



General Motors LLC - Orion Assembly Plant
4555 Giddings Road
Orion, MI 48359

May 16, 2019

Ms. Karen Kajiya-Mills
Environment, Great Lakes and Energy
Air Quality Division – Technical Programs Unit
Constitution Hall, 2nd Floor,
South 525 West Allegan Street
Lansing, MI 48933

rec'd 5/19/19?

Subject: Landfill Gas (LFG) Generator Emission Testing

Dear Ms. Kajiya-Mills:

General Motors LLC, Orion Assembly Plant is planning to conduct emission testing on the #2 Landfill Gas Generator. The emission testing is scheduled to commence on June 18, 2019 and finish on June 19, 2019. This testing is required under Flexible Group FGENGINES by condition V.1 of Permit MI-ROP-B7227-2015b, which requires the testing every five years.

Attached is the test plan for tests to be performed. This testing will comply with EGLE test methods and requirements stipulated in MI-ROP-B7227-2015b as specified in this test plan.

In accordance with MI-ROP-B7227-2015b, GM is submitting this plan no less than 30 days prior to testing to allow EGLE sufficient time to review. GM is requesting EGLE provide written approval of this test plan so that we may proceed with scheduling the manpower and equipment for the test.

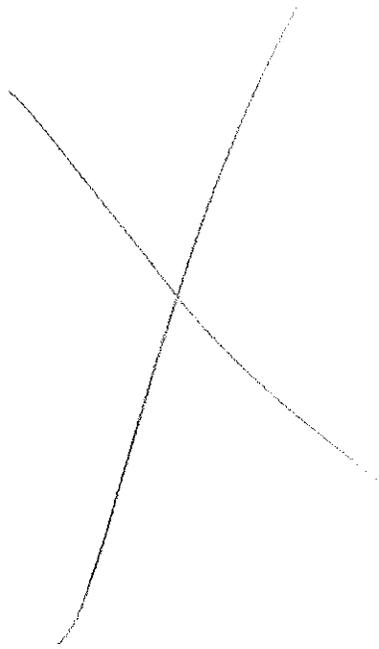
If there are any additional comments or questions related to the test plan, please contact Jessica Alderton of our Strategic Environmental Solutions group at 586-863-8490. For any site specific questions please contact me at 248-941-5353.

Sincerely,

Robert Fenn
Environmental Supervisor

Enclosure

cc: Joyce Zhu, MDEQ AQD
Bob Byrnes, MDEQ AQD





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 General Motors LLC Orion Assembly County Oakland
Source Address 4555 Giddings City Lake Orion
AQD Source ID (SRN) B7227 ROP No. MI-ROP-B7227-2015b ROP Section No. 1

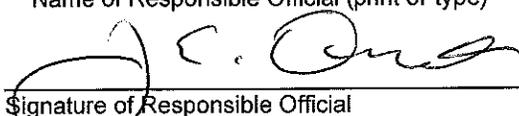
Please check the appropriate box(es):

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).

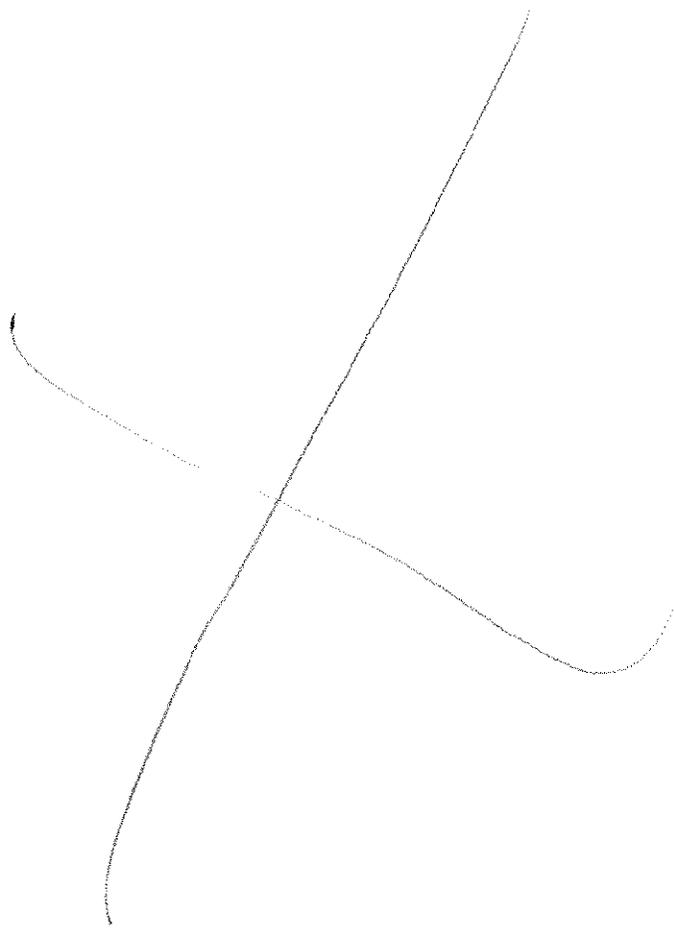
Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))
Reporting period (provide inclusive dates): From _____ To _____
 1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.
 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

Other Report Certification
Reporting period (provide inclusive dates): From May 17, 2019 To May 17, 2019
Additional monitoring reports or other applicable documents required by the ROP are attached as described:
PGENGINES Emission Test Plan Submission

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

Jim E. Quick Plant Director 517-719-9802
Name of Responsible Official (print or type) Title Phone Number
 Date 5/14/19

* Photocopy this form as needed.



**SOURCE TEST PLAN
2019 PARTICULATE MATTER, OXIDES OF
NITROGEN, CARBON MONOXIDE, VOLATILE
ORGANIC COMPOUNDS, AND FORMALDEHYDE
TESTING**

**GENERAL MOTORS, LLC
ORION COGEN FACILITY
ENGINE 2 (EUENGINE2)
ORION, MICHIGAN**

Prepared For:

General Motors, LLC
4555 Giddings Road
Lake Orion, MI 48359

For Submittal To:

EGLE – Air Quality Division
27700 Donald Court
Warren, MI 48092

Prepared By:

Montrose Air Quality Services, LLC
4949 Fernlee Ave.
Royal Oak, MI 48073

Document Number:

049AS-554742-PP-7

Proposed Test Dates:

June 18-19, 2019

Test Plan Submittal Date:

April 30, 2019



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1. Introduction

Montrose Air Quality Services, LLC (MAQS) has been retained by General Motors LLC (GM) to conduct a compliance emissions test program on a single reciprocating engine at the GM Orion Assembly facility in Lake Orion, Michigan. The engine is designated as EUENGINE2. This emissions testing program will include the following:

- (1) Evaluate the volatile organic compound (VOC) emission rates from the EUENGINE2 exhaust using USEPA Method 25A.
- (2) Evaluate emission rates of particulate matter less than 10 microns in diameter (PM₁₀) and particulate matter less than 2.5 microns in diameter (PM_{2.5}), from the engine exhaust stack using USEPA Methods 5 and 202.
- (3) Evaluate emission rates of formaldehyde (CH₂O), Carbon Monoxide (CO), Oxides of Nitrogen (NO_x) from the engine exhaust stack using USEPA Method 320.

The purpose of this document is to present the test plan for this emissions testing program. The emissions testing program is scheduled for June 18th – 19th, 2019, pending approval by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

EGLE Air Quality Division (AQD) has published a guidance document entitled “Format for Submittal of Source Emission Test Plans and Reports” (March 2018). The following is a summary of the emissions test plan in the format suggested by the aforementioned document.

1.a Test Program Contacts

The contact for the source and test plan is:

Mr. Robert Fenn
Environmental Engineer
General Motors LLC
Orion Assembly
4555 Giddings
Lake Orion, MI 48359
248 941 5353

Ms. Jessica Alderton
Senior Environmental Project Engineer
General Motors LLC
30400 Van Dyke Ave.
Warren, MI 48093
(586) 863-8490

Mr. Matthew Young
Client Project Manager
Montrose Air Quality Services, LLC
4949 Fernlee Avenue
Royal Oak, MI 48073
(586) 744-9133

1.b Emission Unit Type

General Motors LLC Orion Assembly Plant (GM) operates five landfill gas engine generators to produce electricity at the plant.

Each engine generator is rated at 1600 kW electrical output (2242 hp). The total combined maximum electrical output will be 8000 kW or 8 MW. The maximum heat input capacity for each engine is approximately 15 MMBtu/hr. The heat capacity of landfill gas is estimated at 500 btu/scf.

GM's Orion Assembly Plant is located near two nonhazardous solid waste landfills and has access to the landfill gas. The engine generators are specifically designed to burn the landfill gas.

The combined exhaust from all five engine generators vents through the existing powerhouse stack located at the plant.

1.c Type and Quantity of Raw Materials

The engine generator burns landfill gas and generates electrical output.

1.d Batch Operations

There are no batch operations.

1.e Process Regulation

The engines are designed to use an air to fuel ratio control system. If the air to fuel ratio control system is not operating to design specification, the engine will shut down and testing will cease.

1.f Process Rating

Each engine generator is rated at 1600 kW electrical output (2242 hp). The total combined maximum electrical output will be 8000 kW or 8 MW. The maximum heat input capacity for each engine is approximately 15 MMBtu/hr. The heat capacity of landfill gas is estimated at 500 btu/scf.

2. Air Pollution Control Equipment

There are no add-on controls associated with the emission source.

3. Permit No. and Emission Limits

MI-ROP-B7227-2015b

Table 1
MI-ROP-B7227-2015b Emission Limitations

Pollutant	Emission Limit (g/hp-hr)	Emission Limit (lb/hr)
VOC	1.0 (g/hp-hr)	2.8 lb/hr
NOx	2.0 (g/hp-hr)	2.97 lb/hr
CO	3.5 (g/hp-hr)	17.3 lb/hr
PM ₁₀	NA	0.64 lb/hr
PM _{2.5}	NA	0.64 lb/hr
CH ₂ O	NA	2.1 lb/hr

Limit applies to each engine in FGENGINES.

4. Pollutants

MAQS will measure volumetric flowrates, CO, NOx, and VOC, CH₂O, PM₁₀ and PM_{2.5} from a single engine exhaust stack.

5. Sampling Train Description

Method 25A (Volatile Organic Compounds)

Volatile Organic compound (VOC) concentrations will be measured according to 40 CFR 60, Appendix A, Method 25A. A sample of the gas stream will be drawn through a stainless steel probe with an in-line glass fiber filter to remove any particulate, and a heated Teflon[®] sample line to prevent the condensation of any moisture from the sample before it enters the analyzer. Data will be recorded at 4-second intervals on a PC equipped with IOtech[®] data acquisition software. MAQS will use a JUM Model 109A Methane/Non-Methane THC hydrocarbon analyzer to determine the VOC concentration.

The JUM Model 109A analyzer utilizes two flame ionization detectors (FIDs) in order to report the average ppmv for total hydrocarbons (THC), as propane, as well as the average ppmv for methane (as methane). Upon entry, the analyzer splits the gas stream. One FID ionizes all of the hydrocarbons in the gas stream sample into carbon, which is then detected as a concentration of total hydrocarbons. Using an analog signal, specifically

voltage, the concentration of THC is then sent to the data acquisition system (DAS), where recordings are taken at 4-second intervals to produce an average based on the overall duration of the test. This average is then used to determine the average ppmv for THC reported as the calibration gas, propane, in equivalent units.

The second FID reports methane only. The sample enters a chamber containing a catalyst that destroys all of the hydrocarbons present in the gas stream other than methane. As with the THC sample, the methane gas concentration is sent to the DAS and recorded. The methane concentration, reported as methane, can then be converted to methane, reported as propane, by dividing the measured methane concentration by the analyzer's response factor.

The analyzer's response factor is obtained by introducing a methane calibration gas to the calibrated J.U.M. 109A. The response of the analyzer's THC FID to the methane calibration gas, in ppmv as propane, is divided by the Methane analyzer's response to the methane calibration gas, in ppmv as methane.

Method 5/202 (PM 10 and PM 2.5)

MAQS's Nutech[®] Model 2010 modular isokinetic stack sampling system will consist of (1) a SS nozzle, (2) a glass lined probe, (3) a heated filter holder, (4) a vertical condenser, (5) an empty pot bellied impinger, (6) an empty modified Greenburg-Smith (GS) impinger, (7) unheated filter holder with a teflon filter, (8) a second modified GS impinger with 100 ml of deionized water, and a third modified GS impinger containing approximately 300 g of silica gel desiccant, (9) a length of sample line, and (10) a Nutech[®] control case equipped with a pump, dry gas meter, and calibrated orifice.

A sampling train leak test will be conducted before and after each test run. After completion of the final leak test for each test run, the filter will be recovered, and the nozzle and the front half of the filter holder assembly will be brushed and triple rinsed with acetone. The acetone rinses will be collected in a pre-cleaned sample container. The impinger train will then be purged with nitrogen for one hour at a flow rate of 14 liters per minute. The CPM filter will be recovered and placed in a petri dish. The back half of the filter housing, the condenser, the pot bellied impinger, the moisture drop out impinger, and the front half of the CPM filter housing and all connecting glassware will be triple rinsed with deionized water and collected in a pre-cleaned sample container. The same glassware will then be rinsed with acetone and collected in a pre-cleaned sample container labeled as the organic fraction. The glassware will then be double rinsed with hexane and added to the same organic fraction sample bottle.

Method 320 (Carbon Monoxide, Oxides of Nitrogen, Moisture, and Formaldehyde)

FTIR data will be collected using an MKS MultiGas 2030 FTIR spectrometer, serial # 016630515. A heated, 3 ft., 3/8 inch diameter, stainless steel probe, maintained at 191°C, will be used to direct effluent gas from the exhaust vent to the FTIR. A heated filter box

(191°C) contains the connection from the probe to the filter assembly to a 100 ft., heated, 3/8 inch, Teflon transfer line. A 0.1µ glass filter will be used for particulate matter removal.

The heated transfer line(s), held at 191°C, connect the probe/filter assembly to the FTIR. The FTIR was equipped with a temperature-controlled, 5.11 meter multipass gas cell maintained at 191°C. Gas flows and sampling system pressures were monitored using a rotometer and pressure transducer. All data will be collected at 0.5cm⁻¹ resolution. Each spectrum will be derived from the coaddition of 64 scans, with a new data point generated approximately every one minute.

Sampling and Analysis Procedures

The emissions test program will utilize the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 1 - “Sample and Velocity Traverses for Stationary Sources”
- Method 2 - “Determination of Stack Gas Velocity and Volumetric Flowrate”
- Method 3A - “Determination of Molecular Weight of Dry Stack Gas”
- Method 5 - “Determination of Particulate Matter Emissions from Stationary Sources”
- Method 25A - “Determination of Total Gaseous Organic Concentration Using A Flame Ionization Analyzer”
- Method 202 - “Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources”
- Method 320 - “Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy”

6. Number and Length of Sampling Runs

Evaluation of gaseous pollutant emission rates will consist of triplicate 60-minute test runs. Evaluation of PM₁₀ and PM_{2.5} emission rates will consist of triplicate 120-minute test runs.

7. Sampling Port Locations

Test ports are identified in Figure 1. Figures specifying traverse point locations determined via USEPA Method 1 will be included in the final test report.

8. Estimated Exhaust Gas Conditions

The flue gas conditions (temperature, moisture and velocity) are to be determined during the testing.

9. Process Operating Conditions

The process will be tested under normal operating conditions for time period in which the generators will be operating. During the testing, the generators will be run at 100% +/- 10% of maximum production as required by 40 CFR 60 Subpart JJJJ.

10. Process Data

GM personnel will ensure that the process is operating properly during the testing by monitoring engine operation. Any upset or problem will be reported immediately to the GM testing coordinator.

11. Monitoring Data

The kilowatt output of Engine 2 will be monitored and recorded every 15 minutes for the duration of each test. The landfill gas usage will also be recorded for the duration of the test.

12. Chain of Custody Procedures

MAQS will employ standard laboratory chain of custody procedures for collected samples.

13. Field Quality Assurance/Quality Control Procedures

Field quality assurance and quality control procedures will follow those prescribed by USEPA Methods 1, 2, 3A, 5, 25A, 202, and 320.

14. Laboratory Quality Assurance/Quality Control Procedures

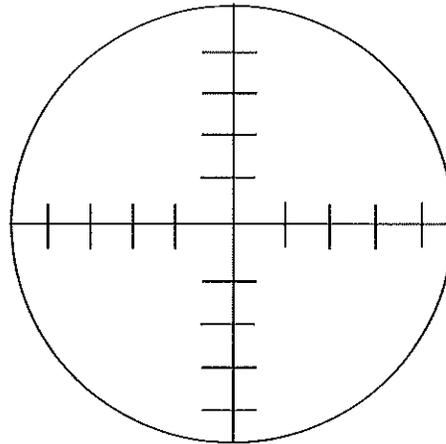
Laboratory quality assurance and quality control procedures will follow the requirements of USEPA Methods 5, 202, and 320.

Figures



Stack Diameter: TBD

Points	Distance "
TBD	TBD



Not to Scale

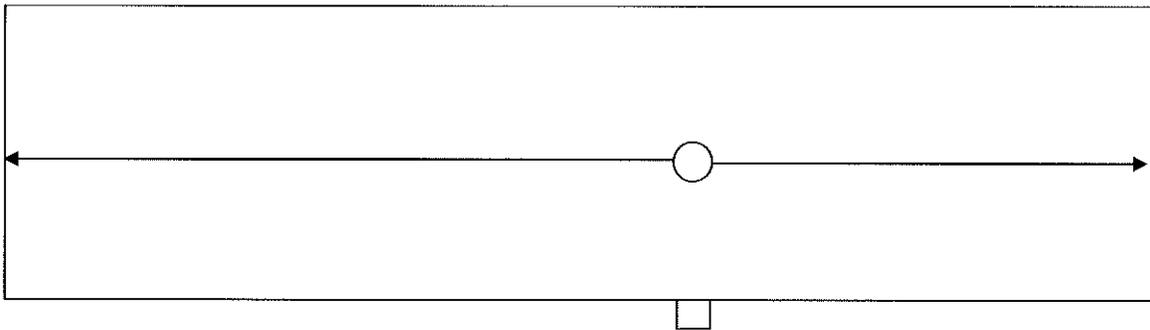


Figure No. 1

Site:
Engine 2 Outlet
General Motors
Lake Orion, MI

Sampling Date:
June 18-19, 2019

**Montrose Air Quality Services,
LLC**
4949 Fernlee
Royal Oak, Michigan

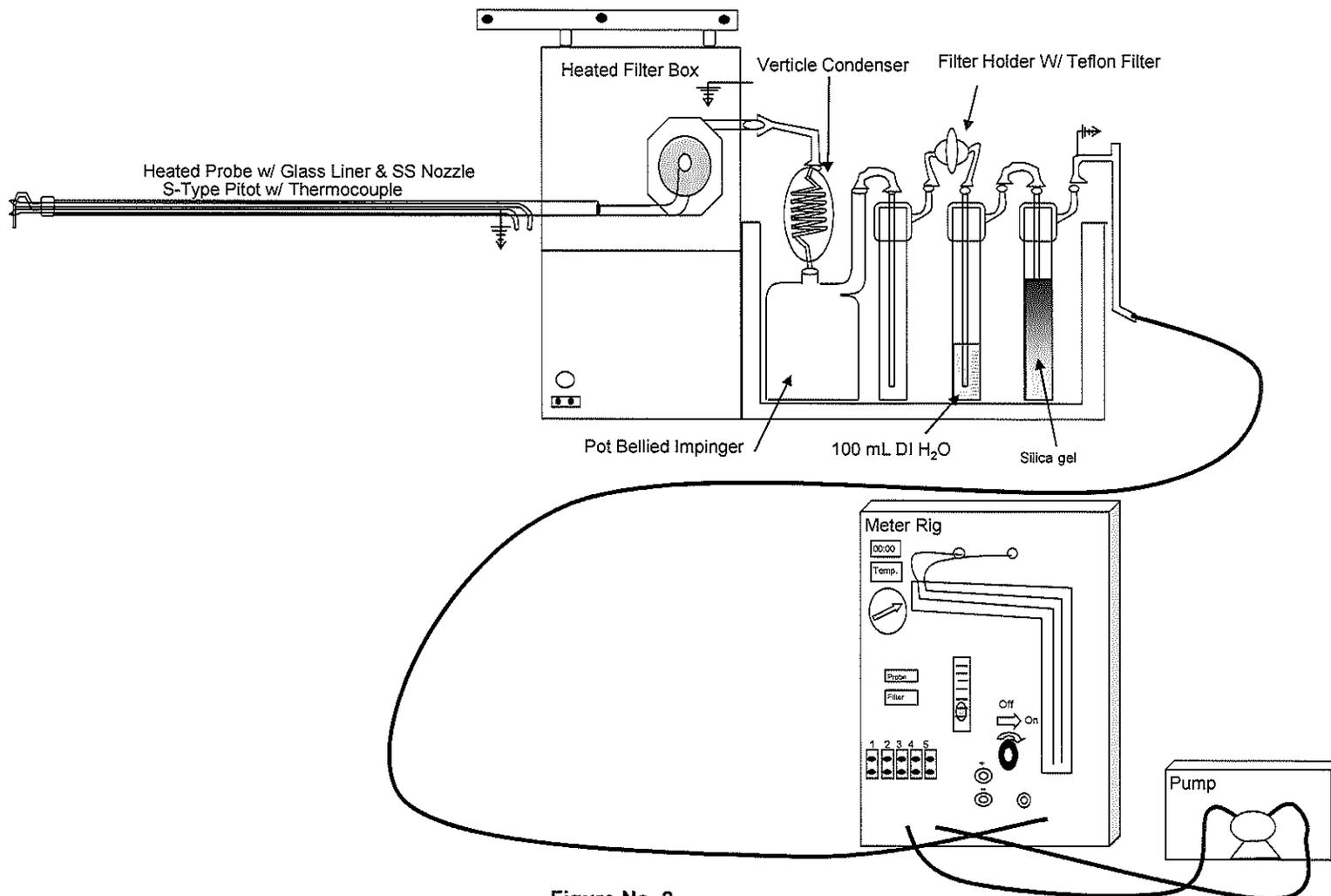


Figure No. 2

Site:
USEPA Method 5/202
General Motors LLC
Lake Orion, Michigan

Sampling Date:
June 18-19, 2019

Montrose Air Quality Services, LLC
4949 Fernlee Avenue
Royal Oak, Michigan 48073

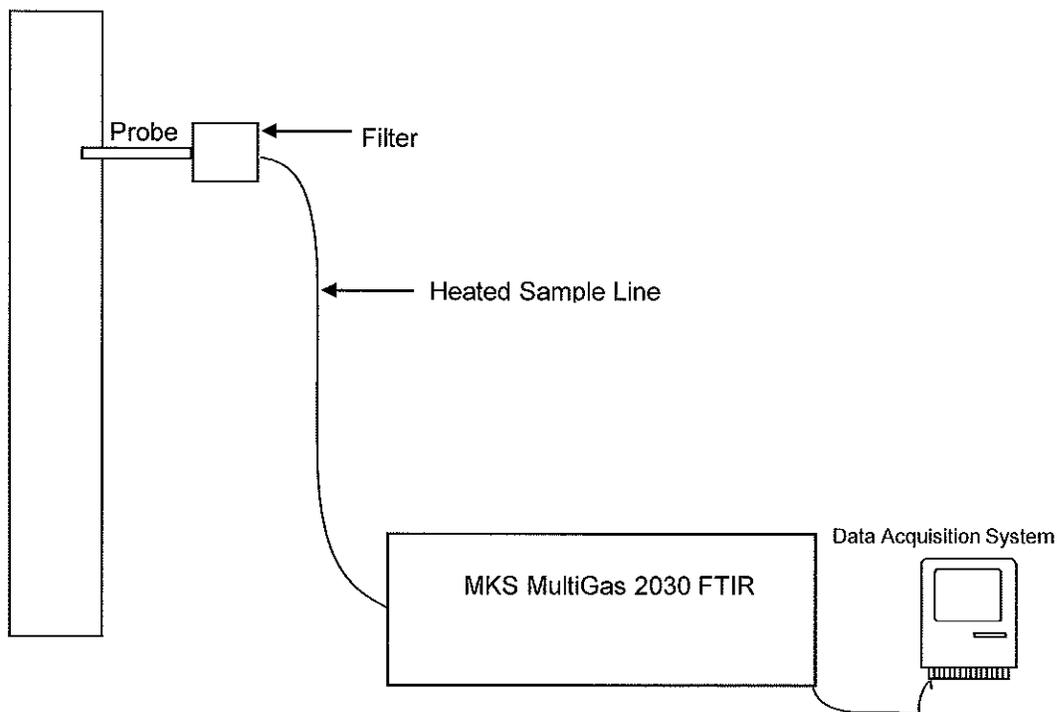


Figure No. 3

<p>Site: USEPA Method 320 General Motors LLC Lake Orion, Michigan</p>	<p>Sampling Date: June 18-19, 2019</p>	<p>Montrose Air Quality Services, LLC 4949 Ferlee Avenue Royal Oak, Michigan 48073</p>
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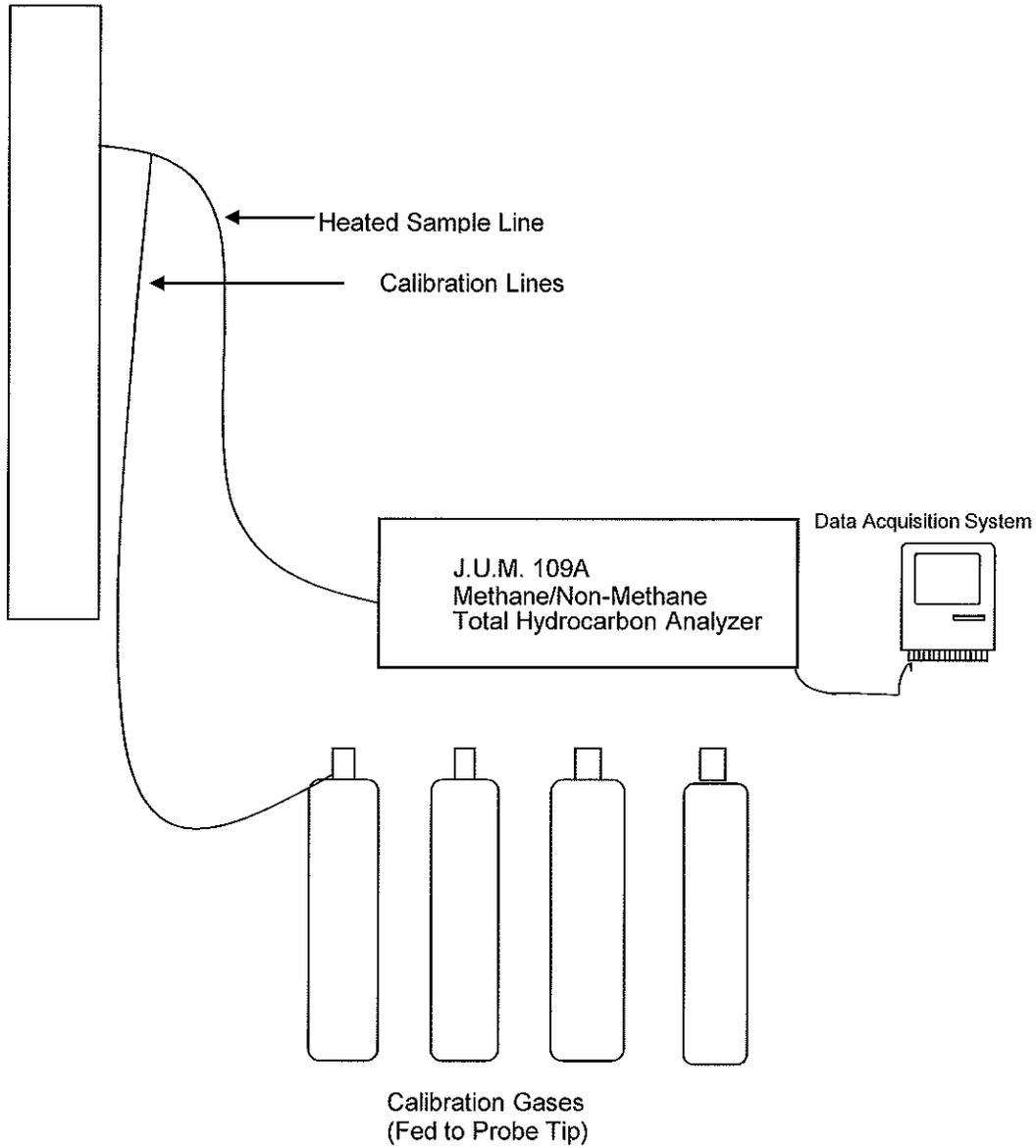


Figure No. 4

Site:
USEPA Method 25A
General Motors LLC
Lake Orion, Michigan

Sampling Date:
June 18-19, 2019

Montrose Air Quality Services, LLC
4949 Fernlee Avenue
Royal Oak, Michigan 48073

