

## 1.0 INTRODUCTION

In accordance with the New Source Performance Standards for Municipal Solid Waste Landfills (Landfill NSPS), 40 CFR 60, Subpart WWW, a Tier 2 landfill gas sampling and analysis test was conducted at the Elk Run Landfill in Onaway, Michigan. The facility is owned by Republic Services of Michigan V, LLC.

The purpose of testing was to determine a site specific NMOC emissions rate. A Tier 1 calculation submitted to MDEQ on January 5, 2018 estimated NMOC emissions of greater than 50 Mg/year. However, 40 CFR 60.754(a)(3) and 40 CFR 60.757(c)(1) provide the site with an opportunity to determine a site specific NMOC concentration by conducting a Tier 2 test within 180 days of the Tier 1 calculation submittal. For the Elk Run Landfill, this deadline corresponded with July 5, 2018. A Tier 2 testing workplan was submitted to the Michigan Department of Environmental Quality (MDEQ) on April 27, 2018. The Tier 2 test was conducted on May 29, 2018.

## 2.0 REGULATORY BACKGROUND

At the Elk Run Landfill, approximately 24.5 acres of waste (9.9 hectares) have been in place for at least two 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 50 Mg/yr. The site-specific NMOC concentration is 190.6 ppm NMOC as hexane. Estimated NMOC emissions at Elk Run Landfill in 2018 are 8.5 Mg/year.

NMOC emissions are also not estimated to exceed 50 Mg/yr for the next five years, using an assumed MSW waste intake rate of 165,000 tons/year. The five year projection is provided in Appendix A of this report. Pursuant to 40 CFR 60.757(b)(1)(ii), 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 60.754. A new site-specific NMOC concentration will have to be obtained in 2023.

### **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 Elk Run Landfill, approximately 24.5 acres (9.9 hectares) met the two-year age criteria. Thus, a minimum of 20 samples were required for the Tier 2 test.

The Elk Run Landfill maintains a network of passive solar flares that provide representative coverage of the waste mass in the landfill. A total of 22 samples were obtained from site LFG infrastructure to meet the Tier 2 sampling requirements, and to provide additional site coverage. Four duplicate samples (two canisters) were also obtained in case of air infiltration to the original samples. However, these did not need to be analyzed since none of the original samples showed air infiltration. Sample locations are presented in Figure 1.

Samples were composited at a ratio of 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 flare has a minimum volume of one liter.

#### **3.2 Analysis**

The samples were collected from each sample location at a flow rate of less than 500 ml/min. A six liter summa canister was utilized for each of the 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 Landtec GEM 5000. 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 O<sub>2</sub> or 20 percent N<sub>2</sub>). Ambient temperature and barometric pressure was also measured and recorded prior to sampling (see Table 1).

Analysis was performed at the Triangle Environmental Services, Inc. laboratory in Research Triangle Park, North Carolina. All samples were analyzed for oxygen and nitrogen (following Method 3C). All samples had concentrations of oxygen below 5% and nitrogen concentrations below 20%; thus they were all suitable for NMOC analysis by Method 25C and were all

included in the final average for the landfill. 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 NMOC emission rate of 8.5 Mg/yr for the year 2018 is below the 50 Mg/year trigger for installation of gas collection and control systems. The Tier 2 sampling results (Appendix B) are valid for five years (until 2023). 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 the next five years, as permitted by 40 CFR 60.757(b)(1)(ii). Again, based on the projected waste intake rates, emissions of NMOC stay below 50 Mg/year for the next five years at 14.3 Mg/year in 2023. The facility will compare actual MSW waste received each year against the projected volume of 165,000 tons/year to verify that the five year calculation is still valid.

**Table 1: Elk Run Landfill  
Tier 2 Sampling Field Data  
May 29, 2018**

Sample Location Name	Sample Time	CH4	CO2	O2	BAL	Pre-Test Tank Pressure (" Hg)	Post-Test Tank Pressure (" Hg)	Sample Canister#	Lab ID#	Barometric Pressure (inches Hg)	Ambient Temperature (°F)
SF-9	9:24 AM	61.4	37.8	0.8	0.0	17	9	6141	C-1	30.0	62.0
SF-2	9:49 AM	60.9	35.2	0.9	3.0	9	1	6141	C-1	30.0	69.0
SF-1	10:09 AM	62.9	37.5	0.1	0.0	17	9	6124	C-2	30.0	69.0
SF-3	10:30 AM	59.1	36.6	0.8	3.5	9	1	6124	C-2	30.0	69.0
SF-4	10:52 AM	59.6	35.0	1.5	4.0	17	9	6170	C-3	30.0	70.0
SF-5	11:12 AM	58.8	38.6	0.4	1.2	9	1	6170	C-3	30.0	72.0
SF-7	11:36 AM	60.2	37.3	0.5	2.0	17	9	6109	C-4	30.0	72.0
SF-6	11:50 AM	60.2	36.7	0.8	2.3	9	1	6109	C-4	30.0	70.0
SF-10	12:05 PM	52.4	34.7	0.9	12.0	17	9	6102	C-5	30.0	70.0
EW-10	12:50 PM	58.3	37.7	0.5	3.5	9	1	6102	C-5	30.0	71.0
EW-7	1:20 PM	64.2	35.6	0.1	0.1	17	9	6112	C-6	30.0	71.0
SF-8	1:32 PM	58.1	37.7	0.6	3.6	9	1	6112	C-6	30.0	71.0
EW-8	1:48 PM	59.0	35.6	0.5	4.9	17	9	6186	C-7	30.0	71.0
EW-5	2:03 PM	61.9	36.3	0.7	1.1	9	1	6186	C-7	30.0	72.0
EW-3	2:26 PM	59.5	36.2	1.1	3.2	17	9	6152	C-8	30.0	72.0
EW-2	2:32 PM	60.5	35.8	0.9	2.8	9	1	6152	C-8	30.0	71.0
EW-4	3:03 PM	58.8	37.4	1.0	2.8	17	9	6131	C-9	30.0	70.0
EW-1	3:16 PM	60.2	37.6	0.5	1.7	9	1	6131	C-9	30.0	71.0
EW-6	2:46 PM	58.1	40.1	0.9	0.9	17	9	6165	C-10	30.0	72.0
EW-9	3:59 PM	59.5	40.0	0.5	0.0	9	1	6165	C-10	30.0	72.0
SF-12	4:18 PM	56.4	38.3	1.1	4.2	17	9	6151	C-11	30.0	72.0
SF-13	4:30 PM	59.3	38.7	0.5	1.5	9	1	6151	C-11	30.0	73.0

**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)
C-1	SF-9, SF-2	5/29/2018	61.8	38.9	0.1	0.3	957	159.5
C-2	SF-1, SF-3		61.0	39.0	0.1	0.8	775	129.2
C-3	SF-4, SF-5		59.1	37.8	0.7	3.1	766	127.7
C-4	SF-7, SF-6		60.9	39.6	0.0	0.3	1468	244.7
C-5	SF-10, EW-10		56.1	38.4	0.3	4.8	1001	166.8
C-6	EW-7, SF-8		59.0	39.6	0.0	0.2	1329	221.5
C-7	EW-8, EW-5		61.1	37.7	0.0	0.1	974	162.3
C-8	EW-3, EW-2		60.7	38.1	0.2	0.7	633	105.5
C-9	EW-4, EW-1		59.0	39.1	0.0	0.1	1213	202.2
C-10	EW-6, EW-9		56.5	40.9	0.0	0.1	1097	182.8
C-11	SF-12, SF-13		56.7	40.1	0.0	0.2	2369	394.8
<b>Average</b>			<b>59.3</b>	<b>39.0</b>	<b>0.1</b>	<b>1.0</b>	<b>1,144</b>	<b>190.6</b>

Notes:

Each composite contains a minimum 1 liter of sample volume per location

CH4: methane

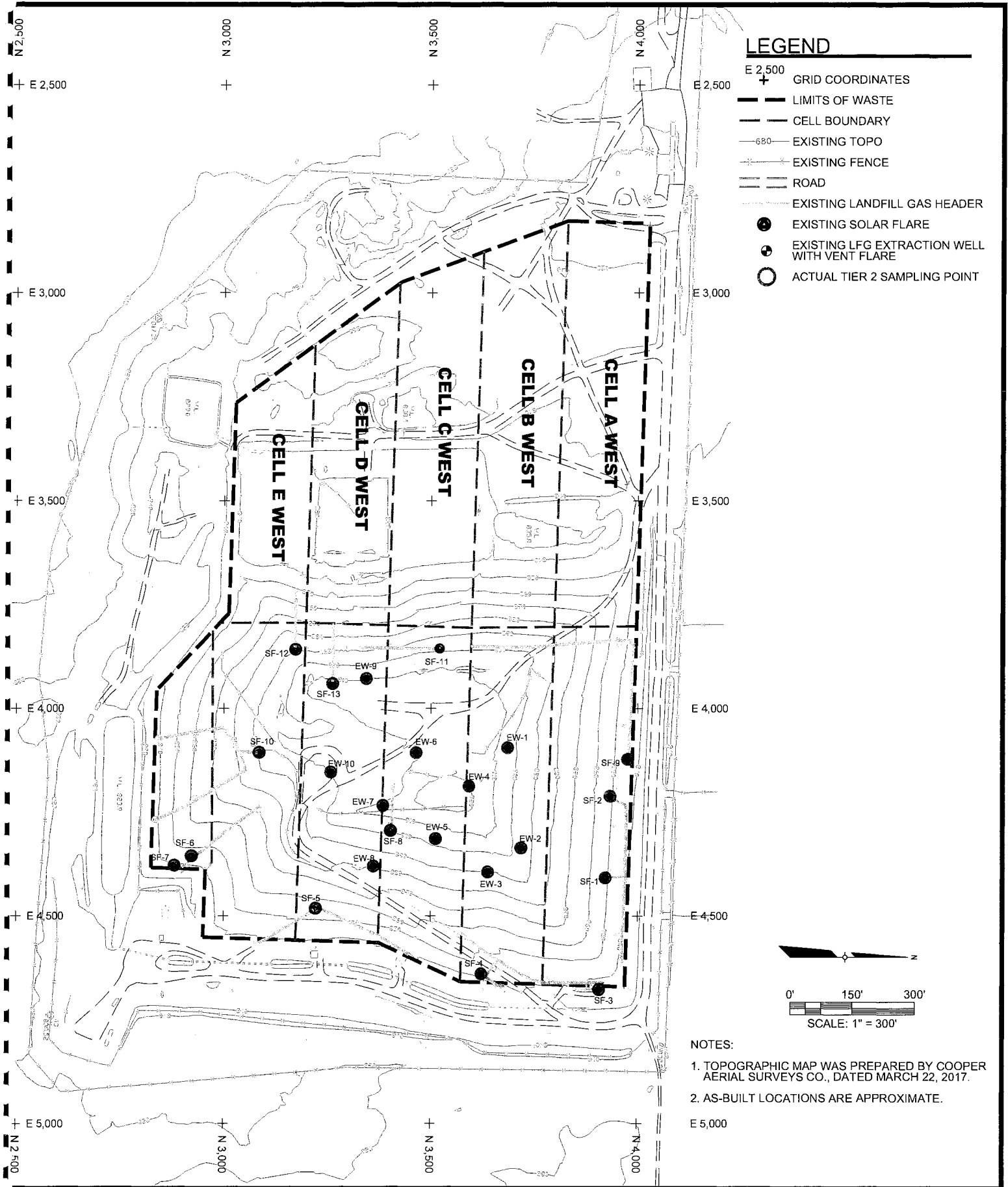
CO2: carbon dioxide

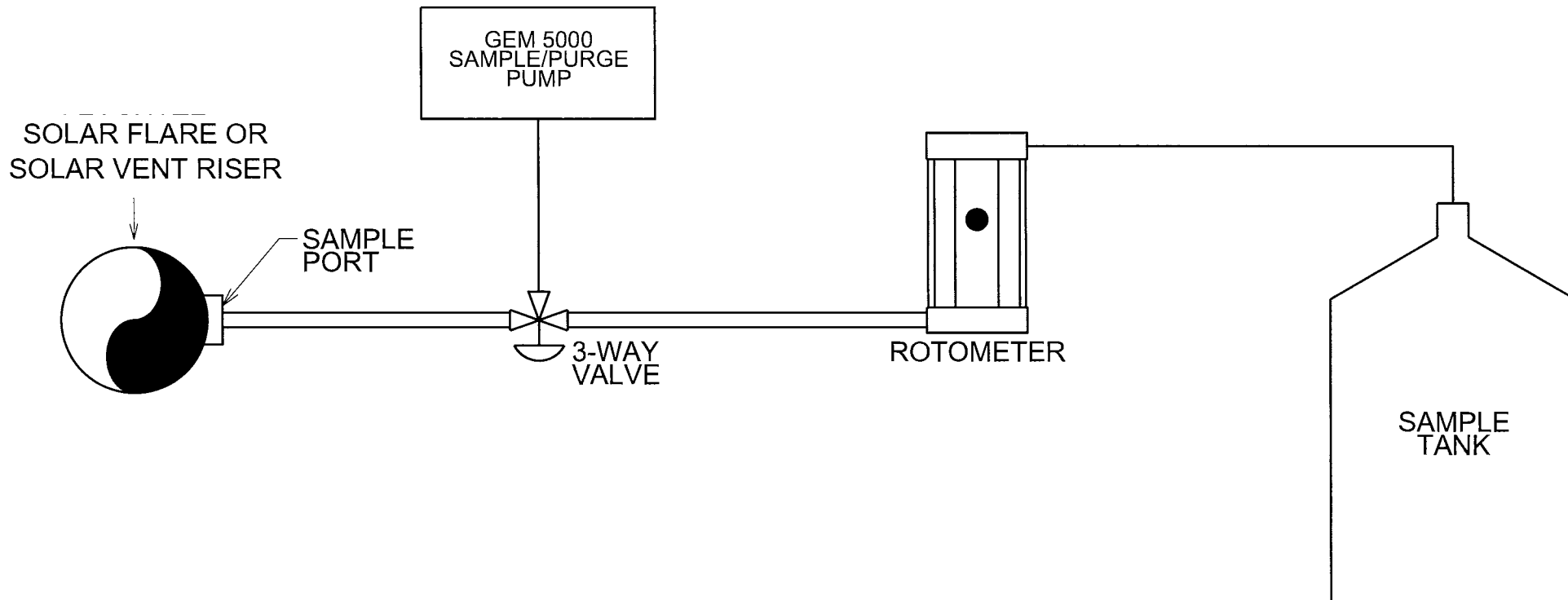
O2: oxygen

N2: nitrogen

%: percent

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





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FIGURE 2  
 METHOD 3C/25C SAMPLING TRAIN  
 REPUBLIC SERVICES – ELK RUN LANDFILL