EXECUTIVE SUMMARY

RWDI AIR Inc. (RWDI) was retained by FCA US LLC to complete a removal efficiency (RE) on test one (1) Zeolite Concentrator from the EU-TOPCOAT 3 Color Booth Line at Jefferson North Assembly Plant (JNAP) located in Detroit, Michigan. JNAP operates under Renewable Operating Permit No. MI-ROP-N2155-2017 (copy of ROP is included in **Appendix A**). The testing followed United States Environmental Protection Agency (USEPA) reference method 25A. Discussions of Modifications are provided in the report ***(Section 5)*** that further outline the details of the testing completed.

Concentrator 3 was initially tested on November 17, 2020 and a final test report was subsequently submitted. In this test program, a retest was completed on January 26, 2021 for the EU-TOPCOAT3 Concentrator due to the replacement of Zeolite. The test report covers the retesting for validation of removal efficiency for a single (1) Zeolite Concentrator servicing the EU-TOPCOAT3 line.

Coatings are applied to vehicles automatically and manually in paint booths. Vehicles proceed through a curing oven. This line consists of three basecoat robot zones, basecoat electrostatic bells, basecoat automatic conventional zone, heated flash zone, two clearcoat robot zones, clearcoat electrostatic bells, and a cure oven. Emissions from the basecoat bell zones, basecoat automatic conventional zone, heated flash and clearcoat bell zones are ducted to a filter house, concentrator, and a thermal oxidizer (TO). Emissions from the ovens are controlled by separate thermal oxidizers. To clarify, Color 1, 2, and 3 each have one dedicated concentrator system, one dedicated TO to treat concentrator emissions, and one dedicated TO treat oven emissions. There is a total of 3 concentrator systems, 3 concentrator TOs, and 3 oven TOs.

Three 1-hour tests concurrently at the inlet and outlet were conducted in order to determine the average removal efficiency of the concentrator. Source testing for Concentrator 3 was completed on January 26, 2021. Sampling was witnessed by Ms. Regina Angellotti from the Michigan Air Quality Division (AQD) of the State of Michigan Department of Environment, Great Lakes and Energy (EGLE). FCA representatives were on-site to ensure the process conditions were within representative operating conditions and included Mr. Thomas Caltrider and Mr. Steven Szura.

The sampling train for Volatile Organic Compounds (VOCs) consisted of a flame ionization analyzer as described in USEPA Method 25A. VOC concentrations were continuously collected via heated sample lines from both the inlet and outlet for each of the sources noted above, simultaneously.

Results of the sampling program are outlined in the following table. Results of individual tests are presented in the **Appendix D**.

Source: EU-TOPCOAT 3 – Concentrator (January 26, 2021)

Test ID	Date	Start	End	Vehicles per hour	Inlet THC (ppm) (as propane)	Inlet Methane [2] (ppm) (as propane)	Inlet NMOC (ppm) (as propane)	Outlet THC (ppm) (as Propane)	Outlet Methane [2] (ppm) (as propane)	Inlet NMOC (ppm) (as propane)	Removal Efficiency [1] (as NMOC)
1	2021-1-26	08:11	09:10	21	81.2	8.69	72.5	16.9	7.87	9.03	87.5%
2	2021-1-26	09:30	10:29	19	86.2	10.6	75.6	20.6	9.89	10.7	85.8%
3	2021-1-26	10:55	11:54	20	78.7	12.0	66.7	21.2	11.3	9.90	85.2%
				Average	**82.0**	**10.4**	**71.6**	**19.6**	**9.67**	**9.88**	**86.2%**

Notes:
[1] Removal efficiency was calculated based on total non-methane concentrations (NMOC).
[2] Methane to Propane conversion determined per test (see **Appendix D**)
NMOC – Non-methane organic compound

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1 INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by FCA US LLC to complete a removal efficiency test (RE) for volatile organic compounds (VOCs) on one (1) Zeolite Concentrator from the EU-TOPCOAT 3 Color Lines at Jefferson North Assembly Plant (JNAP) located in Detroit, Michigan. JNAP operates under Renewable Operating Permit No. MI-ROP-N2155-2017. The testing followed United States Environmental Protection Agency (USEPA) reference method 25A.

Three 1-hour tests concurrently at the inlet and outlet of the source were conducted in order to determine the average removal efficiency of the concentrator. The sampling was conducted on January 26, 2021. Sampling was witnessed by Ms. Regina Angellotti from the Michigan Air Quality Division (AQD) of the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE). FCA representatives were on-site to ensure the process conditions were within representative operating conditions and included Mr. Thomas Caltrider and Mr. Steven Szura.

The notification of intent to conduct the air compliance testing was submitted to the EGLE on December 28, 2020. The quality assurance review of the test plan was completed on January 12, 2021. A copy of the Source Testing Plan and ROP is in **Appendix A** of this report and a copy of the quality assurance review is provided in **Appendix B**.

2 SOURCE DESCRIPTION

2.1 Facility Description

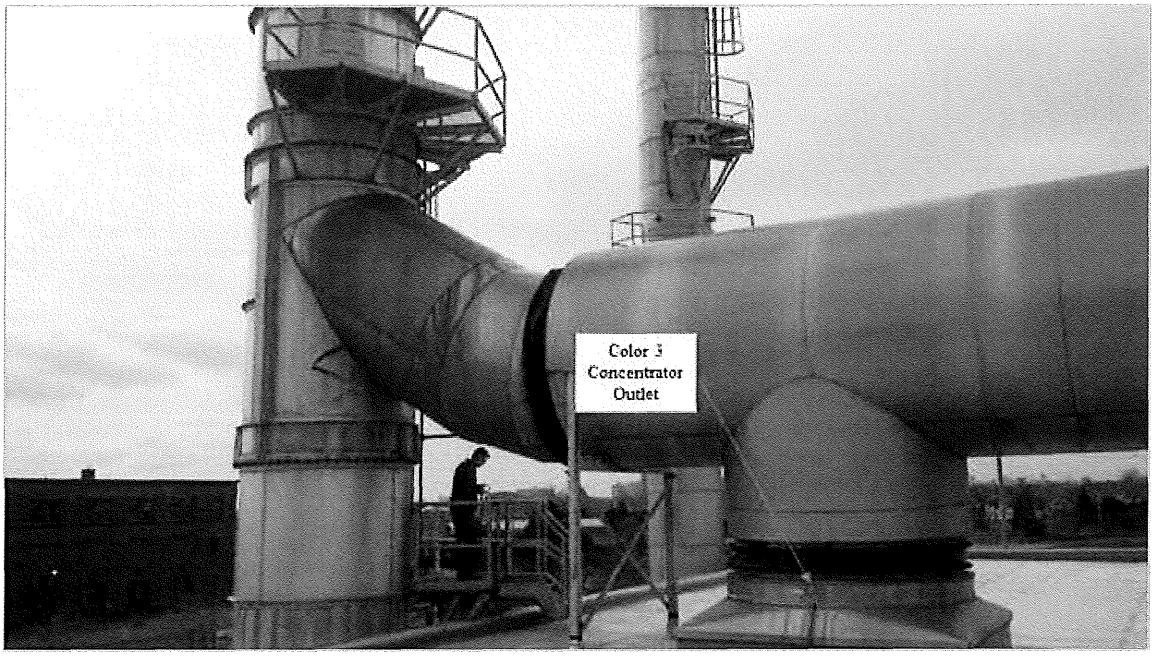
JNAP is located at 2101 Connor Avenue in Detroit, Michigan. The facility completes assembly and paint operations for the Dodge Durango and Jeep Grand Cherokee. Coatings are applied to vehicles automatically and manually in booths. Vehicles proceed through a curing oven. Each line consists of three basecoat robot zones, basecoat electrostatic bells, basecoat automatic conventional zone, heated flash zone, two clearcoat robot zones, clearcoat electrostatic bells, and a cure oven. Emissions from the basecoat bell zones, basecoat automatic conventional zone, heated flash and clearcoat bell zones are ducted to a filter house, concentrator, and a thermal oxidizer (TO). Emissions from the oven are controlled by separate thermal oxidizers. To clarify, Color 1, 2, and 3 each have one dedicated concentrator system, one dedicated TO to treat concentrator emissions, and one dedicated TO to treat oven emissions. There is a total of 3 concentrator systems, 3 concentrator TOs, and 3 oven TOs.

3 SAMPLE LOCATION

Figures 1 and **2** below depict the sources sampled, sampling ports and traverse point locations. Photographs of each sampling location are presented on the following page.

Figure 1: EU-TOPCOAT 3 Concentrator Inlet

Figure 2: EU-TOPCOAT 3 Concentrator Outlet



The inlet and outlet of the EU-TOPCOAT 3 Concentrator were tested simultaneously to evaluate the VOC removal efficiency (RE). These sampling locations did not meet USEPA Method 1 criteria and therefore flow rates could not be measured according to the Method. The flue gas was extracted from a probe located near the center of the duct and continuously introduced into the flame ionization analyzer to measure VOC concentrations. VOC RE was computed based on inlet and outlet NMOC concentrations (ppmv).

4 SAMPLING METHODOLOGY

4.1 Testing Methodology

The following table summarizes the test methodologies that were followed during this program.

Table 4.1: Summary of Test Methodology

Parameter	Proposed Method
Total Methane and Total Non-Methane Organic Compounds (NMOC)	USEPA[1] Method 25A (CEM)
Total VOCs	USEPA[1] Method 25A (CEM)

Notes: [1] USEPA = United States Environmental Protection Agency

4.2 Description of Testing Methodology

The following section provides brief descriptions of the sampling methods.

4.2.1 Continuous Emissions Monitoring for VOCs

Testing for VOCs was accomplished simultaneously at the inlet and outlet using continuous emission monitors (CEM). VOC testing followed USEPA Method 25A "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer". In order to compare inlet and outlet concentrations, the outlet concentrations of total VOCs, methane, and non-methane VOCs were converted to parts per million (ppmv) as propane for the concentrator. A methane response factor was determined for each run by dividing the methane response by the THC response when the mid methane calibration gas is introduced to the analyzer. The response factor was used to determine the correct value used in methane subtraction at both the inlet and outlet. The exhaust gas sample was withdrawn from a single point at the center of the duct/stack using a stainless-steel probe. The sample proceeded through a heated filter where particulate matter was removed. The sample was then transferred via a heated Teflon® line and introduced to the analyzers (hot/wet) for measurement.

Prior to testing, instrument linearity checks and calibration error checks were conducted. USEPA protocol gases were used for all span values. The FIDs were calibrated using zero (>1% of span value) and high (80-90% of span value) sent though the system to the sample tip and returned to the analyzers. Low Span gas and mid ranges were then introduced. In addition, the analyzers were calibrated (zeroed and span checked) at the completion of each test using the Zero and Mid span gases.

Appendix C contains a schematic of a typical Method 25A sampling apparatus. **Appendix D** contains detailed data for the Concentrator sampling program including summary of results, the span value data and 1-minute averages. All field notes are provided in **Appendix E**.

Data acquisition was provided using a data logger system programmed to collect and record data at one second intervals. Average one minute concentrations were calculated from the one second measurements.

4.3 Process Data

JNAP representatives provided production information during testing of the concentrator including the following:

- Concentrator Desorb Inlet Gas Temperature during each test for the Color 3 concentrator.
- Color Booth production rates during each test for the Color 3 concentrator testing periods.

Mr. Thomas Caltrider and Mr. Steven Szura from FCA US LLC recorded and monitored the process during the testing to ensure the production rate was within typical normal production rates. Prior to commencing with the testing, Mr. Caltrider and/or Mr. Szura confirmed that the process was operating normally. During times of lower than representative throughput rates, tests were delayed or paused until representative production levels occurred. Further details are provided in **Appendix G**.

5 MODIFICATIONS

There were no modifications from the test protocol.

6 RESULTS

The average emission results for this study are presented in the following tables. Detailed information regarding each test run can be found in the **Appendix D**.

Table 6.1: EU-TOPCOAT 3 – Concentrator (January 26, 2021)

Test ID	Date	Start	End	Vehicles per hour	Inlet THC (ppm) (as propane)	Inlet Methane [2] (ppm) (as propane)	Inlet NMOC (ppm) (as propane)	Outlet THC (ppm) (as Propane)	Outlet Methane [2] (ppm) (as propane)	Inlet NMOC (ppm) (as propane)	Removal Efficiency [1] (as NMOC)
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Notes:

[1] Removal efficiency was calculated based on total non-methane concentrations (NMOC).
[2] Methane to Propane conversion determined per test (see **Appendix D**)
NMOC – Non-methane organic compound

7 CONCLUSIONS

Testing was successfully completed on January 26, 2021. All parameters were tested in accordance with USEPA referenced methodologies.