

1.0 INTRODUCTION

In accordance with the New Source Performance Standards for Municipal Solid Waste Landfills (Landfill NSPS), 40 CFR 62, Subpart OOO, Tier 2 landfill gas sampling and analysis was conducted at the Northern Oaks Recycling and Disposal Facility (RDF) owned by Waste Management of Michigan, Inc. (WMMI), located in Harrison, Michigan. 40 CFR 62.16718(a)(3)(iii) requires the landfill owner to retest the site-specific NMOC concentration every five years. The purpose of this report is to document the results of the five year NMOC retest program at the landfill. The tests were performed on August 30, 2021.

A Tier 2 testing workplan was submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on July 29, 2021.

The Tier 2 testing workplan was reviewed and approved by EGLE on August 25, 2021.

2.0 REGULATORY BACKGROUND

Northern Oaks is owned and operated by Waste Management of MI, Inc. The landfill began accepting waste in December 1992. Approximately 50.2 acres of waste have been in place for at least two years and were suitable for Tier 2 sampling.

To comply with the NSPS the facility submitted an Initial Design Capacity Report and an NSPS Tier 1 calculation report as required by 40 CFR 62.16714. Northern Oaks RDF decided to improve the accuracy of the emission calculation by performing Tier 2 landfill gas sampling and analysis to show the facility NMOC emissions may be less than the 34 Mg/year NSPS emission threshold. The Tier 2 NMOC value must be retested every five years in accordance with 40 CFR 62.16718(a)(3)(iii).

Based on the sampling results provided in this report, gas collection and control requirements are still not applicable to the facility, since NMOC emissions using the new Tier 2 value do not exceed 34 Mg/yr. The measured site-specific NMOC concentration was determined to be 150.13 ppm NMOC as hexane. This value was used in the NSPS equation to calculate NMOC emissions of 12.5 Mg/year in 2021.

NMOC emissions are not estimated to exceed 34 Mg/yr for the next five years, using an assumed waste intake rate of 250,000 tons/year of MSW. The five year projection is provided in Appendix A of this report. Pursuant to 40 CFR 62.16724(c)(3), the landfill owner or operator may submit a five year report in lieu of annual reports, as long as the actual waste volumes received in subsequent years are less than the estimated projections.

The Tier 2 testing results are valid for five years according to 40 CFR 62.16718. A new site-specific NMOC concentration will have to be obtained in 2026.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 Sample Locations

The NSPS requires collection of two samples per hectare of landfill surface area in which waste has been in-place for a minimum of two years. At the Northern Oaks RDF, approximately 50.2 acres met the two-year age criteria. These include Cells 1, 2, 3, 4, 5A, 5B, and 8.

As shown in Figure 1, the existing gas collection system (GCS), consisting of vertical gas wells, horizontal collection trenches, multiple connections to the leachate system via cleanout risers, and a utility flare, provides coverage for the entire 50.2 acres eligible for Tier 2 sampling. The required three samples from the main header to the utility flare were collected for Tier 2 sampling. An additional sample was collected as a spare.

Actual sampling locations at the header pipe leading to the flare station are shown on the map on Figure 1.

3.2 Analysis

The samples were collected from the header at a flow rate of less than 500 ml/min. A six liter summa canister was utilized for each of the main header samples. Each summa canister was half filled with helium so that the samples could be safely shipped as non-hazardous. The methane, carbon dioxide, and oxygen levels were measured with an Elkins Earthworks Envision meter. The balance gas level was estimated by difference from 100% of the other constituents to assure the samples were valid in the field (less than 5 percent O₂ or 20 percent N₂). Ambient

temperature and barometric pressure was also measured with the Envision meter prior to sampling, and recorded (see Table 1).

Analysis was performed at the AtmAA, Inc. laboratories in Calabasas, CA. All three samples were analyzed for oxygen and nitrogen (following Method 3C). The three initial header samples collected from the active system showed concentrations of oxygen below 5% and nitrogen concentrations below 20%; thus they were all suitable for Method 25C analysis and were all included in the final average for the landfill. Each sample was also analyzed for methane, carbon dioxide and NMOC (following Method 25C). NMOC results are reported as carbon, and must be divided by six to obtain NMOC values as hexane for use in the emissions equation. A schematic of the Method 25C sampling train is found in Figure 2.

4.0 RESULTS

Samples cannot contain oxygen and nitrogen above the acceptable thresholds (i.e. greater than 5% oxygen or greater than 20% nitrogen). All samples were acceptable for use in the calculations. Laboratory analytical data is provided in Appendix B. A summary of laboratory results is shown in Table 2.

The average NMOC value for the site was 150.13 parts per million (ppm) as hexane for the areas of the landfill older than two years and covered by the active gas collection system. The equation provided in 40 CFR 62.16718(b) was used to calculate Tier 2 emissions (Appendix A).

The NMOC emission rate of 12.5 Mg/yr for the year 2021 is below the 34 Mg/year trigger for installation of gas collection and control systems. The Tier 2 sampling results (Appendix B) are valid for five years (until 2026). At that time, a new Tier 2 value will need to be obtained.

Appendix A also contains the calculations for projected yearly uncontrolled NMOC emissions for five years, as permitted by 40 CFR 62.16724(c)(3). Again, based on the projected waste intake rates, emissions of NMOC stay below 34 Mg/year for the next five years.

TABLES

**Table 1: Northern Oaks Landfill
Tier 2 Sampling Field Data
Harrison, Michigan**

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
1	197	28.74	78	P. Cloudy				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	9:15	45.7	29.5	3.9	21			
Leak Check	Vac.	Time	Vac.	Time				
	-20	9:10	-19.8	9:15				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	8/30/2021	9:20	-20	9:26	622	-6	9:26	628
Leak Check	Vac.	Time	Vac.	Time				
	-20	9:30	-19.8	9:31				

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
2	332	28.74	78	P. Cloudy				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	9:45	45.2	29.1	3.9	21.7			
Leak Check	Vac.	Time	Vac.	Time				
	-20.2	9:40	-19.8	9:45				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	8/30/2021	9:47	-20	9:53	619	-4	9:53	625
Leak Check	Vac.	Time	Vac.	Time				
	-20.2	9:54	-19.8	9:55				

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
3	12/14/1900	28.67	91	P. Cloudy				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	10:11	45.2	29	3.9	21.9			
Leak Check	Vac.	Time	Vac.	Time				
	-20	10:00	-19.7	10:05				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	8/30/2021	10:12	-20	10:18	620	-4	10:18	618
Leak Check	Vac.	Time	Vac.	Time				
	-10	11:27	-10	11:28				

TABLE 2
SUMMARY OF METHOD 25C AND METHOD 3C DATA
Northern Oaks RDF
Harrison, Michigan

Sample ID Number	Sample Location	Date Sampled	CH4 (%)	CO2 (%)	O2 (%)	N2 (%)	NMOC (ppm as carbon)	NMOC (ppm as hexane)
Sample 1	Flare header Upstream of Blower	8/30/2021	52.9	34.1	1.57	11.0	530.0	88
Sample 2		8/30/2021	53.0	34.2	1.22	10.8	1,287.0	215
Sample 3		8/30/2021	53.0	34.4	1.43	10.4	883.0	147
		Average	53.0	34.2	1.4	10.7	900.0	150.0

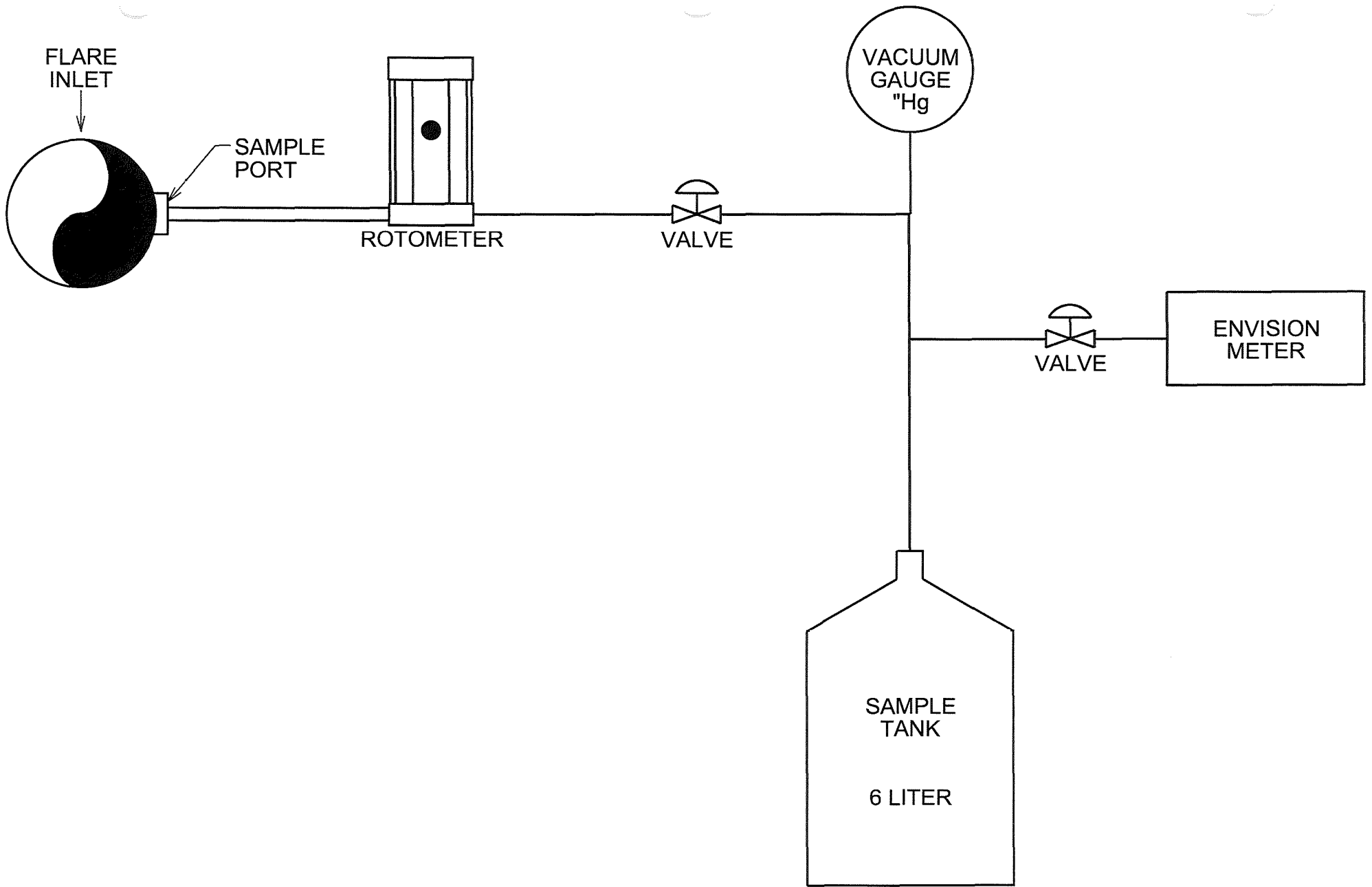
CH4: methane (From Method 3C results)

CO2: carbon dioxide (From Method 3C results)

O2: oxygen

N2: nitrogen

NMOC as hexane: Non Methane Organic Compounds as hexane (NMOC as carbon divided by six)



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FIGURE 2

TOTAL NON-METHANE
ORGANIC COMPOUND SAMPLING TRAIN

NORTHERN OAKS LANDFILL
HARRISON, MICHIGAN

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