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AIR EMISSION TEST REPORT FOR THE VERIFICATION OF AIR POLLUTANT EMISSIONS FROM A LANDFILL GAS FIRED ENGINE – GENERATOR SET

Prepared for:

Energy Developments Coopersville, LLC at the Ottawa County Farms Landfill SRN N3294

ICT Project No.: 2300068
May 12, 2023

IMPACT COMPLIANCE & TESTING

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EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
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 Environment, Great Lakes, and Energy, Air Quality Division upon request.

Source Name: Energy Developments Coopersville, LLC   County: Ottawa

Source Address: 15550 & 15362 68th Avenue   City: Coopersville

AQD Source ID (SRN): N3294   ROP No.: MI-ROP-N3294-2019   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).

☐ **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 ______ To ______

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

Air Emission Test Report for a landfill gas fired reciprocating internal combustion engine. The testing was conducted in accordance with the submitted Stack Test Protocol and the facility operated in compliance with the permit conditions and at the maximum routine operating conditions for the facility.

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

Name of Responsible Official (print or type)	Title	Phone Number
Rocky Tondo	Head of Project Delivery and Technical Services	(330) 728-5266

Signature of Responsible Official: Rocky Tondo   Date: 5-18-23

* Photocopy this form as needed.

Report Certification

AIR EMISSION TEST REPORT

FOR THE
VERIFICATION OF AIR POLLUTANT EMISSIONS
FROM A
LANDFILL GAS FIRED ENGINE – GENERATOR SET

Energy Developments Coopersville, LLC
at the Ottawa County Farms Landfill
Coopersville, MI

The material and data in this document were prepared and reviewed under the supervision of the undersigned.

Report Prepared By:
Tyler J. Wilson Senior Project Manager Impact Compliance & Testing, Inc.

Executive Summary

ENERGY DEVELOPMENTS COOPERSVILLE, LLC
AT THE OTTAWA COUNTY FARMS LANDFILL
LFG FUELED IC ENGINE
EMISSION TEST RESULTS

Energy Developments Coopersville, LLC (EDC) contracted Impact Compliance & Testing, Inc. (ICT) to conduct a performance demonstration for the determination of nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC), emission rates from one (1) Caterpillar (CAT®) Model No. G3520C gas-fired reciprocating internal combustion engine identified as EUENGINE7, operated at the Energy Developments Coopersville, LLC facility located in Coopersville, Ottawa County, Michigan. The RICE is fueled with landfill gas (LFG) that is produced at the Ottawa County Farms Landfill.

Compliance testing was performed with regards to conditions specified in The State of Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) Renewable Operating Permit (ROP) No. MI-ROP-N3294-2019, Permit to Install (PTI) No. 118-20, and the federal Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (the SI-RICE NSPS; 40 CFR Part 60 Subpart JJJJ). The performance testing was conducted May 9, 2023.

The following table presents the CAT® G3520C emissions results from the performance demonstration.

Emission Unit	NO_x (lb/hr)	NO_x (g/bhp-hr)	CO (lb/hr)	CO (g/bhp-hr)	VOC (lb/hr)	VOC (g/bhp-hr)
EUENGINE7	1.99	0.41	12.0	2.47	0.55	0.11
Permit Limits	*4.94*	*3.0*	*16.3*	*5.0*	*3.2*	*1.0*

The following table presents the operating data recorded during the performance demonstration.

Emission Unit	Generator Output (kW)	Engine Output (bhp)	LFG Fuel Use (lb/hr)	Fuel CH_4 Content (%)
EUENGINE7	1,579	2,203	2,370	49.5

The data presented above indicates that EUENGINE7 was tested while the unit operated within 10% of maximum capacity and is in compliance with the emission standards specific to the unit.

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1.0 Introduction

Energy Developments Coopersville, LLC (EDC) owns and operates a Caterpillar (CAT®) Model No. G3520C gas-fired reciprocating internal combustion engine and electricity generator set (RICE genset) identified as EUENGINE7 at the Ottawa County Farms Landfill in Coopersville, Ottawa County, Michigan. The State of Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) has issued EDC Renewable Operating Permit (ROP) No. MI-ROP-N3294-2019 and Permit to Install (PTI) No. 118-20 for operation of the RICE genset.

Air emission compliance testing was performed pursuant to conditions specified in ROP No. MI-ROP-N3294-2019, PTI No. 118-20, and the federal Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (the SI-RICE NSPS; 40 CFR Part 60 Subpart JJJJ), which requires that testing be performed every 8,760 operating hours or three years, whichever occurs first (unless the engine has been certified by the manufacturer as specified in the SI-RICE NSPS).

The compliance testing presented in this report was performed by Impact Compliance & Testing, Inc. (ICT), a Michigan-based environmental consulting and testing company. ICT representatives Tyler Wilson and Christian Smith performed the field sampling and measurements May 9, 2023.

The engine emission performance tests consisted of triplicate, one-hour sampling periods for nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC, as non-methane hydrocarbons (NMHC or NMOC)). Exhaust gas velocity, moisture, oxygen (O_2) content, and carbon dioxide (CO_2) content were determined for each test period to calculate pollutant mass emission rates.

The exhaust gas sampling and analysis was performed using procedures specified in the Stack Test Protocol dated January 12, 2023, that was reviewed and approved by EGLE-AQD.

Questions regarding this air emission test report should be directed to:

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2.0 Summary of Test Results and Operating Conditions

2.1 Purpose and Objective of the Tests

Conditions of ROP No. MI-ROP-N3294-2019, PTI No. 118-20, and 40 CFR Part 60, Subpart JJJJ, Standards of Performance for New Stationary Sources for Stationary Spark Ignition Internal Combustion Engines require EDC to test EUENGINE7 for CO, NOx, and VOC emissions. Engine No. 7 (Emission Unit EUENGINE7) was tested during this compliance test event.

2.2 Operating Conditions During the Compliance Tests

The testing was performed while the EDC engine/generator set was operated at maximum operating conditions. EDC representatives provided kW output in 15-minute increments for each test period.

Landfill gas (LFG) fuel flowrate (pounds per hour, lb/hr) and fuel methane content (%) were also recorded by EDC representatives in 15-minute increments for each test period.

Appendix 2 provides operating records provided by EDC representatives for the test periods.

Average output, fuel consumption, and fuel methane content for the RICE is presented in Table 2.1 and Table 6.1.

2.3 Summary of Air Pollutant Sampling Results

The gases exhausted from the RICE were sampled for three (3) one-hour test periods during the compliance testing performed May 9, 2023.

Table 2.2 presents the average measured CO, NO_X, and VOC emission rates for the engine (average of the three test periods).

Test results for each one-hour sampling period and comparison to the permitted emission rates are presented in Section 6.0 of this report.

Table 2.1 Average engine operating conditions during the test periods

Engine Parameter	Engine No. 7
Generator output (kW)	1,579
Engine output (bhp)	2,203
Engine LFG fuel use (lb/hr)	2,370
LFG methane content (%)	49.5
Exhaust temperature (°F)	903

Table 2.2 Measured Engine No. 7 (EUENGINE7) air pollutant emission rates (three-test average)

Emission Unit	CO		NOx		VOC	
	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)
EUENGINE7	12.0	2.47	1.99	0.41	0.55	0.11
Permit Limit	***16.3***	***5.0***	***4.94***	***3.0***	***3.2***	***1.0***

3.0 Source and Sampling Location Description

3.1 General Process Description

LFG containing methane is produced in the Ottawa County Farms Landfill from the anaerobic decomposition of waste materials. The gas is collected and directed to the Energy Developments Coopersville, LLC gas-to-energy facility where it is used as fuel for the RICE genset that produces electricity.

The gas-to-energy facility primarily consists of gas treatment equipment and one (1) CAT® Model No. G3520C RICE that is connected to an electricity generator.

3.2 Rated Capacities and Air Emission Controls

The CAT® G3520C engine generator set has a rated design capacity of 1,600 kW.

The engine is equipped with an air-to-fuel ratio (AFR) controller that automatically blends the appropriate ratio of combustion air and treated LFG fuel.

The RICE is not equipped with add-on emission control devices. The AFR controller maintains efficient fuel combustion, which minimizes air pollutant emissions. Exhaust gas is exhausted directly to atmosphere through a noise muffler and vertical exhaust stack.

3.3 Sampling Locations

The RICE exhaust gas is directed through a muffler and is released to the atmosphere through a dedicated vertical exhaust stack with a vertical release point.

The exhaust stack sampling ports for the CAT® G3520C engine are located in an individual exhaust stack (horizontal section of the stack before the noise muffler) with an inner diameter of 14.0 inches. The stack is equipped with two (2) sample ports, opposed 90°, that provide a sampling location 21.0 inches (1.50 duct diameters) upstream and >144 inches (>10.3 duct diameters) downstream from any flow disturbance and satisfies the USEPA Method 1 criteria for a representative sample location.

Individual traverse points were determined in accordance with USEPA Method 1.

Appendix 1 provides diagrams of the emission test sampling locations with actual stack dimension measurements.

4.0 Sampling and Analytical Procedures

A Stack Test Protocol for the air emission testing was reviewed and approved by EGLE-AQD. This section provides a summary of the sampling and analytical procedures that were used during the testing periods.

4.1 Summary of Sampling Methods

USEPA Method 1	Exhaust gas velocity measurement locations were determined based on the physical stack arrangement and requirements in USEPA Method 1.
USEPA Method 2	Exhaust gas velocity pressure was determined using a Type-S Pitot tube connected to a red oil incline manometer; temperature was measured using a K-type thermocouple connected to the Pitot tube.
USEPA Method 3A	Exhaust gas O_2 and CO_2 content was determined using paramagnetic and infrared instrumental analyzers, respectively.
USEPA Method 4	Exhaust gas moisture was determined based on the water weight gain in chilled impingers.
USEPA Method 7E	Exhaust gas NOx concentration was determined using chemiluminescence instrumental analyzers.
USEPA Method 10	Exhaust gas CO concentration was measured using an infrared instrumental analyzer.
USEPA Method 25A / ALT-096	Exhaust gas VOC (as NMHC) concentration was determined using a flame ionization analyzer equipped with methane separation column.

4.2 Exhaust Gas Velocity Determination (USEPA Method 2)

The RICE exhaust stack gas velocities and volumetric flow rates were determined using USEPA Method 2 once during each test period. An S-type Pitot tube connected to a red-oil manometer was used to determine velocity pressure at each traverse point across the stack cross section. Gas temperature was measured using a K-type thermocouple mounted to the Pitot tube. The Pitot tube and connective tubing were leak-checked periodically throughout the test periods to verify the integrity of the measurement system.

The absence of significant cyclonic flow for each sampling location was verified using an S-type Pitot tube and oil manometer. The Pitot tube was positioned at each velocity traverse point with the planes of the face openings of the Pitot tube perpendicular to the stack cross-sectional plane. The Pitot tube was then rotated to determine the null angle (rotational angle as measured from the perpendicular, or reference, position at which the differential pressure is equal to zero).

Appendix 3 provides exhaust gas flowrate calculations and field data sheets.

4.3 Exhaust Gas Molecular Weight Determination (USEPA Method 3A)

CO_2 and O_2 content in the RICE exhaust gas stream were measured continuously throughout each test period in accordance with USEPA Method 3A. The CO_2 content of the exhaust was monitored using a M&C GenTwo infrared gas analyzer. The O_2 content of the exhaust was monitored using a M&C GenTwo gas analyzer that uses a paramagnetic sensor.

During each sampling period, a continuous sample of the RICE exhaust gas stream was extracted from the stack using a stainless-steel probe connected to a Teflon® heated sample line. The sampled gas was conditioned by removing moisture prior to being introduced to the analyzers; therefore, measurement of O_2 and CO_2 concentrations correspond to standard dry gas conditions. Instrument response data were recorded using an ESC Model 8816 data acquisition system that monitored the analog output of the instrumental analyzers continuously and logged data as one-minute averages.

Prior to, and at the conclusion of each test, the instruments were calibrated using upscale calibration and zero gas to determine analyzer calibration error and system bias (described in Section 5.0 of this document). Sampling times were recorded on field data sheets.

Appendix 4 provides O_2 and CO_2 calculation sheets. Raw instrument response data are provided in Appendix 5.

4.4 Exhaust Gas Moisture Content (USEPA Method 4)

Moisture content of the RICE exhaust gas was determined in accordance with USEPA Method 4 using a chilled impinger sampling train. Exhaust gas moisture content measurements were performed concurrently with the instrumental analyzer sampling periods. At the conclusion of each sampling period the moisture gain in the impingers was determined gravimetrically by weighing each impinger to determine net weight gain.

4.5 NO_x and CO Concentration Measurements (USEPA Methods 7E and 10)

NO_X and CO pollutant concentrations in the RICE exhaust gas stream were determined using a Thermo Environmental Instruments, Inc. (TEI) Model 42i High Level chemiluminescence NO_X analyzer and a M&C GenTwo CO analyzer.

Throughout each test period, a continuous sample of the engine exhaust gas was extracted from the stack using the Teflon® heated sample line and gas conditioning system and delivered to the instrumental analyzers. Instrument response for each analyzer was recorded on an ESC Model 8816 data acquisition system that logged data as one-minute averages. Prior to, and at the conclusion of each test, the instruments were calibrated using upscale calibration and zero gas to determine analyzer calibration error and system bias.

Appendix 4 provides CO and NO_X calculation sheets. Raw instrument response data are provided in Appendix 5.

4.6 Measurement of VOC (USEPA Method 25A/ALT-096)

The VOC emission rate was determined by measuring the nonmethane hydrocarbon (NMHC or NMOC) concentration in the RICE exhaust gas. NMHC pollutant concentration was determined using a TEI Model 55i Methane / Nonmethane hydrocarbon analyzer. The TEI 55i analyzer contains an internal gas chromatograph column that separates methane from non-methane components. The concentration of NMHC in the sampled gas stream, after separation from methane, is determined relative to a propane standard using a flame ionization detector in accordance with USEPA Method 25A.

The USEPA Office of Air Quality Planning and Standards (OAQPS) has issued an alternate test method approving the use of the TEI 55i-series analyzer as an effective instrument for measuring NMOC from gas-fueled RICE (ALT-096).

Samples of the exhaust gas were delivered directly to the instrumental analyzer using the Teflon® heated sample line to prevent condensation. The sample to the NHMC analyzer was not conditioned to remove moisture. Therefore, VOC measurements correspond to standard conditions with no moisture correction (wet basis).

Prior to, and at the conclusion of each test, the instrument was calibrated using mid-range calibration (propane) and zero gas to determine analyzer calibration error and system bias (described in Section 5.0 of this document).

Appendix 4 provides VOC calculation sheets. Raw instrument response data for the NMHC analyzer is provided in Appendix 5.

5.0 QA/QC Activities

5.1 Flow Measurement Equipment

Prior to arriving onsite (or onsite prior to beginning compliance testing), the instruments used during the source test to measure exhaust gas properties and velocity (barometer, Pitot tube, and scale) were calibrated to specifications in the sampling methods.

5.2 NO_x Converter Efficiency Test

The NO_2 – NO conversion efficiency of the TEI Model 42i analyzer was verified prior to the testing program. A USEPA Protocol 1 certified concentration of NO_2 was injected directly into the analyzer, following the initial three-point calibration, to verify the analyzer's conversion efficiency. The analyzer's NO_2 – NO converter uses a catalyst at high temperatures to convert the NO_2 to NO for measurement. The conversion efficiency of the instrumental analyzer will be deemed acceptable if the measured NOx concentration is at least 90% of the expected value (within 10%).

The NO_2 – NO conversion efficiency test satisfied the USEPA Method 7E criteria (measured NOx concentration was 101.1% of the expected value).

5.3 Gas Divider Certification (USEPA Method 205)

A STEC Model SGD-710C 10-step gas divider was used to obtain appropriate calibration span gases. The ten-step STEC gas divider was NIST certified (within the last 12 months) with a primary flow standard in accordance with Method 205. When cut with an appropriate zero gas, the ten-step STEC gas divider delivered calibration gas values ranging from 0% to 100% (in 10% step increments) of the USEPA Protocol 1 calibration gas that was introduced into the system. The field evaluation procedures presented in Section 3.2 of Method 205 were followed prior to use of gas divider. The field evaluation yielded no errors greater than 2% of the triplicate measured average and no errors greater than 2% from the expected values.

5.4 Instrumental Analyzer Interference Check

The instrumental analyzers used to measure NO_X, CO, O_2, and CO_2 have had an interference response test preformed prior to their use in the field, pursuant to the interference response test procedures specified in USEPA Method 7E. The appropriate interference test gases (i.e., gases that would be encountered in the exhaust gas stream) were introduced into each analyzer, separately and as a mixture with the analyte that each analyzer is designed to measure. All of analyzers exhibited a composite deviation of less than 2.5% of the span for all measured interferent gases. No major analytical components of the analyzers have been replaced since performing the original interference tests.

5.5 Instrument Calibration and System Bias Checks

At the beginning of each day of the testing program, initial three-point instrument calibrations were performed for the NO_x, CO, CO_2, and O_2 analyzers by injecting calibration gas directly into the inlet sample port for each instrument. System bias checks were performed prior to and at the conclusion of each sampling period by introducing the upscale calibration gas and zero gas into the sampling system (at the base of the stainless-steel sampling probe prior to the particulate filter and Teflon® heated sample line) and determining the instrument response against the initial instrument calibration readings.

At the beginning of each test day, appropriate high-range, mid-range, and low-range span gases followed by a zero gas were introduced to the NMHC analyzer, in series at a tee connection, which is installed between the sample probe and the particulate filter, through a poppet check valve. After each one-hour test period, mid-range and zero gases were re-introduced in series at the tee connection in the sampling system to check against the method's performance specifications for calibration drift and zero drift error.

The instruments were calibrated with USEPA Protocol 1 certified concentrations of CO_2, O_2, NO_x, and CO in nitrogen and zeroed using hydrocarbon free nitrogen. The NMHC (VOC) instrument was calibrated with USEPA Protocol 1 certified concentrations of propane in air and zeroed using hydrocarbon-free air. A STEC Model SGD-710C ten-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

5.6 Determination of Exhaust Gas Stratification

A stratification test was performed for the RICE exhaust stack. The stainless-steel sample probe was positioned at sample points correlating to 16.7, 50.0 (centroid), and 83.3% of the stack diameter. Pollutant concentration data were recorded at each sample point for a minimum of twice the maximum system response time.

The recorded concentration data for the RICE exhaust stack indicated that the measured O_2 and CO_2 concentrations did not vary by more than 5% of the mean across the stack diameter. Therefore, the RICE exhaust gas was considered to be unstratified and the compliance test sampling was performed at a single sampling location within the RICE exhaust stack.

5.7 System Response Time

The response time of the sampling system was determined prior to the compliance test program by introducing upscale gas and zero gas, in series, into the sampling system using a tee connection at the base of the sample probe. The elapsed time for the analyzer to display a reading of 95% of the expected concentration was determined using a stopwatch.

Sampling periods did not commence until the sampling probe had been in place for at least twice the greatest system response time.

5.8 Meter Box Calibrations

The dry gas meter sampling console used for moisture testing was calibrated prior to and after the testing program. This calibration uses the critical orifice calibration technique presented in USEPA Method 5. The metering console calibration exhibited no data outside the acceptable ranges presented in USEPA Method 5.

The digital pyrometer in the metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

Appendix 6 presents test equipment quality assurance data (NO_2 – NO conversion efficiency test data, instrument calibration and system bias check records, calibration gas and gas divider certifications, interference test results, meter box calibration records, stratification checks, and field equipment calibration records).

6.0 Results

6.1 Test Results and Allowable Emission Limits

Engine operating data and air pollutant emission measurement results for each one-hour test period are presented in Table 6.1.

The RICE has the following allowable emission limits specified in ROP No. MI-ROP-N3294-2019, PTI No. 118-20, and/or the federal Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (the SI-RICE NSPS; 40 CFR Part 60 Subpart JJJJ):

Emission Unit ID	CO Limits	NOx Limits	VOC Limits
EUENGINE7	16.3 lb/hr & 5.0 g/bhp-hr	4.94 lb/hr & 3.0 g/bhp-hr	3.2 lb/hr & 1.0 g/bhp-hr

6.2 Variations from Normal Sampling Procedures or Operating Conditions

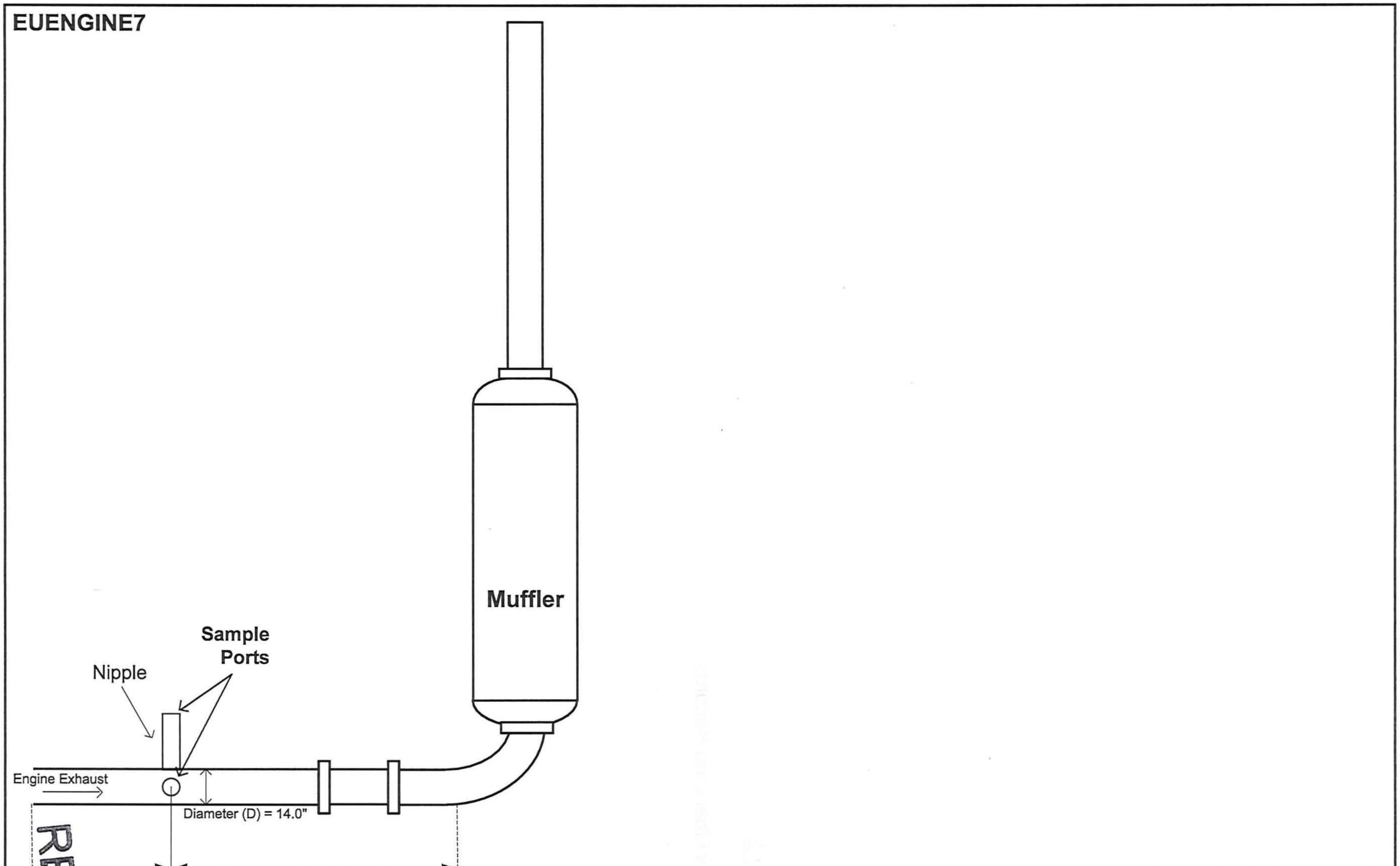
The testing for all pollutants was performed in accordance with USEPA methods and the approved Stack Test Protocol. The RICE-generator set was operated within 10% of maximum output and no variations from normal operating conditions occurred during the engine test periods.

Table 6.1 Measured exhaust gas conditions and NOx, CO, and VOC air pollutant emission rates for Engine No. 7 (EUENGINE7)

Test No. Test date Test period (24-hr clock)	1 5/9/2023 743-843	2 5/9/2023 908-1008	3 5/9/2023 1026-1126	Three Test Average
LFG flowrate (lb/hr)	2,368	2,374	2,368	2,370
Engine output (bhp)	2,206	2,190	2,213	2,203
Generator output (kW)	1,581	1,570	1,586	1,579
LFG methane content (%)	49.2	49.4	49.7	49.5
<u>Exhaust Gas Composition</u>				
CO_2 content (% vol)	10.9	10.8	10.8	10.8
O_2 content (% vol)	8.65	8.72	8.70	8.69
Moisture (% vol)	11.6	12.4	11.7	11.9
Exhaust gas temperature (°F)	902	903	904	903
Exhaust gas flowrate (dscfm)	3,980	3,960	3,984	3,975
Exhaust gas flowrate (scfm)	4,504	4,519	4,513	4,512
<u>Nitrogen Oxides</u>				
NO_X conc. (ppmvd)	74.0	70.0	65.7	69.9
NO_X emissions (lb/hr)	2.11	1.99	1.88	1.99
Permit limit (lb/hr)	-	-	-	*4.94*
NO_X emissions (g/bhp*hr)	0.43	0.41	0.38	0.41
*Permit limit (g/bhp*hr)*	-	-	-	*3.0*
<u>Carbon Monoxide</u>				
CO conc. (ppmvd)	697	693	687	693
CO emissions (lb/hr)	12.1	12.0	12.0	12.0
Permit limit (lb/hr)	-	-	-	*16.3*
CO emissions (g/bhp*hr)	2.49	2.48	2.45	2.47
*Permit limit (g/bhp*hr)*	-	-	-	*5.0*
<u>Volatile Organic Compounds</u>				
VOC conc. (ppmv C_3)	17.5	17.4	18.6	17.9
VOC emissions (lb/hr)	0.54	0.54	0.58	0.55
Permit limit (lb/hr)	-	-	-	*3.2*
VOC emissions (g/bhp*hr)	0.11	0.11	0.12	0.11
*Permit limit (g/bhp*hr)*	-	-	-	*1.0*

APPENDIX 1

- RICE Engine Sample Port Diagram



Energy Developments Coopersville, LLC Exhaust Sample Location, CAT® G3520C RICE		
Scale None	Sheet 1 of 1	IMPACT COMPLIANCE & TESTING

Appendix 2

- Facility Operating Records