PM_{2.5}$) testing for RTO; and
- Particulate (PM, PM_{10} and $PM_{2.5}$) testing for Powder Ovens

As approved in the Source Testing Plan, FCA completed the sampling on one (1) line only of each of the basecoat and clearcoat observation zones. As noted in the PTI, there are four (4) exhaust stacks related to the observation zone. Testing was completed on basecoat line "2" or "South" line (SV-BASE COAT OBSV 2 BOX) and on clearcoat line "2" or "South" Line (SV-CLEAR COAT OBSV 2 BOX).

Please note that the original Source Testing Plan included EU-HEAVY REPAIR BOX as a source to be included in the program. As noted in the PTI, EU-HEAVY REPAIR BOX "the exhaust gases from the EU-HEAVY REPAIR BOX portion of FG-REPAIR BOX into the general in-plant environment". Therefore, this report does not include any emissions related to EU-HEAVY REPAIR BOX.

Similarly, since each of the powdercoat oven lines is identical, testing was completed on one (1) line only of powdercoat oven. Testing was completed on Powdercoat Oven Line "2" or "South" line (SV-POWDERCOAT CURE OVEN 2 BOX).

The test program included measurements of Particulate (PM, PM_{10} and $PM_{2.5}$) and Total Hydrocarbons (THC). The testing was completed to fulfill the requirements from the Michigan Department of Environmental Quality (MDEQ) under the Permit to Install (PTI) (Permit # 27-17B).

RWDI 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, 3a, 4, 5, 25A, 201a and 202.

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

For Particulate (PM, PM_{10} and $PM_{2.5}$), three (3) 120-minute test runs were completed on the RTO (SV-RTO) following USEPA Method 5 and three (3) 120-minute runs (USEPA Method 201A) will be completed on the following:

- Basecoat Observation Zone Stack (SV-BASE COAT OBSV 2 BOX);
- Clearcoat Observation Zone Stack (SV-CLEAR COAT OBSV 2 BOX);
- Powder Oven Stack (SV-POWDERCOAT CURE OVEN 2 BOX); and,
- Combined stack for Spot Repair (EU-SPOT REPAIR 1 BOX SPOT REPAIR 2 BOX BOX).

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

Testing on the RTO was completed during the period of November 7th to 9th, 2018. Testing for all remaining sources noted above was completed on November 13th to 16th, 2018.

Testing was successfully completed on the process lines while all process equipment was operating under normal maximum operating conditions. A total of three test runs were completed for this testing program for each source.

Detailed information on individual tests runs can be found in the **'Appendices'** section. The summary of the results for Destruction Efficiency, PM, PM_{10} and $PM_{2.5}$ can be found in **'Tables'** section.

2 SOURCE DESCRIPTION

2.1 Plant and Sources Overview

SHAP operates an automobile assembly plant that produces Light Duty Trucks for FCA US LLC. Under Flexible Groups: FG-TOPCOAT BOX, FG-RTO and POWDER OVEN PM, and FG-REPAIR BOX these systems exhaust from the South Paint Shop (SPS).

The following table outlines the sampling program

Table 2.1.1: Summary of Sampling Program – SV-RTO

SV-RTO	
Emission Unit Description [Including Process Equipment & Control Device(s)]	FG-TOPCOAT 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). In addition, the RTO also controls the E-Coat dip tank emissions and E-Coat Cure Oven. These units are under EU-E COAT BOX.
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, 3A, 4, 5, 25A and 202 • The outlet sampling location for the RTO meets the USEPA Method 1 criteria. Therefore, the outlet sampling location was used for stack gas velocity, stack gas composition and moisture. • For the compliance testing, three (3) 1-hour tests concurrently at the inlet and outlet were completed for the destruction efficiency testing. Stack gas velocity, gas composition and moisture were taken during each of the tests at the outlet location only. Inlet data was also collected at the same time; however, the location was not ideal. • The sampling train for VOC consisted of an analyzer as described in USEPA Method 25A continuously sampling via heated sample line from both the inlet and outlet of the RTO simultaneously. • Particulate testing consisted of three (3) 120-minute tests.
Modifications	• Method 5 was used to sample for particulate instead of the Method 201a due to restrictions in the port size for the Method 201a inlet head. • Nitrogen purges was 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. • For comparison with the PM limit noted in the PTI, the condensable portion of the particulate in not included for the PM fraction calculation. The condensable fraction of the PM was included in the pounds per hour calculation for the PM10 and PM2.5 fractions. This is consistent with the determination of total PM (filterable) as noted in Method 5 as well as consistent with recommendations outlined in Method 202 since the permit limit is based on Method 5 PM values.

Table 2.1.2: Summary of Sampling Program – Basecoat and Clearcoat Observation Zones

SV-BASE COAT OBSV 2 BOX and SV-CLEARCOAT OBSV 2 BOX	
Emission Unit Description [Including Process Equipment & Control Device(s)]	FG-TOPCOAT BOX: For each of the Color Booth lines, the booth systems are equipment 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, 201A and 202 • Particulate testing consisted of three (3) 120-minute tests.
Modifications	• Sampling was completed on one (1) line for each of the basecoat and clearcoat observation zones. Sampling was completed on basecoat (SV-BASE COAT OBSV 2 BOX) and on clearcoat (SV-CLEAR COAT OBSV 2 BOX) • Since the stack gas or filtration temperature did not expected to exceed 85°F, the impingers will only be used for moisture determination as noted in Method 202. • 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 2.1.3: Summary of Sampling Program – Powdercoat Cure Oven

SV-POWDERCOAT CURE OVEN 2 BOX	
Emission Unit Description [Including Process Equipment & Control Device(s)]	FG-RTO and POWDER OVEN PM: Powdercoat application is applied to light duty truck boxes in the booth and the vehicles are sent to the powdercoat ovens for final curing. The two (2) powdercoat lines run in parallel to each other. The powdercoat oven exhausts exhaust to the atmosphere uncontrolled.
Parameter Tested	Particulate matter, in addition to Stack Gas Velocity, Stack gas composition, and Moisture
Testing Monitoring Methods	• USEPA Methods: 1, 2, 3, 4, 201A and 202 • Particulate testing consisted of three (3) 120-minute tests.
Modifications	• Sampling was completed on one (1) line only of powdercoat oven (SV-POWDERCOAT CURE OVEN 2 BOX) • 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. • For comparison with the PM limit noted in the PTI, the condensable portion of the particulate in not included for the PM fraction calculation. The condensable fraction of the PM was included in the pounds per hour calculation for the PM10 and PM2.5 fractions. This is consistent with the determination of total PM (filterable) as noted in Method 5 as well as consistent with recommendations outlined in Method 202 since the permit limit is based on Method 5 values.

Table 2.1.4: Summary of Sampling Program – Repair Booth

EU-SPOT REPAIR 1 BOX and EU-SPOT REPAIR 2 BOX	
Emission Unit Description [Including Process Equipment & Control Device(s)]	FG-REPAIR BOX: Spot and final repairs are completed on light duty truck boxes. The repair booths consist of sanding and spot painting operations. EU-SPOT REPAIR 1 BOX and EU-SPOT REPAIR 2 BOX are combined into one (1) stack (SV-SPOT REPAIR 1 BOX SPOT REPAIR 2 BOX).
Parameter Tested	Particulate matter, in addition to Stack Gas Velocity, Stack gas composition, and Moisture
Testing Monitoring Methods	• USEPA Methods: 1, 2, 3, 4, 201A and 202 • Particulate testing consisted of three (3) 120-minute tests.
Modifications	• Nitrogen purges were be 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. • The stack gas or filtration temperature did not expected to exceed 85°F, therefore, the impingers were only be used for moisture determination, as noted in Method 202.

2.2 Sampling Locations Overview

The sampling locations for each source are located outside. This following table summarizes the sampling locations.

Table 2.2.1: Summary of the Stack Characteristics

Source	Parameter	Diameter	Approximate Duct Diameters from Flow Disturbance	Number of Ports	Points per Traverse	Average Stack Temperature (°F)	Average Flow Rate (dscf)
SV-RTO	Particulate	98 inches	>8 up and >2 down	4	6	219°F	106,120
	THC				1 Total		
RTO Inlet	THC	101inches	<1 up and <1down	2	1 Total	140°F	133,990
SV-BASE COAT OBSV 2 BOX	Particulate	42 inches	>4 up and >2 down	2	6	75°F	26,920
SV-CLEAR COAT OBSV 2 BOX	Particulate	55 inches	>4 up and >2 down	2	6	82°F	45,740
SV-POWDERCOAT CURE OVEN 2 BOX	Particulate	39.25 inches	>4 up and >2 down	2	6	351°F	7,600
EU-SPOT REPAIR 1 BOX 2 BOX	Particulate	67.5 inches	>4 up and >2 down	2	6	77°F	62,330

Figure 2.2.1: Summary of RTO Sampling Locations

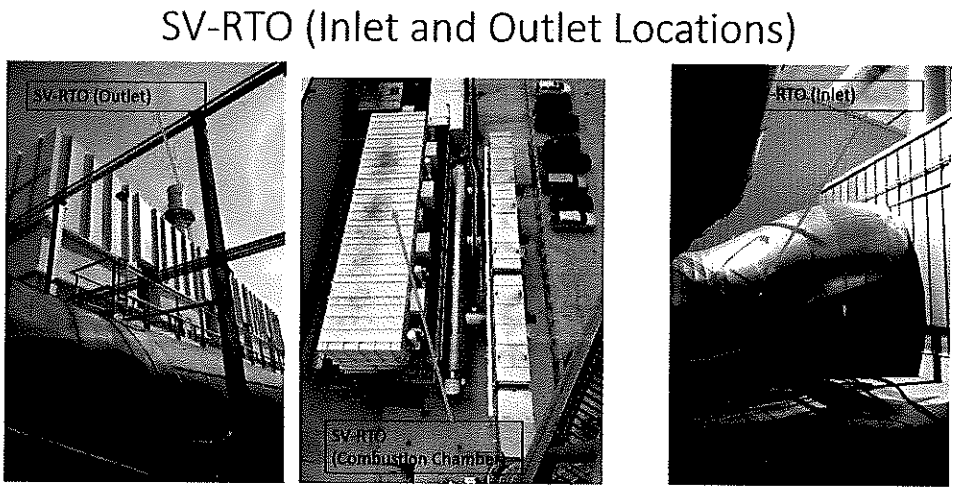


Figure 2.2.2: Summary of Basecoat and Clearcoat Observation Zone Exhausts

SV-BASE COAT OBSV 2 BOX &
SV-CLEAR COAT OBSV 2 BOX

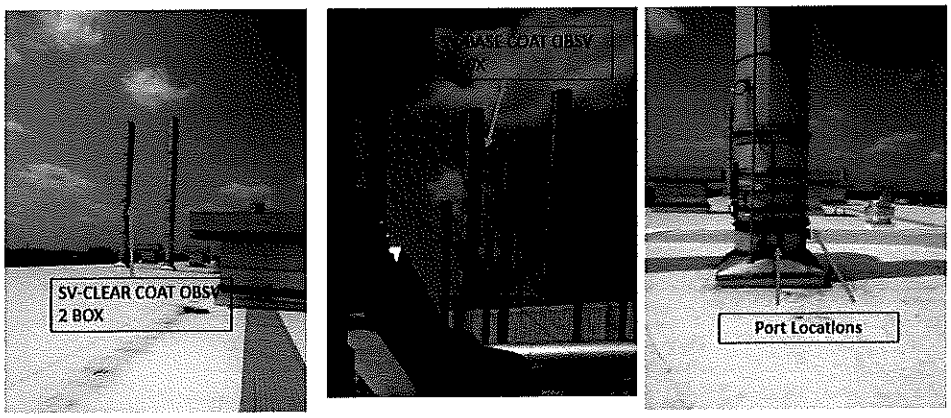


Figure 2.2.3: Summary of Powdercoat Cure Oven Exhaust

SV-POWDERCOAT CURE OVEN 2 BOX

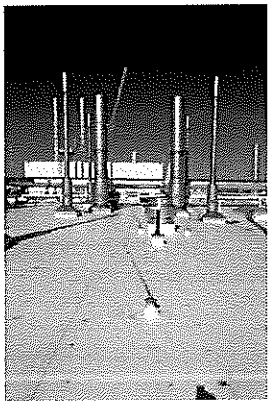
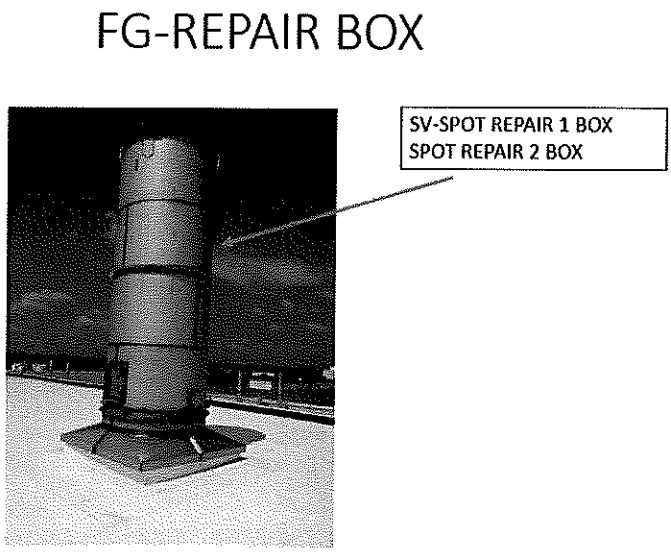


Figure 2.2.4: Summary of Repair (Spot Repair) Exhausts



3 TESTING METHODOLOGIES

3.1 Description of Testing Methodologies

The following section provides brief descriptions of the sampling methods and discusses any modifications to the reference test methods that were completed with the testing. A summary of test durations, methodologies and sampling location is provided in Section 2.1.

3.1.1 Summary of Specific Methodologies

3.1.1.1 Stack Velocity, Temperature, and Volumetric Flow Rate Determination

The exhaust velocities and flow rates were determined following the US EPA Method 2, "Determination of Stack Gas Velocity and Flow Rate (Type S Pitot Tube)". Velocity measurements were taken with a pre-calibrated S-Type pitot tube and incline manometer. Volumetric flow rates were determined following the equal area method as outlined in US 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 digital temperature indicator.

The dry molecular weight of the stack gas were determined following calculations outlined in US EPA Method 3, "Determination of Molecular Weight of Dry Stack Gas". Stack moisture content were determined through direct condensation and according to US EPA Method 4, "Determination of Moisture Content of Stack Gas". Moisture was collected at a single point during each test.

3.1.1.2 Sampling for Total Hydrocarbons (Destruction Efficiency)

VOC Destruction Efficiency testing was performed simultaneously on the inlet and outlet of the RTO (SV-RTO). The measurements were taken continuously following the USEPA Method 25A on the outlet (using a non-methane/methane analyzer) and on the inlet (using a total hydrocarbon analyzer). Stratification checks for oxygen were completed on the RTO exhaust at three locations.

The compliance test consisted of three 60-minute tests on the RTO at the preferred temperature as predetermined from SHAP (1400°F). Regular performance checks on the CEM were carried out by zero and span calibration checks using USEPA Protocol calibration gases. These checks will verify the ongoing precision of the monitor with time by introducing pollutant-free (zero) air followed by known calibration gas (span) into the monitor. The response of the monitor to pollutant-free air and the corresponding sensitivity to the span gases were 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 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 will be within ±5% of the introduced calibration gas concentrations. 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 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 test run 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 the probe outlet so that the calibration gases will be analyzed in the same manner as the flue gas samples.

A gas sample was continuously extracted from the stack and delivered to a series of gas analyzers, which measure the pollutant or diluent concentrations in the gas. The analyzers were calibrated on-site using EPA Protocol No. 1 certified calibration mixtures. 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 maintained the gas temperature above 250°F in order to prevent condensation of stack gas moisture within the line.

3.1.1.3 Sampling for Particulate Matter (PM, PM_{10} and $PM_{2.5}$) - SV-RTO

For the SV-RTO, 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). The ports installed on the SV-RTO were 4" ports that do not allow for the Method 201a head to be inserted into the stack. As such, any particulate measured during the test to be equivalent to the PM_{10} and $PM_{2.5}$ fractions (plus condensable). For comparison with the PM limit noted in the PTI, the condensable portion of the particulate was not included for the PM fraction calculation. The condensable fraction of the PM was included in the pounds per hour calculation for the PM_{10} and $PM_{2.5}$ fractions. This is consistent with the determination of total PM (filterable) as noted in Method 5 as well as consistent with recommendations outlined in Method 202 since the permit limit is based on Method 5 values.

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.

3.1.1.4 Sampling for Particulate Matter (PM, PM_{10} and $PM_{2.5}$) - SV-BASE COAT OBSV 2 BOX, SV-CLEAR COAT OBSV 2 BOX, SV-POWDERCOAT CURE OVEN 2 BOX, and SV-SPOT REPAIR 1 BOX/2 BOX.

Particulate matter ($PM/PM_{10}/PM_{2.5}$) will be sampled following procedures outlined in U.S. EPA Method 201a and Method 202 (Condensable Particulate Matter) for SV-BASE COAT OBSV 2 BOX, SV-CLEAR COAT OBSV 2 BOX, SV-POWDERCOAT CURE OVEN 2 BOX, and SV-SPOT REPAIR 1 BOX / 2 BOX.

As stated in Method 202, the impinger portion was only recovered and included as $PM_{10}/PM_{2.5}$ if the filtration temperature exceeds 85°F. For all noted sources with the exception of the SV-POWDERCOAT CURE OVEN 2 BOX, the stack gas or filtration temperature did not exceed 85°F, therefore, the impingers were only used for moisture determination. For the SV-POWDERCOAT CURE OVEN 2 BOX, Method 202 was followed for recovery of condensable. Nitrogen purge was not be 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. For comparison with the PM limit noted in the PTI, the condensable portion of the particulate was not included for the PM fraction calculation. The condensable fraction of the PM was included in the pounds per hour calculation for the PM_{10} and $PM_{2.5}$ fractions. This is consistent with the determination of total PM (filterable) as noted in Method 5 as well as consistent with recommendations outlined in Method 202 since the permit limit is based on Method 5 values.

3.2 Process Data

During the emissions testing, plant process data was monitored and collected by SHAP personnel to ensure representative operation of the facility. The following information was collected:

1. Production rate for each process; and
2. RTO operating temperature for during each test.

Process data is provided in **Section 5.0** below.

4 RESULTS

The average emission results are presented in the **'Tables'** section of this report. **Table 1** presents a summary of the parameters and methodology used in this sampling program. **Table 2 to 7** presents a summary of results for each source. Detailed information regarding each test can be found in **Appendices B and C**.

Laboratory results are included in **Appendix D**. All calibration information for the equipment used for this study is included in **Appendix E**.

4.1 Discussion of Results

All other concentrations were corrected to reference conditions of, 20°C (68 °F), and 101.3 kPa (29.92 in.Hg) with the exception of the Particulate (PM) results which is expressed as 'wet' as noted in the PTI for comparison to the PM limits.

5 OPERATING CONDITIONS

Operating conditions during the sampling were monitored by FCA personnel. All equipment was operated under normal maximum operating conditions.

Below is a summary of the production data during the testing periods.

Table 5.1-1: Summary of Production Data –Destruction Efficiency Testing

Parameter	Test 1	Test 2	Test 3
Date	2018-11-08	2018-11-08	2018-11-09
Start Time	07:04	15:00	07:31
End Time	08:03	15:59	08:30
RTO Temperature (°F)	1400	1400	1400
Production Counts			
E-Coat Dip Tank	28	62	63
E-Coat Oven North	29	26	27
E-Coat Oven South	30	27	28
Basecoat 1 Booth	38	40	22
Basecoat 2 Booth	29	38	23
Clearcoat 1 Booth	35	43	26
Clearcoat 2 Booth	30	41	25
Color 1 Oven	30	36	25
Color 2 Oven	29	35	35

Table 5.1-2: Summary of Production Data – Particulate Testing – SV-RTO

Parameter	Test 1	Test 2	Test 3
Date	2018-11-07	2018-11-08	2018-11-09
Start Time	09:31	07:04	07:04
End Time	11:16	09:28	09:32
RTO Temperature (°F)	1400	1400	1400
Production Counts			
E-Coat Dip Tank	65 (Max in Dip Tank)	41 (Max in Dip Tank)	63 (Max in Dip Tank)
E-Coat Oven North	27 (Max in Oven)	29 (Max in Oven)	30 (Max in Oven)
E-Coat Oven South	27 (Max in Oven)	30 (Max in Oven)	30 (Max in Oven)
Basecoat 1 Booth	66 (Total Test)	80 (Total Test)	62 (Total Test)
Basecoat 2 Booth	51 (Total Test)	73 (Total Test)	57 (Total Test)
Clearcoat 1 Booth	77 (Total Test)	81 (Total Test)	60 (Total Test)
Clearcoat 2 Booth	51 (Total Test)	74 (Total Test)	61 (Total Test)
Color 1 Oven	37 (Max in Oven)	34 (Max in Oven)	25 (Max in Oven)
Color 2 Oven	32 (Max in Oven)	32 (Max in Oven)	35 (Max in Oven)

Table 5.1-3: Summary of Production Data – Particulate Testing – SV-BASE COAT OBSV 2 BOX

Parameter	Test 1	Test 2	Test 3
Date	2018-11-13	2018-11-13	2018-11-14
Start Time	08:44	11:54	07:10
End Time	10:52	14:00	09:31
Production Counts			
SV-BASE COAT OBSV 2 BOX	74	74	84

Table 5.1-4: Summary of Production Data – Particulate Testing – SV-CLEAR COAT OBSV 2 BOX

Parameter	Test 1	Test 2	Test 3
Date	2018-11-13	2018-11-13	2018-11-14
Start Time	08:07	12:15	07:21
End Time	10:09	14:18	09:47
Production Counts			
SV-CLEAR COAT OBSV 2 BOX	79	73	88

Table 5.1-5: Summary of Production Data – Particulate Testing – SV-POWDERCOAT CURE OVEN 2 BOX

Parameter	Test 1	Test 2	Test 3
Date	2018-11-15	2018-11-16	2018-11-16
Start Time	12:01	06:50	09:29
End Time	13:00	09:15	11:55
Production Counts			
SV-POWDERCOAT CURE OVEN 2 BOX	11:30 to 12:30 – 65 12:30 to 13:30 - 43	0600 to 0700 – 75 0700 to 0800 – 77 0800 to 0900 - 66	09:00 to 10:00 – 33 10:00 to 11:30 – 90 11:30 to 12:30 - 57

Table 5.1-6: Summary of Production Data – Particulate Testing – SV-SPOT REPAIR 1 BOX / 2 BOX

Parameter	Test 1	Test 2	Test 3
Date	2018-11-14	2018-11-15	2018-11-15
Start Time	11:55	06:38	09:03
End Time	14:07	08:43	11:00
Production Counts			
SV-SPOT REPAIR 1 BOX	3	3	3
SV-SPOT REPAIR 2 BOX	3	3	3

Contact was maintained between the operator and the sampling team. A member of the RWDI sampling team contacted the operator before each test, to ensure that the process was at normal maximum operating conditions.

6 CONCLUSIONS

This source test program was successfully completed on RTO, Basecoat Observation Zone South, Clearcoat Observation Zone South, Powdercoat Oven South, and Repair Booth (1&2) stacks on November 7th to November 16th, 2018 2018. All parameters were tested in accordance with referenced.

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