Compliance Test Report
Determination of Tier 2
Non-methane Organic Compound Concentrations

Elk Run Landfill
Onaway, Michigan

Prepared for:

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1.0 INTRODUCTION

In accordance with the Landfill NESHAP – 40 CFR 63 Subpart AAAA and the Federal Plan – 40 CFR 62 Subpart OOO, a Tier 2 landfill gas sampling and analysis test was conducted at the Elk Run Landfill in Onaway, Michigan. The facility is owned by Green For Life (GFL) North Michigan Landfill, Inc.

The purpose of testing was to determine a site specific NMOC emissions rate. Both sets of rules contain provisions for Tier 2 testing – specifically, §62.16718(a)(2)(ii)(B) and §63.1959(a)(2)(ii)(B) allow landfills to determine a site-specific NMOC concentration to calculate NMOC emissions. A Tier 2 testing workplan was submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on March 28, 2023. The Tier 2 test was conducted on May 2-3 and May 26, 2023.

2.0 REGULATORY BACKGROUND

At the Elk Run Landfill, approximately 39.25 acres of waste (15.9 hectares) have been in place for at least two (2) years and were suitable for Tier 2 sampling.

Based on the sampling results provided in this report, gas collection and control requirements are not currently applicable to the facility. NMOC emissions using the site-specific Tier 2 value do not exceed 34 Mg/yr (Federal Plan) or 50 Mg/yr (Landfill NESHAP). The site-specific NMOC concentration is 337.9 ppm NMOC as hexane. Estimated NMOC emissions at Elk Run Landfill in 2023 are 17.99 Mg/year.

The average measured NMOC concentration from the Tier 2 sampling locations in this test was 337.9 ppm NMOC as hexane. Laboratory results are provided in Appendix A. Calculations are provided in Appendix B. The results indicate that the NMOC emissions rate from the facility is 17.99 Mg/year in the year 2023.

In addition, NMOC emissions are not estimated to exceed 34 Mg/year (Federal Plan control threshold) or 50 Mg/yr (Landfill NESHAP control threshold) for the next five years, using a conservative waste intake rate of 165,000 tons/year. The five-year projection is provided in Appendix B of this report and NMOC emissions do not exceed 34 Mg/year (Federal Plan) or 50 Mg/yr (Landfill NESHAP). Pursuant to 40 CFR 62.16724(c)(3) and 40 CFR

63.1981(c)(1)(ii)(A), the landfill owner or operator may submit a five-year report in lieu of annual reports, if 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)(3)(iii) and 40 CFR 63.1959(a)(3)(iii). A new site-specific NMOC concentration will have to be obtained within five years of the May 2-3, 2023 sampling event; i.e. on or before May 3, 2028.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 Sample Locations

The Federal Plan/ Landfill NESHAP requires collection of two (2) samples per hectare of landfill surface area in which waste has been in-place for a minimum of two (2) years. At Elk Run, approximately 39.25 acres, or 15.9 hectares, have waste in place that is at least two (2) years of age. As shown in Figure 1, there are 24 landfill gas collectors in the active gas collection and control system at the time of Tier 2 testing. They cover approximately 21 of the 39.25 acres eligible for Tier 2 sampling at the active landfill. Three (3) samples from the main header to the utility flare were collected for Tier 2 sampling. A fourth, spare canister was collected and was analyzed, as one of the first three samples (F2) was invalid. This is in accordance with §62.16718(a)(3) and §63.1959(a)(3), which only requires analysis of all probe samples if more than the required number are collected.

There are approximately 18.25 acres (7.4 hectares) of landfill surface area in which waste has been in-place for a minimum of two years that does not have collection from the active collection system. Since 2 samples/hectare are required, a minimum of 15 samples needed to be collected from these areas. EIL collected 16 samples to provide a spare. The extra sample was collected by installing an additional test probe in Cell E. Sampling locations are shown in Figure 1. All probe samples, including the spare, were analyzed as required by §62.16718(a)(3) and §63.1959(a)(3). During analysis, it was determined that one (1) canister containing samples from two probes (P7-P8) was invalid due to air intrusion during shipment. It was determined that an additional probe needed to be installed and an additional sample collected to achieve the required 15 samples from these areas of the landfill. The probes were installed by a geoprobe contractor. Samples were composited at a ratio of two (2) samples per canister. The October 17, 2000

Federal Register amendments to the NSPS Test Methods allow for compositing of samples in the field (at up to a ratio of 6:1), provided that equal volumes can be taken from each sample location, and the sample volume from each individual probe has a minimum volume of one liter.

3.2 Probe Installation

Collection probes were installed into the surface of the waste, in accordance with Method 25C. A geoprobe push rig was used to install the temporary probes. Expendable stainless-steel drill tips were placed on four (4) feet long by 1-inch diameter stainless steel sampling rods. A sliding 22-inch perforated stainless-steel screen was present inside the sampling rods. A geoprobe push rig inserted each sampling rod coupled with a 5-foot riser at least three (3) feet into underlying waste material. The geoprobe rig then withdrew the sampling probe by a minimum of 22 inches exposing the perforated steel screen in the waste. Afterwards, a metal attachment with a quarter inch barb fitting was screwed onto the top of the probe to prevent ambient air from entering the probes or gases from seeping out of the landfill gas sampling location.

3.3 Composite Sampling and Analysis

Method 25C procedures allow for composite sampling to occur in the field, if approximately equal volumes of sample are collected from each gas probe/sample location. A minimum volume of one liter per sample probe must be collected (see F.R. Volume 65, No. 201 Page 62067, October 17, 2000).

15 sample locations were required but samples were obtained from 17 locations. Samples were composited at a 2:1 ratio into the canisters. Prior to sample collection, the methane, carbon dioxide, and oxygen levels in the sample probes were measured with a Landtech™ GEM 2000 gas analyzer. The balance gas (nitrogen) level was estimated by difference from 100% of the other constituents to assure the samples were valid in the field (less than 5 percent O_2 or 20 percent N_2). The gas inside the sample probes or vents was evacuated at least twice with the GEM meter. After the probe was purged an evacuated stainless steel six-liter sample canister was attached to each sample probe.

Each sample canister was six (6) liters in nominal volume and partially pre-filled with helium. The remaining volume was collected in equal parts per sample based on a pre-determined process that resulted in a sample volume of a minimum one liter for each composited sample.

Composite sampling was performed by taking an initial vacuum reading from the sample tank. A few inches Hg was subtracted off so that the final canister volume was not brought to zero inches of vacuum. The remaining inches Hg was split almost equally between the two composited probes during sample collection in each canister. Table 1 contains the composite information for each sample point including sampling rate, collection times and beginning and ending cylinder vacuums, as required by Method 25C. The sample flow rate was set around 100 cc/min and was adjusted as necessary during the composite sample to maintain a constant sample flow rate.

Analysis was performed at the laboratory with gas chromatography equipped with a flame ionization detector (GC/FID) for 25C and gas chromatography equipped with a thermal conductivity detector (GC/TCD) for 3C. The samples were analyzed for NMOC (following Method 25C) and for methane, carbon dioxide, oxygen and nitrogen (following Method 3C). 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 for the probe sampling points is found in Figure 3.

4.0 RESULTS

Samples cannot contain oxygen and nitrogen above the acceptable thresholds (i.e. greater than 5% oxygen or greater than 20% nitrogen). Two (2) canisters containing a total of three (3) samples (one from the flare, two composited probe samples) were subject to minor ambient air intrusion during shipping and were deemed not acceptable for use in the final NMOC concentration calculation. Due to this, it was determined that another probe was required to be installed and sampled on May 26, 2023. Analytical results from the remaining canisters containing 18 samples were utilized to calculate an average NMOC value for the site. Laboratory analytical data is provided in Appendix A. A summary of laboratory results is shown in Table 2.

The average NMOC value for the site was 337.9 parts per million (ppm) as hexane. EPA's LandGEM Model (Version 3.03) was used to calculate the 2023 NMOC emissions rate and the five-year projection. Both were under 34 Mg/year (Federal Plan control threshold) and 50

Mg/year (Landfill NESHAP control threshold). All NMOC calculations are provided in Appendix C.

Since the NMOC emissions rates are below the control thresholds, the site is not yet subject to the Federal Plan and Landfill NESHAP requirement to install and operate an active Landfill Gas Collection and Control System for the next five (5) years. As indicated previously, a new Tier 2 test will be conducted five years from the date of the original Tier 2 test; i.e. on or before May 3, 2028. Laboratory Quality Control/Quality Assurance reports and chain-of-custody records are included with the analytical reports in Appendix A.

TABLES

Table 1: Elk Run Landfill Tier 2 Sampling Field Data
Onaway, Michigan

Sample Location Name	Sample Date	Sample Time	CH4	CO2	O2	BAL	Pre-Test Tank Pressure (" Hg)	Post-Test Tank Pressure (" Hg)	Sample Canister#	Lab ID#	Barometric Pressure (" Hg)	Ambient Temperature (°F)
P1	5/2/2023	9:17	59.4	39.8	0.3	0.9	18	10	39983	23E0300-09	28.30	32
P2	5/2/2023	10:04	46.2	32.1	4.7	16.1	10	2	39983	23E0300-09	28.30	32
P3	5/2/2023	10:39	59.3	37.8	1.1	1.2	18	10	44060	23E0300-11	28.35	32
P4	5/2/2023	11:18	60.3	39.2	0.2	0.2	10	2	44060	23E0300-11	28.37	33
P5	5/2/2023	11:54	58.1	40.4	0.7	0.1	18	10	44637	23E0300-12	28.37	33
P6	5/2/2023	12:30	58.7	36.6	0.7	0.1	10	2	44637	23E0300-12	28.39	33
P7	5/2/2023	13:40	26.0	74.0	0.6	0.2	18	10	41726	23E0300-10	28.38	34
P8	5/2/2023	14:15	39.7	59.4	0.2	0.9	10	2	41726	23E0300-10	28.39	34
P9	5/2/2023	15:05	50.1	49.3	0.4	0.2	18	10	39970	23E0300-08	28.45	34
P10	5/2/2023	15:38	48.4	50.9	0.3	0.1	10	2	39970	23E0300-08	28.47	35
P11	5/3/2023	8:00	56.5	43.3	0.2	0.1	18	10	36965	23E0300-06	28.80	40
P12	5/3/2023	8:40	57.8	41.6	0.4	0.1	10	2	36965	23E0300-06	28.80	40
P13	5/3/2023	9:20	57.9	41.4	0.3	0.1	18	10	36455	23E0300-05	28.89	42
P14	5/3/2023	10:05	57.9	41.3	0.5	0.2	10	2	36455	23E0300-05	28.90	43
P15	5/3/2023	10:45	61.0	38.6	0.3	0.1	18	10	39981	23E0300-07	28.90	43
P16	5/3/2023	11:20	60.3	39.2	0.5	0.2	10	2	39981	23E0300-07	28.90	44
F1	5/3/2023	11:45	57.2	35.3	1.2	6.4	18	2	20578	23E0300-01	28.90	45
F2	5/3/2023	12:09	57.7	35.8	0.9	5.7	18	2	30634	23E0300-03	28.90	45
F3	5/3/2023	12:30	57.4	35.6	1.0	6.0	18	2	31325	23E0300-04	28.90	45
F4	5/3/2023	12:51	57.8	35.9	0.9	5.5	18	2	20589	23E0300-02	28.90	45
P17	5/26/2023	8:55	59.0	40.9	0.0	0.1	20	5	30635	23E1539-01	29.4	51

TABLE 2

SUMMARY OF METHOD 25C AND METHOD 3C DATA

Elk Run Landfill

Sample Lab ID Number	Sample Location*	Date Sampled	CH4 (%)	CO2 (%)	O2 (%)	N2 (%)	NMOC (ppm as carbon)	NMOC (ppm as hexane)
23E0300-01	F1	5/3/2023	53.2	36.8	0.7	9.3	1400	233.3
23E0300-02	F4	5/3/2023	46.7	32.7	4.1	16.9	1950	325.0
23E0300-03	F2	5/3/2023	51.1	35.2	5.8	23.2	2220	370.0
23E0300-04	F3	5/3/2023	53.0	36.3	0.8	9.9	1340	223.3
23E0300-05	P13-P14	5/3/2023	52.9	42.9	3.5	13.1	3040	506.7
23E0300-06	P11-P12	5/3/2023	52.0	44.6	0.6	2.8	2220	370.0
23E0300-07	P15-P16	5/3/2023	47.8	35.0	4.2	15.4	2560	426.7
23E0300-08	P9-P10	5/2/2023	42.5	50.1	1.2	6.2	3100	516.7
23E0300-09	P1-P2	5/2/2023	54.0	39.3	1.4	5.3	1550	258.3
23E0300-10	P7-P8	5/2/2023	11.6	37.2	9.7	39.7	14700	2450.0
23E0300-11	P3-P4	5/2/2023	55.1	38.8	0.0	6.1	1330	221.7
23E0300-12	P5-P6	5/2/2023	54.5	40.4	0.8	4.3	1810	301.7
23E1539-01	P17	5/26/2023	50.0	41.5	0.0	8.5	2000	333.3
		Average	**51.1**	**39.9**	**1.6**	**8.9**	**2027.3**	**337.9**

Notes:

Each composite contains a minimum of 1 liter sample volume per location, in accordance with Method 25C.

Sample ID 23E0300-02 (Locations P7- P8) and 23E0300-03 (F2) were excluded from the averages due to elevated oxygen and nitrogen concentrations above 5% and 20% respectively, in accordance with Tier 2 requirements. Samples were not analyzed for NMOC since it was unusable due to air intrusion.

CH4, CO2, O2, and N2 results are reported on a normalized basis using Method 3C.

CH4: methane

CO2: carbon dioxide

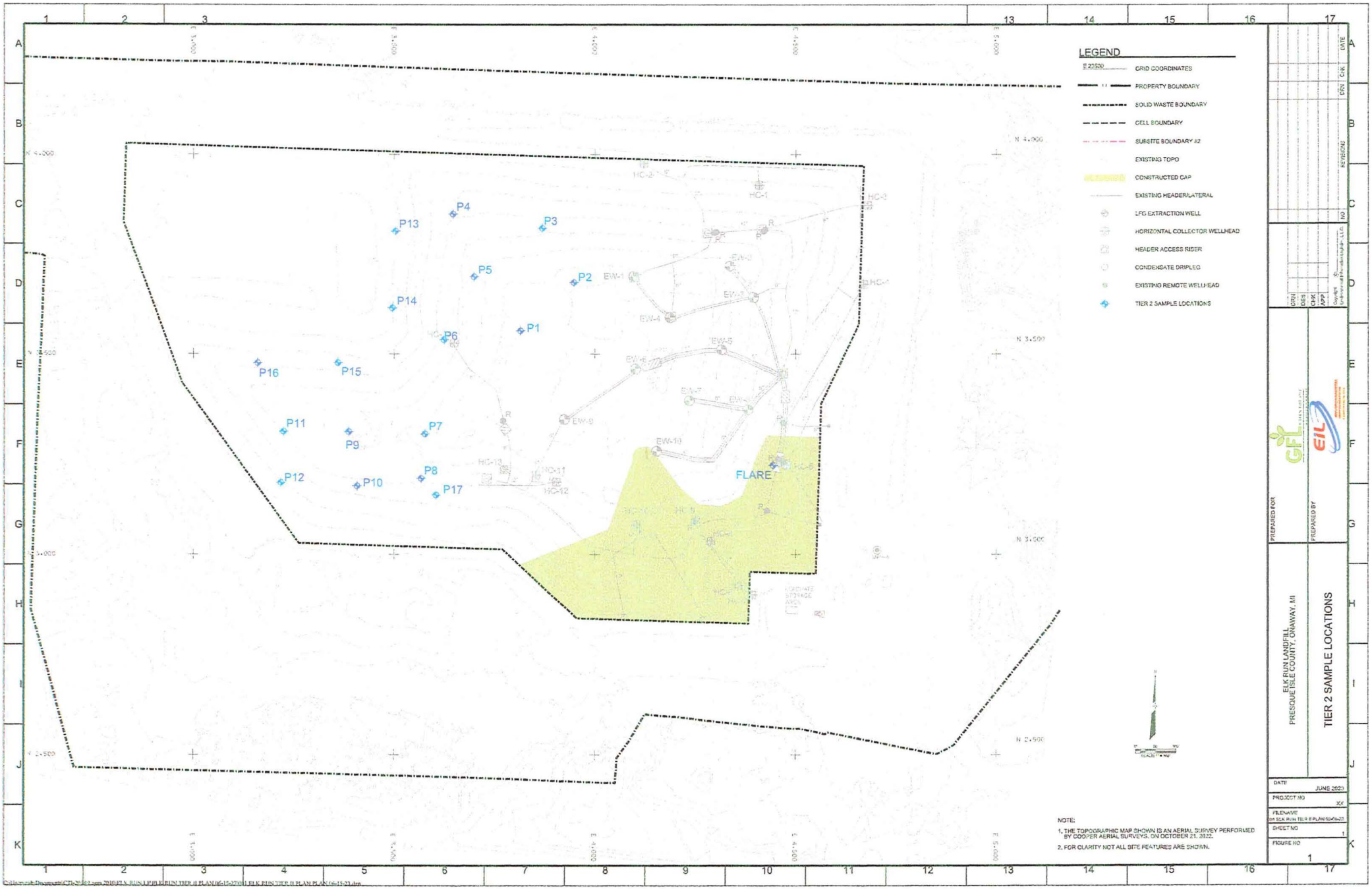
O2: oxygen

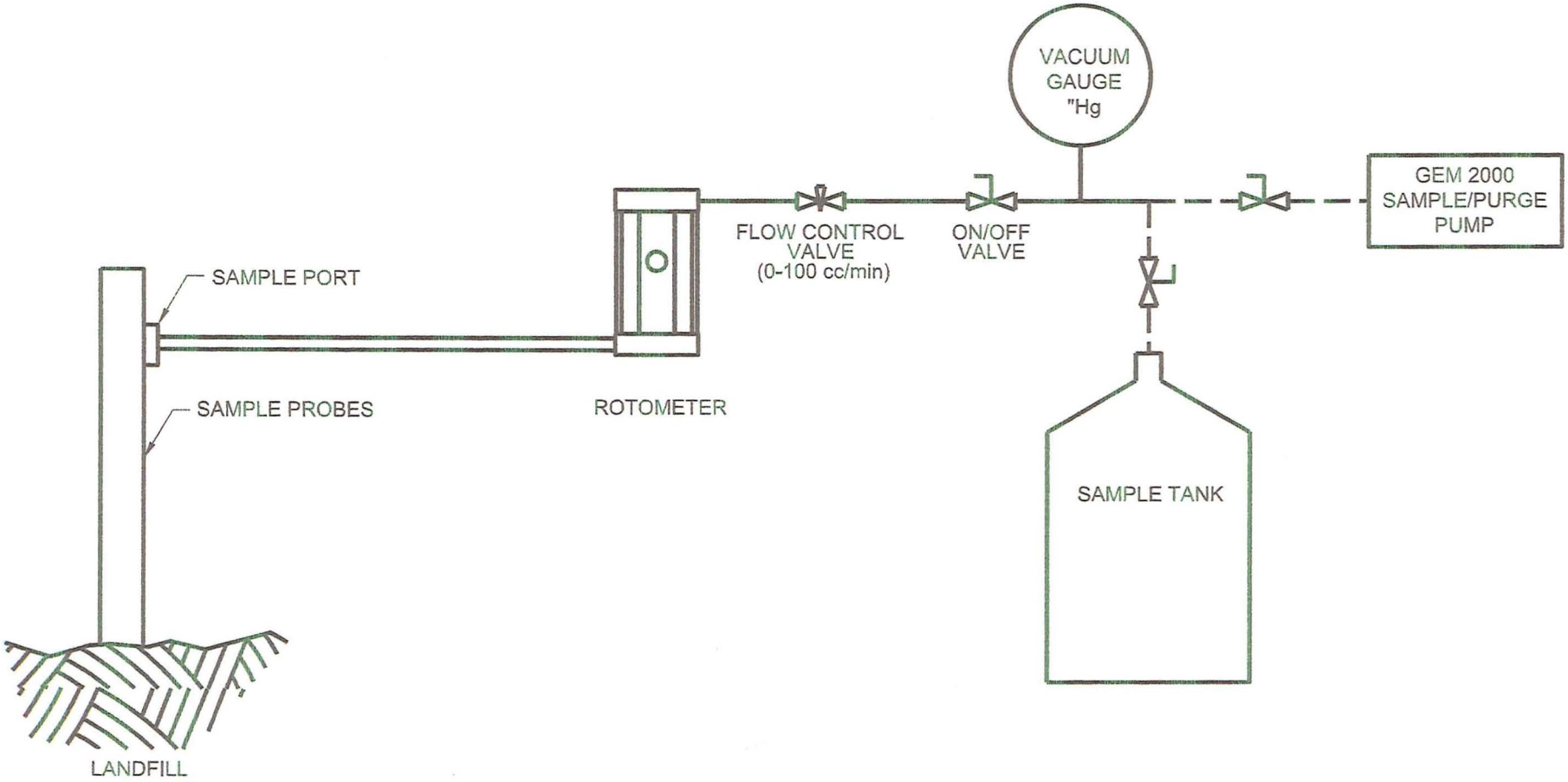
N2: nitrogen

%: percent

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

FIGURES


LEGEND
GRID COORDINATES
PROPERTY BOUNDARY
SOLID WASTE BOUNDARY
CELL BOUNDARY
SUBSITE BOUNDARY #2
EXISTING TOPO
CONSTRUCTED CAP
EXISTING HEADER/LATERAL
LFG EXTRACTION WELL
HORIZONTAL COLLECTOR WELLHEAD
HEADER ACCESS RISER
CONDENSATE DRIPLEG
EXISTING REMOTE WELLHEAD
TIER 2 SAMPLE LOCATIONS
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
P13
P14
P15
P16
P17
FLARE
EW-1
EW-2
EW-3
EW-4
EW-5
EW-6
EW-7
EW-9
EW-10
HC-1
HC-2
HC-3
HC-4
HC-11
HC-12
HC-13
N 4,000
N 3,500
N 3,000
N 2,500
NOTE:
1. THE TOPOGRAPHIC MAP SHOWN IS AN AERIAL SURVEY PERFORMED BY COOPER AERIAL SURVEYS, ON OCTOBER 21, 2022.
2. FOR CLARITY NOT ALL SITE FEATURES ARE SHOWN.
PREPARED FOR
PREPARED BY
ELK RUN LANDFILL
PRESQUE ISLE COUNTY, ONAWAY, MI
TIER 2 SAMPLE LOCATIONS
DATE
JUNE 2023
PROJECT NO
XX
FILENAME
SHEET NO
1
FIGURE NO
1



PREPARED BY

ENVIRONMENTAL INFORMATION LOGISTICS, LLC

FIGURE 2
METHOD 3C/25C TOTAL NON-METHANE ORGANIC COMPOUND SAMPLING TRAIN
ELK RUN LANDFILL
ONAWAY, MICHIGAN

May 2023

APPENDICES