

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

**Waters Landfill  
Frederic, Michigan**

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*Prepared for:*

Waste Management of Michigan, Inc.  
11375 Sherman Road  
Frederic, Michigan 49733

*Prepared by:*

Environmental Information Logistics, LLC  
130 E. Main Street  
Caledonia, MI 49316

*October 24, 2016*



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
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**RENEWABLE OPERATING PERMIT  
REPORT CERTIFICATION**

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name City Environmental Services Inc. of Waters County Crawford  
Source Address 11375 Sherman Road City Frederic  
AQD Source ID (SRN) N5988 ROP No. N5988-2015 ROP Section No. 1

Please check the appropriate box(es):

**Annual Compliance Certification (Pursuant to Rule 213(4)(c))**  
Reporting period (provide inclusive dates): From \_\_\_\_\_ To \_\_\_\_\_  
 1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.  
 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

**Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**  
Reporting period (provide inclusive dates): From \_\_\_\_\_ To \_\_\_\_\_  
 1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.  
 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

**Other Report Certification**  
Reporting period (provide inclusive dates): From N/A To \_\_\_\_\_  
Additional monitoring reports or other applicable documents required by the ROP are attached as described:  
Tier 2 Test Report for NSPS Five Year Retest  
\_\_\_\_\_  
\_\_\_\_\_

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

James Palmer District Manager 989-705-8930  
Name of Responsible Official (print or type) Title Phone Number  
 Date 10/18/16  
Signature of Responsible Official Date

\* Photocopy this form as needed.

## 1.0 INTRODUCTION

In accordance with the New Source Performance Standards for Municipal Solid Waste Landfills (Landfill NSPS), 40 CFR 60, Subpart WWW, Tier 2 landfill gas sampling and analysis was conducted at Waters Landfill in Frederic, Michigan, owned by Waste Management of Michigan, Inc. (WMMI). 40 CFR 60.754(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 September 27, 2016.

A Tier 2 testing workplan was submitted to the Michigan Department of Environmental Quality (MDEQ) on August 26, 2016. MDEQ approved the workplan on August 31, 2016. A copy of the approval letter is included in Appendix A.

## 2.0 REGULATORY BACKGROUND

Waters Landfill, a municipal solid waste landfill owned and operated by Waste Management, began accepting waste in 1972. The facility is subject to the New Source Performance Standards (NSPS), 40 CFR 60 Subpart WWW. To comply with the NSPS the facility submitted an Initial Design Capacity Report and an NSPS Tier 1 calculation report as required by the regulations. Waters Landfill 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 50 Mg/year NSPS emission threshold. The Tier 2 NMOC value must be retested every 5 years.

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 50 Mg/yr. The measured site-specific NMOC concentration was determined to be 208.5 ppm NMOC as hexane. This value was used in the NSPS equation to calculate NMOC emissions of 22.73 Mg/year in 2016.

NMOC emissions are not estimated to exceed 50 Mg/yr for the next five years, using an assumed waste intake rate of 200,000 tons/year of municipal solid waste (MSW). The five year projection is provided in Appendix B 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 2021.

### **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. The site is comprised of multiple landfill units. Two closed areas exist on the north and northeast sides of the site (see Figure 1). These areas have been closed for several years, and had a geosynthetic cap (PVC) placed during final closure. The area designated as “Act 641/Phase 3” is approximately 26 acres, or 10.56 hectares. The area designated as “Act 87” is approximately 21 acres, or 8.5 hectares. Neither of these areas have an active landfill gas collection system, although the Act 641 landfill has 17 passive gas vents installed. Both closed areas are covered by a geosynthetic (PVC) cap.

Another 11.6 acres (4.7 hectares) closed area, Phase 4, has an active landfill gas collection system installed. The landfill gas collection system has also been constructed in the site’s active area, which is delineated by Cells A, B, C, D & E. These five cells are approximately 44.5 acres (18 hectares) in size. The active gas collection system therefore covers 56.1 acres, or 55% of the site’s constructed acreage. Gas is directed to an open flare for combustion.

EIL sent a testing variance request letter to USEPA’s Measurement Technology Group and then, at their direction, sent the same request to USEPA’s Region 5 office. The variance request was for USEPA’s approval of a similar methodology to the 2011 variance of not installing sampling probes in the Act 87 Area at all, but checking the gas quality in the Act 641 vents and sampling those vents with gas quality meeting the Method 25C criteria during the field check at a composite ratio of 3:1. After numerous discussions with USEPA, it was determined that MDEQ had the authority to approve this test methodology.

The required three samples from the main header to the utility flare were collected for Tier 2 sampling during the scheduled Tier 2 sample date on September 27, 2016. 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.

The MCC sampling technician used a hand-held instrument to measure the gas quality in each of the 17 passive vents on September 27, 2016. 9 of the 17 vents had gas quality suitable for Tier 2 sampling. The vents were sampled and composited at a ratio of 3:1. At least one liter of sample was collected from each gas vent, as required by Method 25C.

Field data for gas quality and sampling data at the flare is provided in Table 1. Initial passive vent gas quality check data and the later sampling data for the vents containing suitable gas are provided in Tables 2 and 3 respectively.

### **3.2 Analysis**

The samples were collected from the header and from the nine passive vents at a flow rate of less than 500 ml/min. Summa canisters were utilized for each of the main header samples and for the passive vent 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 O<sub>2</sub> or 20 percent N<sub>2</sub>). Ambient temperature and barometric pressure was also measured with the Envision meter prior to sampling, and recorded (see Tables 1 - 3).

Analysis was performed at the Triangle Environmental Services, Inc. laboratory in Research Triangle Park, North Carolina. Three of the four flare samples were analyzed for oxygen and nitrogen (following Method 3C). The three flare samples collected from the active system showed concentrations of oxygen below 5%; thus they were all suitable for Method 25C analysis and were all included in the final average for the landfill. The fourth canister was therefore not analyzed. The three composite samples collected from the passive vents were also determined to be suitable for Method 25C analysis, since oxygen was below 5%. Each sample was therefore 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 C. A summary of laboratory results is shown in Table 4.

The average NMOC value for the site was 208.5 parts per million (ppm). The equation provided in 40 CFR 60.754(a) was used to calculate Tier 2 emissions (Appendix B).

The NMOC emission rate of 22.73 Mg/yr for the year 2016 is below the 50 Mg/year trigger for installation of gas collection and control systems. The Tier 2 sampling results (Appendix C) are valid for five years (until 2021). At that time, a new Tier 2 value will need to be obtained.

Appendix B also contains the calculations for projected yearly uncontrolled NMOC emissions for 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.

**Table 1: Waters Landfill  
Tier 2 Sampling Field Data  
Frederic, Michigan**

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
#1	6149	29.63	55	Cloudy				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	13:45	47.26	30.87	3.35	18.52			
Leak Check	Vac.	Time	Vac.	Time				
	-9	13:48	-9	13:49				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	9/27/2016	13:50	-15.5	13:50	547	-2.5	14:02	546
Leak Check	Vac.	Time	Vac.	Time				
	-9	14:11	-9	14:12				

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
#2	6188	29.63	56	Cloudy				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	14:12	46.89	30.19	3.46	19.46			
Leak Check	Vac.	Time	Vac.	Time				
	-9	14:12	-9	14:13				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	9/27/2016	14:14	-15	14:14	546	-2.5	14:26	546
Leak Check	Vac.	Time	Vac.	Time				
	-9	14:29	-9	14:30				

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
#3	6137	29.63	55	Rain				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	14:31	46.74	30.43	3.11	19.72			
Leak Check	Vac.	Time	Vac.	Time				
	-9	14:34	-9	14:35				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	9/27/2016	14:36	-15	14:36	548	-2.5	14:47	548
Leak Check	Vac.	Time	Vac.	Time				
	-9	14:50	-9	14:51				

Sample #	Canister #	Barometric Pressure (inches w.c.)	Temperature (°F)	Weather				
#4	6103P	29.6	54	Cloudy				
Gas Quality Check	Time	%CH4	%CO2	%O2	% Bal. Gas			
	14:52	50.5	32.11	2.89	14.5			
Leak Check	Vac.	Time	Vac.	Time				
	-9	14:55	-9	14:56				
Sample	Sample Date	Sample Time	Initial Vac. (inches w.c.)	Time	Flare Flow (cfm)	End Vac (inches w.c.)	Time	Flare Flow (cfm)
	9/27/2016	14:57	-15	14:57	470	-2.5	15:08	470
Leak Check	Vac.	Time	Vac.	Time				
	-9	15:11	-9	15:12				

## Table 2: Waters Landfill Gas Vent Field Quality Check

Date: 27-Sep-16 Temperature: 54 degrees F  
 Technician Name: Pete Campbell Barometric Pressure: 29.63  
 Instrument Used: Envision Time of Gas Quality Check: 8:58 a.m. to 10:22 a.m.  
 Weather Conditions: cloudy

Gas Vent No.	CH4 %	CO2 %	O2 %	Balance Gas %	Comments
GV-1	52.2	29.94	5.03	12.88	O2 not suitable for sampling
GV-2	62.2	34.66	0	3.18	Good for Sampling
GV-3	62.1	34.25	0	3.67	Good for Sampling
GV-4	7.74	3.82	19.82	68.62	O2 & Balance gas not suitable for sampling
GV-5	62.5	34.54	0	2.99	Good for Sampling
GV-6	67.8	32.24	0	0	Good for Sampling
GV-7	67.3	32.68	0	0	Good for Sampling
GV-8	68.6	31.45	0	0	Good for Sampling
GV-9	0.03	0.11	22.6	77.4	O2 & Balance gas not suitable for sampling
GV-10	50.4	34.85	0.42	14.3	Good for Sampling
GV-11	0.01	0	22.6	77.4	O2 & Balance gas not suitable for sampling
GV-12	51.0	29.5	0	19.46	Good for Sampling
GV-13	56.8	36.23	0.0	6.95	Good for Sampling
GV-14	0.0	0	22.19	77.81	O2 & Balance gas not suitable for sampling
GV-15	0.0	0	22.14	77.85	O2 & Balance gas not suitable for sampling
GV-16	29.3	14.28	12.28	44.15	O2 & Balance gas not suitable for sampling
GV-17	13.3	8.2	16.89	61.61	O2 & Balance gas not suitable for sampling

**Table 3: Waters Landfill  
September 27, 2016 Tier 2 Sampling Information - Passive Gas Vents Act 641 Area  
Frederic, Michigan**

Vent Name	Date	Sample Time	CH4	CO2	O2	BAL	Pre-Test Tank Pressure	Post-Test Tank Pressure	Sample Canister#	Barometric Pressure	Ambient Temperature
GV-2	9/27/2016	10:45 a.m.	56.0	32.5	2.7	8.7	-15.5	-11	8T015	29.63	54
GV-3	9/27/2016	11:08 a.m.	59.4	31.8	1.4	7.3	-11	-6.5	8T015	29.63	53
GV-5	9/27/2016	11:24 a.m.	62.6	34.3	0.0	3.1	-6.5	-1.5	8T015	29.6	52
GV-6	9/27/2016	11:42 a.m.	68.1	31.9	0.0	0.0	-15.5	-11	8T010	29.6	53
GV-7	9/27/2016	12:00 p.m.	67.2	32.8	0.0	0.0	-11	-6.5	8T010	29.6	54
GV-8	9/27/2016	12:14 p.m.	68.8	31.2	0.0	0.0	-6.5	-1.5	8T010	29.63	56
GV-10	9/27/2016	12:38 p.m.	46.4	31.7	2.7	19.3	-15.5	-11	8T022	29.63	55
GV-12	9/27/2016	13:01 p.m.	51.9	28.7	0.0	19.4	-11	-6.5	8T022	29.63	55
GV-13	9/27/2016	13:15 p.m.	57.1	36.9	0.0	6.1	-6.5	-1.5	8T022	29.63	55

**TABLE 3**  
**SUMMARY OF METHOD 25C AND METHOD 3C DATA**  
**Waters Landfill Tier 2 Test**

Sample ID Number	Sample Location	Date Sampled	CH4 (%)	CO2 (%)	O2 (%)	N2 (%)	NMOC (ppm as carbon)	NMOC (ppm as hexane)
Sample 1	Flare Inlet 1	9/27/2016	45.1%	30.8%	3.6%	22.3%	1515	253
Sample 2	Flare Inlet 2	9/27/2016	44.7%	30.4%	3.4%	21.8%	1907	318
Sample 3	Flare Inlet 3	9/27/2016	44.9%	30.6%	3.4%	21.8%	1492	249
Sample 1	Act 641 Area Passive Vent Nos. 2, 3 & 5	9/27/2016	57.3%	33.1%	1.3%	9.7%	588	98
Sample 2	Act 641 Area Passive Vent Nos. 6, 7 & 8	9/27/2016	66.6%	33.8%	0.2%	0.6%	1437	240
Sample 3	Act 641 Area Passive Vent Nos. 10, 12 & 13	9/27/2016	47.2%	31.2%	2.0%	20.9%	567.0	95
		<b>Average</b>	<b>50.9%</b>	<b>31.6%</b>	<b>2.3%</b>	<b>16.2%</b>	<b>1,251</b>	<b>208.50</b>

CH4: methane

CO2: carbon dioxide

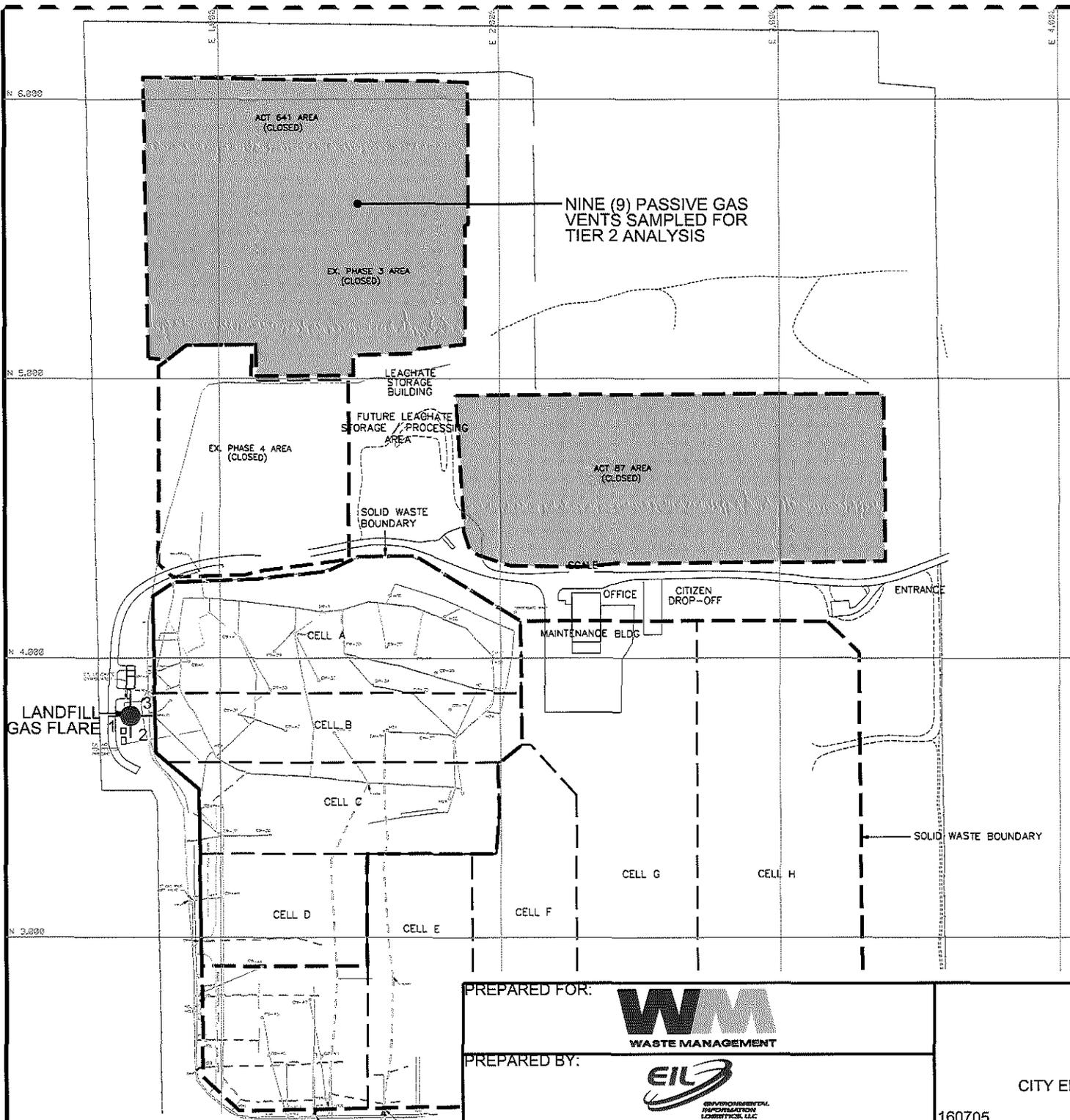
O2: oxygen

N2: nitrogen

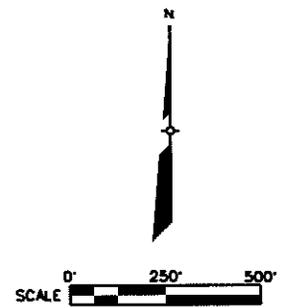
?: percent

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

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- LEGEND**
- LIMITS OF WASTE
  - GRID COORDINATES
  - EXISTING GAS HEADER
  - FINAL COVER (PVC) WITH OUT ACTIVE GAS COLLECTION (APPROVED FOR EXCLUSION FROM TIER II TESTING)
  - ACTUAL TIER II TEST LOCATION

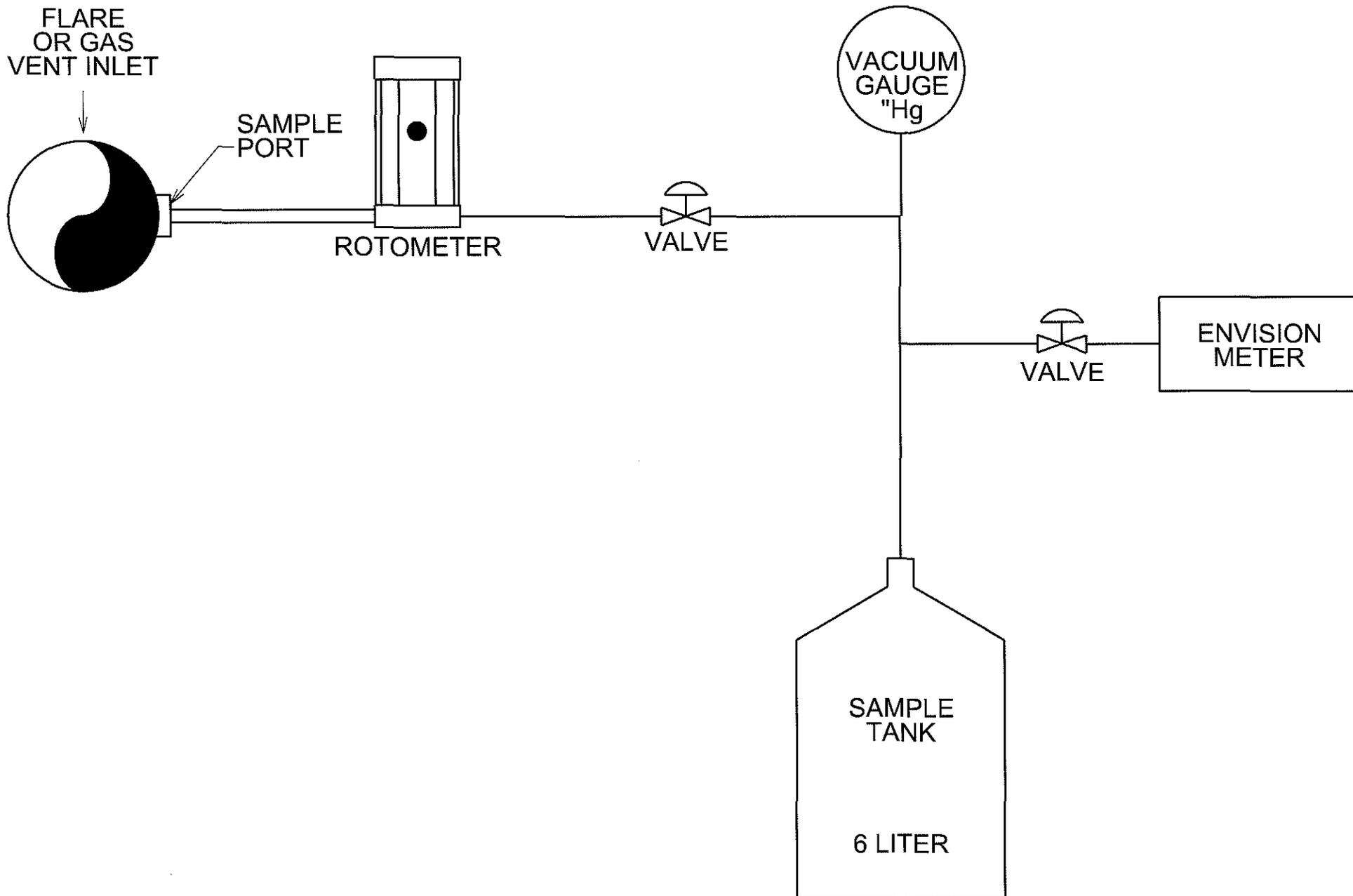


NINE (9) PASSIVE GAS VENTS SAMPLED FOR TIER 2 ANALYSIS

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PREPARED BY:

FIGURE I  
 SITE MAP  
 CITY ENVIRONMENTAL SERVICES OF WATERS  
 FREDERIC, MICHIGAN  
 160705  
 OCTOBER 2016



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FIGURE 2

TOTAL NON-METHANE  
ORGANIC COMPOUND SAMPLING TRAIN

CITY ENVIRONMENTAL SERVICES OF WATERS  
FREDERIC, MICHIGAN

160705

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