Source Test Report for 2022 Compliance Testing RTO #1 System, RTO/RCC #2 System, Primer Surfacer/Guidecoat System, and Clearcoat/Topcoat System General Motors LLC Lansing Grand River Assembly Lansing, Michigan

Prepared For:

GM Lansing Grand River Assembly
920 Townsend Street
Lansing, MI 48933

Prepared By:

Montrose Air Quality Services, LLC
1371 Brummel Avenue
Elk Grove Village, IL 60007

For Submission To:

Michigan Department of Environment, Great Lakes, and Energy
525 W. Allegan St.
Lansing, MI 48933

Document Number: MW023AS-018308-RT-1467
Test Dates: July 12, 13, and 14, 2022
Submittal Date: August 31, 2022

MONTROSE
AIR QUALITY SERVICES

STAC
ACCREDITED
TO ASTM D7036 ONLY
CERT #3925.01

MONTROSE
AIR QUALITY SERVICES

Review and Certification

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature: _____ **Date:** 08 / 26 / 2022

Name: Sean Wheeler, QI **Title:** Client Project Manager

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: Henry M. Taylor **Date:** 08 / 29 / 2022

Name: Henry M. Taylor, QSTO **Title:** Senior Reporting Specialist

MONTROSE
AIR QUALITY SERVICES

Table of Contents

Section **Page**

List of Appendices

List of Tables

List of Figures

1.0 Introduction

1.1 Summary of Test Program

General Motors LLC (GM) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance emissions test on the sources listed in Table 1-1 at their Lansing Grand River Assembly facility located in Lansing, Michigan.

The tests were conducted to meet the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit No. MI-ROP-A1641-2017.

The specific objectives were to:

- Determine THC concentration and emission rates from the RTO #1 System, RTO #2/Rotary Carbon Concentrator (RCC) System, Clearcoat/Topcoat System, and Primer Surfacer/Guidecoat System
- Determine the THC DE of the RTO #1 System and RTO #2/RCC System
- Determine the THC Removal Efficiency (RE) of the RTO #2/RCC System
- Determine the THC Capture Efficiency (CE) of the Clearcoat/Topcoat System and Primer Surfacer/Guidecoat System
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

Table 1-1
Summary of Test Program

Test Dates	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
7/12/22	RTO #1 System	Velocity/Volumetric Flow	EPA 1 & 2	3	60
		O_2, CO_2	EPA 3	3	60
		Moisture	EPA 4	3	60
		THC	EPA 25A	3	60
7/12/22	RTO #2/RCC System	Velocity/Volumetric Flow	EPA 1 & 2	3	60
		O_2, CO_2	EPA 3	3	60
		Moisture	EPA 4	3	60
		THC	EPA 25A	3	60
7/13/22	Clearcoat/Topcoat System	Velocity/Volumetric Flow	EPA 1 & 2	3	60
		O_2, CO_2	EPA 3	3	60
		Moisture	EPA 4	3	60
		THC	EPA 25A	3	60
7/14/22	Primer Surfacer/Guidecoat System	Velocity/Volumetric Flow	EPA 1 & 2	3	60
		O_2, CO_2	EPA 3	3	60
		Moisture	EPA 4	3	60
		THC	EPA 25A	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix C.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective permit limits in Tables 1-2 through 1-5. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

The tests were conducted according to Test Plan No. MW023AS-018308-PP-469 dated June 6, 2022.

Table 1-2
Summary of Average Compliance Results – RTO #1 System

July 12, 2022

Parameter/Units	Average Results	Emission Limits
Total Hydrocarbons, as Propane (THC)		
ppmvw	4.36	--
lb/hr	1.0	--
DE, %	95.0	--

Table 1-3
Summary of Average Compliance Results – RTO #2/RCC System

July 12, 2022

Parameter/Units	Average Results	Emission Limits
Total Hydrocarbons, as Propane (THC)		
RTO DE, %	97.5	--
RCC RE, %	81.6	--

Table 1-4
Summary of Average Compliance Results – Clearcoat/Topcoat System

July 13, 2022

Parameter/Units	Average Results	Emission Limits
Total Hydrocarbons, as Propane (THC)		
CE, %	80.0	--

Table 1-5
Summary of Average Compliance Results – Primer Surfacer/Guidecoat System

July 14, 2022

Parameter/Units	Average Results	Emission Limits
Total Hydrocarbons, as Propane (THC)		
CE, %	85.7	--

RECEIVED
SEP -- 1 2022
AIR QUALITY DIV.

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location:	General Motors LLC Lansing Grand Rvier Assembly 920 Townsend St. Lansing, MI 48933	
Project Contact:	Brent Cousino	Jeff Hummel
Role:	Environmental Engineer	Senior Environmental Engineer
Email:	brent.cousino@gm.com	Jeffrey.hummel@gm.com

Agency Information

Regulatory Agency:	EGLE
Agency Contact:	Jeremy Howe
Telephone:	231-878-6687
Email:	howej1@michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC
Contact:	Sean Wheeler
Title:	Client Project Manager
Telephone:	630-860-4743
Email:	stwheeler@montrose-env.com

Test personnel and observers are summarized in Table 1-6.

Table 1-6
Test Personnel and Observers

Name	Affiliation	Role/Responsibility
James Christ	Montrose	Client Project Manager/QSTI/Trailer Operator/Sample Recovery/Sample Train Operator
Sean Wheeler	Montrose	Client Project Manager/Field Team Leader/QI/Trailer Operator/Sample Recovery/Sample Train Operator
Jeremy Devries/Paul Repuyan	Montrose	Senior Technician/Sample Recovery/Sample Train Operator
John Ziber/Dakota Gauf/Scott Dater	Montrose	Field Technician/Sample Recovery/Sample Train Operator
Jacob Cartee	Montrose	Report Preparation
Brent Cousino	GM	Client Liaison/Test Coordinator
Jeff Hummel	GM	Client Liaison/Test Coordinator

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

EU-Electrocoat: An electrocoat dip tank followed by an electrocoat curing oven followed by a dry filtered scuff booth. VOC emissions from both the tank and oven are controlled by a thermal oxidizer (No. 1). Note: VOC emissions from the guidecoat curing oven and the two topcoat curing ovens are also controlled by thermal oxidizer No. 1.

EU-Guidecoat: A guidecoat spray booth followed by a curing oven. The solvent borne guidecoat is applied automatically with electrostatic bell applicators or equivalent. A robot zone, which performs cut ins, follows the bell zone. The guidecoat booth is equipped with a wet eliminator system to control particulate emissions from paint overspray. VOC emissions from the automatic electrostatic bell section of the guidecoat booth are controlled by thermal oxidizer No. 2. VOC emissions from the guidecoat curing oven are controlled by thermal oxidizer No. 1.

FG-Topcoat: Two parallel topcoat spray systems which consist of a spray booth followed by a curing oven. There is a heated flash-off area located between the basecoat portion of the booth and the clearcoat portion of the booth. The waterborne basecoat is applied automatically with electrostatic bell and electrostatic robot applicators or equivalent. The solvent borne clearcoat is applied automatically with electrostatic bell and electrostatic robot applicators or equivalent. The waterborne basecoat booths are equipped with a wet eliminator system to control particulate emissions from overspray; this airflow is emitted out an unabated stack. The solvent borne clearcoat (CC) booths are also equipped with a wet eliminator system, and the CC bell and robot zones are controlled by the RCC and RTO No. 2 (as is the heated flash).

2.2 Flue Gas Sampling Locations

Information regarding the sampling locations is presented in Table 2-1. The sampling locations listed in Table 2-1 are colored for each system in which they are used:

- RTO #1 System
- RTO #2/RCC System
- Clearcoat/Topcoat System
- Primer Surfacer/Guidecoat System

Table 2-1
Sampling Locations

Sampling Locations	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
RTO #1 Inlet	64	360/5.63	180/2.81	Flow: 16 (8/port); Gaseous: 1
RTO #1 Outlet	67	480/7.16	720/10.75	Flow: 16 (8/port); Gaseous: 1
TC6/RCC Inlet	103x47.5	>130/>2.0	>32.5/>0.5	Flow: 20 (4/port); Gaseous: 1
RTO #2 Inlet/ RCC Outlet	30x30	60/2	30/1	Flow: 16 (4/port); Gaseous: 1
RTO #2 Outlet	30x30	60/2	30/1	Flow: 16 (4/port); Gaseous: 1
RTO #2 System Combined Exhaust	77	390/5.82	600/8.96	Flow: 16 (8/port); Gaseous: 1
PS1A/PS1A	48x66	144 /2.5	96 /1.7	Flow: 16 (4/port); Gaseous: 1
PS1B/PS1B	48x66	264/4.75	112/2.02	Flow: 16 (4/port); Gaseous: 1
PS2A	78	288/3.69	144/1.85	Flow: 16 (8/port); Gaseous: 1
PS2B	78	288/3.69	144/1.85	Flow: 16 (8/port); Gaseous: 1
PS3	44x24	85/2.74	30/0.966	Flow: 25 (5/port); Gaseous: 1
Heated Flash	18x36	108/4.5	6/0.25	Flow: 20 (4/port); Gaseous: 1
TC2	40	600/15.0	240/6.0	Flow: 16 (8/port); Gaseous: 1
TC3A	42x60	150/3.04	40/0.81	Flow: 20 (4/port); Gaseous: 1
TC3B	76x42	36/0.67	54/1.00	Flow: 16 (4/port); Gaseous: 1

The sample locations were verified in the field to conform to EPA Method 1. Absence of cyclonic flow conditions was confirmed following EPA Method 1, Section 11.4. See Appendix A.1 for more information.

2.3 Operating Conditions and Process Data

The emission tests were performed while the units and air pollution control devices were operating at the conditions required by the permit.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B.

3.0 Sampling and Analytical Procedures

3.1 Test Methods

The test methods for this test program have been presented in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - None
- Method Exceptions:
  - None

The sample port and traverse point locations are detailed in Appendix A.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

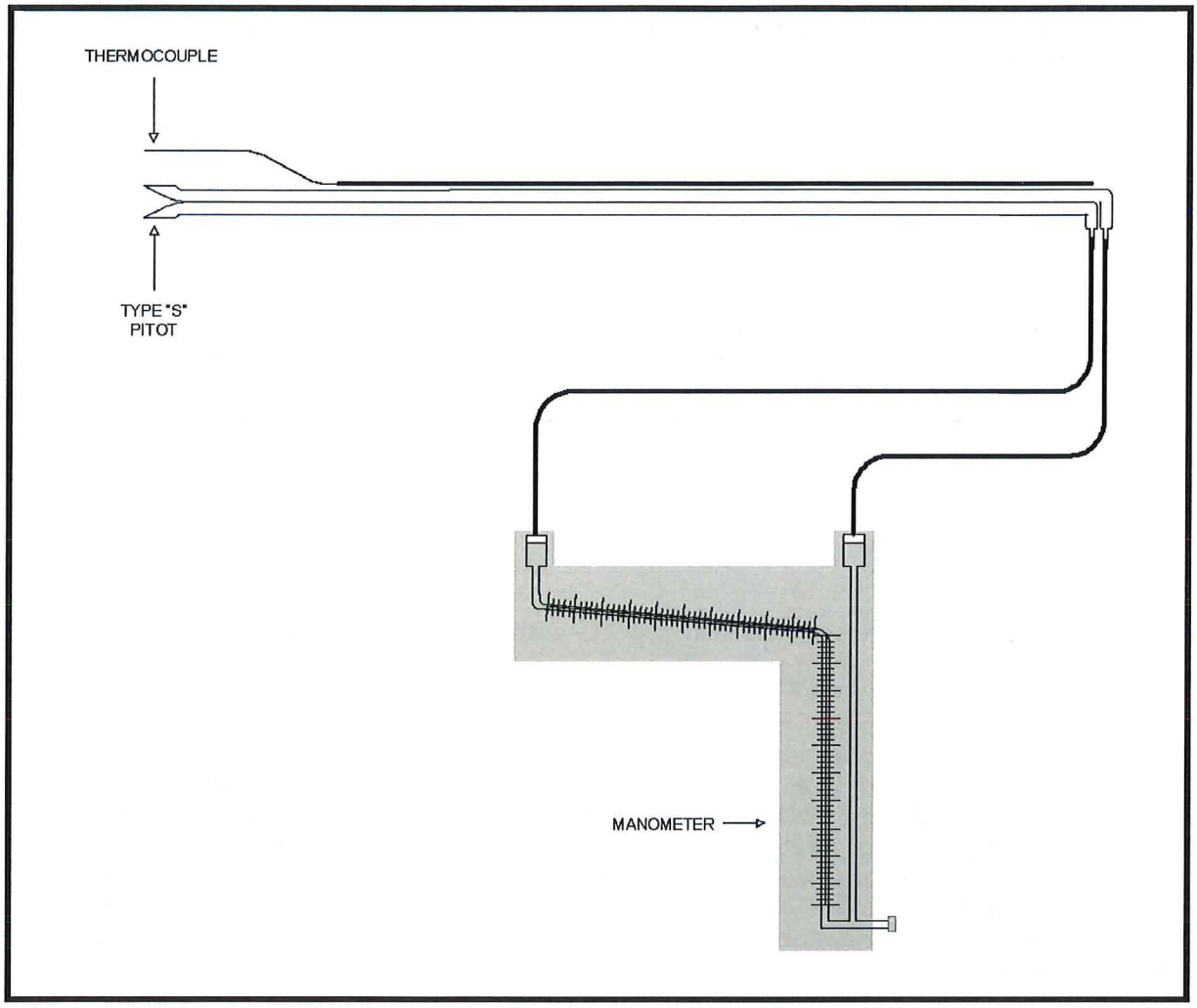
EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Stausscheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1. The molecular weight of the gas stream is determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate is calculated using the measured average velocity head, the area of the duct at the measurement plane, the measured average temperature, the measured duct static pressure, the molecular weight of the gas stream, and the measured moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - S-type pitot tube coefficient is 0.84
  - P-type (standard) pitot tube is used to measure velocity
  - A dry molecular weight of 29.0 lb/lb-mol is utilized in flow rate calculations for processes that emit essentially air
- Method Exceptions:
  - None

The typical sampling system is detailed in Figure 3-1 and 3-2.

FIGURE 3-1
EPA METHOD 2 SAMPLING TRAIN



3.1.3 EPA Method 3, Gas Analysis for the Determination of Dry Molecular Weight

EPA Method 3 is used to measure the percent O_2 and CO_2 in the gas stream. A gas sample is extracted from a stack by one of the following methods: (1) single-point, grab sampling; (2) single-point, integrated sampling; or (3) multi-point, integrated sampling. The gas sample is analyzed for percent CO_2 and percent O_2 using either an Orsat or a Fyrite analyzer.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - A Fyrite-type combustion gas analyzer was used to measure the analyte concentrations
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes

3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

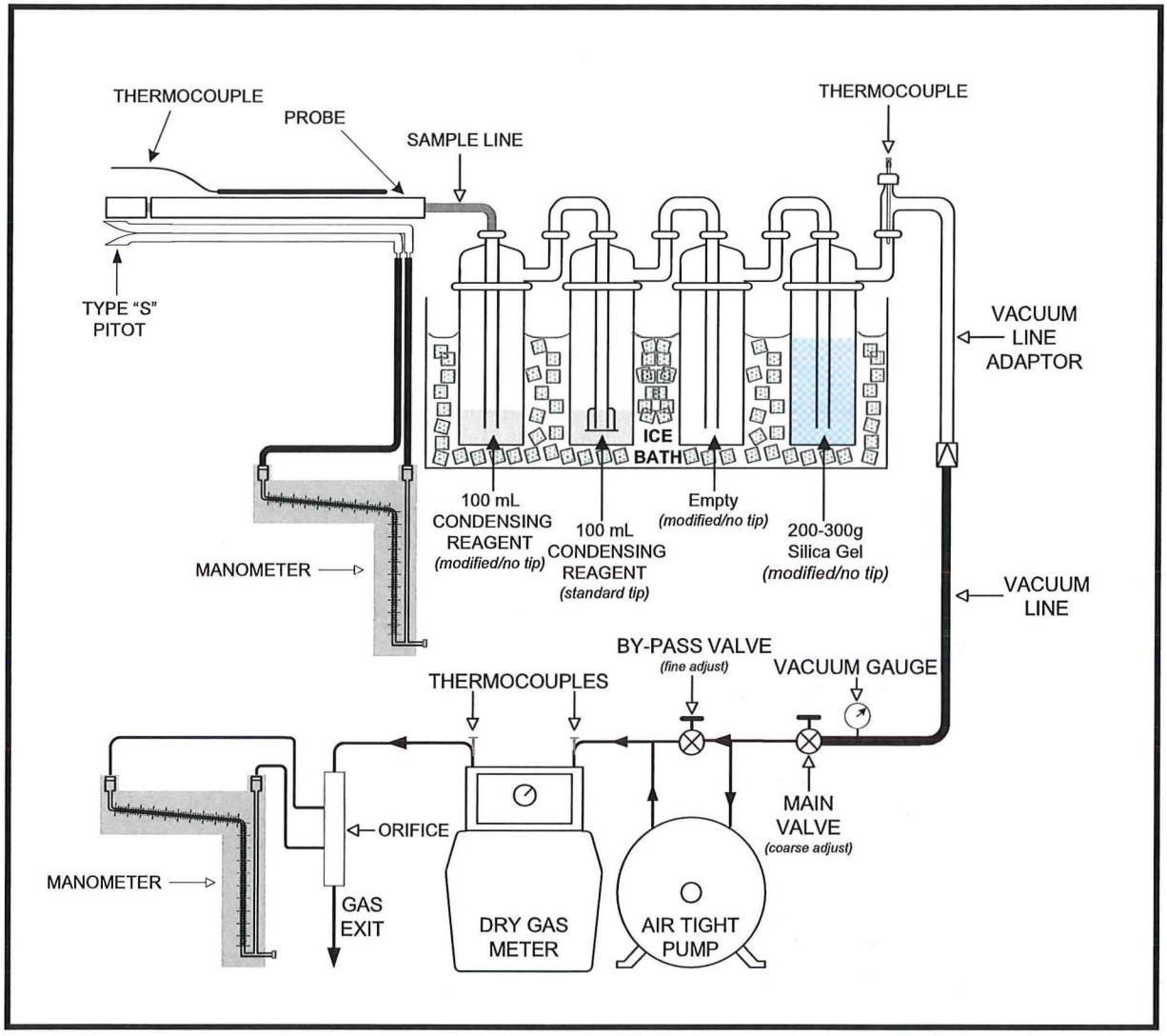
EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Since it is theoretically impossible for measured moisture to be higher than psychrometric moisture, the psychrometric moisture is also calculated, and the lower moisture value is used in the calculations
- Method Exceptions:
  - Moisture sampling is performed as a stand-alone method at a single point in the centroid of the stack
  - Wet bulb and dry bulb stack gas temperatures are used to calculate the moisture using psychrometry
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-2.

FIGURE 3-2
EPA METHOD 4 DETACHED WITH PITOTS SAMPLING TRAIN



3.1.5 EPA Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

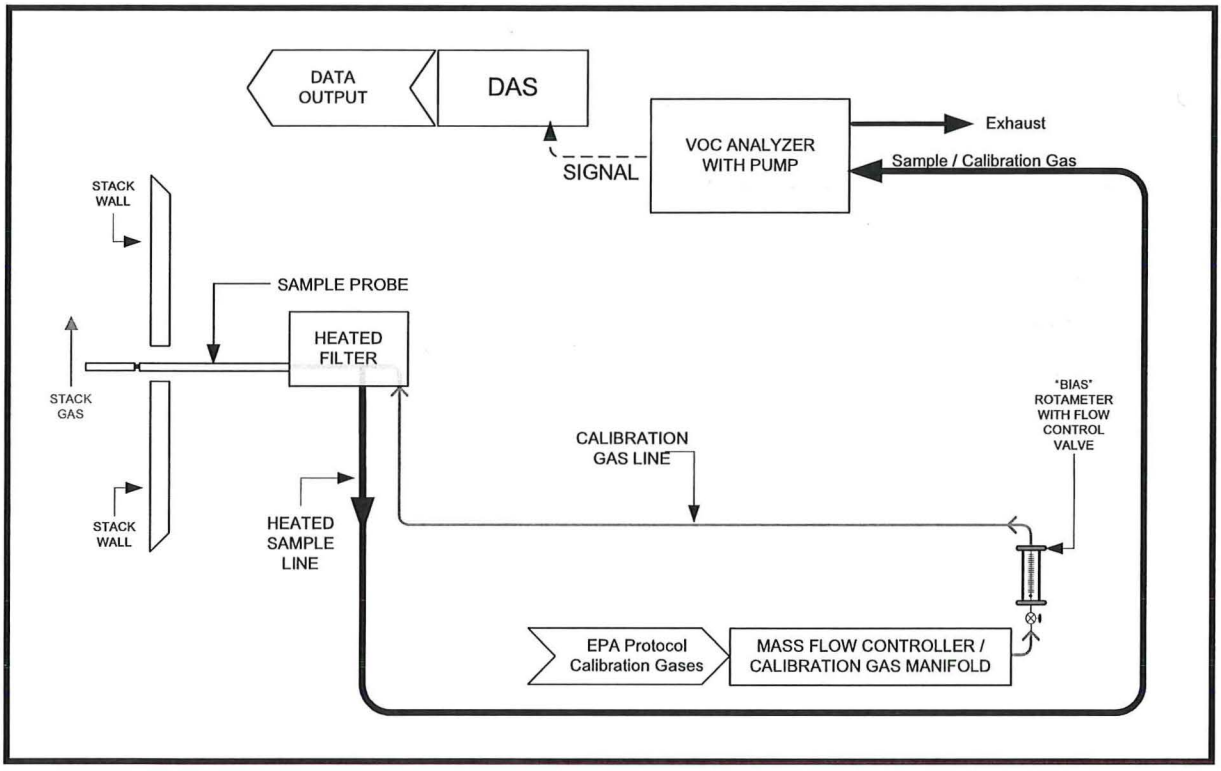
EPA Method 25A is an instrumental test method used to measure the concentration of THC in stack gas. A gas sample is extracted from the source through a heated sample line and glass fiber filter to a FIA. Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Results are reported in terms of propane
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-2.

FIGURE 3-3
EPA METHOD M25A SAMPLING TRAIN



3.2 Process Test Methods

The test plan did not require that process samples be collected during this test program; therefore, no process sample data are presented in this test report.

4.0 Test Discussion and Results

4.1 Field Test Deviations and Exceptions

Other than the method exceptions listed in Section 3.1.4, no field deviations or exceptions from the test plan or test methods occurred during this test program.

4.2 Presentation of Results

The average results are compared to the permit limits in Tables 1-2 through 1-5. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-4. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

Table 4-1
THC Emissions and DE Results -
RTO #1 System

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	7/12/2022	7/12/2022	7/12/2022	--
Time	09:35-10:35	12:18-13:18	14:00-15:00	--
Inlet Flue Gas Parameters				
flue gas temperature, °F	308.8	306.7	307.8	307.7
volumetric flow rate, acfm	51,169	51,276	50,896	51,114
volumetric flow rate, scfm	33,829	33,991	33,693	33,838
volumetric flow rate, dscfm	32,645	33,145	32,786	32,859
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	20.9	20.9	20.9	20.9
moisture content, % volume	3.54	2.53	2.73	2.93
Inlet Total Hydrocarbons, as Propane (THC)				
ppmvw	114	50	108	91
lb/hr	26.4	11.6	25.1	21.0
Outlet Flue Gas Parameters				
flue gas temperature, °F	384	386	389	386
volumetric flow rate, acfm	55,494	55,899	55,599	55,664
volumetric flow rate, scfm	33,495	33,655	33,383	33,511
volumetric flow rate, dscfm	32,574	32,756	32,397	32,575
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	20.9	20.9	20.9	20.9
moisture content, % volume	2.79	2.71	2.99	2.83
Outlet Total Hydrocarbons, as Propane (THC)				
ppmvw	5.4	3.0	4.7	4.4
lb/hr	1.23	0.70	1.07	1.00
DE, %	95.3	94.0	95.7	95.0

Table 4-2
THC Emissions, DE, and RE Results -
RTO #2/RCC System

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	7/12/2022	7/12/2022	7/12/2022	--
Time	09:55-10:55	12:18-13:18	14:00-15:00	--
RTO Inlet Flue Gas Parameters				
flue gas temperature, °F	146.4	153.4	146.2	148.7
volumetric flow rate, acfm	8,737	8,839	8,889	8,822
volumetric flow rate, scfm	7,691	7,692	7,827	7,737
volumetric flow rate, dscfm	7,491	7,598	7,701	7,597
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	2.65	1.25	1.66	1.85
RTO Inlet Total Hydrocarbons, as Propane (THC)				
ppmvw	691	502	724	639
lb/hr	36.5	26.5	38.9	34.0
RTO Outlet Flue Gas Parameters				
flue gas temperature, °F	349	351	355	352
volumetric flow rate, acfm	10,594	9,996	9,731	10,107
volumetric flow rate, scfm	6,755	6,356	6,152	6,421
volumetric flow rate, dscfm	6,501	6,101	5,953	6,185
CO_2, % volume dry	0.2	0.2	0.2	0.2
O_2, % volume dry	20.0	20.0	20.0	20.0
moisture content, % volume	3.80	4.05	3.28	3.71
RTO Outlet Total Hydrocarbons, as Propane (THC)				
ppmvw	21.0	15.4	21.9	19.4
lb/hr	0.97	0.67	0.92	0.85
DE, %	97.3	97.5	97.6	97.5
RTO Combined Exhaust Flue Gas Parameters				
flue gas temperature, °F	114	114	112	113
volumetric flow rate, acfm	80,833	81,114	83,643	81,863
volumetric flow rate, scfm	71,776	72,057	74,514	72,782
volumetric flow rate, dscfm	67,528	69,772	72,240	69,846
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	6.0	3.2	3.1	4.1

Table 4-2 (Continued)
THC Emissions, DE, and RE Results -
RTO #2/RCC System

Parameter/Units	Run 1	Run 2	Run 3	Average
RTO Combined Exhaust Total Hydrocarbons, as Propane (THC)				
ppmvw	20.4	11.5	20.2	17.3
lb/hr	10.03	5.69	10.32	8.68
RCC Inlet Flue Gas Parameters				
flue gas temperature, °F	87.1	88.4	87.8	87.8
volumetric flow rate, acfm	80,539	79,185	80,049	79,924
volumetric flow rate, scfm	74,742	73,318	74,192	74,084
volumetric flow rate, dscfm	72,290	70,817	71,528	71,545
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	3.32	3.45	3.63	3.47
RCC Inlet Total Hydrocarbons, as Propane (THC)				
ppmvw	105.7	47.5	104.5	85.9
lb/hr	54.28	23.90	53.24	43.81
RCC Outlet Total Hydrocarbons, as Propane (THC)				
lb/hr	9.06	5.02	9.40	7.83
RE, %	83.3	79.0	82.4	81.6

Table 4-3
THC Emissions and CE Results -
Clearcoat/Topcoat System

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	7/13/2022	7/13/2022	7/13/2022	--
Time	09:15-10:15	12:15-13:15	14:15-15:15	--
PS-1A Flue Gas Parameters				
flue gas temperature, °F	96.0	97.0	95.7	96.2
volumetric flow rate, acfm	61,232	61,427	61,245	61,301
volumetric flow rate, scfm	56,392	56,471	56,436	56,433
volumetric flow rate, dscfm	54,542	54,551	54,585	54,559
CO_2, % volume dry	0.00	0.00	0.00	0.00
O_2, % volume dry	21.00	21.00	21.00	21.00
moisture content, % volume	3.28	3.40	3.28	3.32
PS-1B Flue Gas Parameters				
flue gas temperature, °F	98.0	101.3	101.7	100.3
volumetric flow rate, acfm	68,693	81,491	72,329	74,171
volumetric flow rate, scfm	63,037	74,348	65,937	67,774
volumetric flow rate, dscfm	61,581	72,504	64,322	66,136
CO_2, % volume dry	0.00	0.00	0.00	0.00
O_2, % volume dry	21.00	21.00	21.00	21.00
moisture content, % volume	2.31	2.48	2.45	2.41
PS-1 Flue Gas Parameters				
volumetric flow rate, scfm	6,645	17,877	9,501	11,341
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
PS-1 Total Hydrocarbons, as Propane (THC)				
ppmvw	166.9	150.2	153.9	157.0
lb/hr	7.62	18.43	10.04	12.03
Heated Flash Flue Gas Parameters				
flue gas temperature, °F	132	134	131	132
volumetric flow rate, acfm	13,047	14,166	13,798	13,670
volumetric flow rate, scfm	11,276	12,206	11,950	11,811
volumetric flow rate, dscfm	11,103	11,996	11,743	11,614
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	1.6	1.8	1.8	1.7
Heated Flash Total Hydrocarbons, as Propane (THC)				
ppmvw	37.9	22.7	50.5	37.0
lb/hr	2.93	1.90	4.15	2.99

Table 4-3 (Continued)
THC Emissions and CE Results -
Clearcoat/Topcoat System

Parameter/Units	Run 1	Run 2	Run 3	Average
TC2 Flue Gas Parameters				
flue gas temperature, °F	272	273	273	272
volumetric flow rate, acfm	17,544	17,642	17,698	17,628
volumetric flow rate, scfm	12,261	12,321	12,359	12,313
volumetric flow rate, dscfm	12,022	12,103	12,161	12,095
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	20.9	20.9	20.9	20.9
moisture content, % volume	1.99	1.81	1.64	1.81
TC2 Total Hydrocarbons, as Propane (THC)				
ppmvw	101.0	41.2	112.8	85.0
lb/hr	8.51	3.48	9.57	7.19
TC3A Flue Gas Parameters				
flue gas temperature, °F	73	73	74	73
volumetric flow rate, acfm	43,685	43,494	43,769	43,649
volumetric flow rate, scfm	41,633	41,419	41,635	41,562
volumetric flow rate, dscfm	40,521	40,313	40,485	40,440
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	2.7	2.7	2.8	2.7
TC3A Total Hydrocarbons, as Propane (THC)				
ppmvw	8.8	5.8	8.8	7.8
lb/hr	2.52	1.64	2.52	2.23
TC3B Flue Gas Parameters				
flue gas temperature, °F	81	81	79	80
volumetric flow rate, acfm	75,991	76,100	75,916	76,002
volumetric flow rate, scfm	71,532	71,651	71,727	71,637
volumetric flow rate, dscfm	69,142	69,257	69,488	69,296
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	3.4	3.4	3.2	3.3
TC3B Total Hydrocarbons, as Propane (THC)				
ppmvw	12.4	16.2	15.0	14.5
lb/hr	6.09	7.98	7.37	7.15

Table 4-3 (Continued)
THC Emissions and CE Results -
Clearcoat/Topcoat System

Parameter/Units	Run 1	Run 2	Run 3	Average
TC6 Flue Gas Parameters				
flue gas temperature, °F	84	84	85	84
volumetric flow rate, acfm	75,807	77,468	76,443	76,573
volumetric flow rate, scfm	71,721	73,233	72,144	72,366
volumetric flow rate, dscfm	69,734	71,101	70,072	70,302
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	2.8	3.0	2.9	2.9
TC6 Total Hydrocarbons, as Propane (THC)				
ppmvw	97.7	85.6	104.2	95.8
lb/hr	48.11	43.04	51.62	47.59
Capture Efficiency (CE)				
%	84.2	73.2	82.6	80.0

RECEIVED
SEP - 1 2022
AIR QUALITY DIV.

Table 4-4
THC Emissions and CE Results -
Primer Surfacer/Guidecoat System

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	7/14/2022	7/14/2022	7/14/2022	--
Time	09:25-10:25	12:15-13:15	14:15-15:15	--
PS-1A Flue Gas Parameters				
flue gas temperature, °F	94.2	92.8	94.3	93.8
volumetric flow rate, acfm	105,015	104,606	104,953	104,858
volumetric flow rate, scfm	97,733	97,595	97,654	97,661
volumetric flow rate, dscfm	94,332	93,994	94,412	94,229
CO_2, % volume dry	0.00	0.00	0.00	0.00
O_2, % volume dry	21.00	21.00	21.00	21.00
moisture content, % volume	3.48	3.69	3.32	3.50
PS-1B Flue Gas Parameters				
flue gas temperature, °F	95.5	101.2	99.6	98.8
volumetric flow rate, acfm	108,051	108,982	109,039	108,691
volumetric flow rate, scfm	100,321	100,160	100,504	100,328
volumetric flow rate, dscfm	99,318	97,085	97,539	97,981
CO_2, % volume dry	0.00	0.00	0.00	0.00
O_2, % volume dry	21.00	21.00	21.00	21.00
moisture content, % volume	1.00	3.07	2.95	2.34
PS-1 Flue Gas Parameters				
volumetric flow rate, scfm	2,588	2,565	2,850	2,668
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
PS-1 Total Hydrocarbons, as Propane (THC)				
ppmvw	162.6	173.0	181.8	172.5
lb/hr	2.9	3.0	3.6	3.2

Table 4-4 (Continued)
THC Emissions and CE Results -
Primer Surfacer/Guidecoat System

Parameter/Units	Run 1	Run 2	Run 3	Average
PS-2A Flue Gas Parameters				
flue gas temperature, °F	75	77	78	77
volumetric flow rate, acfm	15,114	15,874	16,850	15,946
volumetric flow rate, scfm	14,493	15,183	16,081	15,253
volumetric flow rate, dscfm	14,121	14,805	15,621	14,849
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	2.6	2.5	2.9	2.7
PS-2A Total Hydrocarbons, as Propane (THC)				
ppmvw	14.1	14.6	17.2	15.3
lb/hr	1.40	1.52	1.90	1.61
PS-2B Flue Gas Parameters				
flue gas temperature, °F	81	81	81	81
volumetric flow rate, acfm	12,941	13,216	13,427	13,194
volumetric flow rate, scfm	12,319	12,583	12,774	12,559
volumetric flow rate, dscfm	11,981	12,238	12,408	12,209
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	21.0	21.0	21.0	21.0
moisture content, % volume	2.8	2.8	2.9	2.8
PS-2B Total Hydrocarbons, as Propane (THC)				
ppmvw	10.4	13.9	15.9	13.4
lb/hr	0.88	1.20	1.39	1.16
PS-3 Flue Gas Parameters				
flue gas temperature, °F	290	298	299	296
volumetric flow rate, acfm	16,952	16,950	16,949	16,950
volumetric flow rate, scfm	11,644	11,525	11,503	11,558
volumetric flow rate, dscfm	11,415	11,287	11,265	11,322
CO_2, % volume dry	0.0	0.0	0.0	0.0
O_2, % volume dry	20.9	20.9	20.9	20.9
moisture content, % volume	2.01	2.10	2.11	2.07
PS-3 Total Hydrocarbons, as Propane (THC)				
ppmvw	170.77	163.54	172.30	168.87
lb/hr	13.66	12.94	13.61	13.40
Capture Efficiency (CE)				
%	87.9	85.5	83.9	85.7

5.0 Internal QA/QC Activities

5.1 QA/QC Audits

The meter boxes and sampling trains used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, minimum sample durations met the applicable QA/QC criteria.

EPA Method 25A FIA calibration audits were within the measurement system performance specifications for the calibration drift checks and calibration error checks.

5.2 QA/QC Discussion

All QA/QC criteria were met during this test program.

5.3 Quality Statement

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).