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# FCA US LLC
## Jefferson North Assembly Plant
Detroit, Michigan

# Revised Final Report

## EU-TOPCOAT Oven 1, 2 and 3 RTO Destruction Efficiency Testing & EU-TOPCOAT 1, 2, and 3 Concentrators Removal Efficiency

RWDI # 1502282
April 25, 2016

[redacted]

**SUBMITTED TO**

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**Andrew Whitsitt**
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**SUBMITTED BY**

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DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

# RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

*Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.*

**Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.**

Source Name: FCA US LLC - Jefferson North Assembly Plant — County: Wayne

Source Address: 2101 Connor Avenue — City: Detroit

AQD Source ID (SRN): N2155 — ROP No.: MI-ROP-N2155-2010 — ROP Section No.:

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

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☒ **Other Report Certification**

Reporting period (provide inclusive dates): From N/A To N/A

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Final report for EU-Topcoat Oven 1,2 and 3 RTO Destruction Efficiency testing &

EU-Topcoat 1,2 and 3 Concentrators Removal Efficiency dated January 2016.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

| Curt Towne | Plant Manager | 313-956-7721 |
|---|---|---|
| Name of Responsible Official (print or type) | Title | Phone Number |
| Curtis E. Towne | | 1/25/16 |
| Signature of Responsible Official | | Date |

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

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# EXECUTIVE SUMMARY

RWDI AIR Inc. (RWDI) was retained by FCA US LLC to complete destruction efficiency (DE) for volatile organic compounds on three (3) rotary regenerative thermal oxidizers (RTOs) serving the EU-TOPCOAT 1, 2, and 3 Ovens and removal efficiency (RE) on three (3) Zeolite Concentrators from the EU-TOPCOAT 1, 2 and 3 Color Lines at Jefferson North Assembly Plant (JNAP) located in Detroit, Michigan. JNAP operates under Renewable Operating Permit No. MI-ROP-N2155-2010. The testing followed United states Environmental Protection Agency (USEPA) reference method 25A. The original report dated January 28, 2016 has been revised to address comments received from Mr. Mark Dziadosz from Michigan Department of Environmental Quality (DEQ) Air Quality Department (AQD) dated April 19, 2016. Revisions include the following:

1) Correction to RTO temperatures noted in Topcoat 2 and 3 (Appendix D);
2) Updated reference to propane to methane response factor (Field Note Appendix G);
3) Update to calibration gas response on Concentrator 3 (Appendix C and Field Note Appendix G); and
4) Update to Drift Corrected Values to Topcoat Oven 1 RTO (Appendix D, Executive Summary & Section 5 Tables EU-TOPCOAT Oven 1 – RTO).

Three 1-hour tests concurrently at the inlet and outlet of each source were conducted in order to determine the average destruction/removal efficiency o f the RTOs/concentrators. Stack gas velocity, gas composition and moisture were also taken once during the three (3) 1-hour tests for the exhaust of each of the RTOs. The sampling was conducted from December 1st to 3rd, 2015. Sampling was witnessed by Mr. Mark Dziadosz and Mr. Bob Byrnes from the Southeast Michigan Air Quality Division of the State of Michigan Department of Environmental Quality.

Coatings are applied to vehicles automatically and manually in 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. Emissions from the oven are controlled by separate thermal oxidizers.

The sampling train for VOC's 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 tables. Results of individual tests are presented in the Appendices.

## Source: EU-TOPCOAT 1 - Concentrator

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 13:14 | 14:14 | 16 | 84 | 4.9 | 94.2% |
| 2 | 2015-12-01 | 14:28 | 15:27 | 14 | 74 | 5.0 | 93.3% |
| 3 | 2015-12-01 | 15:36 | 16:36 | 17 | 81 | 2.6 | 96.7% |
| | | | | **Average** | **80** | **4.2** | **94.7%** |

## Source: EU-TOPCOAT 2 - Concentrator

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 8:17 | 9:17 | 14 | 84 | 0.8 | 99.0% |
| 2 | 2015-12-02 | 9:29 | 10:29 | 16 | 115 | 0.7 | 99.4% |
| 3 | 2015-12-02 | 10:37 | 11:37 | 11 | 75 | 0.3 | 99.6% |
| | | | | **Average** | 92 | 0.6 | 99.3% |

## Source: EU-TOPCOAT 3 - Concentrator

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 14:28 | 15:28 | 21 | 58 | 6.6 | 88.6% |
| 2 | 2015-12-02 | 15:41 | 16:41 | 18 | 80 | 7.2 | 91.0% |
| 3 | 2015-12-03 | 6:41 | 7:40 | 18 | 68 | 7.0 | 89.7% |
| | | | | **Average** | 69 | 6.9 | 89.8% |

## Source: EU-TOPCOAT Oven 1 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [3] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 10:00 | 11:00 | 19 | 254 | 2.4 | 4.8 | 1.9 | 0.6 | 99.8% |
| 2[2] | 2015-12-01 | 11:55 | 13:31 | 17 | 245 | 2.1 | 4.9 | 1.9 | 0.2 | 99.9% |
| 3 | 2015-12-01 | 13:55 | 14:55 | 23 | 240 | 3.7 | 4.9 | 1.9 | 1.8 | 99.2% |
| | | | | **Average** | 246 | 2.7 | 4.8 | 1.9 | 0.9 | 99.6% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 2 was delayed from 12:33 to 13:07 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 1Topcoat Oven 1 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [3] (as Propane) | Outlet NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 10:00 | 11:00 | 19 | 11.7 | 0.11 | 0.09 | 0.03 | 99.8% |
| 2[2] | 2015-12-01 | 11:55 | 13:31 | 17 | 11.2 | 0.10 | 0.09 | 0.01 | 99.9% |
| 3 | 2015-12-01 | 13:55 | 14:55 | 23 | 11.0 | 0.17 | 0.09 | 0.08 | 99.2% |
| | | | | Average | 11.3 | 0.13 | 0.09 | 0.04 | 99.6% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 2 was delayed from 12:33 to 13:07 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 2 - RTO

| Test ID | Date | Start | End | Vehicles *per hour* | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [2] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 9:55 | 10:55 | 25 | 349 | 10.0 | 22.2 | 8.5 | 1.4 | 99.6% |
| 2 | 2015-12-02 | 16:32 | 17:32 | 24 | 321 | 10.5 | 21.0 | 8.1 | 2.4 | 99.2% |
| 3 | 2015-12-03 | 10:03 | 11:03 | 26 | 309 | 10.3 | 22.2 | 8.6 | 1.7 | 99.4% |
| | | | | Average | 326 | 10.3 | 21.8 | 8.4 | 1.9 | 99.4% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 2 - RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [2] (as Propane) | Outlet Total NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 9:55 | 10:55 | 25 | 16.4 | 0.47 | 0.40 | 0.07 | 99.6% |
| 2 | 2015-12-02 | 16:32 | 17:32 | 24 | 15.1 | 0.49 | 0.38 | 0.11 | 99.2% |
| 3 | 2015-12-03 | 10:03 | 11:03 | 26 | 14.5 | 0.48 | 0.40 | 0.08 | 99.4% |
| | | | | Average | 15.3 | 0.48 | 0.39 | 0.09 | 99.4% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 3 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [3] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-03 | 12:58 | 14:35 | 21 | 265 | 18.9 | 19.6 | 7.5 | 11.4 | 95.7% |
| 2 | 2015-12-03 | 14:50 | 15:50 | 28 | 307 | 17.7 | 18.8 | 7.2 | 10.5 | 96.6% |
| 3 | 2015-12-03 | 16:51 | 17:51 | 18 | 255 | 19.1 | 19.7 | 7.6 | 11.5 | 95.5% |
| | | | | Average | 276 | 18.6 | 19.3 | 7.4 | 11.1 | 95.9% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 1 was delayed from 13:35 to 14:10 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 3 – RTO

| Test ID | Date | Start | End | Vehicles *per hour* | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [3] (as Propane) | Outlet Total NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-03 | 12:58 | 14:35 | 21 | 14.1 | 1.01 | 0.40 | 0.61 | 95.7% |
| 2 | 2015-12-03 | 14:50 | 15:50 | 28 | 16.3 | 0.99 | 0.38 | 0.56 | 96.6% |
| 3 | 2015-12-03 | 16:51 | 17:51 | 18 | 13.6 | 1.02 | 0.40 | 0.61 | 95.5% |
| | | | | Average | 14.7 | 0.99 | 0.40 | 0.59 | 95.9% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 1 was delayed from 13:35 to 14:10 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

# 1. INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by FCA US LLC to complete destruction efficiency (DE) for volatile organic compounds on three (3) rotary regenerative thermal oxidizers (RTOs) serving the EU-TOPCOAT 1, 2, and 3 Ovens and removal efficiency (RE) on three (3) Zeolite Concentrators from the EU-TOPCOAT 1, 2 and 3 Color Lines at Jefferson North Assembly plant (JNAP) located in Detroit, Michigan. JNAP operates under Renewable Operating Permit No. MI-ROP-N2155-2010. The testing followed United states Environmental Protection Agency (USEPA) reference method 25A. The original report dated January 28, 2016 has been revised to address comments received from Mr. Mark Dziadosz from Michigan Department of Environmental Quality (DEQ) Air Quality Department (AQD) dated April 19, 2016. Revisions include the following:

1) Correction to RTO temperatures noted in Topcoat 2 and 3 (Appendix D);
2) Updated reference to propane to methane response factor (Field Note Appendix G);
3) Update to calibration gas response on Concentrator 3 (Appendix C and Field Note Appendix G); and
4) Update to Drift Corrected Values to Topcoat Oven 1 RTO (Appendix D).

Three 1-hour tests concurrently at the inlet and outlet of each source were conducted in order to determine the average destruction/removal efficiency of the RTOs/concentrators. Stack gas velocity, gas composition and moisture were also taken once during the three (3) 1-hour tests for the exhaust of each of the RTOs. The sampling was conducted from December 1st to 3rd, 2015. Sampling was witnessed by Mr. Mark Dziadosz and Mr. Bob Byrnes from the Southeast Michigan Air Quality Division of the State of Michigan Department of Environmental Quality.

The notification of intent to conduct the air compliance testing was submitted to the Michigan Department of Environmental Quality on October 29th 2015. The quality assurance review of the test plan was completed on November 18th, 2015. Both the notification of intent letter and the quality assurance review letter as well as a copy of the RNOP is located in **Appendix A** of this report.

# 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. 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. Emissions from the oven are controlled by separate thermal oxidizers.

# 3. SAMPLE LOCATION

Figures 1 through 12 below depict the sources sampled, sampling ports and traverse point locations. Photographs of each sampling location are presented below. **Appendix B** contains detailed Schematics of all sampling locations.

**Figure 1:** EU-TOPCOAT 1 Concentrator Inlet

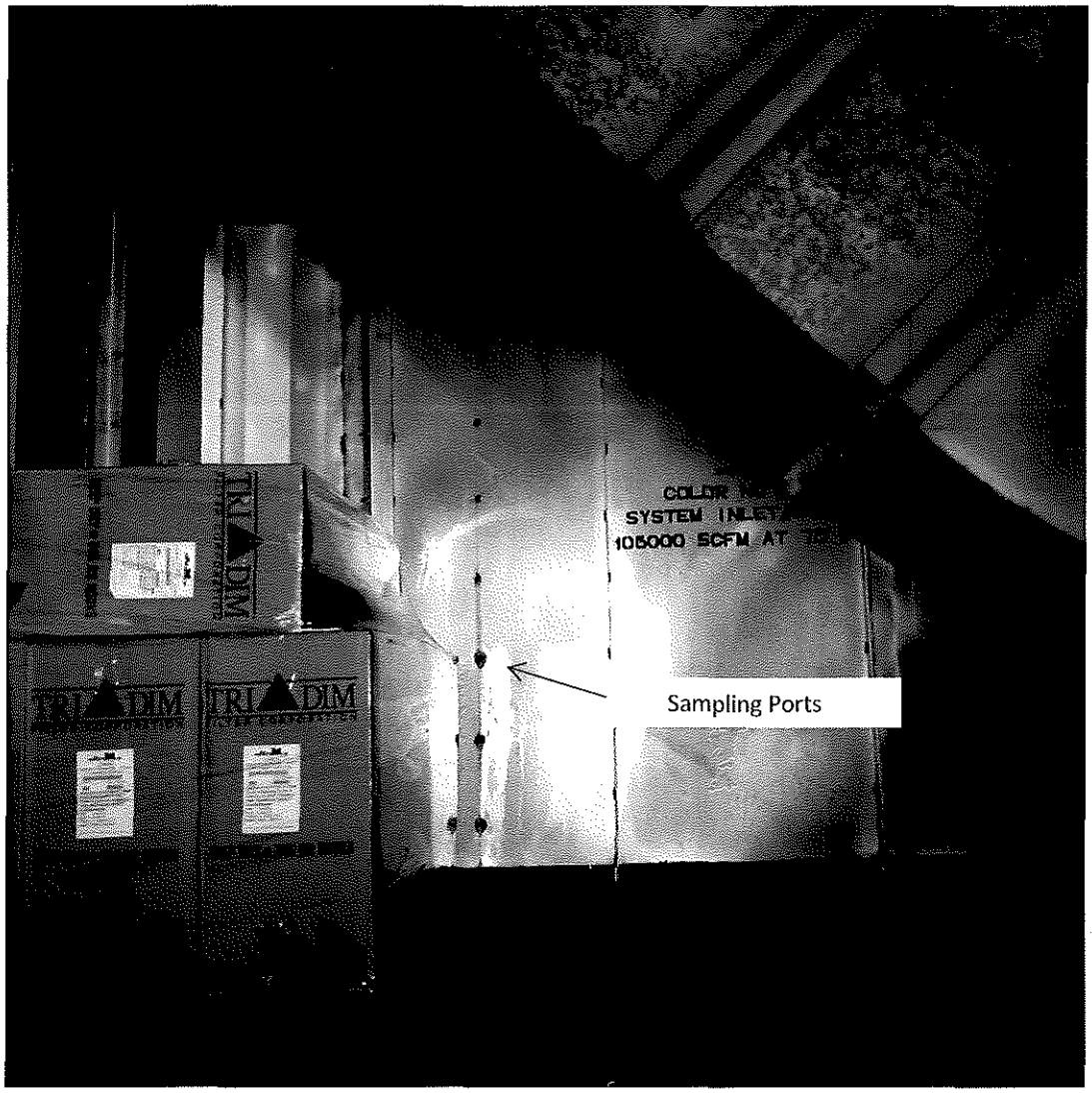

**Figure 2:** EU-TOPCOAT 1 Concentrator 1 Outlet

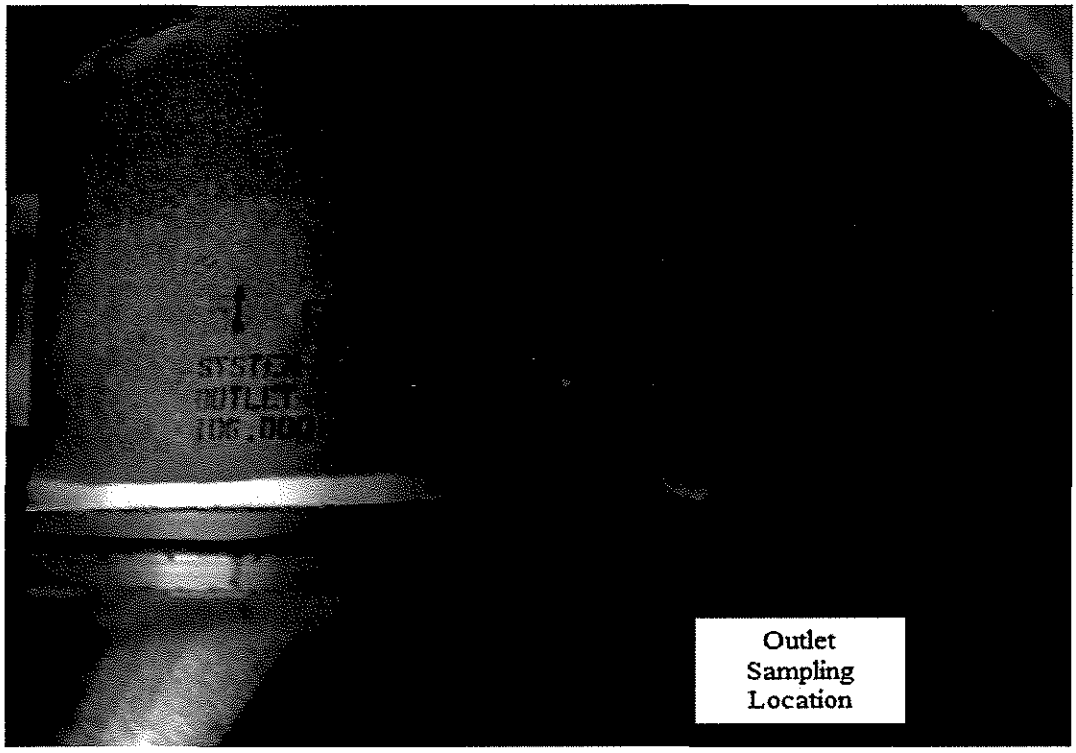

**Figure 3:** EU-TOPCOAT 2 Concentrator Inlet

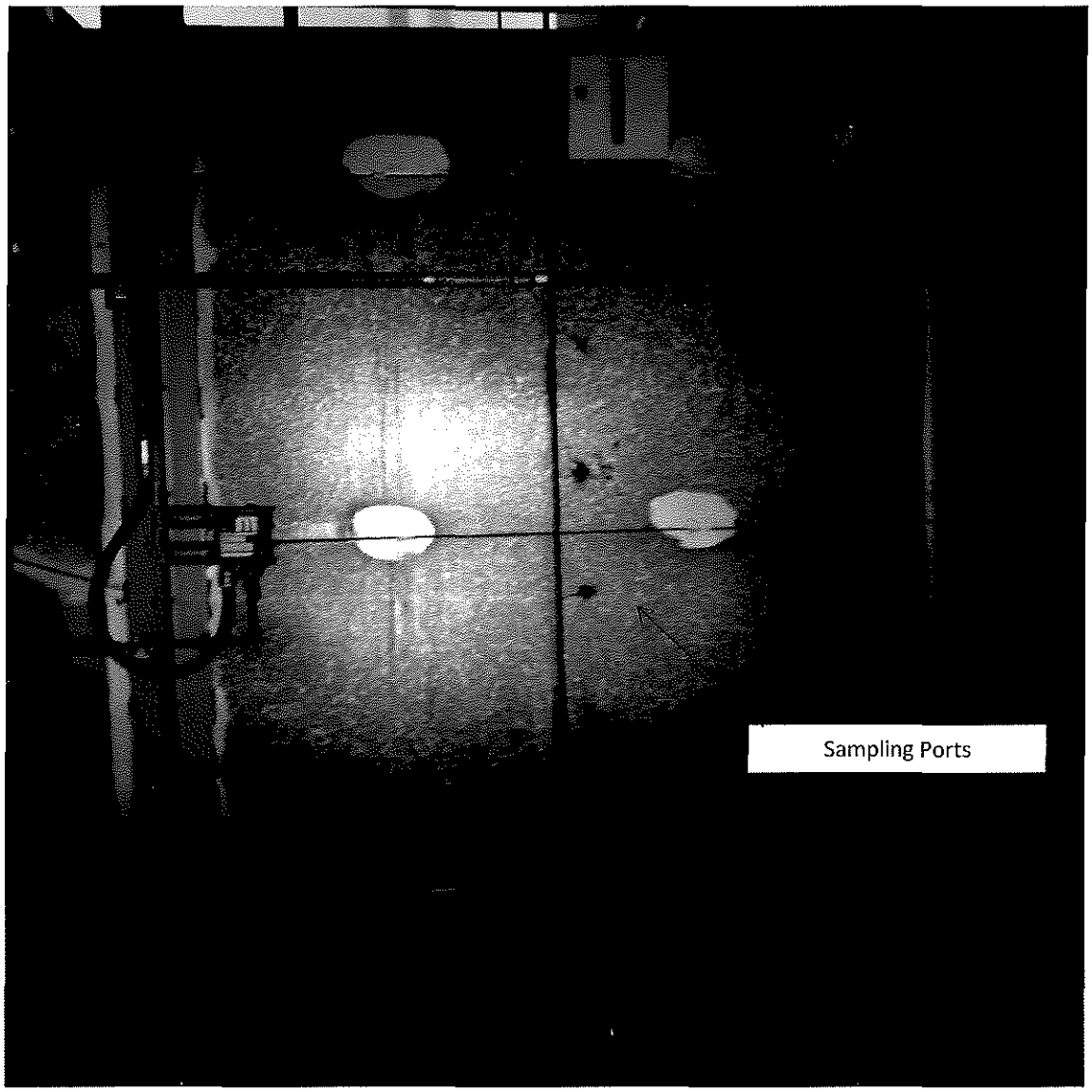

**Figure: 4:** EU-TOPCOAT 2 Concentrator Outlet

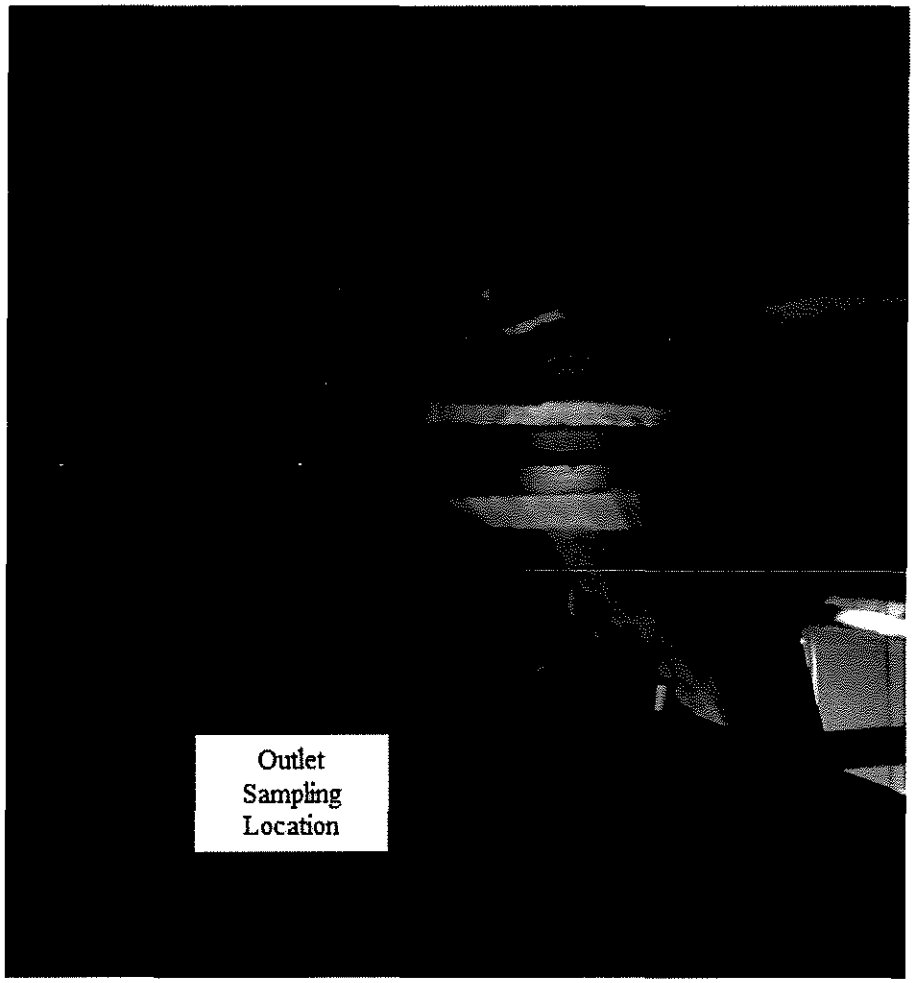

**Figure 5:** EU-TOPCOAT 3 Concentrator Inlet

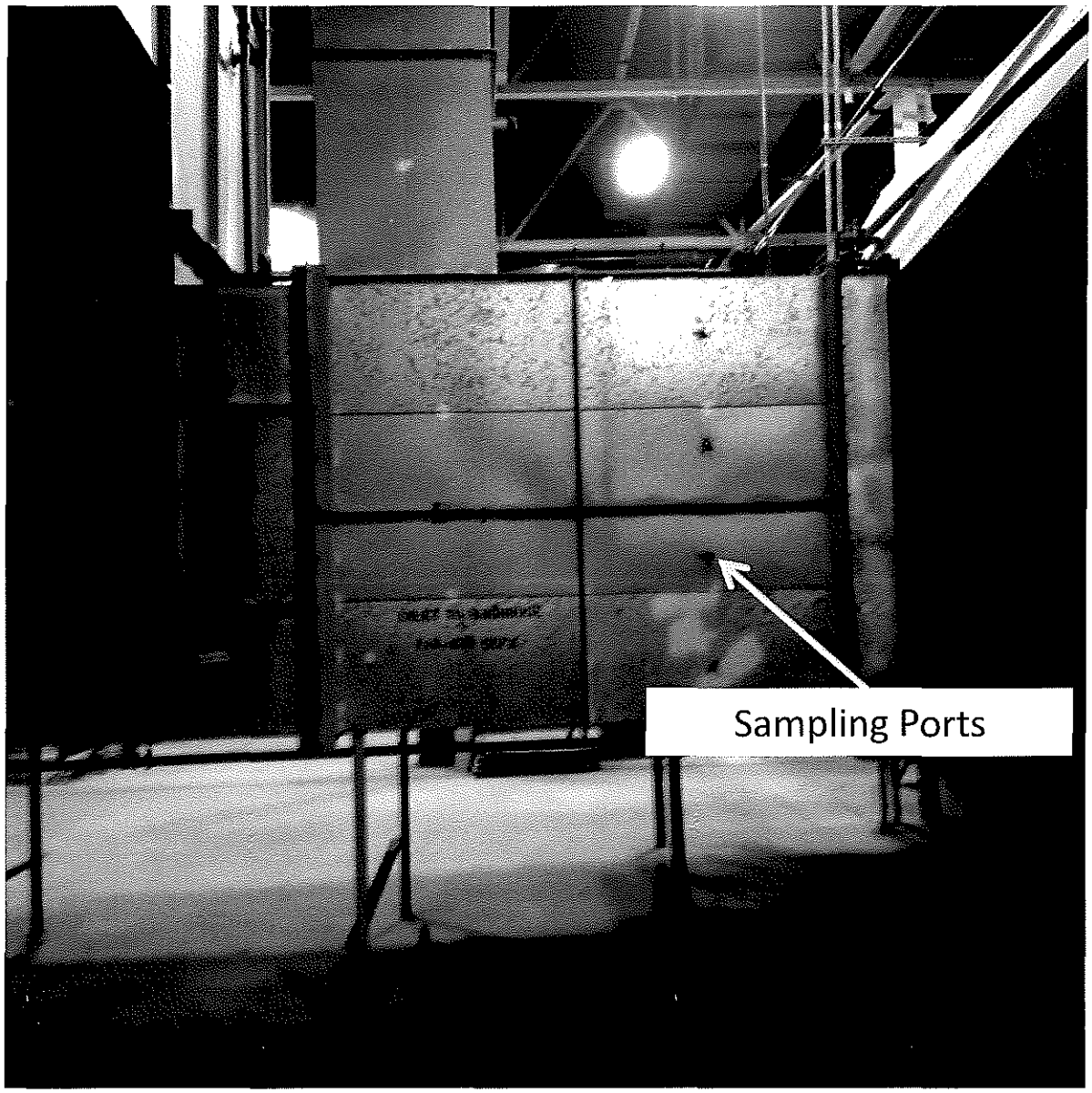

**Figure 6:** EU-TOPCOAT 3 Concentrator Outlet

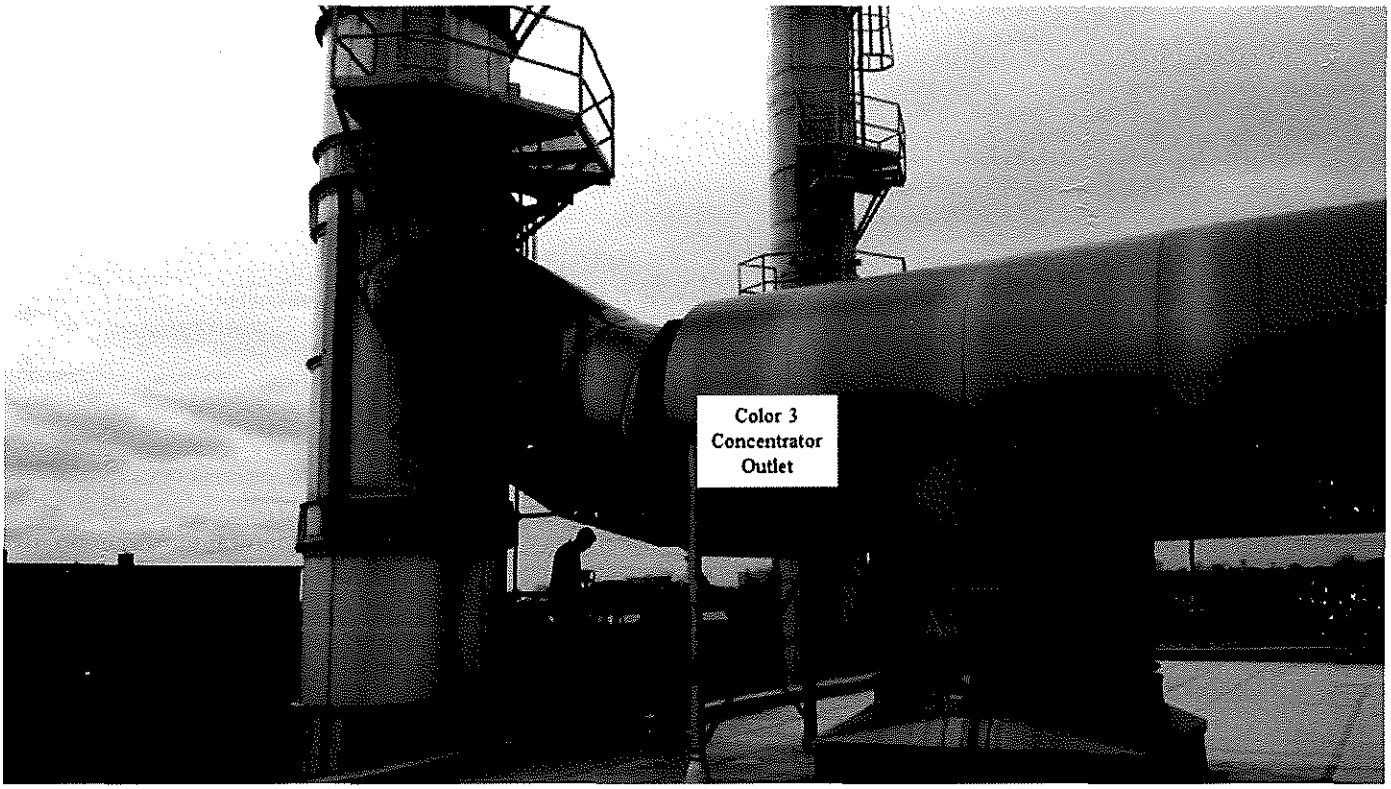

**Figure 7:** EU-TOPCOAT Oven 1 RTO Inlet

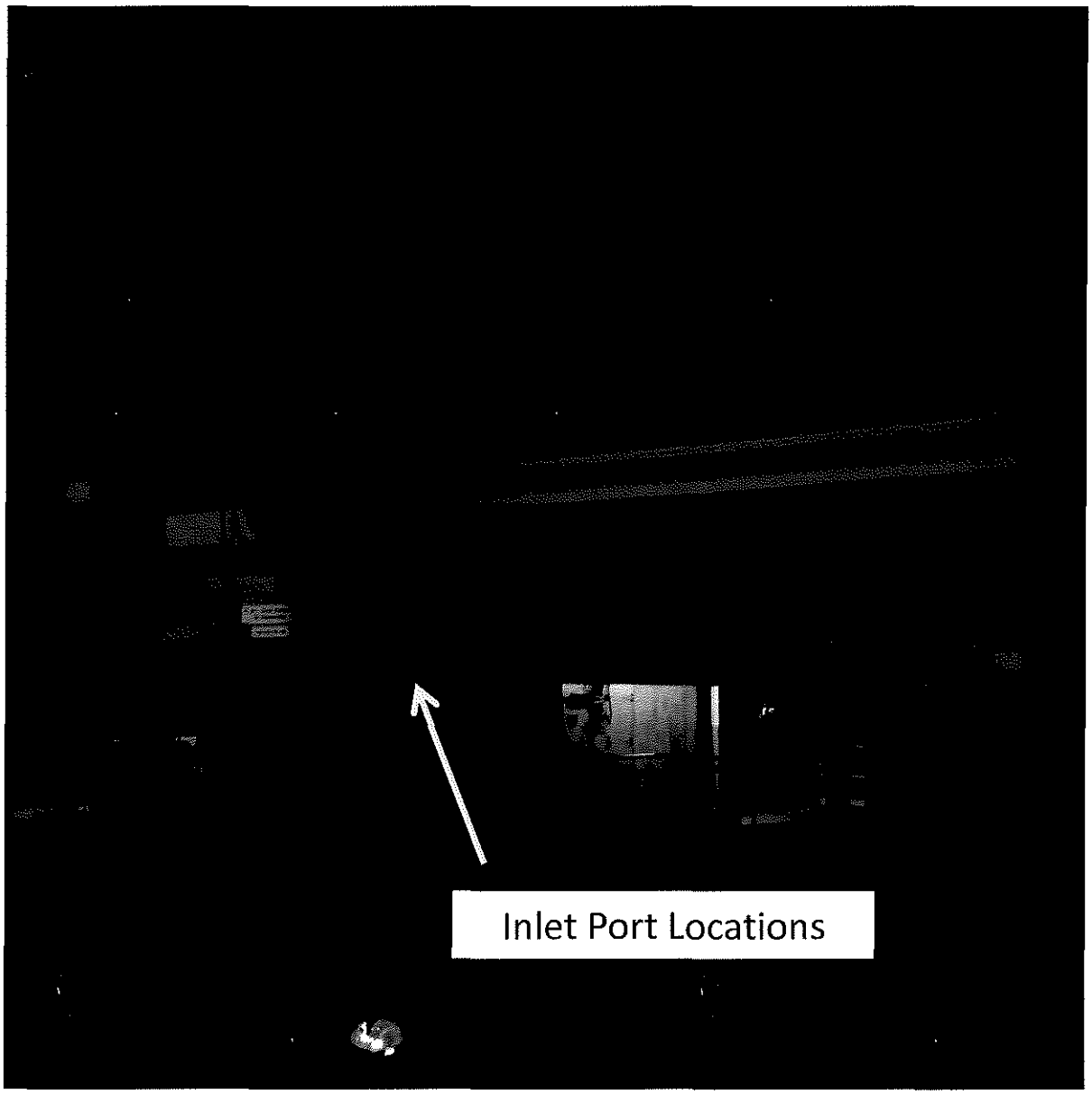

**Figure 8:** EU-TOPCOAT Oven 1 RTO Outlet

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# FCA US LLC
## Jefferson North Assembly Plant
Detroit, Michigan

# Revised Final Report

## EU-TOPCOAT Oven 1, 2 and 3 RTO Destruction Efficiency Testing & EU-TOPCOAT 1, 2, and 3 Concentrators Removal Efficiency

RWDI # 1502282
April 25, 2016

**SUBMITTED TO**

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**SUBMITTED BY**

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# RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

*Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.*

**Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.**

Source Name: FCA US LLC - Jefferson North Assembly Plant | County: Wayne

Source Address: 2101 Connor Avenue | City: Detroit

AQD Source ID (SRN): N2155 | ROP No.: MI-ROP-N2155-2010 | ROP Section No.:

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

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☒ **Other Report Certification**

Reporting period (provide inclusive dates): From N/A To N/A

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Final report for EU-Topcoat Oven 1,2 and 3 RTO Destruction Efficiency testing &
EU-Topcoat 1,2 and 3 Concentrators Removal Efficiency dated January 2016.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

| Curt Towne | Plant Manager | 313-956-7721 |
|---|---|---|
| Name of Responsible Official (print or type) | Title | Phone Number |
| Signature of Responsible Official | | 1/25/16 Date |

* Photocopy this form as needed.

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Three 1-hour tests concurrently at the inlet and outlet of each source were conducted in order to determine the average destruction/removal efficiency o f the RTOs/concentrators. Stack gas velocity, gas composition and moisture were also taken once during the three (3) 1-hour tests for the exhaust of each of the RTOs. The sampling was conducted from December 1st to 3rd, 2015. Sampling was witnessed by Mr. Mark Dziadosz and Mr. Bob Byrnes from the Southeast Michigan Air Quality Division of the State of Michigan Department of Environmental Quality.

Coatings are applied to vehicles automatically and manually in 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. Emissions from the oven are controlled by separate thermal oxidizers.

The sampling train for VOC's 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 tables. Results of individual tests are presented in the Appendices.

### Source: EU-TOPCOAT 1 - Concentrator

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 13:14 | 14:14 | 16 | 84 | 4.9 | 94.2% |
| 2 | 2015-12-01 | 14:28 | 15:27 | 14 | 74 | 5.0 | 93.3% |
| 3 | 2015-12-01 | 15:36 | 16:36 | 17 | 81 | 2.6 | 96.7% |
| | | | | **Average** | **80** | **4.2** | **94.7%** |

### Source: EU-TOPCOAT 2 - Concentrator

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 8:17 | 9:17 | 14 | 84 | 0.8 | 99.0% |
| 2 | 2015-12-02 | 9:29 | 10:29 | 16 | 115 | 0.7 | 99.4% |
| 3 | 2015-12-02 | 10:37 | 11:37 | 11 | 75 | 0.3 | 99.6% |
| | | | | **Average** | 92 | 0.6 | 99.3% |

### Source: EU-TOPCOAT 3 - Concentrator

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 14:28 | 15:28 | 21 | 58 | 6.6 | 88.6% |
| 2 | 2015-12-02 | 15:41 | 16:41 | 18 | 80 | 7.2 | 91.0% |
| 3 | 2015-12-03 | 6:41 | 7:40 | 18 | 68 | 7.0 | 89.7% |
| | | | | **Average** | 69 | 6.9 | 89.8% |

### Source: EU-TOPCOAT Oven 1 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [3] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 10:00 | 11:00 | 19 | 254 | 2.4 | 4.8 | 1.9 | 0.6 | 99.8% |
| 2[2] | 2015-12-01 | 11:55 | 13:31 | 17 | 245 | 2.1 | 4.9 | 1.9 | 0.2 | 99.9% |
| 3 | 2015-12-01 | 13:55 | 14:55 | 23 | 240 | 3.7 | 4.9 | 1.9 | 1.8 | 99.2% |
| | | | | **Average** | 246 | 2.7 | 4.8 | 1.9 | 0.9 | 99.6% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 2 was delayed from 12:33 to 13:07 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 1Topcoat Oven 1 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [3] (as Propane) | Outlet NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 10:00 | 11:00 | 19 | 11.7 | 0.11 | 0.09 | 0.03 | 99.8% |
| 2[2] | 2015-12-01 | 11:55 | 13:31 | 17 | 11.2 | 0.10 | 0.09 | 0.01 | 99.9% |
| 3 | 2015-12-01 | 13:55 | 14:55 | 23 | 11.0 | 0.17 | 0.09 | 0.08 | 99.2% |
| | | | | Average | 11.3 | 0.13 | 0.09 | 0.04 | 99.6% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 2 was delayed from 12:33 to 13:07 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 2 - RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [2] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 9:55 | 10:55 | 25 | 349 | 10.0 | 22.2 | 8.5 | 1.4 | 99.6% |
| 2 | 2015-12-02 | 16:32 | 17:32 | 24 | 321 | 10.5 | 21.0 | 8.1 | 2.4 | 99.2% |
| 3 | 2015-12-03 | 10:03 | 11:03 | 26 | 309 | 10.3 | 22.2 | 8.6 | 1.7 | 99.4% |
| | | | | Average | 326 | 10.3 | 21.8 | 8.4 | 1.9 | 99.4% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 2 - RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [2] (as Propane) | Outlet Total NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 9:55 | 10:55 | 25 | 16.4 | 0.47 | 0.40 | 0.07 | 99.6% |
| 2 | 2015-12-02 | 16:32 | 17:32 | 24 | 15.1 | 0.49 | 0.38 | 0.11 | 99.2% |
| 3 | 2015-12-03 | 10:03 | 11:03 | 26 | 14.5 | 0.48 | 0.40 | 0.08 | 99.4% |
| | | | | Average | 15.3 | 0.48 | 0.39 | 0.09 | 99.4% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 3 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [3] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-03 | 12:58 | 14:35 | 21 | 265 | 18.9 | 19.6 | 7.5 | 11.4 | 95.7% |
| 2 | 2015-12-03 | 14:50 | 15:50 | 28 | 307 | 17.7 | 18.8 | 7.2 | 10.5 | 96.6% |
| 3 | 2015-12-03 | 16:51 | 17:51 | 18 | 255 | 19.1 | 19.7 | 7.6 | 11.5 | 95.5% |
| | | | | Average | 276 | 18.6 | 19.3 | 7.4 | 11.1 | 95.9% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 1 was delayed from 13:35 to 14:10 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 3 – RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [3] (as Propane) | Outlet Total NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-03 | 12:58 | 14:35 | 21 | 14.1 | 1.01 | 0.40 | 0.61 | 95.7% |
| 2 | 2015-12-03 | 14:50 | 15:50 | 28 | 16.3 | 0.99 | 0.38 | 0.56 | 96.6% |
| 3 | 2015-12-03 | 16:51 | 17:51 | 18 | 13.6 | 1.02 | 0.40 | 0.61 | 95.5% |
| | | | | Average | 14.7 | 0.99 | 0.40 | 0.59 | 95.9% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 1 was delayed from 13:35 to 14:10 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

CONSULTING ENGINEERS & SCIENTISTS

# 1. INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by FCA US LLC to complete destruction efficiency (DE) for volatile organic compounds on three (3) rotary regenerative thermal oxidizers (RTOs) serving the EU-TOPCOAT 1, 2, and 3 Ovens and removal efficiency (RE) on three (3) Zeolite Concentrators from the EU-TOPCOAT 1, 2 and 3 Color Lines at Jefferson North Assembly plant (JNAP) located in Detroit, Michigan. JNAP operates under Renewable Operating Permit No. MI-ROP-N2155-2010. The testing followed United states Environmental Protection Agency (USEPA) reference method 25A. The original report dated January 28, 2016 has been revised to address comments received from Mr. Mark Dziadosz from Michigan Department of Environmental Quality (DEQ) Air Quality Department (AQD) dated April 19, 2016. Revisions include the following:

1) Correction to RTO temperatures noted in Topcoat 2 and 3 (Appendix D);
2) Updated reference to propane to methane response factor (Field Note Appendix G);
3) Update to calibration gas response on Concentrator 3 (Appendix C and Field Note Appendix G); and
4) Update to Drift Corrected Values to Topcoat Oven 1 RTO (Appendix D).

Three 1-hour tests concurrently at the inlet and outlet of each source were conducted in order to determine the average destruction/removal efficiency of the RTOs/concentrators. Stack gas velocity, gas composition and moisture were also taken once during the three (3) 1-hour tests for the exhaust of each of the RTOs. The sampling was conducted from December 1st to 3rd, 2015. Sampling was witnessed by Mr. Mark Dziadosz and Mr. Bob Byrnes from the Southeast Michigan Air Quality Division of the State of Michigan Department of Environmental Quality.

The notification of intent to conduct the air compliance testing was submitted to the Michigan Department of Environmental Quality on October 29th 2015. The quality assurance review of the test plan was completed on November 18th, 2015. Both the notification of intent letter and the quality assurance review letter as well as a copy of the RNOP is located in **Appendix A** of this report.

# 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. 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. Emissions from the oven are controlled by separate thermal oxidizers.

## Source: EU-TOPCOAT Oven 2 RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [2] (as Propane) | Outlet Total NMVOC (ppm) [2] (as Propane) | Destruction Efficiency (ppm) [1][3] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 9:55 | 10:55 | 25 | 349 | 10.0 | 22.2 | 8.5 | 1.4 | 99.6% |
| 2 | 2015-12-02 | 16:32 | 17:32 | 24 | 321 | 10.5 | 21.0 | 8.1 | 2.4 | 99.2% |
| 3 | 2015-12-03 | 10:03 | 11:03 | 26 | 309 | 10.3 | 22.2 | 8.6 | 1.7 | 99.4% |
| | | | | Average | 326 | 10.3 | 21.8 | 8.4 | 1.9 | 99.4% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Methane to Propane conversion based on Methane response factor of 2.6
[3] NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 2 RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [2] (as Propane) | Outlet Total NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1][3] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 9:55 | 10:55 | 25 | 16.4 | 0.47 | 0.40 | 0.07 | 99.6% |
| 2 | 2015-12-02 | 16:32 | 17:32 | 24 | 15.1 | 0.49 | 0.38 | 0.11 | 99.2% |
| 3 | 2015-12-03 | 10:03 | 11:03 | 26 | 14.5 | 0.48 | 0.40 | 0.08 | 99.4% |
| | | | | Average | 15.3 | 0.48 | 0.39 | 0.09 | 99.4% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Methane to Propane conversion based on Methane response factor of 2.6
[3] NMVOC – Non-methane volatile organic compound

**Source: EU-TOPCOAT Oven 3 RTO**

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [3] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1[2] | 2015-12-03 | 12:58 | 14:35 | 21 | 265 | 18.9 | 19.6 | 7.5 | 11.4 | 95.7% |
| 2 | 2015-12-03 | 14:50 | 15:50 | 28 | 307 | 17.7 | 18.8 | 7.2 | 10.5 | 96.6% |
| 3 | 2015-12-03 | 16:51 | 17:51 | 18 | 255 | 19.1 | 19.7 | 7.6 | 11.5 | 95.5% |
| | | | | Average | 276 | 18.6 | 19.3 | 7.4 | 11.1 | 95.9% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 1 was delayed from 13:35 to 14:10 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

**Source: EU-TOPCOAT Oven 3 – RTO**

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [3] (as Propane) | Outlet Total NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1[2] | 2015-12-03 | 12:58 | 14:35 | 21 | 14.1 | 1.01 | 0.40 | 0.61 | 95.7% |
| 2 | 2015-12-03 | 14:50 | 15:50 | 28 | 16.3 | 0.94 | 0.38 | 0.56 | 96.6% |
| 3 | 2015-12-03 | 16:51 | 17:51 | 18 | 13.6 | 1.02 | 0.40 | 0.61 | 95.5% |
| | | | | Average | 14.7 | 0.99 | 0.40 | 0.59 | 95.9% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 1 was delayed from 13:35 to 14:10 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

All sampling field notes are provided in **Appendix G**. All calibration data can be found in **Appendix H**. Calibration gas certificates are provided in **Appendix I**. Sample calculations are provided in **Appendix J**.

# 6. CONCLUSIONS

Testing was successfully completed on December 3rd, 2015. All parameters were tested in accordance with USEPA referenced methodologies.

**Figure 9:** EU-TOPCOAT Oven 2 RTO Inlet

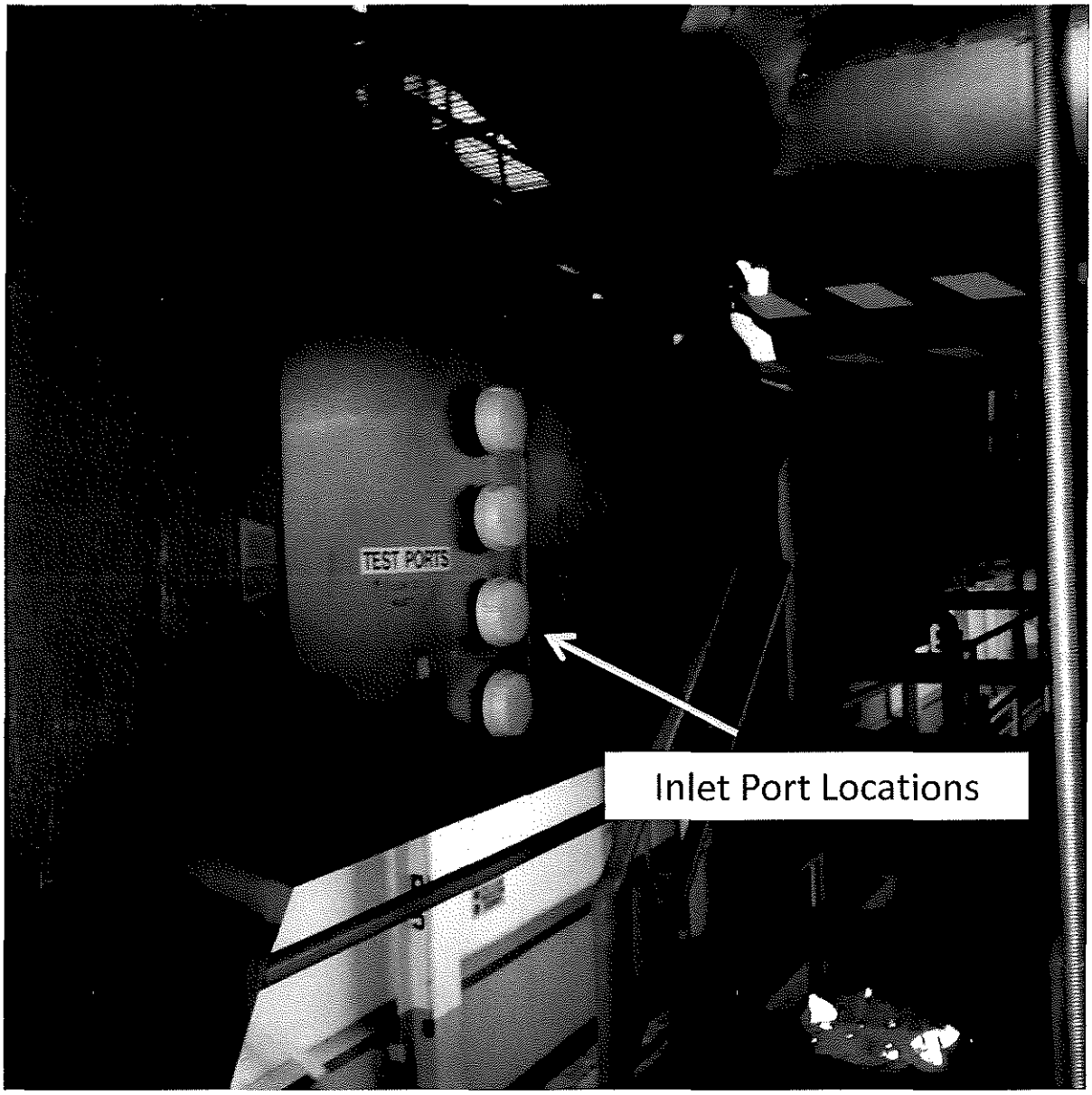


**Figure 10:** EU-TOPCOAT Oven 2 RTO Outlet

**Figure 11:** EU-TOPCOAT Oven 3 RTO Inlet

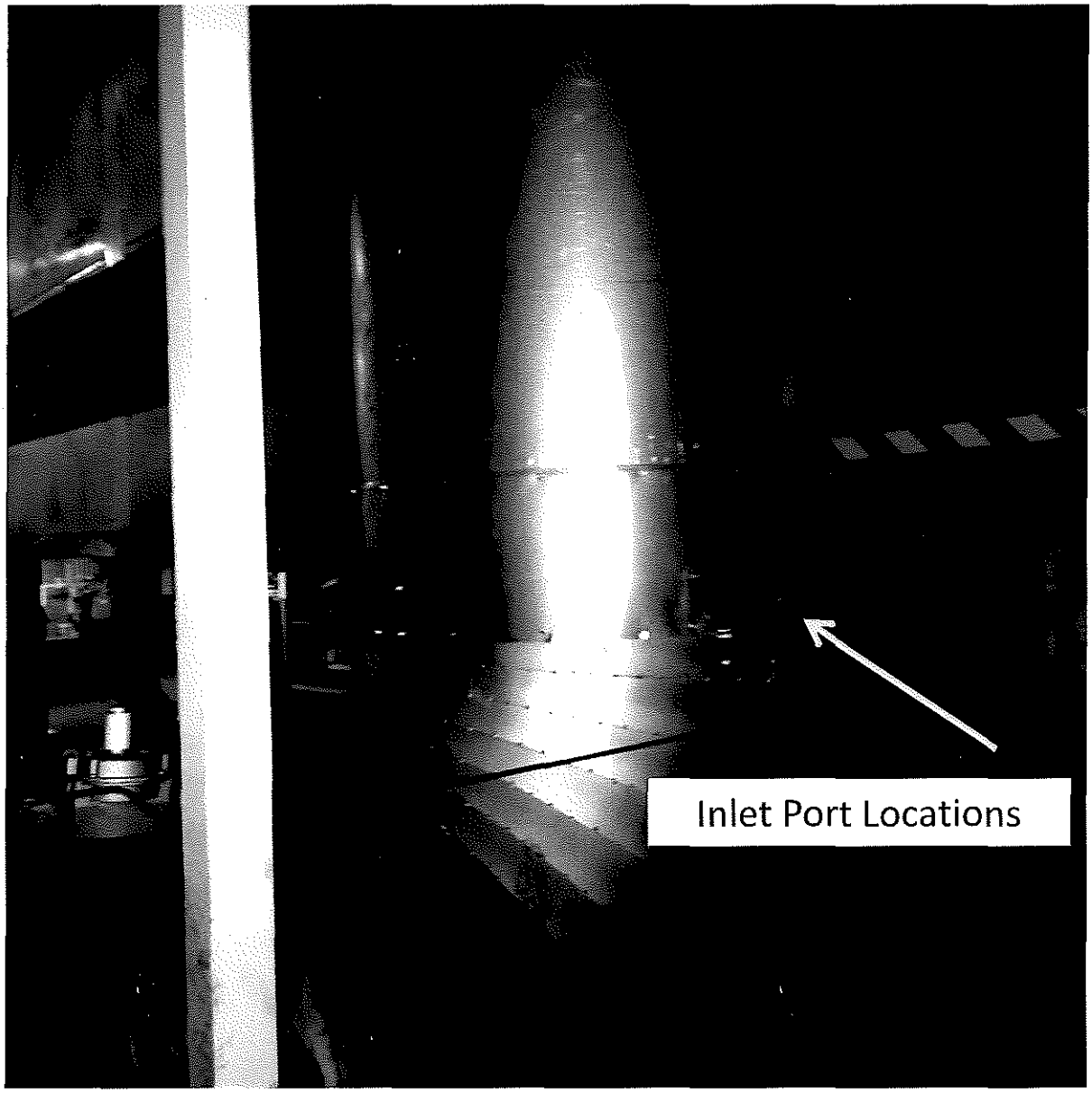
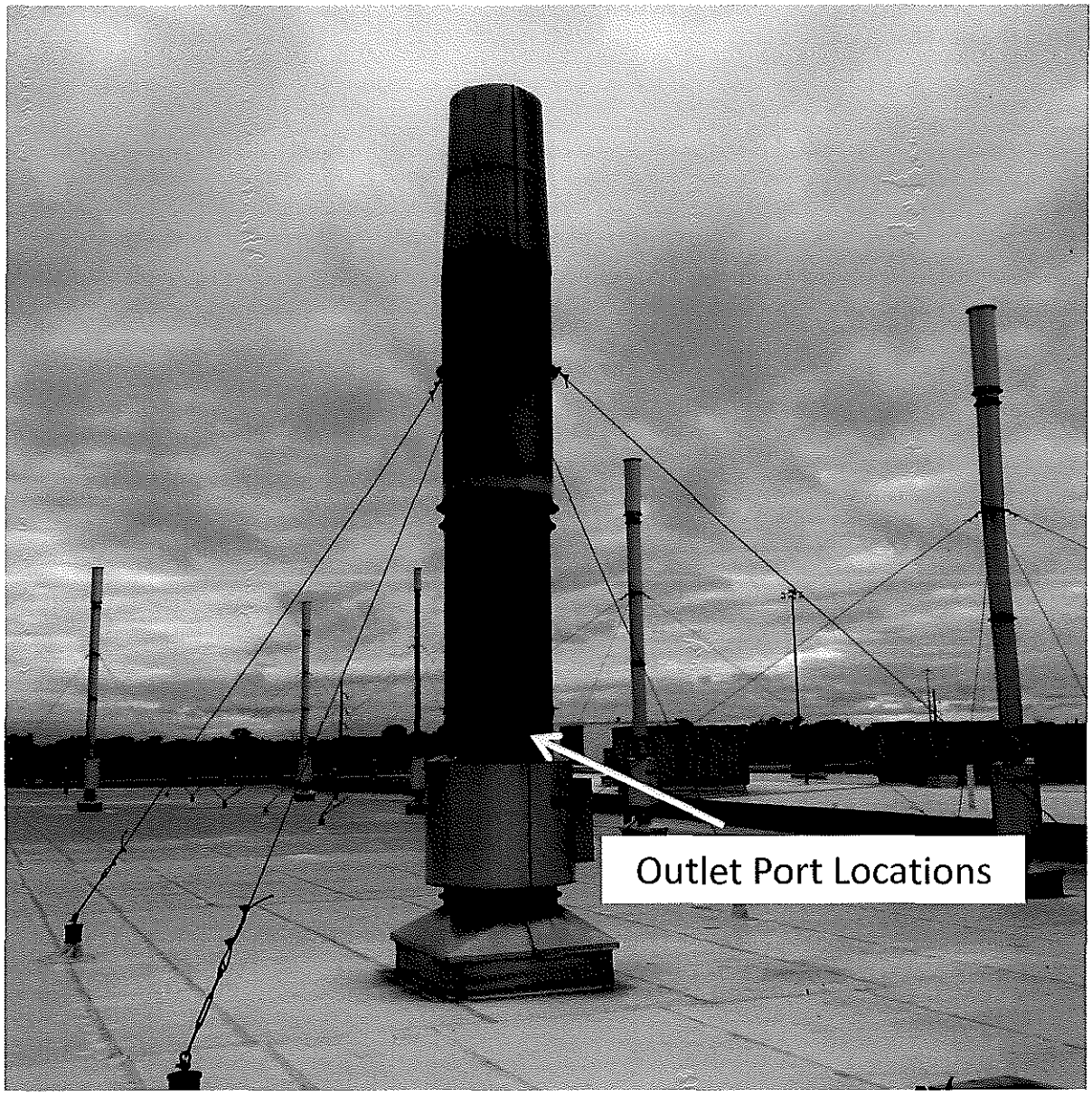


**Figure 12:** EU-TOPCOAT Oven 3 RTO Outlet



The inlet and outlet of each of the EU-TOPCOAT 1, 2, and 3 Concentrators were tested simultaneously to evaluate the VOC removal efficiency. These sampling locations did not meet USEPA Method 1 criteria and therefore flow rates could not be measured. 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 VOC concentrations (ppmv).

The inlet and outlet of each of the EU-TOPCOAT Oven 1, 2 and 3 RTOs were tested simultaneously to evaluate the VOC destruction efficiency. The inlet sampling location did not meet the USEPA Method 1 criteria and therefore flow rates although measured were not used for the DE emission rate calculation. The outlet sampling locations were considered ideal and flow, temperature and moisture were measured at these locations. The flow was assumed to be the same on the Inlet as was measured at the Outlet. VOC DE was computed based on inlet and outlet emissions rates (lb/hr) and concentration basis (ppmv).

# 4. SAMPLING METHODOLOGY

## 4.1 Testing Methodology

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

Summary of Test Methodology

| Parameter | Proposed Method |
|---|---|
| Velocity, Temperature, Flow rate | USEPA Method 1 to 4 |
| Total VOCs | USEPA[1] Method 25A (CEM) |
| Total Methane and Total Non-Methane 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 Stack Velocity, Temperature, and Volumetric Flow Rate Determination

The exhaust velocities and flow rates were determined following the USEPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate". Velocity measurements were taken with a pre-calibrated S-Type pitot tube on the inlet and a pre-calibrated standard pitot on the outlet. All pressure readings were taken with an incline manometer. Volumetric flow rates were determined following the equal area method as outlined in USEPA Method 2. Temperature measurements were made simultaneously with the velocity measurements and were conducted using a Type K chromel-alumel thermocouple in conjunction with a digital temperature indicator. As noted in the Notification for testing, flow measurements were only completed once during the testing at the inlet and outlet of the RTOs. Due to the non-ideal location of the RTO inlets, the inlet flow was considered to be the same as the outlet for DE calculations. No flows were measured on the Concentrators due to the non-ideal sampling locations. Flow information can be found in **Appendix F**.

The dry molecular weight of the stack gas was determined following calculations outlined in USEPA Method 3, "Determination of Molecular Weight of Dry Stack Gas". Oxygen and carbon monoxide were monitored using an electrochemical cell and a non-dispersive infrared sensor. Stack moisture content was determined through direct condensation and according to USEPA Method 4, "Determination of Moisture Content of Stack Gas". As noted in the Notification for Testing, moisture test was only completed at the outlet of the exhaust stacks for the RTOs. Moisture tests were not completed on the Concentrators.

### 4.2.2 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 RTOs. The methane response factor was 2.6. For the Concentrators a direct comparison of VOCs (as propane) was used to determine the RE. The exhaust gas sample was withdrawn from a single point at the centre 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 FIAs 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 (25 to 35% of span value) and mid (45 to 55% of span value) 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. The test runs were considered valid provided the response was within ±3% from the instrument span value. **Appendix C** contains detailed data for the Concentrator sampling program including summary of results, the span value data and 1 minute averages. **Appendix D** contains detailed data for the RTO sampling program including summary of results, the span value data and 1 minute averages.

Two separate gas dilution systems were used to introduce known values of calibration gases into the VOC analyzers. The gas dilution systems consisted of calibrated orifices. The systems diluted a high level calibration gas to within ±2% of predicted values. Environics gas dilution system serial # 5372400001 had three sets of dilutions at 10%, 20%, 25% and 30% of the high level (151 ppm) calibration gas performed. The table below summarizes the gas divider calibrations. Subsequently a certified mid-level gas (44.9 ppm) was introduced into the analyzer; the calibration gas concentration was within 10% of the 30% dilution. Environics gas dilution system serial # 0047973003 had three sets of dilutions at 5%, 10%, 19% and 22% of the high gas value (456 ppm) calibration gas performed. The table below summarizes the gas divider calibrations. Subsequently a certified mid-level gas (44.9 ppm) and was within 10% of the 10% dilution.

Environics Gas Divider Calibration - Serial # 5372400001

| Gas Dilution | Expected Concentration | Acceptable Range | | Actual Concentration #1 | Actual Concentration #2 | Actual Concentration #3 | Acceptable Yes/No |
|---|---|---|---|---|---|---|---|
| | | Low | High | | | | |
| 10% | 15.10 | 14.80 | 15.40 | 15.11 | 15.14 | 15.13 | Yes |
| 20% | 30.20 | 29.60 | 30.80 | 30.15 | 30.09 | 30.1 | Yes |
| 25% | 37.75 | 37.00 | 38.51 | 37.78 | 37.79 | 37.8 | Yes |
| 30% | 45.30 | 44.39 | 46.21 | 45.31 | 45.33 | 45.32 | Yes |
| Bottle Value = | 151 | | | | | | |

Environics Gas Divider Calibration - Serial # 0047973003

| Gas Dilution | Expected Concentration | Acceptable Range | | Actual Concentration #1 | Actual Concentration #2 | Actual Concentration #3 | Acceptable Yes/No |
|---|---|---|---|---|---|---|---|
| | | Low | High | | | | |
| 5% | 22.80 | 22.34 | 23.26 | 22.74 | 22.76 | 22.91 | Yes |
| 10% | 45.60 | 44.69 | 46.51 | 45.48 | 45.84 | 45.94 | Yes |
| 19% | 86.64 | 84.91 | 88.37 | 87 | 87.1 | 86.93 | Yes |
| 22% | 100.32 | 98.31 | 102.33 | 100.58 | 100.35 | 100.83 | Yes |
| Bottle Value = | 456 | | | | | | |

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 concentrators and RTOs including one minute temperature data and vehicle throughput of the oven. Further details are provided in **Appendix E**.

Mr. Rohit Patel and Mr. Andrew Whitsitt 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. Patel and/or Mr. Whitsitt confirmed that the process was operating normally. During times of low throughput tests were delayed or paused until higher production levels occurred.

# 5. 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 C** for Concentrators testing and **Appendix D** for RTOs testing.

**Source: EU-TOPCOAT 1 Concentrator**

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 13:14 | 14:14 | 16 | 84 | 4.9 | 94.2% |
| 2 | 2015-12-01 | 14:28 | 15:27 | 14 | 74 | 5.0 | 93.3% |
| 3 | 2015-12-01 | 15:36 | 16:36 | 17 | 81 | 2.6 | 96.7% |
| | | | | **Average** | **80** | **4.2** | **94.7%** |

**Source: EU-TOPCOAT 2 - Concentrator**

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 8:17 | 9:17 | 14 | 84 | 0.8 | 99.0% |
| 2 | 2015-12-02 | 9:29 | 10:29 | 16 | 115 | 0.7 | 99.4% |
| 3 | 2015-12-02 | 10:37 | 11:37 | 11 | 75 | 0.3 | 99.6% |
| | | | | **Average** | 92 | 0.6 | 99.3% |

**Source: EU-TOPCOAT 3 - Concentrator**

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Removal Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 2015-12-02 | 14:28 | 15:28 | 21 | 58 | 6.6 | 88.6% |
| 2 | 2015-12-02 | 15:41 | 16:41 | 18 | 80 | 7.2 | 91.0% |
| 3 | 2015-12-03 | 6:41 | 7:40 | 18 | 68 | 7.0 | 89.7% |
| | | | | **Average** | 69 | 6.9 | 89.8% |

CONSULTING ENGINEERS & SCIENTISTS

## Source: EU-TOPCOAT Oven 1 RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (ppm) (as propane) | Outlet THC (ppm) (as Propane) | Outlet Methane (ppm) (as Methane) | Outlet Methane (ppm) [3] (as Propane) | Outlet Total NMVOC (ppm) (as Propane) | Destruction Efficiency (ppm) [1] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 10:00 | 11:00 | 19 | 254 | 2.4 | 4.8 | 1.9 | 0.6 | 99.8% |
| 2[2] | 2015-12-01 | 11:55 | 13:31 | 17 | 245 | 2.1 | 4.9 | 1.9 | 0.2 | 99.9% |
| 3 | 2015-12-01 | 13:55 | 14:55 | 23 | 240 | 3.7 | 4.9 | 1.9 | 1.8 | 99.2% |
| | | | | Average | 246 | 2.7 | 4.8 | 1.9 | 0.9 | 99.6% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 2 was delayed from 12:33 to 13:07 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

## Source: EU-TOPCOAT Oven 1 RTO

| Test ID | Date | Start | End | Vehicles per hour | Inlet THC (lb/hr) (as propane) | Outlet THC (lb/hr) (as Propane) | Outlet Methane (lb/hr) [3] (as Propane) | Outlet NMVOC (lb/hr) (as Propane) | Destruction Efficiency (lb/hr) [1] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2015-12-01 | 10:00 | 11:00 | 19 | 11.7 | 0.11 | 0.09 | 0.03 | 99.8% |
| 2[2] | 2015-12-01 | 11:55 | 13:31 | 17 | 11.2 | 0.10 | 0.09 | 0.01 | 99.9% |
| 3 | 2015-12-01 | 13:55 | 14:55 | 23 | 11.0 | 0.17 | 0.09 | 0.08 | 99.2% |
| | | | | Average | 11.3 | 0.13 | 0.09 | 0.04 | 99.6% |

**Notes:**
[1] Destruction efficiency was calculated based on total non-methane THC concentrations.
[2] Test 2 was delayed from 12:33 to 13:07 due to low production
[3] Methane to Propane conversion based on Methane response factor of 2.6
NMVOC – Non-methane volatile organic compound

# 3. SAMPLE LOCATION

Figures 1 through 12 below depict the sources sampled, sampling ports and traverse point locations. Photographs of each sampling location are presented below. **Appendix B** contains detailed Schematics of all sampling locations.

**Figure 1:** EU-TOPCOAT 1 Concentrator Inlet

**Figure 2:** EU-TOPCOAT 1 Concentrator 1 Outlet

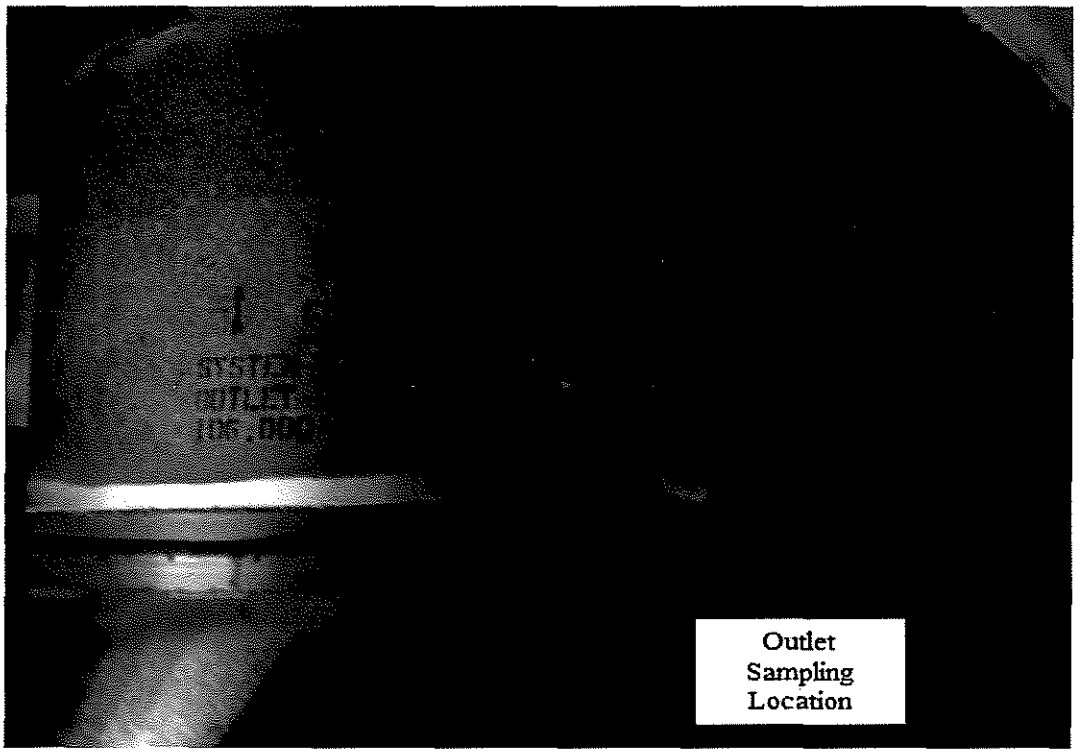


**Figure 3:** EU-TOPCOAT 2 Concentrator Inlet

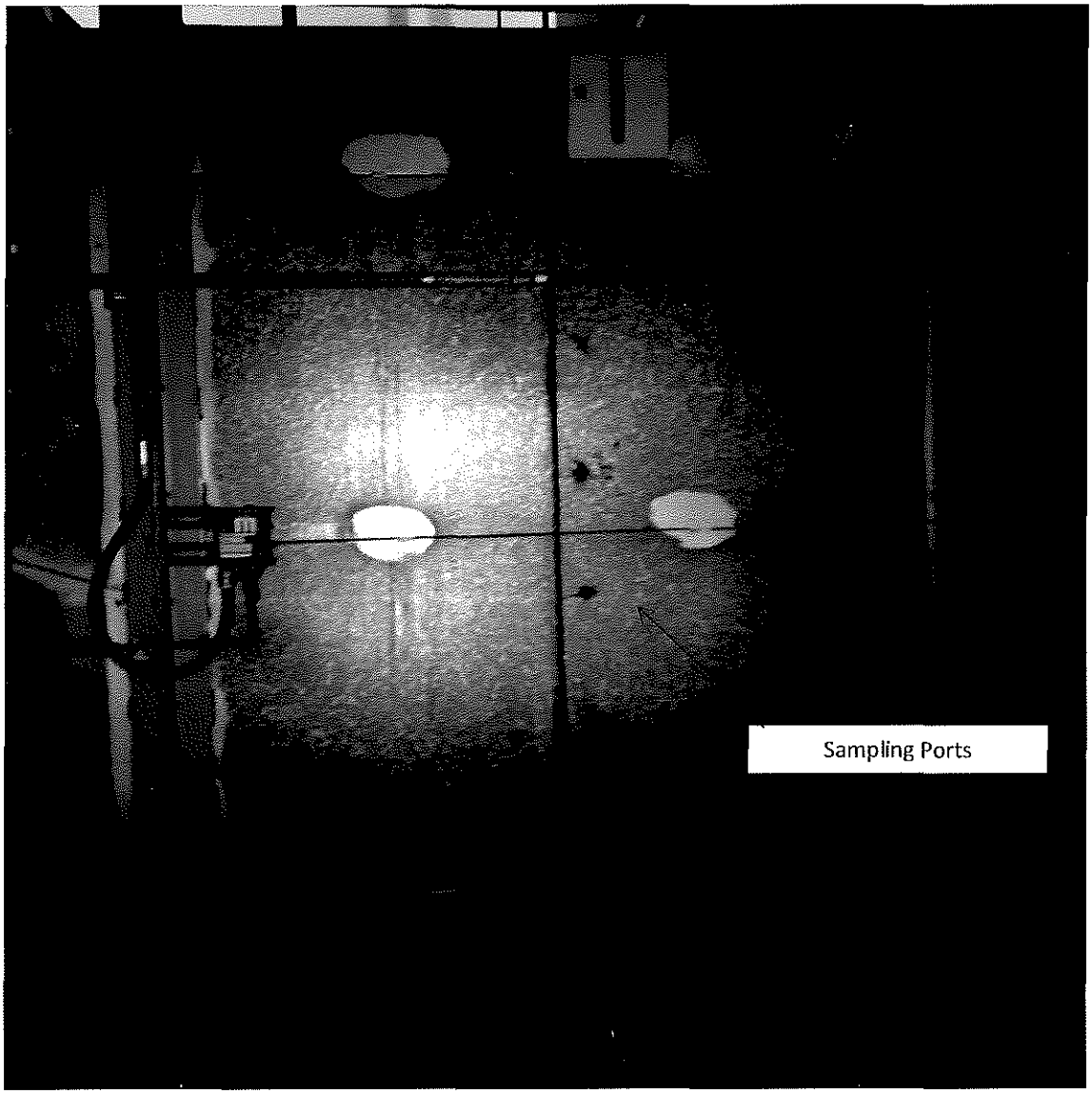


**Figure: 4:** EU-TOPCOAT 2 Concentrator Outlet

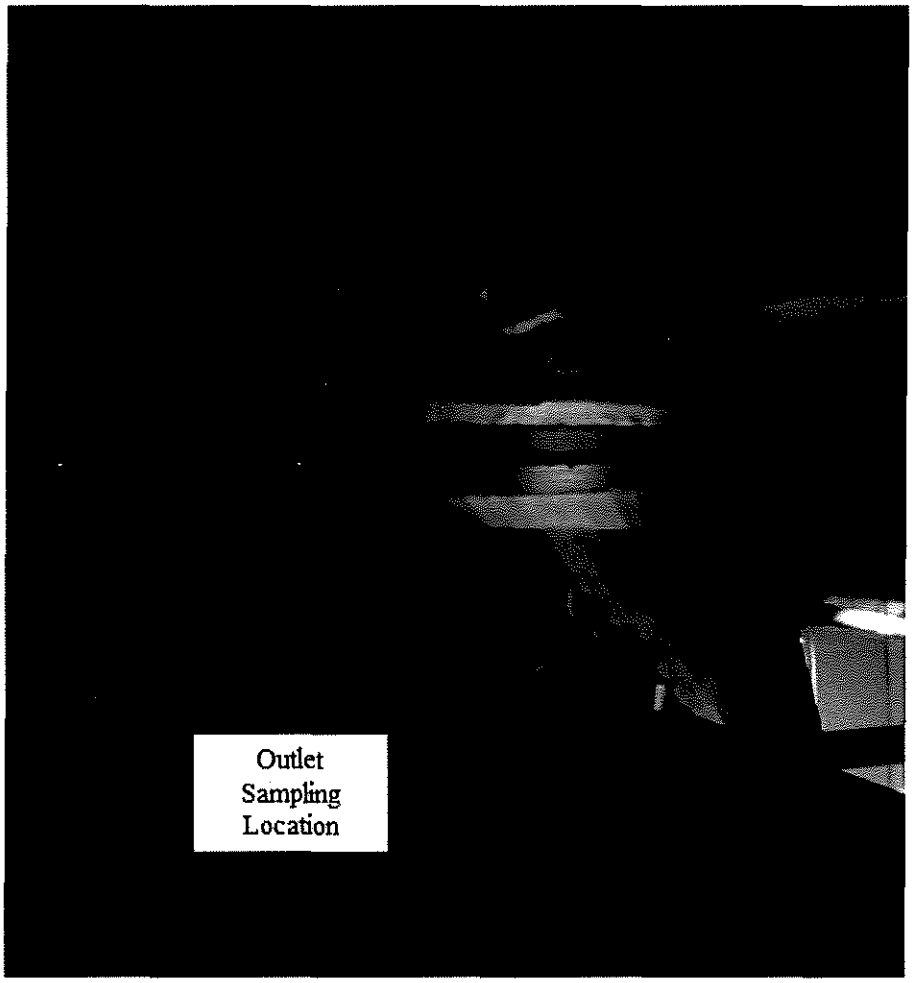


**Figure 5:** EU-TOPCOAT 3 Concentrator Inlet

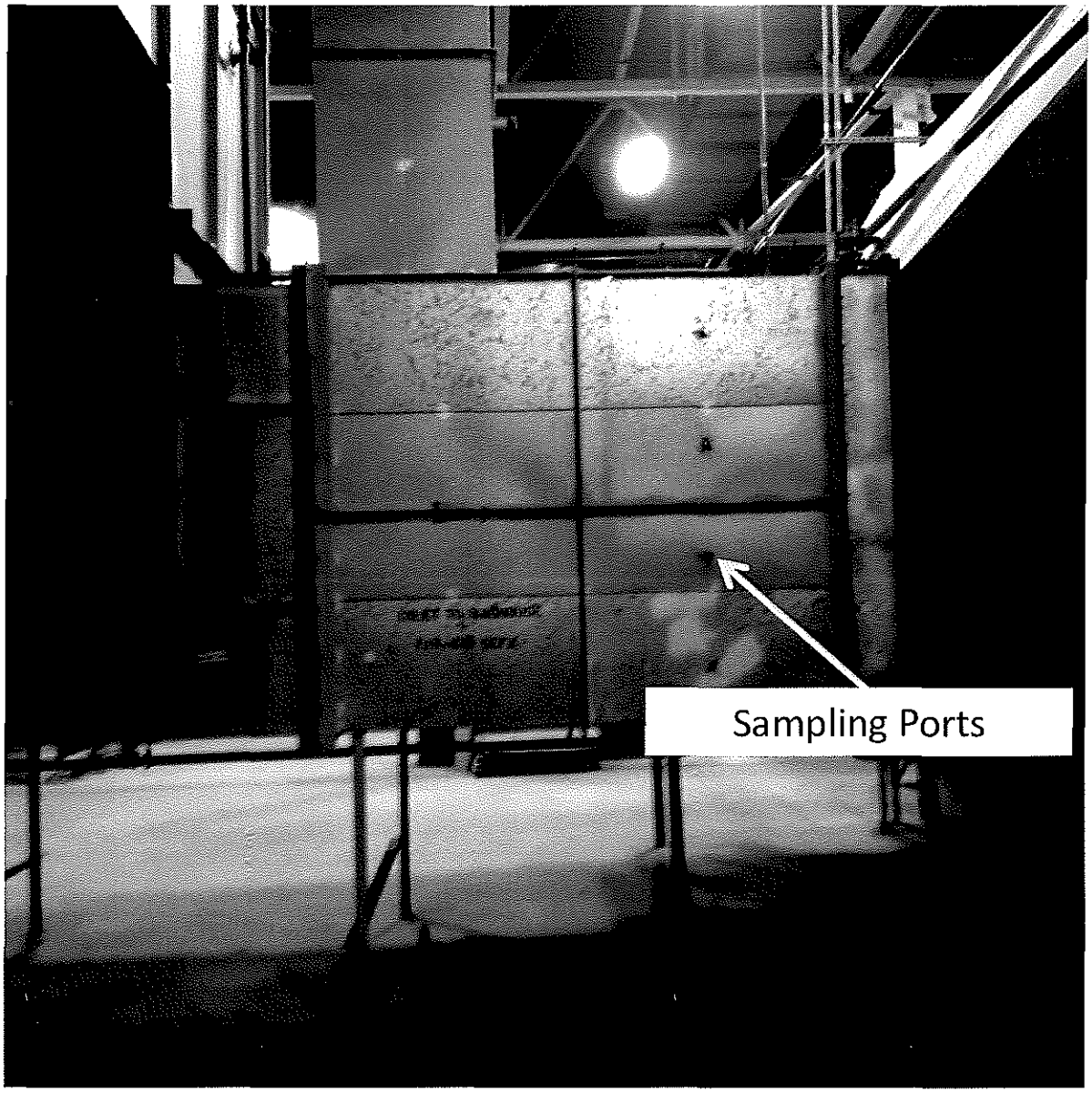


**Figure 6:** EU-TOPCOAT 3 Concentrator Outlet

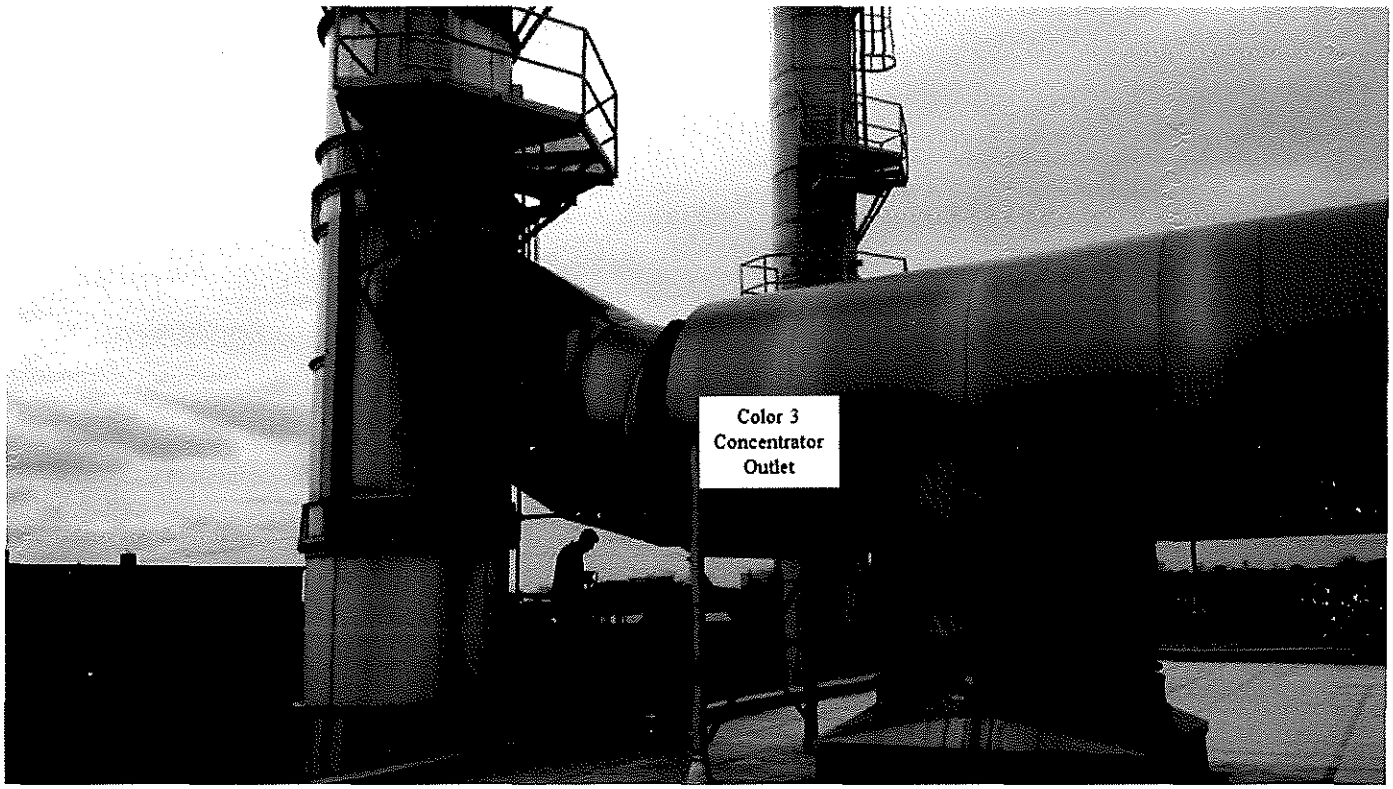


**Figure 7:** EU-TOPCOAT Oven 1 RTO Inlet

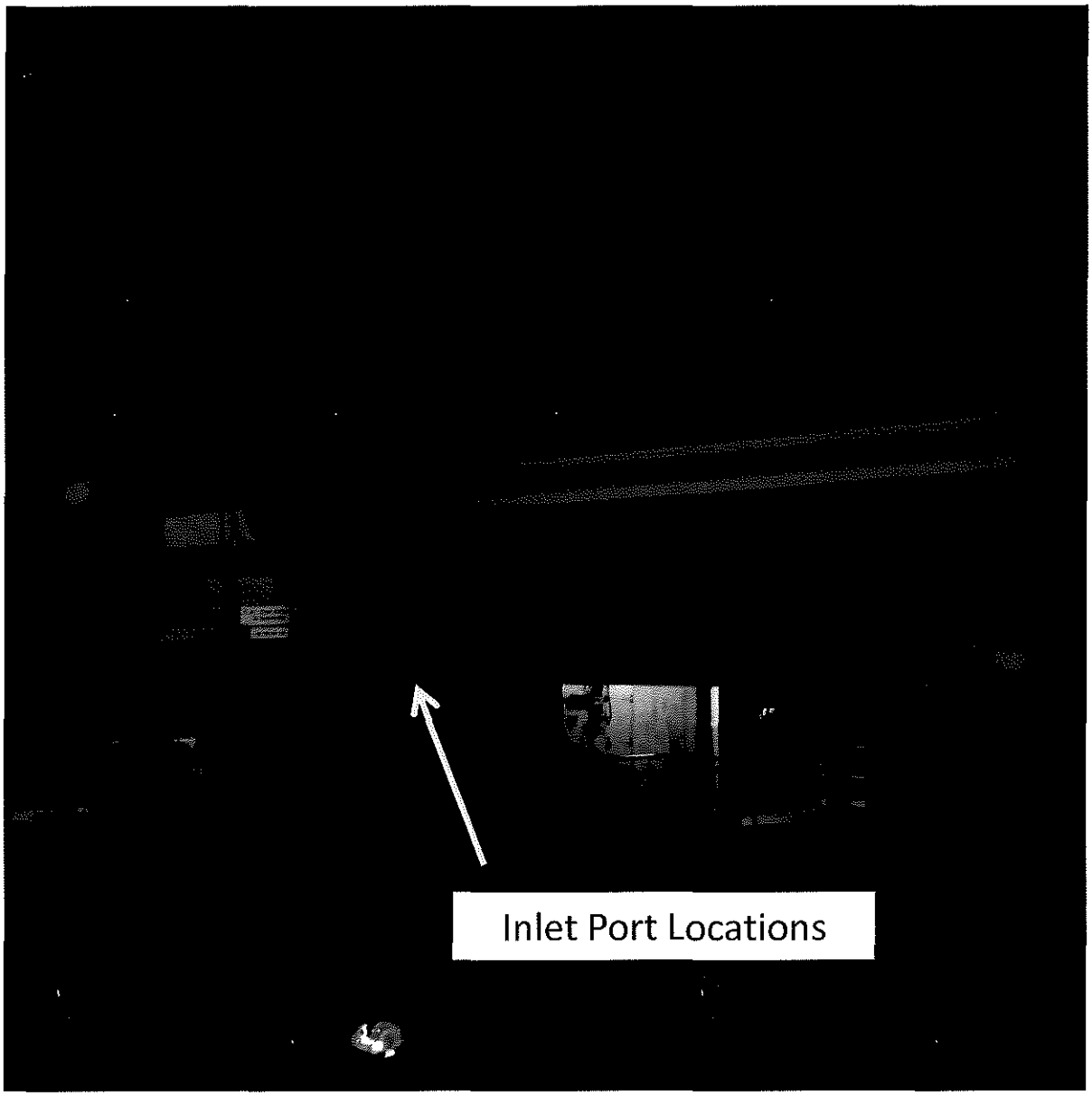


**Figure 8:** EU-TOPCOAT Oven 1 RTO Outlet