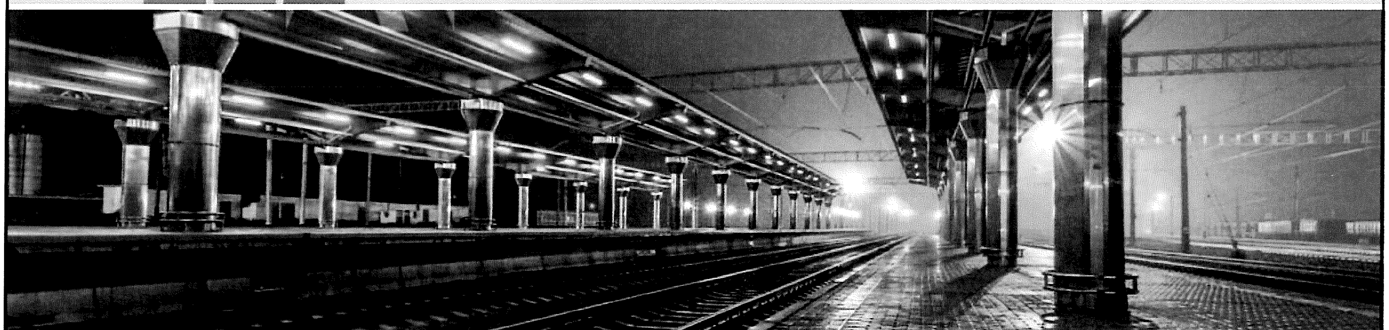
APEX COMPANIES, LLC



Air Emissions Test Report
Emergency Reciprocating Internal Combustion Engine
Fiat Chrysler Automobiles (FCA) US LLC
Sterling Heights Assembly Plant (SHAP) North
Sterling Heights, Michigan

State Registration No. B7248

FCA

FIAT CHRYSLER AUTOMOBILES

Project No. 11019-000056.00
October 31, 2019

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APEX

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Executive Summary

Fiat Chrysler Automobiles (FCA) US LLC retained Apex Companies, LLC to complete testing of an emergency reciprocating internal combustion engine (RICE) at the Sterling Heights Assembly Plant (SHAP) North facility in Sterling Heights, Michigan. The purpose of the testing was to measure gaseous emissions from an emergency RICE as required by the facility's Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit MI-ROP-B7248-2014a, dated November 18, 2014, in accordance with 40 CFR Part 60 Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines."

Concentrations and mass emission rates of the following were measured at the two exhaust stacks of the emergency RICE:

- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Volatile organic compounds (VOCs)

This report summarizes the air emission test program, which was conducted on September 11, 2019. The following source was tested:

- EU-ENG-NEW PSHOP2 - A 701-horsepower Cummins Model GTA28CC natural-gas-fired stationary emergency spark ignition internal combustion engine.

The sampling was conducted in accordance with United States Environmental Protection Agency Methods 1A, 2, 3A, 4, 7E, 10, 25A, and 205 as described in the Intent-to-Test Plan submitted to EGLE on June 24, 2019.

Three 60-minute test runs were performed. Each of the two exhaust stacks were monitored for 30 minutes per test run. The results of the testing are summarized in the following table.

Emergency RICE Test Results

Emission Unit ID	Parameter	Unit	Result			Average
			Run 1	Run 2	Run 3	
EU-ENG-NEW PSHOP2	NO_x	ppmvd @ 15% O_2	14.9	32.7	29.4	25.7
		g/hp-hr	0.26	0.56	0.51	0.44
	CO	ppmvd @ 15% O_2	98.2	58.6	70.9	75.9
		g/hp-hr	1.03	0.62	0.74	0.80
	VOCs	ppmvd @ 15% O_2	19.6	20.7	22.4	20.9
		g/hp-hr	0.39	0.42	0.45	0.42

NO_x = nitrogen oxide
CO = carbon monoxide
VOCs = volatile organic compounds
ppmvd @ 15% O_2 = part per million by volume, dry, corrected to 15% oxygen
g/hp-hr = gram per horsepower-hour

1.0 Introduction

1.1 Summary of Test Program

Fiat Chrysler Automobiles (FCA) US LLC retained Apex Companies, LLC (Apex) to complete testing of an emergency reciprocating internal combustion engine (RICE), noted as EU_ENG-NEW-PSHOP2, at the Sterling Heights Assembly Plant (SHAP) North facility in Sterling Heights, Michigan. The purpose of the testing was to measure gaseous emissions from an emergency RICE as required by the facility's Michigan Department of Environment, Great Lakes and Energy (EGLE) Renewable Operating Permit (ROP) MI-ROP-B7248-2014a, dated November 18, 2014, in accordance with 40 CFR Part 60 Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines."

The sampling was conducted in accordance with United States Environmental Protection Agency (USEPA) Methods 1A, 2, 3A, 4, 7E, 10, 25A, and 205 as described in the Intent-to-Test Plan submitted to EGLE on June 24, 2019.

Table 1-1 lists the emission source tested, parameters, and test date.

Table 1-1
Source Tested, Parameters, and Test Date

Emission Unit ID	Test Parameter	Test Date
EU-ENG-NEW PSHOP2	NO_x, CO, VOCs	September 11, 2019

1.2 Key Personnel

The key personnel involved in this test program are listed in Table 1-2. Mr. David Kawasaki, Staff Consultant with Apex, led the emission testing program. Mr. Adekunle Sanni, Environmental Specialist, and Mr. Brad Bergeron, Air Compliance Testing, both with FCA US LLC, provided process coordination and recorded operating parameters. Mr. Remilando Pinga, with EGLE, witnessed the testing and verified production parameters were recorded.

Table 1-2
Key Contact Information

FCA	
Brad Bergeron Air Compliance Testing **Fiat Chrysler Automobiles (FCA) US LLC - SHAP** 38111 Van Dyke Avenue Sterling Heights, Michigan 48312 Phone: 519.817.9888 brad.bergeron@external.fcagroup.com	Adekunle Sanni Environmental Specialist **Fiat Chrysler Automobiles (FCA) US LLC - SHAP** 38111 Van Dyke Avenue Sterling Heights, Michigan 48312 Phone: 586.978.6279 adekunle.sanni@fcagroup.com
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Karen Kajiya-Mills Technical Programs Unit Supervisor **EGLE Air Quality Division** **Technical Programs Unit** Constitution Hall, 2nd Floor, South 525 West Allegan Street Lansing, Michigan 48909 Phone: 517.256.0880 kajiya-millsk@michigan.gov Remilando Pinga Senior Environmental Engineer **EGLE Air Quality Division** **Warren District Office** 27700 Donald Court Warren, Michigan 48092 Phone: 586.753.3745 pingar@michigan.gov	Joyce Zhu District Supervisor **EGLE Air Quality Division** **Warren District Office** 27700 Donald Court Warren, Michigan 48092 Phone: 586.753.3748 zhuj@michigan.gov

2.0 Source and Sampling Locations

2.1 Process Description

SHAP North paints and assembles the new RAM 1500 truck cabs. EU-ENG-NEWSHOP2 is an emergency spark ignition, natural gas fired reciprocating internal combustion engine (RICE) located at the facility, designed to provide electricity in the event of an emergency power failure. Emissions from the emergency RICE are regulated by EGLE ROP MI-ROP-B7248-2014a, dated November 18, 2014, in accordance with 40 CFR Part 60 Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines."

Natural gas is used to fuel the emergency RICE. The emergency RICE was operated within 10% of the highest achievable load during testing. The rated capacity of the process is a maximum of 5,890 cubic feet of natural gas per hour at 450 kilowatts (kW). While onsite during testing, a representative from Cummins indicated that engine power of the emergency RICE was 413 kW while the testing was being conducted.

2.2 Control Equipment Description

The emergency RICE is equipped with a non-selective catalytic reduction (NSCR) system for passively controlling carbon monoxide (CO), nitrogen oxides (NO_x), and hydrocarbon emissions. The NSCR system is a catalyst bed that results in control of CO and hydrocarbons emissions. The engine is equipped with controls to adjust the fuel-air ratio of the engine intake manifold.

2.3 Flue Gas Sampling Locations

Because the emergency RICE has two exhausts, each exhaust was sampled for half of each test run duration. In order to conduct the testing, two stack extensions, of the same configuration, were installed at the two exhaust locations on top of the emergency RICE. Each exhaust was routed into an 8-inch-internal-diameter stack extension; each extension was equipped with sampling ports in accordance with USEPA Method 1A.

The upper two sampling ports, which were used to measure velocity and moisture for the flowrate determination, are 1-inch diameter sampling ports that are oriented at 90° to one another and are located:

- Approximately 24 inches (3 duct diameters) from the nearest upstream disturbance (the lower sampling ports).
- Approximately 12 inches (1.5 duct diameters) from the nearest downstream disturbance (the stack exit).

The lower two sampling ports, which were used to measure gaseous emissions, are 1-inch diameter sampling ports that are oriented at 90° to one another and are located:

- 24 inches (3 duct diameters) from the nearest upstream disturbance (the connection to the engine exhaust pipe).
- 24 inches (3 duct diameters) from the nearest downstream disturbance (the upper sampling ports).

The sampling ports were accessible via ladder. Figure 2-1 depicts the emergency RICE with stack extensions. Figure 1 in the Appendix depicts the sampling ports and traverse point locations of one representative exhaust stack extension for the emergency RICE.

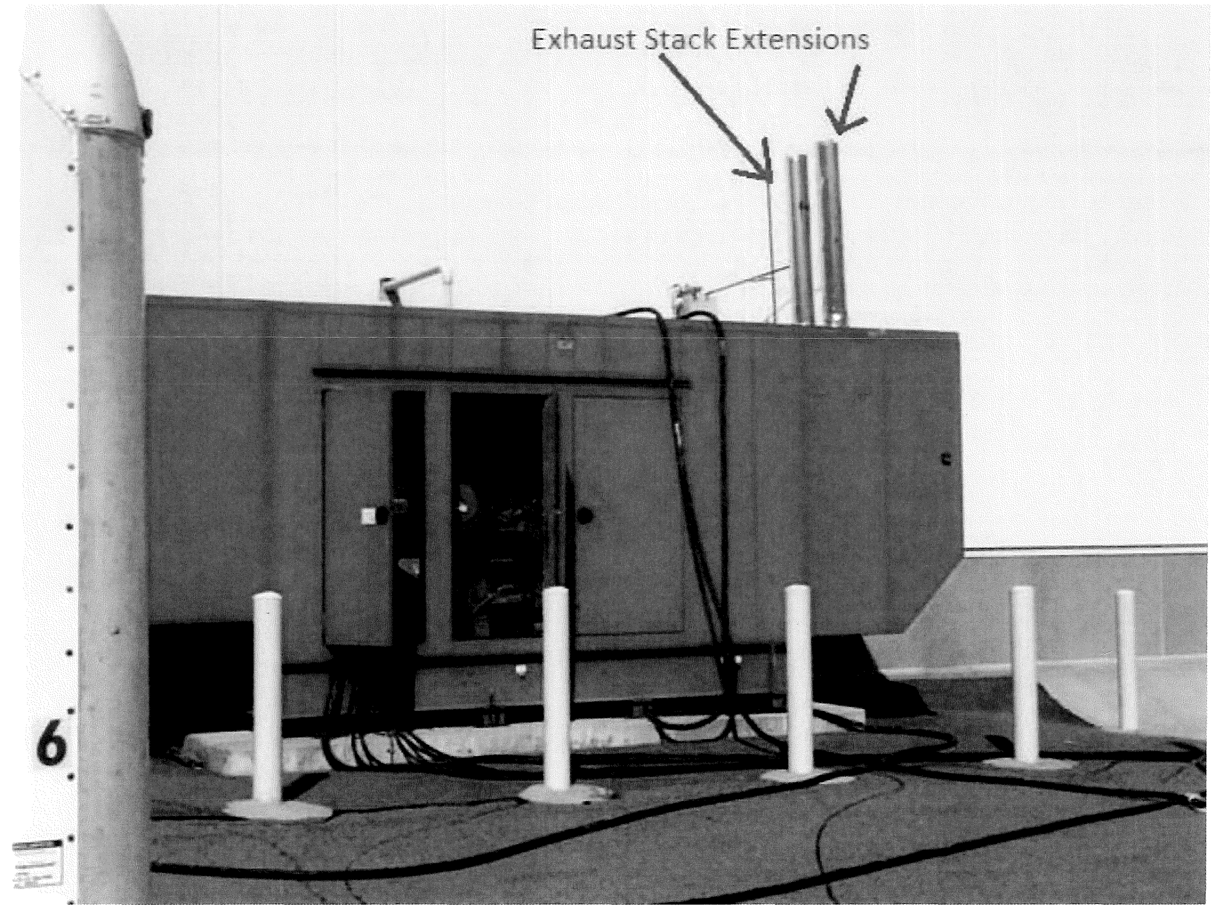

Figure 2-1. Emergency RICE Stack Locations

3.0 Summary and Discussion of Results

3.1 Objectives and Test Matrix

The objective of the testing was to measure NO_X, CO, and VOC concentrations and emission rates from the emergency RICE source as required by the facility's EGLE ROP MI-ROP-B7248-2014a, dated November 18, 2014.

Table 3-1 summarizes the sampling and analytical test matrix.

Table 3-1
Sampling and Analytical Matrix

Sampling Location	Sample/Type of Pollutant	Sample Method	Date (2019)	Run	Start Time	End Time	Analytical Laboratory
EU-ENG-NEW PSHOP2	Flowrate, molecular weight, moisture content, NO_X, CO and VOCs	USEPA 1A, 2, 3A, 4, 7E, 10, 25A, and 205	Sept. 11	1	9:02	10:12†	Not applicable
				2	10:30	11:33	
				3	11:51	12:54	

† During Test Run 1, testing was paused from 9:43 to 9:51 because the probe became disconnected from the stack.

3.2 Field Test Changes and Issues

Communication between FCA US LLC, Apex, and EGLE allowed the testing to be completed as proposed in the June 24, 2019, Intent-to-Test Plan, with the following exceptions:

- Test Date Change – Testing was originally scheduled for August 1, 2019, however, as a result of a mechanical issue with the engine, and with the concurrence of Mr. Mark Dziadosz with Michigan EGLE, testing was postponed until September 11, 2019.
- During Test Run 1, testing was paused from 9:43 to 9:51 because the probe became disconnected from the stack.

3.3 Summary of Results

The results are summarized in Table 3-2. Detailed results of the testing are presented in Table 1 after the Tables Tab of this report. Graphs are presented after the Graphs Tab of this report. Sample calculations are presented in Appendix B.

Table 3-2
Emergency RICE Test Results

Emission Unit ID	Parameter	Unit	Result Run 1	Result Run 2	Result Run 3	Average
EU-ENG-NEW PSHOP2	NO_x	ppmvd @ 15% O_2	14.9	32.7	29.4	25.7
		g/hp-hr	0.26	0.56	0.51	0.44
	CO	ppmvd @ 15% O_2	98.2	58.6	70.9	75.9
		g/hp-hr	1.03	0.62	0.74	0.80
	VOCs	ppmvd @ 15% O_2	19.6	20.7	22.4	20.9
		g/hp-hr	0.39	0.42	0.45	0.42

NO_x = nitrogen oxide
CO = carbon monoxide
VOCs = volatile organic compounds
ppmvd @ 15% O_2 = part per million by volume, dry, corrected to 15% oxygen
g/hp-hr = gram per horsepower-hour

4.0 Sampling and Analytical Procedures

Apex measured emissions in accordance with USEPA sampling methods. Table 4-1 presents the emissions test parameters and sampling methods.

Table 4-1
Emission Testing Methods

Parameter	Source	USEPA Reference	
	EU-ENG-NEW PSHOP2	Method	Title
Sampling ports and traverse points	•	1A	Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts
Velocity and flowrate	•	2	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
Molecular weight	•	3A	Determine of Oxygen and Carbon Dioxide Concentration in Emissions From Stationary Sources (Instruments Analyzer Procedure)
Moisture content	•	4	Determination of Moisture Content in Stack Gases
Nitrogen oxides (NO_X)	•	7E	Determination of Nitrogen Oxides Emissions from Stationary Sources
Carbon monoxide (CO)	•	10	Determination of Carbon Monoxide Emissions from Stationary Sources
Volatile organic compounds (VOCs)	•	25A	Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer
Gas dilution	•	205	Verification of Gas Dilution Systems for Field Instrument Calibrations

4.1 Emission Test Methods

4.1.1 Volumetric Flowrate (USEPA Methods 1A and 2)

USEPA Method 1A, "Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts," from the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60), Appendix A, was used to evaluate the sampling location and the number of traverse points for the measurement of velocity profiles. Figure 1 (see Figures Tab) depicts the sampling location and traverse points.

Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)," was used to measure flue gas velocity and calculate volumetric flowrate. A standard Pitot tube and thermocouple assembly connected to a digital manometer and thermometer was used. Because the dimensions of Apex's Pitot tubes meet the requirements outlined in Method 2, Section 10.2, a baseline Pitot tube coefficient of 0.99 (dimensionless) was assigned.

The digital manometer and thermometer are calibrated using calibration standards, which are traceable to National Institute of Standards (NIST). The Pitot tube inspection and calibration sheets are included in Appendix A.

Cyclonic Flow Check. Apex evaluated whether cyclonic flow was present at the sampling locations. Cyclonic flow is defined as a flow condition with an average null angle greater than 20°. The direction of flow can be determined by aligning the Pitot tube to obtain zero (null) velocity head reading—the direction would be parallel to the Pitot tube face openings or perpendicular to the null position. By measuring the angle of the Pitot tube face openings in relation to the stack walls when a null angle is obtained, the direction of flow is measured. If the absolute average of the flow direction angles is greater than 20°, the flue gas is considered to be cyclonic at that sampling location and an alternative location should be selected.

The average of the measured traverse point flue gas velocity null angles were less than 20° at the sampling locations. The measurements indicate the absence of cyclonic flow.

Field data sheets are included in Appendix C. Computer-generated field data sheets are included in Appendix D.

4.1.2 Oxygen, Nitrogen Oxides, and Carbon Monoxide (USEPA Method 3A, 7E, and 10)

USEPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrument Analyzer Procedure)," was used to measure the oxygen concentration of the flue gas. USEPA Method 7E, "Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Method)" was used to measure NO_x concentrations. Carbon monoxide concentrations were measured using USEPA Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources." The sampling trains for USEPA Methods 3A, 7E, and 10 are similar and the flue gas was extracted from the stack through:

- A stainless-steel probe.
- Heated Teflon® sample line to prevent condensation.
- A chilled Teflon condenser with peristaltic pump to remove moisture from the sampled gas stream prior to entering the analyzer.
- Paramagnetic (O_2), chemiluminescence (NO_x), and infrared (CO) gas analyzers.

Figure 4-1 depicts the USEPA Methods 3A, 7E, and 10 sampling train.

Data were recorded at 1-second intervals on a computer equipped with data acquisition software. Recorded concentrations were reported in 1-minute averages over the duration of each test run.

Before testing, a three-point stratification test was conducted by measuring the VOC gas concentration at a location positioned at 17, 50, and 83% of the stack diameter for at least twice the analyzer response time. The VOC concentrations measured were uniform in the stack cross section and less than ±5% or 0.5 part per million (ppm) of the mean concentration for all traverse points so the gas stream was considered to be unstratified and a single sampling point, located near the centroid of the duct, was used for sampling.

A calibration error check was performed by introducing zero-, mid-, and high-level calibration gases directly into the analyzer. The calibration error check was performed to evaluate the analyzer response is within ±2% of the calibration gas span. Prior to each test run, a system-bias test was performed in which known concentrations of calibration gases were introduced at the probe tip to measure if the analyzers response is within ±5% of the calibration span.

An NO/NO_2 conversion check was performed prior to the first test day by introducing an approximate 52.6 ppm NO_2 calibration gas into the NO_x analyzer. The analyzer's NO_x concentration response was greater than 90% of the introduced NO_2 calibration gas concentration, so the analyzer's NO/NO_2 conversion met the converter efficiency requirement of Section 13.5 of USEPA Method 7E.

At the conclusion of the each test run, an additional system-bias check was performed to evaluate the drift from pre- and post-test system-bias checks. The system-bias checks evaluated if the analyzer drift is within the allowable criterion of ±3% from pre-test to post-test system bias checks. The analyzer drift data was used to correct the measured flue gas concentration.

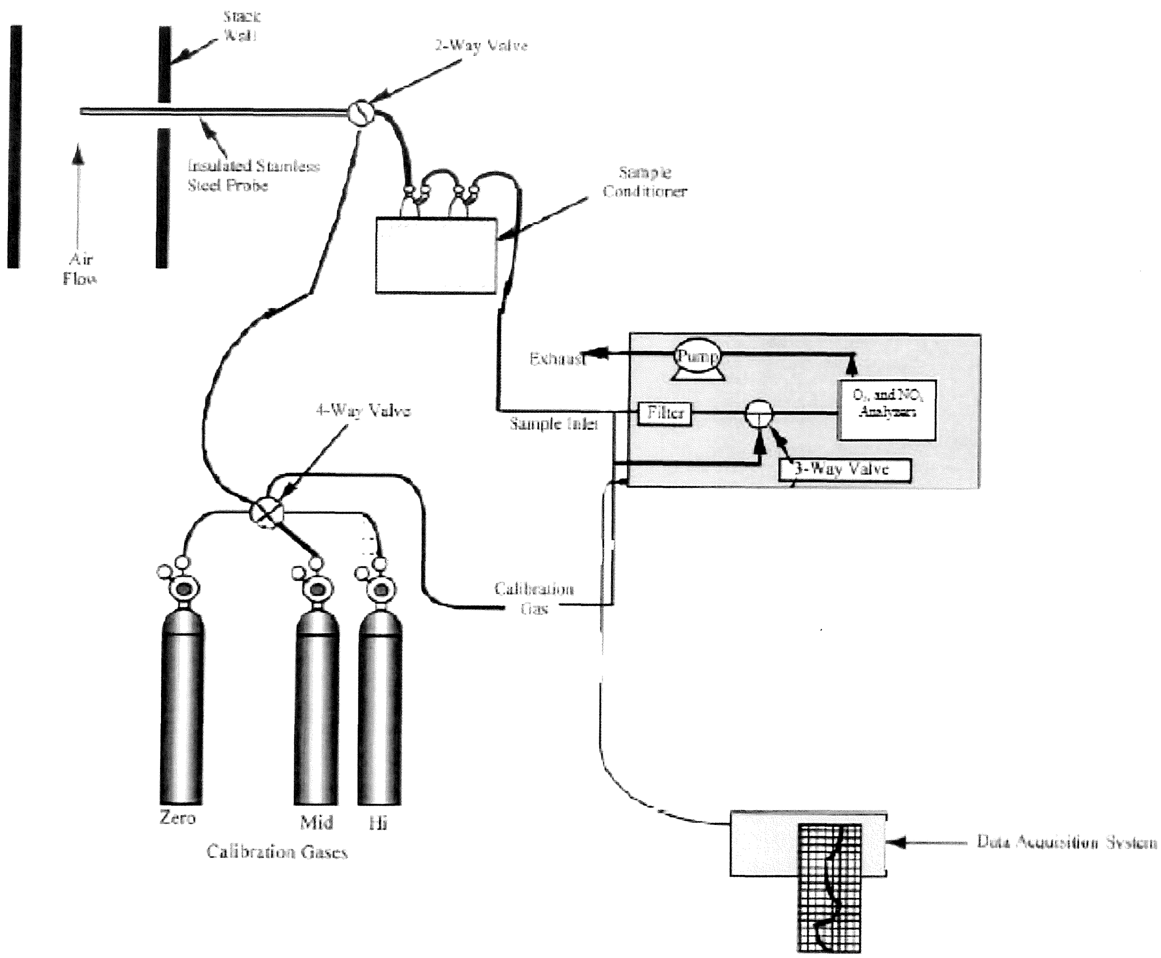

Figure 4-1. USEPA Methods 3A, 7E, and 10 Sampling Train

4.1.3 Moisture Content (USEPA Method 4)

The moisture content at the exhaust to atmosphere locations was measured using USEPA Method 4, "Determination of Moisture Content in Stack Gases." Apex's modular USEPA Method 4 stack sampling system consists of:

- A stainless steel probe.
- Tygon® umbilical line connecting the probe to the impingers.
- A set of four Greenburg-Smith (GS) impingers with the configuration shown in Table 4-2 situated in a chilled ice bath.
- A sampling line.

- An Environmental Supply® control case equipped with a pump, dry-gas meter, and calibrated orifice.

Table 4-2
USEPA Methods 4 Impinger Configuration

Impinger Order (Upstream to Downstream)	Impinger Type	Impinger Contents	Contents
1	Modified - knockout	Empty	0 grams
2	Modified	Empty	0 grams
3	Modified	HPLC Water	~100 grams
4	Modified	Silica desiccant	~300 grams

Before initiating a test run, the sampling train was leak-checked by capping the probe tip and applying a vacuum of approximately 10 inches of mercury to the sampling train. The dry-gas meter was then monitored for approximately 1 minute to verify that the sample train leak rate was less than 0.02 cubic feet per minute (cfm). The sample probe was inserted into the sampling port near the centroid of the stack in preparation of sampling. Flue gas was extracted at a constant rate from the stack, with moisture removed from the sample stream by the chilled impingers.

At the conclusion of the test run, a post-test leak check was conducted and the impinger train was carefully disassembled. The weight of liquid or silica gel in each impinger was measured with a scale capable of measuring ±0.5 gram. The weight of water collected within the impingers and volume of flue gas sampled was used to calculate the percent moisture content. One moisture content sample was collected during each test run. Figure 4-2 depicts the USEPA Method 4 sampling train.

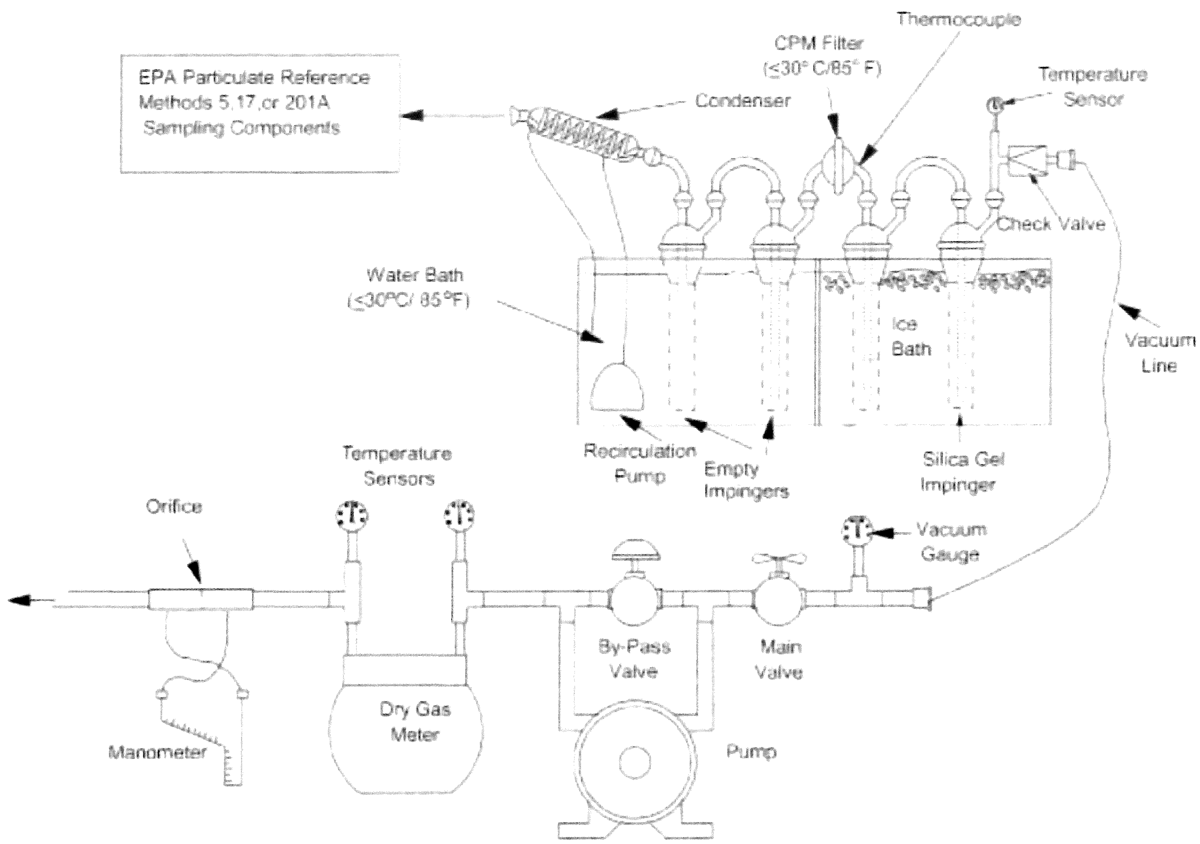

Figure 4-2. USEPA Method 4 Sampling Train

4.1.4 Volatile Organic Compounds (USEPA Method 25A)

USEPA Method 25A, "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer," was used to measure volatile organic compound concentrations in the flue gas. Samples were collected through a stainless steel probe and heated sample line into an analyzer.

A flame ionization detector (FID) determines the average hydrocarbon concentration in part per million by volume (ppmv) of VOC as the calibration gas (i.e., propane). The FID is fueled by 100% hydrogen, which generates a flame with a negligible number of ions. Flue gas is introduced into the FID and enters the flame chamber. The combustion of flue gas generates electrically charged ions. The analyzer applies a polarizing voltage between two electrodes around the flame, producing an electrostatic field. Negatively charged ions, anions, migrate to a collector electrode, while positive charged ions, cations, migrate to a high-voltage electrode. The current between the electrodes is directly proportional to the hydrocarbon concentration in the sample. The flame chamber is depicted in Figure 4-3.

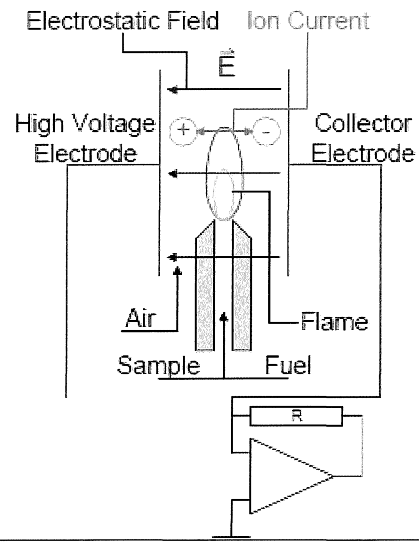

Figure 4-3. FID Flame Chamber

Using the voltage analog signal, measured by the FID, the concentration of VOCs was recorded by a data acquisition system (DAS). The average concentration of VOCs is reported as the calibration gas (i.e., propane) in equivalent units.

Before testing, the analyzer was calibrated by introducing a zero-calibration range gas (<1% of span value) and high-calibration range gas (80-90% span value) to the tip of the sampling probe. The span value was set to 1.5 to 2.5 times the expected concentration (e.g., 0-100 ppmv). Next, a low-calibration range gas (25-35% of span value) and mid-calibration range gas (45-55% of span value) were introduced. The analyzers are considered to be calibrated when the analyzer response is ±5% of the calibration gas value.

At the conclusion of a test run, a calibration drift test was performed by introducing the zero- and mid-calibration gas to the tip of the sampling probe. The test run data was considered valid if the calibration drift test demonstrated the analyzers are responding within 3% of the calibration span from pre-test to post-test calibrations.

Figure 4-4 depicts the USEPA Method 25A sampling train.

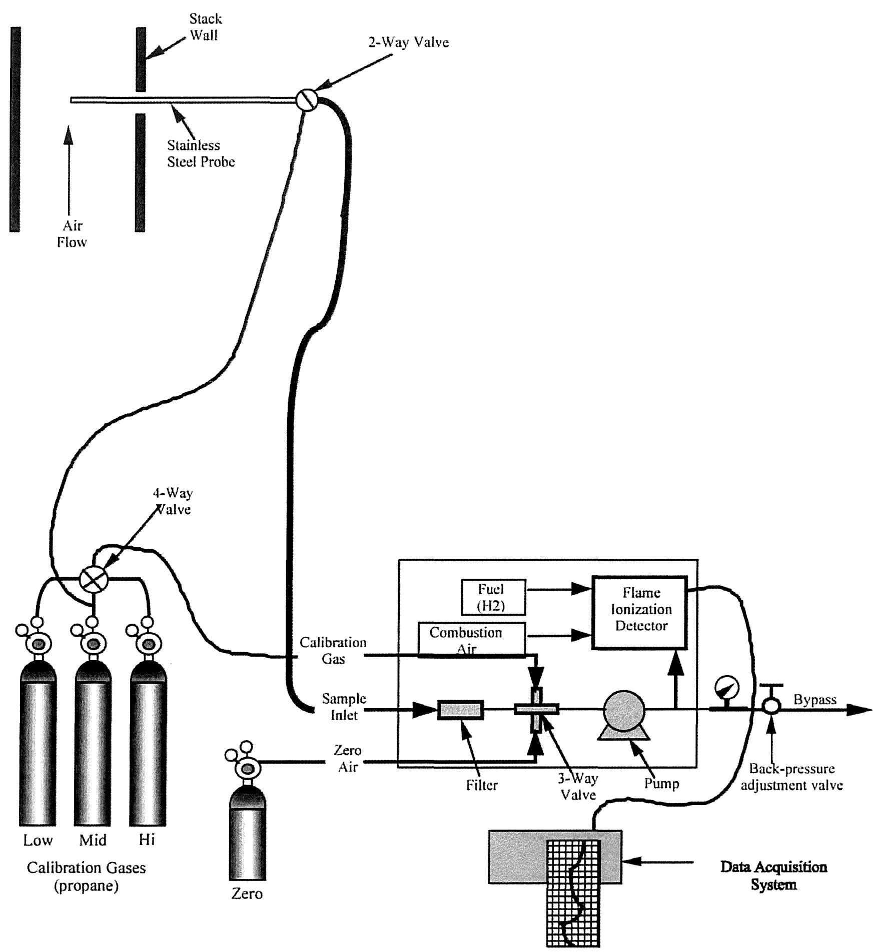

Figure 4-4. USEPA Method 25A Sampling Train

4.1.5 Gas Dilution (USEPA Method 205)

USEPA Method 205, "Verification of Gas Dilution Systems for Field Instrument Calibrations," was used to introduce known values of calibration gases into the analyzers. The gas dilution system consists of calibrated orifices or mass flow controllers and dilutes a high-level calibration gas to within ±2% of predicted values. The gas divider is capable of diluting gases at set increments and was evaluated for accuracy in the field in accordance with USEPA Method 205.

The gas divider dilutions were measured to evaluate that they were within ±2% of predicted values. Two sets of three dilutions of the high-level calibration gas were performed. In addition, a certified mid-level calibration gas was introduced into an analyzer; this calibration gas concentration was within ± 10% of a gas divider dilution concentration.

5.0 Quality Assurance and Quality Control

5.1 QA/QC Procedures

Equipment used in this emissions test program passed Quality Assurance (QA) and Quality Control (QC) procedures. Refer to Appendix A for equipment calibrations. Before testing, the sampling equipment was cleaned, inspected, and calibrated according to procedures outlined in the applicable USEPA sampling method and USEPA's "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods."

5.2 QA/QC Audits

Onsite QA/QC procedures (i.e., Pitot tube inspections, nozzle size verifications, leak check, calculation of isokinetic sampling rates, calibrations) were performed in accordance with the respective USEPA sampling methods. Equipment inspection and calibration measurements are presented in Appendix A.

Offsite QA audits include dry-gas meter and thermocouple calibrations.

5.2.1 Audit Sample Results QA/QC

QA audit samples were not proposed during this test program. Currently, audit samples for the parameters to be measured are not available from the EPA Stationary Source Audit Program.

5.2.2 Instrument Analyzer QA/QC

The instrument analyzer sampling trains described in Section 4.1 were audited for measurement accuracy and data reliability. The analyzers passed the applicable calibration criteria. Table 5-1 summarizes the gas cylinders used during this test program. Analyzer calibration, bias, and drift data are included in Appendix A.

Table 5-1
Calibration Gas Cylinder Information

Parameter	Gas Vendor	Cylinder Serial Number	Cylinder Value	Expiration Date
Air	Airgas	CC139694	-	04/05/2026
Nitrogen	Airgas	1535054Y	-	02/04/2024
Carbon monoxide	Airgas	CC27329	1,005 ppm	12/26/2025
Carbon monoxide	Airgas	CC469854	4,988 ppm	05/09/2026
Nitrogen oxide	Airgas	XC034410B	1,008 ppm	01/03/2026
Nitrogen dioxide	Airgas	CC506783	52.50 ppm	05/17/2021
Oxygen/carbon dioxide	Airgas	ALM-047449	19.99%/19.89%	05/22/2026
Propane	Airgas	CC18627	1,098 ppm	11/30/2026

5.2.3 Dry-Gas Meter QA/QC

Table 5-2 summarizes the dry-gas meter calibration checks in comparison to the acceptable USEPA tolerance. Complete dry-gas meter calibrations are included in Appendix A.

Table 5-2
Dry-Gas meter Calibration QA/QC

Dry-Gas Meter	Pre-test DGM Calibration Factor	Post-test DGM Calibration Factor	Difference Between Pre- and Post-test Calibrations	Acceptable Tolerance	Comment
7	1.006 (6/24/2019)	0.996 (9/13/2019)	0.010	±0.05	Valid

5.2.4 Thermocouple QA/QC

Temperature measurements using thermocouples and digital pyrometers were compared to a reference temperature prior to testing to evaluate accuracy of the equipment. The thermocouples and pyrometers measured temperature within ±1.5% of the reference temperatures and were within USEPA acceptance criteria. Thermocouple calibration sheets are included in Appendix A.

5.3 Data Reduction and Validation

The emissions testing Project Manager and/or the QA/QC Officer validated computer spreadsheets. The computer spreadsheets were used to ensure that field calculations were accurate. Random inspection of the field data sheets were conducted to verify data have been recorded appropriately. At the completion of a test, the raw field data were entered into computer spreadsheets to provide applicable onsite emissions calculations. The computer data were checked against the raw field sheets for accuracy during review of the report.

5.4 QA/QC Problems

Equipment audits and QA/QC procedures demonstrate sample collection accuracy and compliance for the test runs.

6.0 Limitations

The information and opinions rendered in this report are exclusively for use by Fiat Chrysler Automobiles (FCA) US LLC. Apex Companies, LLC will not distribute or publish this report without consent of Fiat Chrysler Automobiles (FCA) US LLC except as required by law or court order. The information and opinions are given in response to a limited assignment and should be implemented only in light of that assignment. Apex Companies, LLC accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages

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