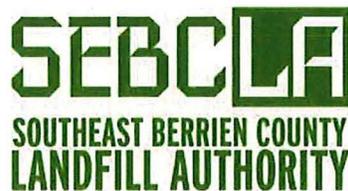


# **Open Flare Performance Test Report**

**Prepared for:**

**Southeast Berrien County  
Landfill Authority**



**January 31, 2023**





# Report Certification

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## Open Flare Performance Test

**Southeast Berrien County Landfill  
1540 Mayflower Road, Niles, MI 49120**

This document has been reviewed by Southeast Berrien County Landfill Authority representatives and approved for submittal to the Michigan Department of Environment, Great Lakes and Energy (EGLE) – Air Quality Division as part of this Open Flare Performance Test Report.

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

Impact Compliance & Testing, Inc.



Max Fierro

Environmental Consultant

## Table of Contents

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<b>TABLE OF CONTENTS.....</b>	<b>III</b>
<b>1 INTRODUCTION.....</b>	<b>1</b>
<b>2 SUMMARY OF RESULTS.....</b>	<b>2</b>
<b>3 SAMPLING AND ANALYTICAL PROCEDURES .....</b>	<b>3</b>
3.1 VISUAL DETERMINATION OF FUGITIVE EMISSIONS FROM MATERIAL SOURCES AND SMOKE EMISSIONS FROM FLARES (METHOD 22, ALTERNATIVE 42) .....	3
3.2 DETERMINATION OF THE NET HEATING VALUE OF THE LANDFILL GAS (METHOD 3C, ALTERNATIVE 42).....	3
3.3 STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE (METHOD 2C, ALTERNATIVE 55) ...	3
<b>4 TEST RESULTS AND DISCUSSION .....</b>	<b>4</b>
4.1 METHOD 22, ALTERNATIVE 42 .....	4
4.2 METHOD 3C, ALTERNATIVE 42 .....	4
4.3 METHOD 2C, ALTERNATIVE 55.....	5
4.4 CONCLUSIONS .....	5

### APPENDICES

APPENDIX A OPEN FLARE PERFORMANCE TEST PLAN

APPENDIX B FIELD DATA

APPENDIX C LANDFILL GAS ANALYTICAL REPORT

APPENDIX D NET HEATING AND EXHAUST VELOCITY CALCULATIONS

## List of Tables, Figures and Drawings

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### Tables:

Table 1.1: Contact Information

Table 5.1: LFG & Analytical Results

Table 5.2: Exhaust Velocity Readings

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# 1 Introduction

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The Southeast Berrien County Landfill (SEBCLF) is owned and operated by Southeast Berrien County Landfill Authority located in Niles, Michigan. SEBCLF retained Impact Compliance & Testing (ICT) to conduct an open flare performance test on SEBCLF's 2,000 standard cubic feet per minute (scfm) open flare (EUOPENFLARE). The open flare is utilized to provide backup landfill gas (LFG) control when the Landfill Gas-to-Energy (LFGTE) plant is not operating or there is excess LFG beyond the capacity of the energy plant.

The test was performed as required by the facility's Title V Permit MI-ROP-N5432-2022 in accordance with FGOPENFLARE-OOO Condition V and FGOPENFLARE-AAAA Condition V. SEBCLF is required to demonstrate compliance with 40 CFR 60.18 and 40 CFR 63.11 by conducting a performance test no later than 180-days (April 19, 2023) after permit re-issuance (October 21, 2022). ICT conducted the field work on January 10, 2023 in accordance with the previously referenced regulations and the test plan submitted to the Michigan Department of Environment, Great Lakes and Energy (EGLE) on December 6, 2022

The names, addresses and telephone numbers of those involved with the open flare testing are listed in Table 1.1 below:

**Table 1.1 – Contact Information**

<b>Name and Title</b>	<b>Company/Address</b>	<b>Phone Number</b>
William Housand, Environmental Manager	SEBCLF 3200 Chamberlain Rd. Buchanan, MI	269-338-1859
Summer Hitchens, Sr. Project Manager	ICT 37660 Hills Tech Dr. Farmington Hills, MI	734-357-8045
Max Fierro, Environmental Consultant	ICT 4180 Keller Rd. Ste B Holt, MI	734-357-8397

## 2 Summary of Results

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The SEBCLF open flare serves as a back-up control device for when the LFGTE plant is not operating or there is excess LFG beyond the capacity of the energy plant. The flare is designed to meet the performance requirements of 40 CFR 60.18 at flows up to 2,000 scfm. The flare operated at an average measured inlet volumetric flow rate of approximately 1,250 scfm during the testing.

The results of the tests were:

- Visible emissions: no accumulated emission time,
- Average net heating value of the gas being combusted: 20.35 mega joules per standard cubic meter (MJ/m<sup>3</sup>), and
- Average exhaust gas exit velocity: 28.89 feet per second (ft/sec).

The performance criteria are less than 5 minutes visible emissions in a 30-minute period, a net heating value of greater than 7.45 MJ/m<sup>3</sup>, and a maximum exit velocity less than 60 ft/sec.

The test results demonstrate the SEBCLF open flare meets the performance requirements of 40 CFR 60.18, and thus also satisfies the requirements of 63.1959(b)(2)(iii)(B)/62.16714(c)(2) at the test flow rate.

## 3 Sampling and Analytical Procedures

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ICT conducted the measurements in accordance with USEPA approved alternative methods as explained in the test plan. A copy of the approved test plan is included in Appendix A. The test procedures are as summarized below:

### 3.1 Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares (Method 22, Alternative 42)

ICT conducted a single, 30-minute, non-continuous observation of the flare exhaust for smoke emissions. ICT observed continuously for 15 minutes, then took a break for 5 minutes, and resumed observation for another 15 minutes, to ensure completion of the full 30-minute period of observation time. A copy of Method 22 observation data is presented in Appendix B.

### 3.2 Determination of the Net Heating Value of the Landfill Gas (Method 3C, Alternative 42)

ICT used Method 3C to determine the net heating value of the landfill gas. ICT conducted two (2) 30-minute tests, one sample collected for backup, and submitted the samples to Air Technology Laboratories, Inc. (Air Technologies), City of Industry, California. Air Technology analyzed the sample for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrogen (N<sub>2</sub>), and oxygen (O<sub>2</sub>). The Air Technology laboratory analytical report is presented in Appendix C. Net heating values were then calculated in accordance with 40 CFR 63.1959(d)/62.16718(d) for the laboratory analyzed sample. The net heating value calculations have been included in Appendix D.

### 3.3 Stack Gas Velocity and Volumetric Flow Rate (Method 2C, Alternative 55)

On May 20, 2009 USEPA approved the use of a mass flow meter in place of Method 2C to measure the flow rate to a utility flare. This alternative stipulated the calculation had to be 'recent.' ICT used the flare flow meter to measure the flow rate at the flare. The flare's exhaust velocity calculations have been included in Appendix D.

## 4 Test Results and Discussion

ICT performed the performance testing in accordance with the test methods as proposed in the open flare test plan. Mr. Max Fierro performed the testing as detailed below. The flare operated as designated with no upset conditions during the test, therefore no re-testing was required. Additionally, during the three months prior to the test there was no significant maintenance activities performed on the non-enclosed flare. Find below a detailed discussion of the test methods utilized and discussion of the results and compliance status of the non-enclosed flares.

### 4.1 Method 22, Alternative 42

Visible emissions testing by Method 22, Alternative 42 was performed by Mr. Fierro of ICT. Mr. Fierro observed continuously for 15 minutes, took a break for 5 minutes and resumed observation until the full 30-minute period of observation was complete. A copy of Mr. Fierro's observations including weather conditions and wind direction during the test are included with the field forms in Appendix B. No visible emissions were observed during either 15-minute period for the flare and therefore it is compliant with 40 CFR 60.18(f)(1) which requires less than 5 minutes of visible emissions during a 30-minute test period. The field readings are included in the field data provided in Appendix B.

### 4.2 Method 3C, Alternative 42

The net heating value of the gas being combusted in the flare was performed in accordance with Method 3C, Alternative 42. Mr. Fierro performed the LFG sampling. During the performance test, two (2) gas samples were taken using 6-L Summa canisters and sent to Air Technology Laboratory for analysis (one as a back-up). In addition, two (2) methane readings were taken using an Envision gas analyzer at the common header prior to the flare. The gas readings were taken prior to and after the collection of the LFG sample.

The results of the gas readings and laboratory analytical results are detailed in Table 5.1 below:

**Table 5.1 – LFG & Analytical Results**

Date	Time	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	Balance (%)	Heating Value (MJ/m <sup>3</sup> )
1/10/2023	11:05 AM	52.7	35.9	1.5	9.9	19.89
1/10/2023 (Laboratory Analysis)	11:12-11:42 AM	57.0	39.0	1.9	13.0	21.51 (calculated)
1/10/2023	11:45 AM	52.1	36.2	1.6	10.1	19.66

Sample calculations of the net heating value in accordance with 40 CFR 60.18(f)(3) can be found in Appendix D. As detailed in the above table and supporting calculations the net heating value for the LFG combusted in the flare is at least 7.45 MJ/m<sup>3</sup> and therefore is compliant with 40 CFR 60.18(f)(3).

### 4.3 Method 2C, Alternative 55

The actual exhaust velocity of the flare was determined by Method 2C, Alternative 55. During the testing period the flow rate to the flare was monitored by a mass flow meter and recorded in 5-minute intervals. The exhaust velocity was then determined by dividing the volumetric flow rate by the unobstructed cross-sectional area of the flare tip. The exhaust velocity at the beginning and end of the testing period are provided in Table 5.2 below:

**Table 5.2 – Exhaust Velocity Readings**

Date	Time	Flow (scfm)	Exit Velocity (ft/sec)
1/10/2023	11:12 AM	1270	29.34
1/10/2023	11:48 AM	1231	28.44

Sample calculations of the flare exhaust velocity calculations and recorded flow information are included in Appendix D. As detailed in the above table and supporting calculations because the actual exhaust velocity is less than 60 ft/sec and is therefore in compliance with 40 CFR 60.18(f)(4)(i).

### 4.4 Conclusions

The test results demonstrate the SEBCLF open flare meets the performance requirements of 40 CFR 60.18, and thus also satisfies the requirements of 40 CFR 63.1959(d)/62.16718(d) at the test flow rate.