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TRANSMITTAL

DATE: 2022-04-11

Project Reference No: 2203138

TO: Tammy Bell
Technical Programs Unit - AQD
State of Michigan - Environment, Great Lakes
and Energy (EGLE)

ADDRESS/EMAIL: bellt4@michigan.gov

FROM: Thomas Caltrider

EMAIL: thomas.caltrider@stellantis.com

RE: **FCA US LLC**
Source Testing Report for Detroit Assembly Complex - Mack (DACM)
Permit to Install (PTI) 14-19A
Detroit, Michigan

Dear Ms. Bell,

Please find enclosed one (1) copy of the Source Testing Report for FCA US LLC Detroit Assembly Complex - Mack (DACM). The Source Testing Report covers the re-testing of the following sources as per the Permit to Install (PTI) 14-19A: observation zone exhausts serving the Primer (EUPRIMER) and basecoat/clearcoat (EUTOPCOAT). The retesting of these particulate matter emissions sources was completed following the implementation of several odor mitigation strategies. Should you have any questions, please feel free to contact me directly.

Kind regards,

FCA US LLC (Stellantis)

A handwritten signature in cursive script that reads "Thomas Caltrider".

Thomas Caltrider, P.E.
Corporate Environmental Programs
Environmental Health & Safety

cc: April Wendling (Michigan EGLE - Detroit District Office, AQD)
Paul-Diven (FCA US LLC - DACM, Environmental Specialist)
Brad Bergeron (RWDI AIR Inc.)

NA2155-test-20220207

FINAL REPORT



FCA US LLC

DETROIT, MICHIGAN

**DETROIT ASSEMBLY COMPLEX MACK (DACM):
SOURCE TESTING PROGRAM PARTICULATE MATTER RE-TEST
FOR BASECOAT OBSERVATION, CLEARCOAT OBSERVATION, &
TUTONE OBSERVATION**

RWDI #2203138

April 11, 2022

SUBMITTED TO

**Michigan Department of
Environment,
Great Lakes, and Energy (EGLE)**
AQD - Technical Programs Unit (TPU)
Constitution Hall 2nd Floor | South
525 West Allegan Street
Lansing, Michigan 48933

**April Wendling
Michigan Department of
Environment,
Great Lakes, and Energy (EGLE)**

**FCA US LLC
Detroit Assembly Complex Mack
(DACM)**
4000 Saint Jean Street
Detroit, MI 48214

SUBMITTED BY

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EXECUTIVE SUMMARY

RWDI USA Inc. (RWDI) was retained by FCA US LLC (FCA) to complete an air emission testing program at their Detroit Assembly Complex – Mack (DACM) located at 4000 Saint Jean Street, Detroit, Michigan. DACM operates an automobile assembly plant that produces the all-new Jeep Grand Cherokee L. The original testing was completed in October of 2021. This re-test included the modifications that were made to the facility with respect to ambient flash modifications and booth rebalancing. FCA communicated with EGLE regarding the retesting and a new Source Testing Plan was agreed was not required prior to re-testing. Under Permit to Install (PTI) 14-19A the emissions testing covers the required testing outlined in the FGAUTOASSEMBLY Flexible group (V(1)) for the following:

- PM/PM₁₀/PM_{2.5} emissions from EUPRIMER and EUTOPCOAT observations zones. For Basecoat 1 and Clearcoat 1, since the two (2) coating lines are virtually identical, the observation stacks from one (1) line was tested and assumed to be representative of the 2nd line. For Tutone (or EU-PRIMER) there is only one (1) exhaust for the Primer/Tutone booth.

In addition, PM/PM₁₀/PM_{2.5} emissions from EUSPOTREPAIR exhaust stack were also measured. However, based upon conversations with Ms. Angellotti of EGLE, the testing was deemed invalid. Since there were no modifications to the EUSPOTREPAIR, FCA decided not to complete the retesting. The results from the invalid runs are included in the report in **Appendix H**.

Sections V(1) and V(2) of FGAUTOASSEMBLY require the verification of PM, PM₁₀, and PM_{2.5} emission rates from representative particulate units.

DACM recorded the production rate of vehicles processed during each particulate test from each of the sources. Testing was completed during the week of February 7th, 2022.

**DETROIT ASSEMBLY COMPLEX MACK (DACM): SOURCE TESTING PROGRAM
 PARTICULATE MATTER RE-TEST FOR BASECOAT OBSERVATION, CLEARCOAT OBSERVATION,
 & TUTONE OBSERVATION
 FCA US LLC
 RWDI#2203138
 April 11, 2022**



A summary of the results can be found in the "Tables" section of this report.

Table i: Average Emission Data – Particulate Testing (PM/PM₁₀/PM_{2.5})

Source	Parameter	Emission Rate (lb/hr)			
		Run 1	Run 2	Run 3	Average
SVPRMOBS (Tutone)	PM	0.30	0.12	0.09	0.17
	PM ₁₀	0.06	0.07	0.05	0.06
	PM _{2.5}	0.04	0.03	0.01	0.02
SVC1BCOBS (Basecoat 1)	PM	0.08	0.13	0.10	0.10
	PM ₁₀	0.05	0.09	0.04	0.06
	PM _{2.5}	0.03	0.04	0.01	0.03
SVC1CCOBS (Clearcoat 1)	PM	0.13	0.21	0.47	0.27
	PM ₁₀	0.07	0.09	0.39	0.18
	PM _{2.5}	0.02	0.06	0.01	0.03

Table ii: Average Concentration Data – Particulate Testing (PM/PM₁₀/PM_{2.5})

Source	Parameter	Emission Rate (gr/dscf)			
		Run 1	Run 2	Run 3	Average
SVPRMOBS (Tutone)	PM	0.00125	0.00049	0.00040	0.00071
	PM ₁₀	0.00026	0.00030	0.00024	0.00027
	PM _{2.5}	0.00015	0.00012	0.00005	0.00010
SVC1BCOBS (Basecoat 1)	PM	0.00043	0.00069	0.00053	0.00055
	PM ₁₀	0.00028	0.00047	0.00021	0.00032
	PM _{2.5}	0.00014	0.00019	0.00006	0.00013
SVC1CCOBS (Clearcoat 1)	PM	0.00063	0.00104	0.00230	0.00132
	PM ₁₀	0.00034	0.00042	0.00192	0.00089
	PM _{2.5}	0.00009	0.00028	0.00007	0.00015



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1 INTRODUCTION

RWDI USA Inc. (RWDI) was retained by FCA US LLC (FCA) to complete an air emission testing program at their Detroit Assembly Complex – Mack (DACM) located at 4000 Saint Jean Street, Detroit, Michigan. DACM operates an automobile assembly plant that produces the all-new Jeep Grand Cherokee L. The original testing was completed in October of 2021. This re-test included the modifications that were made to the facility with respect to ambient flash modifications and booth rebalancing. FCA communicated with EGLE regarding the retesting and a new Source Testing Plan was agreed was not required prior to re-testing. Under Permit to Install (PTI) 14-19A the emissions testing covers the required testing outlined in the FGAUTOASSEMBLY Flexible group (V(1)) for the following:

- PM/PM₁₀/PM_{2.5} emissions from EUPRIMER and EUTOPCOAT observations zones. For Basecoat 1 and Clearcoat 1, since the two (2) coating lines are virtually identical, the observation stacks from one (1) of each line was tested and assumed to be representative of the 2nd line. For Tutone (or EU-PRIMER) there is only one (1) exhaust for the Primer/Tutone booth.

In addition, PM/PM₁₀/PM_{2.5} emissions from EUSPOTREPAIR exhaust stack were also measured. However, based upon conversations with Ms. Angellotti of EGLE, the testing was deemed invalid. Since there were no modifications to the EUSPOTREPAIR, FCA decided not to complete the retesting. The results from the invalid runs are included in the report in **Appendix H**.

Sections V(1) and V(2) of FGAUTOASSEMBLY require the verification of PM, PM₁₀, and PM_{2.5} emission rates from representative particulate units.

Testing was successfully completed while all process equipment was operating under normal operating conditions.

Testing was completed during the week of February 7th, 2022. Testing of emissions was conducted by Mr. Mason Sakshaug, Mr. Juan Vargas, Mr. Ben Durham, Mr. Brad Bergeron, Mr. Zach Huber, and Mr. Steve Smith of RWDI. Mr. Thomas Caltrider and Mr. Paul Diven were on-site to monitor the process operation and witness the testing on behalf of FCA US LLC. Ms. Regina Angellotti from the State of Michigan Department of Environment, Great Lakes and Energy (EGLE) was on-site to witness the testing at DACM.

2 PROCESS DESCRIPTION

DACM operates an automobile assembly plant that produces the all-new Jeep Grand Cherokee L models for FCA US LLC under Emission Units and Flexible Group: EUPRIMER, EUTOPCOAT, EUSPOTREPAIR and FG-AUTOASSEMBLY. Additional information for process emissions can be found in **Appendix A**.



3 SAMPLING LOCATIONS AND METHODS

3.1 Sampling Location

This following table summarizes the sampling locations.

Table 3.1.1: Summary of the Stack Characteristics

Source	Parameter	Diameter	Approximate Duct Diameters from Flow Disturbance	Number of Ports	Points per Traverse	Total Points per Test	Stack Temperature
SVPRMOBS (Tutone)	PM/PM ₁₀ /PM _{2.5}	44"	~7 downstream and >8 upstream	2	6	12 PM/Flow	77°F
SVC1BCOBS (Basecoat 1)	PM/PM ₁₀ /PM _{2.5}	36"	~9 downstream and >8 upstream	2	6	12 PM/Flow	77°F
SVC1CCOBS (Clearcoat 1)	PM/PM ₁₀ /PM _{2.5}	40"	~8 downstream and >8 upstream	2	6	12 PM/Flow	80°F
SVRPRCS (Rapid Repair)	PM/PM ₁₀ /PM _{2.5}	77.5"	~8 downstream and >2 upstream	2	6	12 PM/Flow	75°F

Example photos of sources are provided below:



Figure 3.1.1.1 – Tutone Observation Zone Exhaust



Figure 3.1.1.2 – Basecoat Observation Zone Exhaust

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Figure 3.1.1.3 – Clearcoat Observation Zone Exhaust

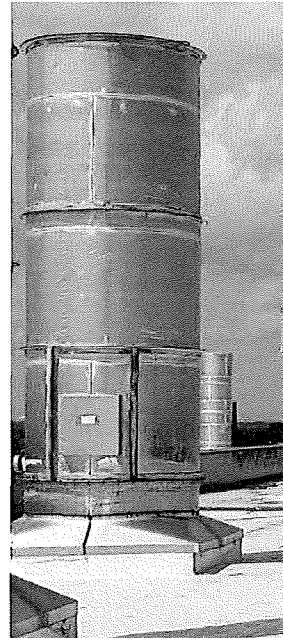


Figure 3.1.1.4 – Rapid Repair Booth Exhaust

3.2 Test Methodology

3.2.1 Velocity, Temperature and Volumetric Flow Rate Determination

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. 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 was determined following calculations outlined in U.S. EPA Method 3, “Gas Analysis for the Determination of Dry Molecular Weight”. The stack was assumed to be at ambient conditions for the determination of the dry molecular weight. Stack moisture content was determined through direct condensation and according to U.S. EPA Method 4, “Determination of Moisture Content of Stack Gases”.

3.2.2 Sampling for Particulate Matter (PM, PM₁₀ and PM_{2.5})

Particulate matter (PM/PM₁₀/PM_{2.5}) was sampled following procedures outlined in U.S. EPA Method 201A. Method 202 was only used if the filter temperature exceeded 85°F.



As stated in Method 202, *"If the gas filtration temperature exceeds 30°C (85°F) and you must measure both the filterable and condensable (material that condenses after passing through a filter) components of total primary (direct) PM emissions to the atmosphere, then you must combine the procedures in this method with the procedures in Method 201A of appendix M to this part for measuring filterable PM. However, if the gas filtration temperature never exceeds 30°C (85°F), then use of this method is not required to measure total primary PM"*.

For Basecoat 1 Observation (SVC1BCOBS), Tutone (SVPRMOBS), and Clearcoat 1 Observation (SVC1CCOBS), the filtration temperature did not exceed 85°F, therefore, the results for PM/PM₁₀/PM_{2.5} only include the Method 201A portion. For Spot Repair (EUSPOTREPAIR), the filtration temperature did not exceed 85°F, therefore the results for PM only include the Method 5 portion. Nitrogen purges were not completed post sample to remove sulphates for any of the sampling as sulfur dioxide exposure was not expected to be an issue at this source location. This was approved in the Source Testing Plan. Blank corrections were made in accordance with EPA Method 201A and Method 5, where applicable.

For the observation zone exhausts (Primer, Basecoat and Clearcoat), the tests were 120 minutes in duration. For the Spot Repair Exhaust, the tests were 240 minutes.

3.3 Quality Assurance/ Quality Control Measures

Applicable quality assurance measures were implemented during the sampling program to ensure the integrity of the results. These measures included detailed documentation of field data, equipment calibrations for all measured parameters, completion of Chain of Custody forms when submitting laboratory samples, and submission of field blank samples to the laboratories.

All samplers were bench tested and calibrated in RWDI's office prior to field deployment. For each sample collected with a Method 5 sampling train, both pre- and post- leak checks were conducted by plugging the inlet and drawing a vacuum of equal to or greater than the vacuum recorded during the test. Dry gas meter reading leakage rates greater than 4 percent of the average sampling rate or 0.00057 m³/min (0.02 cfm), whichever is less, were considered unacceptable. Similar leak check procedures for pitot tube and pressure lines were also conducted. Daily temperature sensor audits were completed by noting the ambient temperature, as measured by a reference thermometer, and comparing these values to those obtained from the stack sensor. Leak checks for each test were documented on the field data sheets presented in the applicable appendices for each sample parameter.

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. **Tables 2 and 3** provide details on the stack gas characteristics and PM/PM₁₀/PM_{2.5} results, respectively. Detailed information regarding each particulate test can be found in **Appendices B through C**.



All calibration information for the equipment used for this study is included in **Appendix D**. Laboratory results are included in **Appendix E**. Production data is summarized in **Appendix F**. Sample calculations are included in **Appendix G**.

4.1 Discussion of Results

Sampling was completed during the week of February 7th, 2022. A summary of the results can be found in the Tables section of this report and the more detailed calculations can be found in **Appendices B, C, and D**.

PM/PM₁₀/PM_{2.5} was measured (U.S. EPA Method 201A). The results have been summarized below in **Table 4.1.1 and 4.1.2**.

Concentrations were corrected to reference conditions of 68 °F, and 29.92 in.Hg. Operating conditions during the sampling were monitored by FCA personnel. All equipment was operated under normal representative operating conditions.

Table 4.1.1: Average Emission Data – Particulate Testing (PM/PM₁₀/PM_{2.5})

Source	Parameter	Emission Rate (lb/hr)			
		Run 1	Run 2	Run 3	Average
SVPRMOBS (Tutone)	PM	0.30	0.12	0.09	0.17
	PM ₁₀	0.06	0.07	0.05	0.06
	PM _{2.5}	0.04	0.03	0.01	0.02
SVC1BCOBS (Basecoat 1)	PM	0.08	0.13	0.10	0.10
	PM ₁₀	0.05	0.09	0.04	0.06
	PM _{2.5}	0.03	0.04	0.01	0.03
SVC1CCOBS (Clearcoat 1)	PM	0.13	0.21	0.47	0.27
	PM ₁₀	0.07	0.09	0.39	0.18
	PM _{2.5}	0.02	0.06	0.01	0.03

Table 4.1.2: Average Concentration Data – Particulate Testing (PM/PM₁₀/PM_{2.5})

Source	Parameter	Emission Rate (gr/dscf)			
		Run 1	Run 2	Run 3	Average
SVPRMOBS (Tutone)	PM	0.00125	0.00049	0.00040	0.00071
	PM ₁₀	0.00026	0.00030	0.00024	0.00027
	PM _{2.5}	0.00015	0.00012	0.00005	0.00010
SVC1BCOBS (Basecoat 1)	PM	0.00043	0.00069	0.00053	0.00055
	PM ₁₀	0.00028	0.00047	0.00021	0.00032
	PM _{2.5}	0.00014	0.00019	0.00006	0.00013
SVC1CCOBS (Clearcoat 1)	PM	0.00063	0.00104	0.00230	0.00132
	PM ₁₀	0.00034	0.00042	0.00119	0.00089
	PM _{2.5}	0.00009	0.00028	0.00007	0.00015

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5 OPERATING CONDITIONS

Operating conditions during sampling were monitored by DACM personnel. 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 MODIFICATIONS

PM/PM10/PM2.5 emissions from EUSPOTREPAIR exhaust stack were also measured. However, based upon conversations with Ms. Angellotti of MI EGLE, the testing was deemed invalid. Since there were no modifications to the EUSPOTREPAIR since the previous emissions testing and report submittal to EGLE, FCA decided not to complete the retesting. The results from the invalid runs are included in the report.

Data from the invalid EUSPOTREPAIR sample runs is provided in **Appendix H**.

7 CONCLUSIONS

Testing was successfully completed during the week of February 7th, 2022. All parameters were tested in accordance with referenced methodologies.

TABLES



Table 1: Summary of Sampling Parameters and Methodology

Source	No. of Tests per Stack	Sampling Parameter	Sampling Method
Basecoat 1 Observation ^[2]	3	Stack Parameters	U.S. EPA ^[1] Methods 1-4
	3	PM/PM10/PM2.5	U.S. EPA ^[1] Method 201A
Tutone Observation	3	Stack Parameters	U.S. EPA ^[1] Methods 1-4
	3	PM/PM10/PM2.5	U.S. EPA ^[1] Method 201A
Clearcoat 1 Observation	3	Stack Parameters	U.S. EPA ^[1] Methods 1-4
	3	PM/PM10/PM2.5	U.S. EPA ^[1] Method 201A
Rapid Repair Booth	3	Stack Parameters	U.S. EPA ^[1] Methods 1-4
	3	PM/PM10/PM2.5	U.S. EPA ^[1] Method 5

Notes:

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