Open Flare Performance Test Report

Prepared for:

Granger Waste Services: Wood Street Landfill

GRANGER
WASTE SERVICES

May 7, 2021

IMPACT
COMPLIANCE & TESTING

List of Tables, Figures and Drawings

Tables:

1 Introduction

The Granger Waste Services Wood Street Landfill (WSL) retained Impact Compliance & Testing (ICT) to conduct an open flare performance test on the landfill's 1,300 standard cubic feet per minute (scfm) open flare at WSL in Lansing, Michigan. 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-N5997-2020 in accordance with emission unit EUOPENFLARE Condition V and 40 CFR 60.752(b)(iii)(A) and 40 CFR 60.757(f-g), the WSL is required to demonstrate compliance with 40 CFR 60.18 by conducting a performance test no later than 180-days (April 5, 2021) after issuance of the ROP. ICT conducted the field work on April 1, 2021 in accordance with the previously referenced regulations and the test plan submitted to the Michigan Department of Environment, Great Lakes and Energy (EGLE) on March 24, 2021.

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

Name and Title	Company/Address	Phone Number
Serenity Skillman, Environmental Engineer	Granger Waste Services 16980 Wood Road, Lansing MI	734-371-9760
Clay Gaffey, Environmental Consultant	ICT 4180 Keller Rd. Suite B Holt, MI	517-481-3645
Summer Hitchens, Sr. Project Manager	ICT 37660 Hills Tech Dr. Farmington Hills, MI	734-357-8045

2 Summary of Results

The WSL 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 1,300 scfm. The flare operated at an average measured inlet volumetric flow rate of approximately 510 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: 25.91 mega joules per standard cubic meter (MJ/m^3), and
- Average exhaust gas exit velocity: 17.81 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/m3, and a maximum exit velocity less than 60 ft/sec.

The test results demonstrate the WSL open flare meets the performance requirements of 40 CFR 60.18, and thus also satisfies the requirements of 60.752(b)(2)(iii)(B), at the test flow rate.

3 Source Description

The WSL is owned and operated by Granger Waste Services (Granger). WSL is located in Lansing, Michigan and began accepting waste in 1974. WSL has previously and continues to accept municipal solid waste and other non-hazardous wastes in accordance with the facility solid waste operating license 9504, issued by EGLE. The WSL consists of approximately 229.7 acres of permitted Type II area and 12.6 acres of Type II area. The landfill has an overall design capacity of about 20.54 million tons and is therefore required to collect and control the landfill gas produced by the facility. The WSL does this via the landfill gas collection and control system (GCCS).

The primary control device at the facility is the LFG treatment system. The LFG treatment system involves compressing, filtering, dewatering and passing the LFG through a scrubber. The LFG treatment system discharges the LFG to the LFGTE plant for electricity production. The open flare rated for 1,300 scfm is used as the backup control device.

4 Sampling and Analytical Procedures

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:

4.1 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 open flare exhaust for smoke emissions. ICT observed continuously for 15 minutes, then took a break for 20 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.

4.2 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 a 30-minute test and submitted the samples to Air Technology Laboratories, Inc. (Air Technologies), City of Industry, California. Air Technology analyzed the sample for carbon dioxide (CO2), methane (CH4), nitrogen (N2), and oxygen (O2). The Air Technology laboratory analytical report is presented in Appendix C. Net heating values were then calculated in accordance with 40 CFR 60.754(e) for the laboratory analyzed sample. The net heating value calculations have been included in Appendix D.

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

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

5 Test Results and Discussion

ICT performed the performance testing in accordance with the test methods as proposed in the open flare test plan. Mr. Clay Gaffey performed the testing as detailed below. The open 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 open flare. Find below a detailed discussion of the test methods utilized and discussion of the results and compliance status of the open flare.

5.1 Method 22, Alternative 42

Visible emissions testing by Method 22, Alternative 42 was performed by Mr. Gaffey of ICT. Mr. Gaffey observed continuously for 15 minutes, took a break for 20 minutes and resumed observation until the full 30-minute period of observation was complete. A copy of Mr. Gaffey'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 and therefore is in compliance 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.

5.2 Method 3C, Alternative 42

The net heating value of the gas being combusted in the flare was tested by Method 3C, Alternative 42. Mr. Gaffey performed the LFG sampling. During the performance test, a gas sample was taken using a 6-L Summa canister and sent to Air Technology Laboratory for analysis. In addition, 2 methane readings were taken using an Envision at the common header prior to the open 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_4 (%)	CO_2 (%)	O_2 (%)	Balance (%)	Heating Value (MJ/m^3)
4/1/2021	10:11	51.9	36.8	1.7	9.6	19.57
4/1/2021 (Laboratory Analysis)	10:12-10:42	54	39	2.7	13	20.36(calculated)
4/1/2021	10:48	51.9	36.8	1.7	9.6	19.57

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 open flare is at least 7.45 MJ/m^3 and therefore is in compliance with 40 CFR 60.18(f)(3).

5.3 Method 2C, Alternative 55

The actual exhaust velocity of the open flare was determined by Method 2C, Alternative 55. During the testing period the flow rate to the open 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)
4/1/2021	10:07	536.5	25.62
4/1/2021	11:52	527.3	25.18

Sample calculations of the open 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).

5.4 Conclusions

The test results demonstrate the WSL open flare meets the performance requirements of 40 CFR 60.18, and thus also satisfies the requirements of 60.752(b)(2)(iii)(B), at the test flow rate.