

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 North American Natural Resources SBL-LLC County Berrien
Source Address 3200 Chamberlain Road City Buchanan
AQD Source ID (SRN) N5432 ROP No. N5432-2021 ROP Section No. 2

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:

Test report for CO, NOx, and VOC emissions from landfill gas fired CAT G3520C IC engines (EUENGINE2-S2 and EUENGINE3-S2). The testing was conducted in accordance with MI-ROP-N5432-2021. The facility was operated in compliance with the permit conditions or at the maximum routine operating conditions.

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

| | | |
|---|-------------------------------|-----------------------|
| <u>Richard Spranger</u> | <u>Director of Operations</u> | <u>(517) 719-1322</u> |
| Name of Responsible Official (print or type) | Title | Phone Number |
|  | | <u>7-31-19</u> |
| Signature of Responsible Official | | Date |

* Photocopy this form as needed.



AIR EMISSION TEST REPORT

Title: AIR EMISSION TEST REPORT FOR THE VERIFICATION OF AIR POLLUTANT EMISSIONS FROM LANDFILL GAS FIRED ENGINE – GENERATOR SETS

Report Date: July 25, 2019

Test Date(s): July 2, 2019 & July 16, 2019

| Facility Information | |
|----------------------|---|
| Name: | North American Natural Resources Southeast Berrien County Landfill |
| Street Address: | 32 Amberlain Road |
| City, County, State: | Buchanan, Berrien, Michigan |
| Facility SRN: | N: |
| Phone: | (248) 35-250 |

| Emission Unit and Permit Information | |
|--------------------------------------|-----------------------------|
| Operating Permit No.: | MI-ROP-N5 -2021 |
| Emission Unit Nos.: | EUENGINE3-S2 & EUENGINE2-S2 |

| Testing Contractor | |
|--------------------|---|
| Company: | Impact Compliance & Testing, Inc. |
| Mailing Address: | 37 Hills Tech Drive Farmington Hills, MI 48331 |
| Phone: | (734) 464-388 |
| Project No.: | 163 |

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

NORTH AMERICAN NATURAL RESOURCES
SOUTHEAST BERRIEN COUNTY LANDFILL

1.0 INTRODUCTION

North American Natural Resources (NANR) operates gas-fired reciprocating internal combustion engine (RICE) and electricity generator sets at the Southeast Berrien County Landfill in Buchanan, Berrien County, Michigan. The RICE are fueled by landfill gas (LFG) that is recovered from the Southeast Berrien County Landfill. The recovered gas is transferred to NANR where it is treated and used as fuel.

The Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) has issued to NANR a Renewable Operating Permit (MI-ROP-N5432-2021) for operation of the renewable electricity generation facility, which consists of three (3) CAT® Model No. G3520C RICE-generator set identified as emission units EUENGINE1-S2, EUENGINE2-S2, and EUENGINE3-S2 (Flexible Group ID: FGENGINES-S2).

Air emission compliance testing was performed pursuant to ROP No. MI-ROP-N5432-2021 and the federal Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (the SI-RICE NSPS; 40 CFR Part 60 Subpart JJJJ). The conditions of ROP No. MI-ROP-N5432-2021 state:

... The permittee must conduct performance testing every 8,760 hours or 3 years after the initial test, whichever comes first. ... to demonstrate compliance with the emission limits in 40 CFR 60.4233(e) ... If a performance test is required, the performance test shall be conducted according to 40 CFR 60.4244.

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 Brad Thome and Jory VanEss performed the field sampling and measurements July 2, 2019 (EUENGINE3-S2) and July 16, 2019 (EUENGINE2-S2). The emission test events for EUENGINE3-S2 and EUENGINE2-S2 were performed within 8,760 operating hours of the previous test event, which occurred March 27-28, 2018. EUENGINE1-S2 is currently undergoing maintenance and will be tested at a later date. The EGLE-AQD will be notified prior to performing the emission test event for EUENGINE1-S2.

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The exhaust gas sampling and analysis was performed using procedures specified in the Stack Test Protocol that was reviewed and approved by the EGLE-AQD in the May 31, 2019 Test Plan Approval Letter. EGLE-AQD representatives Mr. Matt Deskins and Mr. Dave Patterson observed portions of the testing project.

The engine emission performance tests consisted of triplicate, one-hour sampling periods for nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC, as non-methane hydrocarbons (NMHC)). Exhaust gas velocity, moisture content, oxygen (O₂) content, and carbon dioxide (CO₂) content were determined for each test period to calculate pollutant mass emission rates.

Questions regarding this emission test report should be directed to:

Brad Thome
Environmental Consultant
Impact Compliance & Testing, Inc.
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Mr. Richard Spranger
Director of Operations
North American Natural Resources
300 North 5th Street, Suite 100
Ann Arbor, MI 48104
Ph: (517) 719-1322

Report Certification

This test report was prepared by Impact Compliance & Testing, Inc. based on field sampling data collected by ICT. Facility process data were collected and provided NANR employees or representatives. This test report has been reviewed by NANR representatives and approved for submittal to the EGLE-AQD.

I certify that the testing was conducted in accordance with the specified test methods and submitted Stack Test Protocol unless otherwise specified in this report. I believe the information provided in this report and its attachments are true, accurate, and complete.

Report Prepared By:

Reviewed By:



Brad Thome
Environmental Consultant
Impact Compliance & Testing, Inc.

Tyler J. Wilson
Senior Project Manager
Impact Compliance & Testing, Inc.

2.0 SUMMARY OF TEST RESULTS AND OPERATING CONDITIONS

2.1 Purpose and Objective of the Tests

The conditions of MI-ROP-N5432-2021 and 40 CFR Part 60 Subpart JJJJ require NANR to test engines EUENGINE1-S2, EUENGINE2-S2, and EUENGINE3-S2 for CO, NO_x, and VOC emissions every 8,760 hours of operation or three (3) years, whichever comes first.

2.2 Operating Conditions During the Compliance Tests

The testing was performed while the NANR engine/generator sets were operated at maximum operating conditions (within 10% of rated capacity). The rated capacity for the CAT® G3520C engine generator sets are 1,600 kilowatt (kW) electricity output. NANR representatives provided kW output in 15-minute increments for each test period. The EUENGINE3-S2 and EUENGINE2-S2 generator electricity output ranged between 1,518 and 1,604 kW for each test period.

Fuel flowrate (standard cubic feet per minute (scfm)), fuel methane content (%), air-to-fuel ratio, and inlet pressure (psi) were also recorded by NANR representatives in 15-minute increments for each test period. The EUENGINE3-S2 and EUENGINE2-S2 fuel consumption rate ranged between 575 and 598 scfm, fuel methane content ranged between 47.0 and 49.6%, air-to-fuel ratio ranged between 7.3 and 7.7, and inlet pressure ranged between 45.5 and 49.8.

Appendix 1 provides operating records provided by NANR representatives for the test periods.

Engine output (bhp) cannot be measured directly and was calculated based on the recorded electricity output, the calculated CAT® Model G3520C generator efficiency (95.7%), and the unit conversion factor for kW to horsepower (0.7457 kW/hp).

$$\text{Engine output (bhp)} = \text{Electricity output (kW)} / (0.957) / (0.7457 \text{ kW/hp})$$

Table 2.1 presents a summary of the average engine operating conditions during the test periods.

2.3 Summary of Air Pollutant Sampling Results

The gases exhausted from the sampled LFG fueled RICE (EUENGINE3-S2 and EUENGINE2-S2) were sampled for three (3) one-hour test periods during the compliance testing performed July 2, 2019 (EUENGINE3-S2) and July 16, 2019 (EUENGINE2-S2).

Table 2.2 presents the average measured CO, NO_x, and VOC emission rates for each 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 | EUENGINE3-S2 CAT® G3520C | EUENGINE2-S2 CAT® G3520C |
|----------------------------|-----------------------------|-----------------------------|
| Generator output (kW) | 1,524 | 1,601 |
| Engine output (bhp) | 2,136 | 2,243 |
| Engine LFG fuel use (scfm) | 583 | 592 |
| LFG methane content (%) | 47.9 | 49.6 |
| Air-to-fuel ratio | 7.4 | 7.6 |
| Inlet pressure (psi) | 46.6 | 49.1 |
| Exhaust temperature (°F) | 977 | 950 |

Table 2.2 Average measured emission rates for each engine (three-test average)

| Emission Unit | CO Emission Rates | | NOx Emission Rates | | VOC Emission Rates | |
|---------------------|-------------------|------------|--------------------|-------------|--------------------|------------|
| | (lb/hr) | (g/bhp-hr) | (lb/hr) | (g/bhp-hr) | (lb/hr) | (g/bhp-hr) |
| EUENGINE3-S2 | 11.9 | 2.54 | 1.28 | 0.27 | 0.66 | 0.14 |
| EUENGINE2-S2 | 12.2 | 2.46 | 1.21 | 0.24 | 0.76 | 0.15 |
| <i>Permit Limit</i> | - | <i>2.8</i> | - | <i>0.62</i> | - | <i>1.0</i> |