

# FINAL REPORT



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## FORD MOTOR COMPANY

FLAT ROCK, MICHIGAN

### **FLAT ROCK ASSEMBLY PLANT (FRAP): RCO OCM TEST REPORT**

RWDI #2304078

August 7, 2023

#### **SUBMITTED TO**

**Sue Hicks**  
**Ford Motor Company**  
Environmental Engineer  
Fairlane Plaza North, Suite 800  
290 Town Center Drive  
Dearborn, Michigan 48126

**Jonathan Lamb**  
**EGLE**  
Constitution Hall, 2<sup>nd</sup> Floor South  
525 West Allegan Street  
Lansing, MI 48909-7760

**Ford**  
**Flat Rock Assembly Plant**  
1 International Drive  
Flat Rock, Michigan 48134

#### **SUBMITTED BY**

**Steve Smith, QSTI**  
Project Manager  
Steve.Smith@rwdi.com

**David Trahan**  
Senior Field Technician  
David.Trahan@rwdi.com

**RWDI USA LLC**  
**Consulting Engineers & Scientists**  
2239 Star Court  
Rochester Hills, Michigan 48309

T: 248.841.8442  
F: 519.823.1316



[rwdi.com](http://rwdi.com)

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**FLAT ROCK ASSEMBLY PLANT (FRAP): RCO OCM TEST REPORT  
FORD MOTOR COMPANY**

RWDI#2304078  
August 7, 2023



## EXECUTIVE SUMMARY

RWDI USA LLC (RWDI) was retained by Ford Motor Company (Ford) to complete the emission sampling program at the Flat Rock Assembly Plant (FRAP) located at 1 International Drive, Flat Rock, Michigan. FRAP operates an automobile assembly plant that produces the Ford Mustang. The testing evaluated volatile organic compound (VOC) concentrations at the outlet of three (3) regenerative catalytic oxidizers (RCO). The test program was completed on June 29<sup>th</sup>, 2023.

**Executive Table i:** RCO Average

Parameter	Concentration			
	RCO A	RCO B	RCO C	Average
Outlet VOC (as propane)	3.61 ppmv	3.07 ppmv	1.55 ppmv	2.74 ppmv

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# 1 INTRODUCTION

RWDI USA LLC (RWDI) was retained by Ford Motor Company (Ford) to complete the RCO Outlet Concentration Monitoring (OCM) emission sampling program at the Flat Rock Assembly Plant (FRAP) located at 1 International Drive, Flat Rock, Michigan. FRAP operates an automobile assembly plant that produces the Ford Mustang. The testing evaluated volatile organic compound (VOC) concentrations at the outlet of three (3) regenerative catalytic oxidizers (RCO).

## 1.1 Location and Dates of Testing

The test program was completed on June 29<sup>th</sup>, 2023 at the Ford FRAP facility.

## 1.2 Purpose of Testing

FRAP requires periodic monitoring of the VOC concentration of exhaust from each of the three (3) RCOs.

## 1.3 Description of Source

Vehicle body panels are stamped and assembled on site from sheet metal components. The bodies are cleaned, treated, and prepared for painting in the phosphate system. Drawing compounds, mill oils, and dirt are removed from the vehicle bodies utilizing both high pressure spray and immersion cleaning/rinsing techniques. Vehicle bodies are then dip coated in electro deposition corrosion primer paint for protection. The electro primer (e-coat) is heat cured to the vehicle body in a high-temperature bake oven. After completing the e-coat operation, vehicle bodies are conveyed to the sealer area for application of various sealants to body seams and joints. Vehicle bodies are then conveyed to an oven to cure the sealers.

After the sealer oven, the vehicles are routed to one of the two identical 3-wet paint systems. In the booth, the vehicles are painted with primer, a color basecoat, and a protective clearcoat layer using automatic bells on robot spray applicators. The vehicles are then passed through an oven to cure the 3-wet applications. The 3-wet booths allow for paint application of one layer after the other without the intermediate drying stage.

The vehicle paint process includes the e-coat priming (guidecoat) surface priming, base/clearcoat and vehicle sealing operations. The majority of the process emissions associated with these coating activities are oxidized at elevated temperatures by the RCO and RTO emission control equipment.



## 3 SOURCE DESCRIPTION

### 3.1 Description of Process and Emission Control Equipment

FRAP operates three (3) RCOs for emission control. See 1.3 for further description of the process.

### 3.2 Process Flow Sheet or Diagram

Each RCO controls VOC emissions from the painting process.

### 3.3 Type and Quantity of Raw and Finished Materials

The units associated with this process are EGECOAT, EGGUIDECOAT/EGTOPCOAT, and EGCOAT. These include body sealing agents, top/basecoat color paints, protective coatings, and electro deposition primer.

### 3.4 Normal Rated Capacity of Process

The plant was operating at normal production for most of the testing.

### 3.5 Process Instrumentation Monitored During the Test

The RCO temperature was monitored during the test.



Propane. During each run for each RCO, the Total Hydrocarbon (as Propane) and the Methane (corrected to as Propane) was determined and the methane response (as Propane) was subtracted from the Total Hydrocarbon (as Propane) value. This resulted in obtaining the Total Non-Methane Organic Compound (NMOC) values from each for the RCO outlets.

## 4.2 Description of Recovery and Analytical Procedures

There were no samples to recover during this test program. All testing used real time data from the analyzers.

## 4.3 Sampling Port Description

The sampling locations for outlets are located outside for each RCO. Each RCO outlet is 107.5".

# 5 TEST RESULTS AND DISCUSSION

## 5.1 Detailed Results

Table 5.1.1: Table of Results

Parameter	Concentration			
	RCO A	RCO B	RCO C	Average
Outlet VOC (as propane)	3.61 ppmv	3.07 ppmv	1.55 ppmv	2.74 ppmv

Detailed Results are provided in **Appendix B**.

## 5.2 Discussion of Results

Each RCO had a result of under 5 ppm VOC.

## 5.3 Variations in Testing Procedures

Due to low production, the second test was extended to meet a sixty minute period however was divided into two (2) time periods consisting of 13:35 to 13:55 and 14:39 to 15:19. The first test was a complete 30-minute period without any interruptions for production.

## TABLES



**Table 1: RCO A - THC, Methane and NMOC EMISSIONS TABLE**

Source: RCO A Outlet  
 RWDI Project # 2304078

Parameter	Test 1	Test 2	Average
Date	29-Jun-23	29-Jun-23	--
Start Time:	8:05	13:35 to 13:55	--
Stop Time:	8:34	14:39 to 15:19	--
Duration (mins):	30	60	--
<b>Total Hydrocarbons (THC) Concentration (as propane) ppm:</b>			
	41.1	39.1	40.1
THC Concentration (as propane) ppm corrected per Method 7E:	41.1	40.0	40.5
<b>Methane (CH<sub>4</sub>) Concentration (as methane) ppm:</b>			
	90.2	86.3	88.2
CH <sub>4</sub> Concentration (as methane) ppm corrected per Method 7E:	89.6	86.3	88.0
CH <sub>4</sub> Concentration (as propane) ppm corrected per Method 7E:	37.5	36.3	36.9
Non-Methane Organic Compounds (NMOC) Concentration (minus methane) ppm corrected per Method 7E:	3.53	3.69	3.61
Methane to Propane Response Factor:	2.39	2.38	2.38

**Table 2: RCO B - THC, Methane and NMOC EMISSIONS TABLE**

Source: RCO B Outlet  
 RWDI Project # 2304078

Parameter	Test 1	Test 2	Average
Date	29-Jun-23	29-Jun-23	--
Start Time:	8:05	13:35 to 13:55	--
Stop Time:	8:34	14:39 to 15:19	--
Duration (mins):	30	60	--
Total Hydrocarbons (THC) Concentration (as propane) ppm:	6.24	4.96	5.60
THC Concentration (as propane) ppm corrected per Method 7E:	6.22	5.05	5.63
Methane (CH <sub>4</sub> ) Concentration (as methane) ppm:	6.38	5.49	5.93
CH <sub>4</sub> Concentration (as methane) ppm corrected per Method 7E:	6.49	5.59	6.04
CH <sub>4</sub> Concentration (as propane) ppm corrected per Method 7E:	2.74	2.39	2.57
Non-Methane Organic Compounds (NMOC) Concentration (minus methane) ppm corrected per Method 7E:	3.47	2.66	3.07
Methane to Propane Response Factor:	2.37	2.34	2.35

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**Table 3: RCO C - THC, Methane and NMOC EMISSIONS TABLE**

Source: RCO C Outlet  
 RWDI Project # 2203057

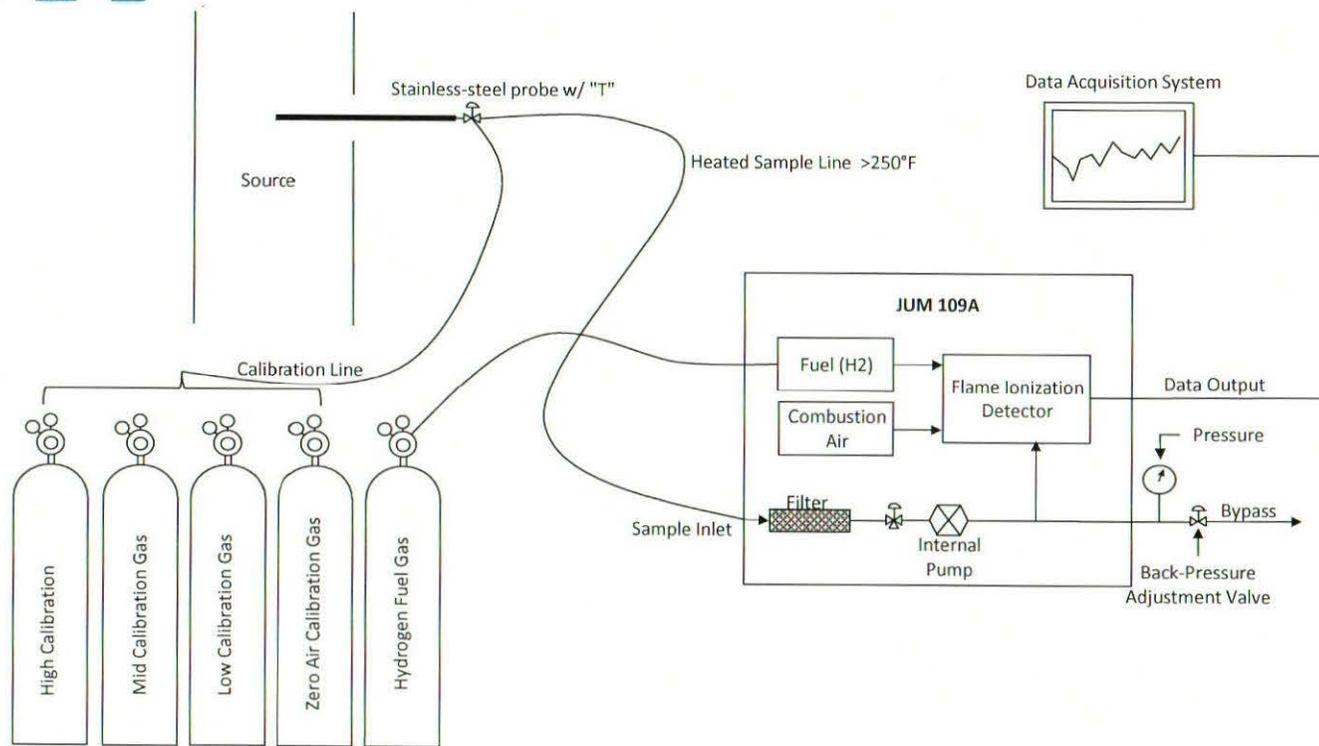
Parameter	Test 1	Test 2	Average
Date	29-Jun-23	29-Jun-23	--
Start Time:	8:05	13:35 to 13:55	--
Stop Time:	8:34	14:39 to 15:19	--
Duration (mins):	30	60	--
Total Hydrocarbons (THC) Concentration (as propane) ppm:	5.46	4.34	4.90
THC Concentration (as propane) ppm corrected per Method 7E:	5.41	4.30	4.85
Methane (CH <sub>4</sub> ) Concentration (as methane) ppm:	8.79	6.69	7.74
CH <sub>4</sub> Concentration (as methane) ppm corrected per Method 7E:	8.84	6.66	7.75
CH <sub>4</sub> Concentration (as propane) ppm corrected per Method 7E:	3.74	2.86	3.30
Non-Methane Organic Compounds (NMOC) Concentration (minus methane) ppm corrected per Method 7E:	1.67	1.43	1.55
Methane to Propane Response Factor:	2.37	2.33	2.35

## FIGURES





Figure No. 1: USEPA Method 25A Schematic



**USEPA Method 25A**

Ford Motor Company  
Flat Rock Assembly Plant (FRAP)

Flat Rock, MI

Project# 2304078

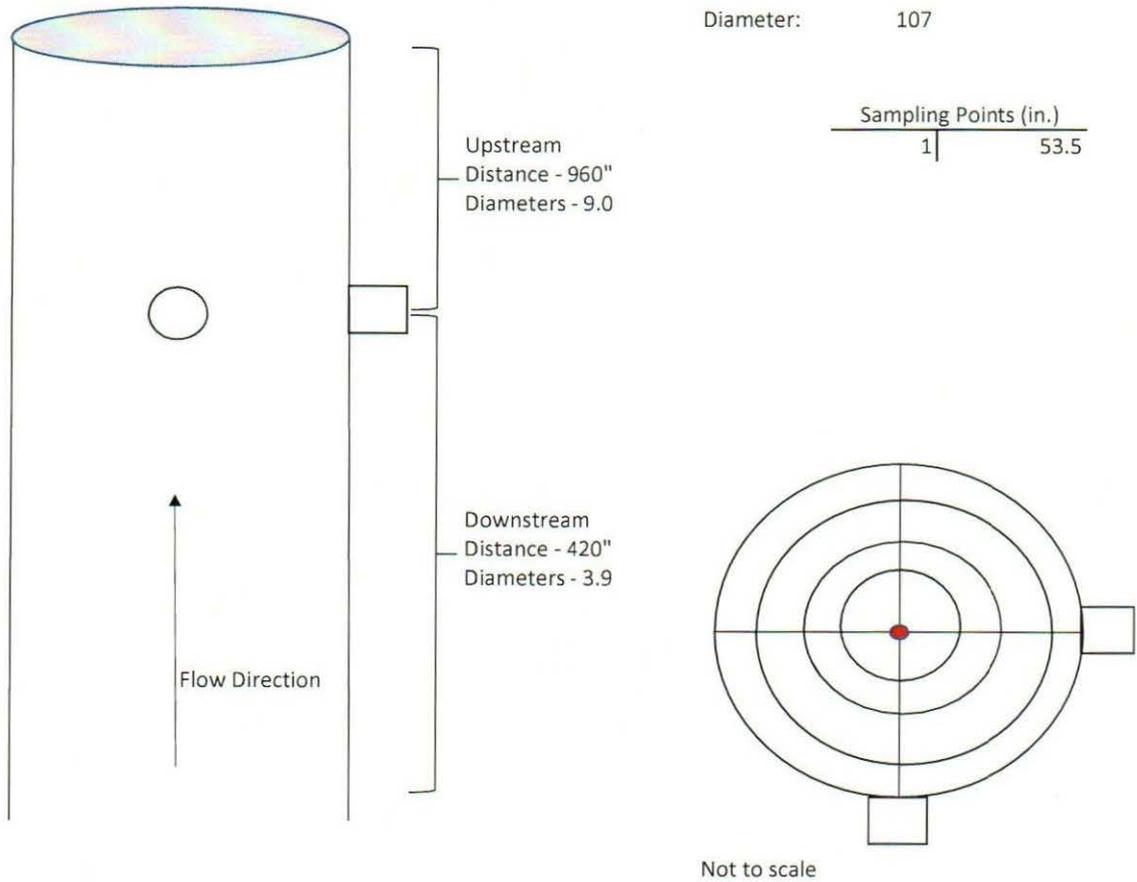
Figure No. 1

Date: June 29<sup>th</sup>, 2023





Figure No. 2 Upstream and Downstream Locations and Method 25A Sample Location

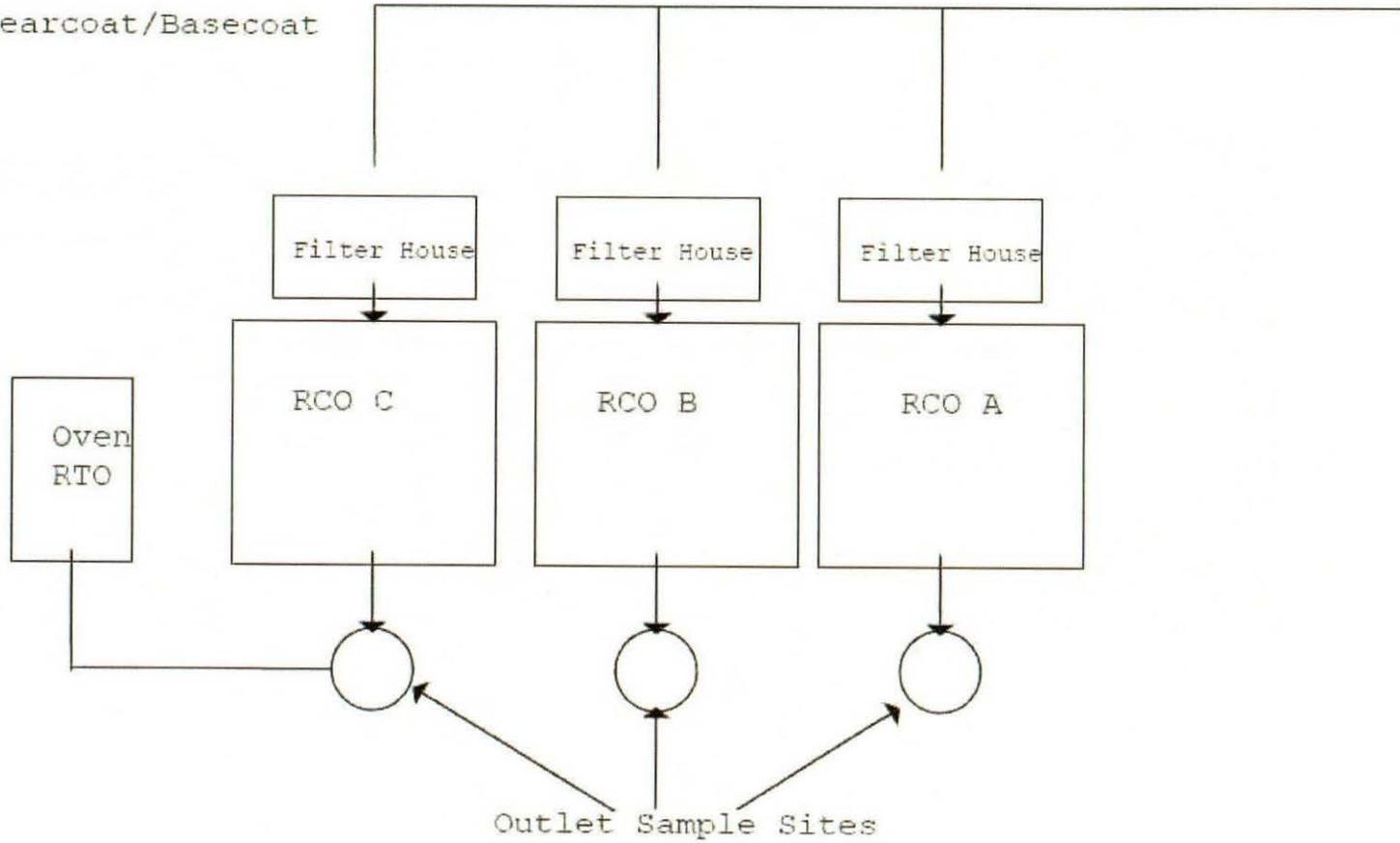


Source  
Ford  
FRAP  
Flat Rock, MI

Date:  
29-Jun-23

RWDI USA LLC  
2239 Star Court  
Rochester Hills, MI 48309

Prime/Clearcoat/Basecoat



**Ford Motor Company**  
**Flat Rock Assembly Plant (FRAP)**  
Abatement System Layout and Sampling Locations

Flat Rock, Michigan

Figure No. 3

Project #2304078

Date: June 29<sup>th</sup>, 2023

