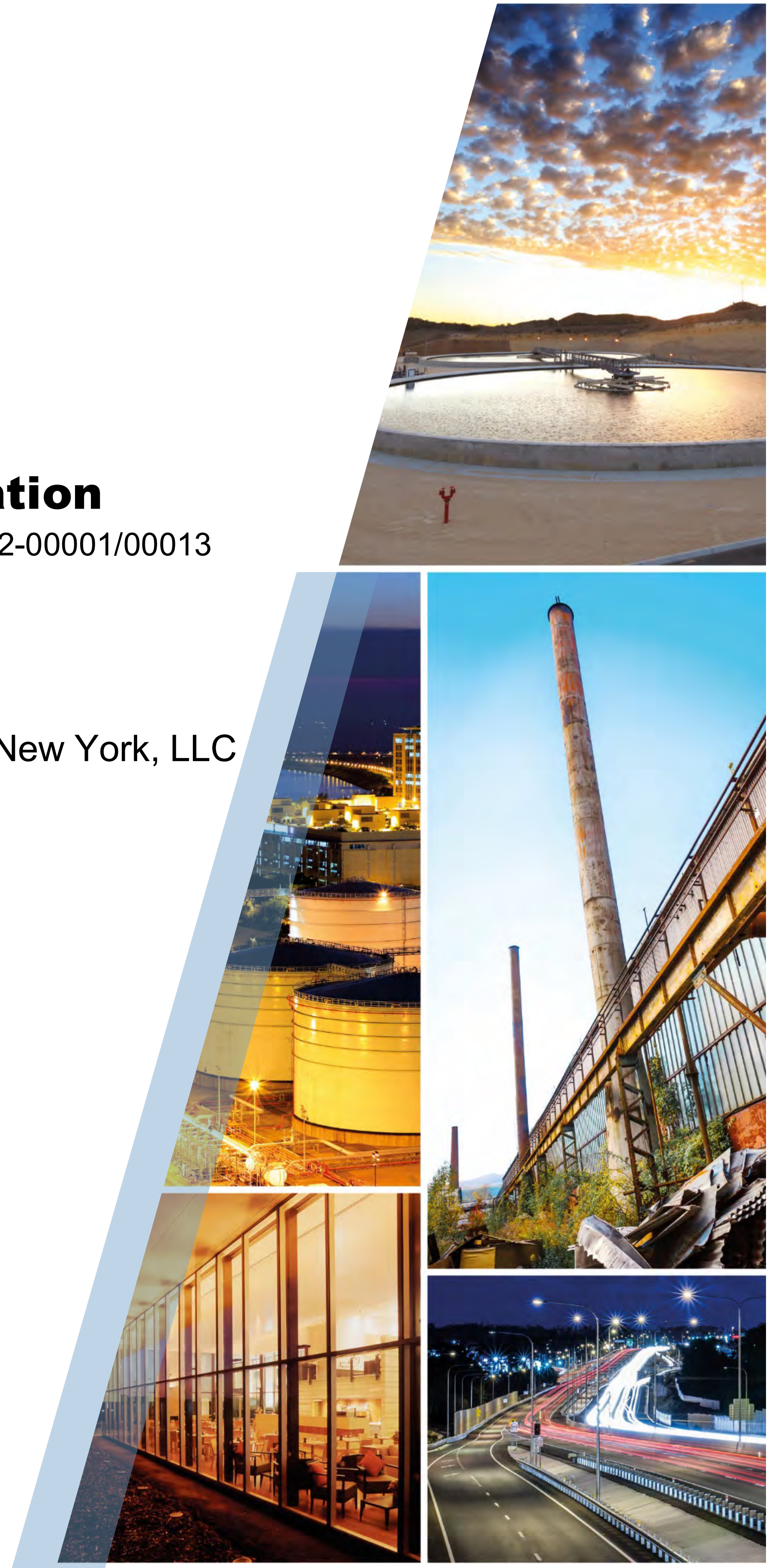
Title V Modification

NYSDEC Permit ID# 9-1462-00001/00013
Chaffee Landfill
Chaffee, New York

Waste Management of New York, LLC



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1. Introduction

GHD has prepared the following emissions inventory of the Chaffee MSW landfill located in Chaffee, New York. The emissions inventory is intended as supporting information for the Title V Permit Modification for a proposed landfill expansion. This inventory includes the project emission potential from a proposed 5,081,955 cubic yard landfill expansion.

WMNY owns and operates the solid waste management facility located at 10860 Olean Road in Chaffee, New York under NYSDEC Part 360, Permit #9-1462-00001/00013 (Facility or Site). The Facility accepts municipal solid waste (MSW) and other non-hazardous wastes, mainly from Erie County. The landfill operations at the facility include tipping, covering, compacting, landfill cell construction, hauling, leachate collection and storage, and equipment maintenance operations. The landfill has an active landfill gas (LFG) collection system that conveys collected LFG to on-site flares and the Renewable Energy Facility, consisting of eight internal combustion engines. The engines are operated by Waste Management Renewable Energy LLC (WMRE) and are used to generate electricity for off-site use. The Standard Industrial Classification (SIC) for the Chaffee Landfill facility is 4953.

2. Facility Description

2.1 Existing Landfill Areas

There are currently three landfill areas at the facility: the Closed Landfill, the Western Expansion Landfill and the Valley Fill Expansion.

The Closed Landfill began accepting waste in 1958 and was capped and closed in 2010 with a total of 7.5 million tons of waste-in-place.

The Western Expansion Landfill opened in November 2007 and consists of six double lined landfill cells covering approximately 57.3 acres. The total design capacity of the Western Expansion Landfill is approximately 8,312,922 cubic yards.

A Title V Modification to authorize construction and operation of the Valley Fill Landfill Expansion was submitted on November 1, 2012 and was subsequently approved by NYSDEC. Initial construction of the Valley Fill Landfill Expansion commenced in September 2013. The capacity of the Valley Fill Expansion is 2,039,598 cubic yards and will increase life of the permitted facility by approximately 2.3 years.

For purposes of this document, the Existing Landfill is defined as the Closed Landfill, the Western Expansion Landfill, and the Valley Fill Expansion. The estimated total facility potential-to-emit for the Existing Landfill was summarized in the Title V Renewal Application that was submitted to NYSDEC in June 2019. Also included in the Title V Renewal Application was an assessment of facility compliance with 6 NYCRR Part 212.

2.2 Future Landfill Areas

A Title V Permit Modification/Application is accompanying this document to authorize construction/operation of the proposed Area 7/8 Development. The capacity of the Area 7/8 Development is approximately 5.1 million cubic yards and will allow the Facility to accept waste for an additional +/- 7 years, assuming the maximum permitted waste acceptance rate of 720,000 tons per year (600,000 tons per year (TPY) MSW and 120,000 TPY alternative daily cover (ADC)).

2.3 Landfill Gas Collection and Combustion System

LFG at the existing facility is currently collected in an active system and combusted to generate electricity. The collection system consists of vertical extraction wells and horizontal collectors. LFG is drawn from the landfill via blowers and directed through a gas header to eight internal combustion engines (eight Caterpillar 3516 engines) at the Renewable Energy Facility, where electricity is produced for sale on the open market. In addition, WMNY also operates one 99 MMBtu/hr (~ 3,300 cfm) enclosed flare and one 27.3 MMBtu/hr (~ 910 cfm) open flare used to combust the excess gas and as a back-up to the energy plant.

3. Facility Emission Unit Descriptions

3.1 Emission Unit Descriptions

This inventory has been developed to evaluate the current and future air emissions that will result from the proposed Area 7/8 Development.

The following is a list of existing and proposed new emission sources and controls from the Facility:

Emission Unit	Process	Source/Control	Description
L-00001	LGF	0LGF1	Existing 3,300-cfm Enclosed Flare (C)
		FLAR3	Existing 910-cfm Open Flare (C)
		LNDFL	Collected LFG – Original Landfill (S)
		LNDF2	Collected LFG – Western Expansion Landfill (S)
		LNDF3	Collected LFG – Valley Fill Expansion (S)
		* LNDF4	Collected LFG – Area 7/8 Development (S)
	LEA	TANKS	Leachate Storage Emissions (S)
	301	LNDFL	Fugitive LFG - Original Landfill (S)
		LNDF2	Fugitive LFG – Western Expansion Landfill (S)
		LNDF3	Fugitive LFG – Valley Fill Expansion (S)
		* LNDF4	Fugitive LFG – Area 7/8 Development (S)
	183	LNDFL	Fugitive Dust – Original Landfill (S)
		LNDF2	Fugitive Dust – Western Expansion Landfill (S)
		LNDF3	Fugitive Dust – Valley Fill Expansion (S)
		* LNDF4	Fugitive Dust – Area 7/8 Development (S)
M-00001	PSB	0PSB1	Paint Booth – Spray Gun (S)
		0PSB2	Paint Booth – Fabric Filters (C)
P-00001	601	ENG01	LFG Combustion – Engine #1 (C)
		ENG02	LFG Combustion – Engine #2 (C)
		ENG03	LFG Combustion – Engine #3 (C)
		ENG04	LFG Combustion – Engine #4 (C)
		ENG05	LFG Combustion – Engine #5 (C)
		ENG06	LFG Combustion – Engine #6 (C)
	602	ENG01	Insignificant Activities – Engine #1 (S)
		ENG02	Insignificant Activities – Engine #2 (S)
		ENG03	Insignificant Activities – Engine #3 (S)
		ENG04	Insignificant Activities – Engine #4 (S)
		ENG05	Insignificant Activities – Engine #5 (S)
		ENG06	Insignificant Activities – Engine #6 (S)
		ENG07	Insignificant Activities – Engine #7 (S)
		ENG08	Insignificant Activities – Engine #8 (S)
	603	ENG07	LFG Combustion – Engine #7 (C)
		ENG08	LFG Combustion – Engine #8 (C)

* Denotes proposed new sources
S = Emission Source
C = Control Device

3.2 Summary of Project Emissions (New Emission Source LNDF4)

The following sections present discussions of the project emissions estimated for the Area 7/8 Development only (Emission Source LNDF4). Supporting calculations are provided as referenced.

3.2.1 Landfill Gas Generation

Based on information provided by WMNY, GHD calculated LFG generation estimates for the Area 7/8 Development. These estimates were based on historical actual and projected waste acceptance values utilizing the United States Environmental Protection Agency (USEPA) LandGEM Model Version 3.02.

A generation potential (L_o) value of 139.6 m^3/Mg and generation rate (k) of 0.04 yr^{-1} were utilized for the Area 7/8 Development. These modeling parameters were referenced from the Gas Collection and Control System (GCCS) Design Plan for the Facility and are considered very conservative (AP-42, Section 2.4 (11/98) calls out a L_o value of 100 m^3/Mg for MSW landfills). The concentration of non-methane organic compounds (NMOC) in the LFG is assumed to be 595 ppm, per AP-42, and a methane content of 50 percent by volume is assumed.

A portion of the incoming MSW is comprised of C&D waste and inerts. For an estimate of future LFG generation rates, the total waste acceptance rate is assumed (conservatively) to be 720,000 TPY (600,000 TPY MSW and 120,000 TPY ADC (which is the permitted acceptance rate for the facility)). In order to be conservative, it is assumed that all of the incoming waste is putrescible (100 percent putrescible waste fraction assumed). An 85 percent collection efficiency was used to determine the amount of gas collected and the resulting fugitive emissions. Figure 1 presents the LFG model for the Area 7/8 Development, which shows the estimated amount of LFG generated. Based on these calculations, the peak year of LFG generation for the Area 7/8 Development will be approximately 2029, with a total of 2,466 cfm generated (approximately 2,096 cfm of collected LFG in 2029).

3.2.2 Fugitive Landfill Gas

It is not possible for a properly maintained and operated collection and soil cover system to collect and oxidize all generated landfill gas, therefore some is released to the atmosphere as fugitive emissions. The primary constituents of concern for LFG are methane, NMOC, volatile organic compounds (VOCs), and hazardous air pollutants (HAPs). HAPs and VOCs are a portion of the NMOCs. The estimate of fugitive LFG was based on the expected LFG generation multiplied by one minus the assumed collection efficiency of the gas collection system. NMOC emissions were calculated based on an AP-42 value of 595 ppm, and VOCs were calculated as 39 percent of NMOC emissions, per AP-42. Calculated fugitive NMOC and VOC emissions for the peak years of gas generation (year 2029) are presented in Table 2. Emissions of speciated HAP compounds in the fugitive LFG were calculated using values compiled by the Waste Industry Air Coalition (WIAC). Speciated HAP emissions for the Area 7/8 Development were calculated for the peak year of fugitive emissions (year 2029) and are provided in Table 2A.

Fugitive greenhouse gas (GHG) emissions were calculated by assuming that LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. Total GHG emissions in terms of carbon dioxide equivalents were calculated using global warming potential values referenced from

40 CFR Part 98, Subpart A. Table 2 presents the calculated fugitive GHG emissions for the Area 7/8 Development (year 2029).

3.2.3 Landfill Gas Combustion

It is assumed that collected LFG from the Area 7/8 Development will be combusted in the onsite flares for the following reasons:

- The Renewable Energy Facility is the primary method of controlling LFG at the Facility; the landfill gas flares are used to combust the excess gas and as a back-up to the energy plant.
- The Renewable Energy Facility is operating near 100% capacity (except for downtime periods due to maintenance) and will continue to do so going forward. The average amount of LFG processed at the Renewable Energy Facility in 2018 was approximately 2,404 cfm and the plant was operational for 99.85% of the 2018 calendar year.

Combustion emissions for the LFG flares are presented in Table 3. The following information was used to estimate combustion emissions from the 99 MMBtu/hr (~ 3,300 cfm) enclosed flare and the 27.3 MMBtu/hr (~ 910 cfm) open flare:

- CO and NOx emissions for the enclosed flare are based on manufacturer guarantee information (Emission rate for CO = 0.20 lb/MMBtu; Emission rate for NOx = 0.06 lb/MMBtu). CO and NOx emissions for the open flare were referenced from the Title V Permit Minor Modification Application, dated December 2005 (Emission rate for CO = 0.22 lb/MMBtu; Emission rate for NOx = 0.052 lb/MMBtu)
- SO_2 emissions are based on a total reduced sulfur (TRS) concentration of 252 ppm and a 0 percent destruction efficiency (DE) [TRS concentration based on conservative estimate]
- NMOC emissions are based on a concentration of 595 ppm and a DE of 98 percent [referenced from USEPA AP-42, Section 2.4 (11/98)]
- VOC emissions are calculated assuming that VOCs are 39 percent of total NMOC [referenced from USEPA AP-42, Section 2.4 (11/98)]
- PM emissions are based on an emission rate of 17 pounds per million cubic feet of methane combusted [referenced from USEPA AP-42, Section 2.4 (11/98)].

Emissions of speciated HAP compounds in the combusted LFG were calculated based on values compiled by WIAC. The concentration of HCl was referenced from "Measurement of Toxic Emissions from Landfill: History and Current Developments (Sullivan, Patrick S. and Bins, John, November 2002)." A destruction efficiency of 98 percent was assumed in the calculations (except for mercury and HCl). Speciated HAP emissions for the flares were calculated for the peak year of gas generation (year 2029) and are provided in Table 3A.

GHG emissions from the flares were calculated by assuming that LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. Total GHG emissions in terms of carbon dioxide equivalents were calculated using global warming potential values referenced from 40 CFR Part 98, Subpart A. Table 3B presents the calculated GHG emissions from combustion of LFG in the flares.

3.2.4 Fugitive Dust Emissions – Area 7/8 Development

Off-road PM emissions are primarily caused by the moving and handling of soil by heavy equipment such as loaders, soil trucks and bulldozers. Operational vehicles and waste hauling vehicles also generate particulate emissions from traveling on both the paved and unpaved roads at the Facility. While the proposed Area 7/8 Development includes various construction activities, those activities are not expected to increase significantly above current levels. Similarly, the daily waste acceptance rate is not proposed to be increased, so the associated vehicle and equipment traffic will not increase significantly, other than to account for the change in traffic routes.

3.2.5 Total Project Emissions – Area 7/8 Development

Based on the calculations described in the previous sections, the total project emission potential for the Area 7/8 Development is presented below:

	Emissions (tons/year)										
	NMOC	***VOCs***	***HAPs***	***Hi- HAP***	***NO_x***	***CO***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***	***Biogenic CO_2***	***Anthropogenic GHG***
Landfill Fugitive Emissions (2029)	12.7	5.0	1.2	0.4	---	---	---	---	---	7,049	38,557
Flared LFG Emissions (2029)	1.4	0.6	0.7	0.1	15.6	57.5	22.7	4.7	4.7	59,726	2,889
Project Emission Potential	**14.2**	**5.5**	**1.8**	**0.5**	**15.6**	**57.5**	**22.7**	**4.7**	**4.7**	**66,775**	**41,446**
Allowable PSD/NSR Thresholds	**50**	**40**	**---**	**---**	**40**	**100**	**40**	**15**	**10**	**75,000**	

Notes:

[A] According to 6 NYCRR 231-4.1(b)(40)(iii), fugitive emissions are not included in the project emission potential.

[B] Emissions are calculated based on LFG combustion by flaring; the method of control may be revisited depending on control technology options that may arise in the future

Table 1 presents a full summary of projected emissions from the Area 7/8 Development.

3.3 Summary of Updated Total Facility Emissions

The following sections present discussions of the updated facility potential emissions. Supporting calculations are provided as referenced.

3.3.1 Landfill Gas Generation

Based on information provided by WMNY, GHD updated the LFG generation estimates for all landfill areas (entire facility). These estimates were based on historical actual and projected waste acceptance values utilizing the United States Environmental Protection Agency (USEPA) LandGEM Model Version 3.02.

A generation potential (L_o) value of 139.6 m^3/Mg and generation rate (k) of 0.04 yr^{-1} were utilized for all landfill areas. These modeling parameters were referenced from the Gas Collection and Control System (GCCS) Design Plan for the Facility and are considered very conservative (AP-42, Section 2.4 (11/98) calls out a L_o value of 100 m^3/Mg for MSW landfills). The concentration of non-methane organic compounds (NMOC) in the LFG is assumed to be 595 ppm, per AP-42, and a methane content of 50 percent by volume is assumed.

A portion of the incoming MSW is comprised of C&D waste and inerts. For an estimate of future LFG generation rates, the total waste acceptance rate is assumed (conservatively) to be 720,000 TPY (600,000 TPY MSW and 120,000 TPY ADC (which is the permitted acceptance rate for the facility)). In order to be conservative, it is assumed that all of the incoming waste is putrescible (100 percent putrescible waste fraction assumed). An 85 percent collection efficiency was used to determine the amount of gas collected and the resulting fugitive emissions. Figure 2 presents the updated LFG model for the entire facility, which shows the estimated amount of LFG generated. Based on these calculations, the peak year of LFG generation will be approximately 2029, with a total of 7,377 cfm generated from the entire facility (approximately 6,237 cfm of collected LFG in 2029).

3.3.2 Fugitive Landfill Gas

It is not possible for a properly maintained and operated collection and soil cover system to collect and oxidize all generated landfill gas, therefore some is released to the atmosphere as fugitive emissions. The primary constituents of concern for LFG are methane, NMOC, volatile organic compounds (VOCs), and hazardous air pollutants (HAPs). HAPs and VOCs are a portion of the NMOCs. The estimate of fugitive LFG was based on the expected LFG generation multiplied by one minus the assumed collection efficiency of the gas collection system. NMOC emissions were calculated based on an AP-42 value of 595 ppm, and VOCs were calculated as 39 percent of NMOC emissions, per AP-42. Calculated fugitive NMOC and VOC emissions for the peak years of gas generation (year 2029) are presented in Table 5. Emissions of speciated HAP compounds in the fugitive LFG were calculated using values compiled by the Waste Industry Air Coalition (WIAC). Speciated HAP emissions for the entire facility were calculated for the peak year of fugitive emissions (year 2029) and are provided in Table 5A.

Fugitive greenhouse gas (GHG) emissions were calculated by assuming that LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. Total GHG emissions in terms of carbon dioxide equivalents were calculated using global warming potential values referenced from 40 CFR Part 98, Subpart A. Table 5 presents the calculated fugitive GHG emissions for the entire facility (year 2029).

3.3.3 Landfill Gas Combustion

Collected LFG is routed from the landfill areas through a gas header and directed to the Chaffee Landfill Renewable Energy Facility (REF) which consists of eight Caterpillar 3516 engines. The REF contains a treatment system in accordance with 40 CFR 60.752(b)(2)(iii)('C'). There are no emissions or vents associated with the gas treatment system that removes particulate > 10 microns, removes moisture with air to air cooler, and compresses the gas. Any remaining excess LFG is combusted in one (1) 99 MMBtu/hr (~ 3,300 cfm) enclosed flare, and one 27.3 MMBtu/hr (~ 910 cfm) open flare. Emission estimates were based on the use of all three of these control devices for the combustion of landfill gas. The following summarizes the capacity of these control devices:

Control Device	*Capacity (cfm)*
3516 Engines (8 total)	2,400
3,300 cfm enclosed flare	3,300
910 cfm open flare	910
Total	**6,610**

Combustion of LFG in either the engines or flares results in emissions of NMOC, VOCs, carbon monoxide (CO), oxides of nitrogen (NOx), sulfur dioxide (SO_2), particulate matter (PM), and HAPs, including hydrogen chloride (HCl).

Combustion emissions for the 99 MMBtu/hr (~ 3,300 cfm) enclosed flare and 27.3 MMBtu/hr (~ 910 cfm) open flare are presented in Table 6. It is assumed that the LFG is combusted primarily in the engines, with the enclosed and open flares combusting the remaining LFG. This combustion scenario is outlined below:

Control Device	**Permitted Peak Combustion (cfm)**
3516 Engines (8 total)	2,400
3,300 cfm enclosed flare	2,927
910 cfm open flare	910
Total	**6,237**

The following information was used to estimate combustion emissions from the 99 MMBtu/hr (~ 3,300 cfm) enclosed flare and the 27.3 MMBtu/hr (~ 910 cfm) open flare:

- CO and NOx emissions for the enclosed flare are based on manufacturer guarantee information (Emission rate for CO = 0.20 lb/MMBtu; Emission rate for NOx = 0.06 lb/MMBtu). CO and NOx emissions for the open flare were referenced from the *Title V Permit Minor Modification Application*, dated December 2005 (Emission rate for CO = 0.22 lb/MMBtu; Emission rate for NOx = 0.052 lb/MMBtu)
- SO_2 emissions are based on a total reduced sulfur (TRS) concentration of 252 ppm and a 0 percent destruction efficiency (DE) [TRS concentration based on conservative estimate]
- NMOC emissions are based on a concentration of 595 ppm and a DE of 98 percent [referenced from USEPA AP-42, Section 2.4 (11/98)]
- VOC emissions are calculated assuming that VOCs are 39 percent of total NMOC [referenced from USEPA AP-42, Section 2.4 (11/98)]
- PM emissions are based on an emission rate of 17 pounds per million cubic feet of methane combusted [referenced from USEPA AP-42, Section 2.4 (11/98)]

Emissions of speciated HAP compounds in the combusted LFG were calculated based on values compiled by WIAC. The concentration of HCl was referenced from "Measurement of Toxic Emissions from Landfill: History and Current Developments (Sullivan, Patrick S. and Bins, John, November 2002)." A destruction efficiency of 98 percent was assumed in the calculations (except for mercury and HCl). Speciated HAP emissions for the flares were calculated for the peak year of gas generation (year 2029) and are provided in Table 6A.

GHG emissions from the flares were calculated by assuming that LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. Total GHG emissions in terms of carbon dioxide equivalents were calculated using global warming potential values referenced from 40 CFR Part 98, Subpart A. Table 6B presents the calculated GHG emissions from combustion of LFG in the flares.

Potential combustion emissions for the eight existing Caterpillar 3516 engines are presented in Table 7. The following information was used to estimate combustion emissions from the internal combustion engines (all emission factors referenced from the *Chaffee Landfill PPP State Facility Permit Application*, dated February 2006):

- CO and NOx emissions for the existing Caterpillar 3516 engines are based on performance test results from similar engines (conservative estimate)
- SO_2 emissions are based on a total reduced sulfur (TRS) concentration of 252 ppm and a 0 percent destruction efficiency (DE) [TRS concentration based on conservative estimate]
- NMOC emissions are based on a concentration of 595 ppm and a DE of 98 percent [referenced from USEPA AP-42, Section 2.4 (11/98)]
- VOC emissions are calculated assuming that VOCs are 39 percent of total NMOC [referenced from USEPA AP-42, Section 2.4 (11/98)]
- PM emissions are based on an emission factor of 0.01 grains per cubic foot of LFG (based on engineering estimate)

Emissions of speciated HAP compounds in the combusted LFG were calculated based on values compiled by WIAC. The concentration of HCl was referenced from "Measurement of Toxic Emissions from Landfill: History and Current Developments (Sullivan, Patrick S. and Bins, John, November 2002)." A destruction efficiency of 98 percent was assumed in the calculations (except for mercury and HCl). Speciated HAP emissions for the internal combustion engines are provided in Table 7A.

GHG emissions for the existing internal combustion engines were calculated by assuming that LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. Total GHG emissions in terms of carbon dioxide equivalents were calculated using global warming potential values referenced from 40 CFR Part 98, Subpart A. GHG emissions for the internal combustion engines are provided in Table 7B.

3.3.4 Engine Plant Tanks/Vents

The following emission sources are located in the Renewable Energy Facility:

Existing Caterpillar 3516 Engine Plant:

- 8 Crankcase Breather Vents With Mist Eliminators
- 1 Coolant Tank
- 8 Oil Tanks
- 1 Condensate Tank
- 1 Gas Chromatograph Vent

Each IC engine has a crankcase breather vent. The breather vent in each engine removes the vapors generated within the crankcase. The breather vent for each engine is piped to individual mist eliminators. The mist eliminator units trap oil and water suspended in the breather vent exhaust and return the captured oil/water to the used oil tank. Emissions were estimated by assuming each engine consumes 16 gallons of engine oil per month, with 50 percent of the oil combusted by the engines and 50 percent released through the crankcase breather vent. The mist eliminator units remove 95 percent of this oil and return it to the used oil tank. Table 8 contains the calculations for the emissions of particulates from the crankcase breather vent.

Emissions from the engine oil tanks and the coolant tank are generated from the volatilization of liquids and from the working and breathing losses from the filling and unloading of the tanks. Emissions from these tanks are assumed to be insignificant (negligible).

Condensate knockouts are located within the energy plant to remove condensate from the LFG prior to combustion. Emissions from the condensate tank are assumed to be insignificant (negligible).

Emissions from the gas chromatograph vent are also assumed to be insignificant (negligible).

3.3.5 Leachate Storage

The leachate storage system consists of two above ground storage tanks within a secondary containment system; each tank has a capacity of approximately 405,000 gallons for a total storage volume of 810,000 gallons. There are also two small underground leachate storage tanks located on the east side of the Closed Landfill (one 12,000 gallon tank and one 25,000 gallon tank); however, these two horizontal tanks are considered exempt under 6 NYCRR 201-3.2(c)(26).

Emissions from the vertical storage tanks were estimated using the methodology from AP-42, Section 7.1 (Organic Liquid Storage Tanks, 11/06). The following information was used in the calculations:

- The leachate analytical data for the period of June 2014 through June 2017 was evaluated and the maximum detection value was used
- A throughput of 15 million gallons per year was utilized in the calculations

These calculations demonstrate that emissions from the leachate storage tanks are considered insignificant (refer to Attachment 1 of Appendix B for calculations).

3.3.6 Paint Booth

The Facility operates a paint spray booth to coat miscellaneous equipment, primarily facility vehicles and waste receptacles (Facility is already subject to 6 NYCRR Part 228-1). The booth is approximately 25-feet wide and 60-feet long. A high volume low pressure (HVLP) spray gun is used with a rated capacity of 0.117 gallons per minute. Emissions are vented through particulate filters, rated at 90 percent efficiency and exhausted through two identical stacks.

Table 9 presents the calculated emissions for the paint booth (calculated based on information provided in the SDS sheet for Sheboygan Paint Co. Premium WM Green Aqua Enamel). Based on a review of paint usage at the Facility over the last 10 years, it is not expected to exceed 1,000 gallons of paint in a given year.

3.3.7 Exempt Sources

The following sections give a description of emission sources that are considered exempt under 6 NYCRR 201-3.2(c). A summary of exempt sources at the Facility is presented in Table 10.

3.3.7.1 Propane Furnace [6NYCRR 201-3.2(C)(1)(i)]

Heat at the maintenance shop area is provided by a propane - gas fired furnace. The furnace is rated less than 10 million Btu/hour. A conservative propane throughput for the Facility was estimated based on an evaluation of previous emission statements. Emission factors for propane combustion were referenced from USEPA AP-42, Section 1.5 (7/08). Table 10A presents a summary of emissions from the propane furnace.

3.3.7.2 Natural Gas Furnace [6NYCRR 201-3.2(C)(1)(i)]

A natural gas furnace (< 10 million Btu/hour) is used to heat the office space area. A conservative natural gas throughput for the Facility was estimated based on evaluation of previous emission statements. Emission factors for natural gas combustion were referenced from USEPA AP-42, Section 1.4 (7/98). Table 10B presents a summary of emissions from natural gas combustion at the Facility.

3.3.7.3 Portable Gasoline Generators [6NYCRR 201-3.2(C)(3)(iii)]

The Site operates small portable gasoline generators that are all rated less than 20 horsepower. These small generators are operated by Site personnel on an as-needed basis. Emissions were calculated by assuming an operating time of 500 hours per year for one small gasoline generator, rated at 20 horsepower (extremely conservative estimate), utilizing emission factors from USEPA AP-42, Section 3.3 (10/96). Table 10C presents a summary of emissions for the portable gasoline generators.

3.3.7.4 Dewatering Pump [6NYCRR 201-3.2(C)(3)(ii)]

A dewatering pump powered by diesel fuel is used to remove water from gas extraction wells at the Facility. The dewatering pump is less than 80 horsepower and operates less than 500 hours per year. Emission factors for the dewatering pump were referenced from USEPA AP-42, Section 3.3 (10/96). Table 10D presents a summary of emissions for the dewatering pump.

3.3.7.5 Odor Neutralizers [6NYCRR 201-3.2(C)(45)]

The Facility utilizes neutralizing agent sprayers as a means of controlling odor that occurs from fugitive emissions. VOC emissions were calculated assuming an estimated annual usage of 1,000 gallons per year and a volatilization factor of 97 percent (referenced from the MSDS sheet). Table 10E presents the emissions due to application of odor neutralizers.

3.3.7.6 Parts Washers [6NYCRR 201-3.2(C)(39)(i)]

The Facility utilizes two Model 250 parts washers (manufactured by Safety Kleen) for cleaning miscellaneous parts and tools. The tanks are remote reservoirs and are considered exempt under 6 NYCRR Part 201-3.2(c)(39)(i). Emissions were estimated assuming a maximum annual usage rate of 1,000 gallons per year of Safety Kleen Premium Solvent. Table 10F presents the emissions for the parts washers at the Facility.

3.3.7.7 Storage of Petroleum Products [6NYCRR 201-3.2(C)(25)]

Unleaded gasoline is stored in a 300-gallon above-ground storage tank (AST) and on-road diesel fuel (hauling company) is stored in a 12,000-gallon under-ground storage tank (UST) for use by vehicles at the Facility. Emissions are generated from the volatilization of these liquids and from the working and breathing losses from the filling and unloading of the tanks. Emissions calculations for the storage tanks at the Facility were estimated utilizing TANKS 3.1 software and actual throughputs recorded by the Facility. In order to obtain a conservative estimate, the calculated emissions from the TANKS model output were doubled for the diesel and gasoline storage tanks.

Working and breathing losses from the filling and unloading of the following ASTs at the Facility are assumed to be negligible:

- 2,000 gallon off-road diesel
- 300 gallon transmission fluid
- 1,400 gallons used oil
- 500 gallon used oil
- (2) 500 gallon hydraulic oil
- 500 gallon lube oil
- 500 gallon motor oil
- 1,500 gallon lube oil
- 1,500 gallon used oil
- 1,000 gallon off-road diesel (Contractor Tank-Temp) (was removed from Site in June 2019 but may be utilized for future operations)

3.3.8 Updated Total Facility Emissions

The Area 7/8 Development will allow for waste acceptance through 2029 (at maximum waste receipts) and will generate a peak volume of 7,377cfm of LFG in 2029 (approximately 6,237 scfm of LFG collected and combusted). The potential emissions for the entire facility are presented below:

	Emissions (tons/year)										
	NMOC	*VOCs*	*HAPs*	*Hi- HAP*	*NO_x*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*Biogenic CO_2*	*Anthropogenic GHG*
Facility Potential Emissions	**42.1**	**25.7**	**5.6**	**1.5**	**150.9**	**341.5**	**67.6**	**24.8**	**24.8**	**210,111**	**126,348**
Major Facility Thresholds	**50**	**40**	**---**	**---**	**100**	**250**	**250**	**100**	**100**	**100,000**	

Notes:

[A] According to 6 NYCRR 231-4.1(b)(40)(iii), fugitive emissions are not included in the project emission potential.

[B] Emissions are calculated based on LFG combustion by flaring; the method of control may be revisited depending on control technology options that may arise in the future

Table 4 presents a full summary of projected emissions from the entire facility.

4. Regulatory Discussion

The following presents a discussion of the Chaffee Landfill applicability to certain regulatory requirements as a result of the Proposed Area 7/8 Development:

1. Title V (6 NYCRR Part 201): Chaffee Landfill is an existing permitted Title V Facility as a major source of CO, NOx and GHG. A modification to the existing Title V permit will be prepared to incorporate the Proposed Area 7/8 Development.
2. NSPS (40 CFR Subpart WWW, 6 NYCRR Part 208): The Facility is also subject to NSPS Operational Standards since NMOC emissions are greater than 50 million megagrams per year, and the landfill has a design capacity greater than 2.5 million megagrams.
3. MACT (40 CFR 63 Subpart AAAA): The existing Facility is also already subject to the MACT Standards. These rules require the existing Facility to perform routine monitoring and record-keeping, and also require semi-annual and annual compliance reporting. The proposed Area 7/8 Development will not require special permitting or monitoring requirements above those already in place at the Facility.
4. RACT (6 NYCRR Part 227): The facility is currently subject to RACT requirements as a major source of NOx (greater than 100 TPY). A RACT analysis for the existing enclosed flares was submitted to NYSDEC on December 16, 2011.
5. PSD: The Proposed Area 7/8 Development is not subject to PSD as the project emission potential is less than the project significance thresholds for all compounds, with the exception of GHG (> 75,000 TPY). However, due to the Supreme Court decision in 'Utility Air Regulatory Group vs. EPA (2014)', a project cannot be subject to PSD if the only pollutant to exceed the project significance threshold is GHG.
6. NANSR: The Proposed Area 7/8 Development is not subject to NANSR due to a potential significant net increase in NOx of less than 40 TPY to a major source (existing source emissions >100 TPY) located in a non-attainment region for ozone.
7. HAPs: Based on calculations for potential emissions, the Proposed Area 7/8 Development is not a major source of HAPs for single HAP totals greater than 10 TPY. Total HAPs are also below the major source threshold of 25 TPY.

5. Title V Permit Modification Forms

Appendix A contains the completed air permit application forms to authorize construction and operation of the Area 7/8 Development.

6. 6 NYCRR Part 212 Evaluation

New York's air toxics program was updated and promulgated on June 14, 2015, prior to the effective date of the current permit. Therefore, a Part 212 evaluation was completed as part of the recent Title V Renewal Application (June 2019) for the process emission sources at the Chaffee Landfill. The Part 212 evaluation was completed in accordance with the policy document, DAR-1.

GHD updated the modeling report that was provided in the July 2019 Title V Renewal application (which was conducted according to the latest modeling protocol, dated June 28, 2019) in order to include the Area 7/8 Development. An analysis of the modeled results demonstrates that the maximum modeled ground level concentrations are lower than the limits for all compounds shown in Tables 7 and 8 of Appendix B. Therefore, no further analysis is required under 6 NYCRR Part 212.

Figure 1

LandGEM - Modeled LFG Production from Area 7/8 Development

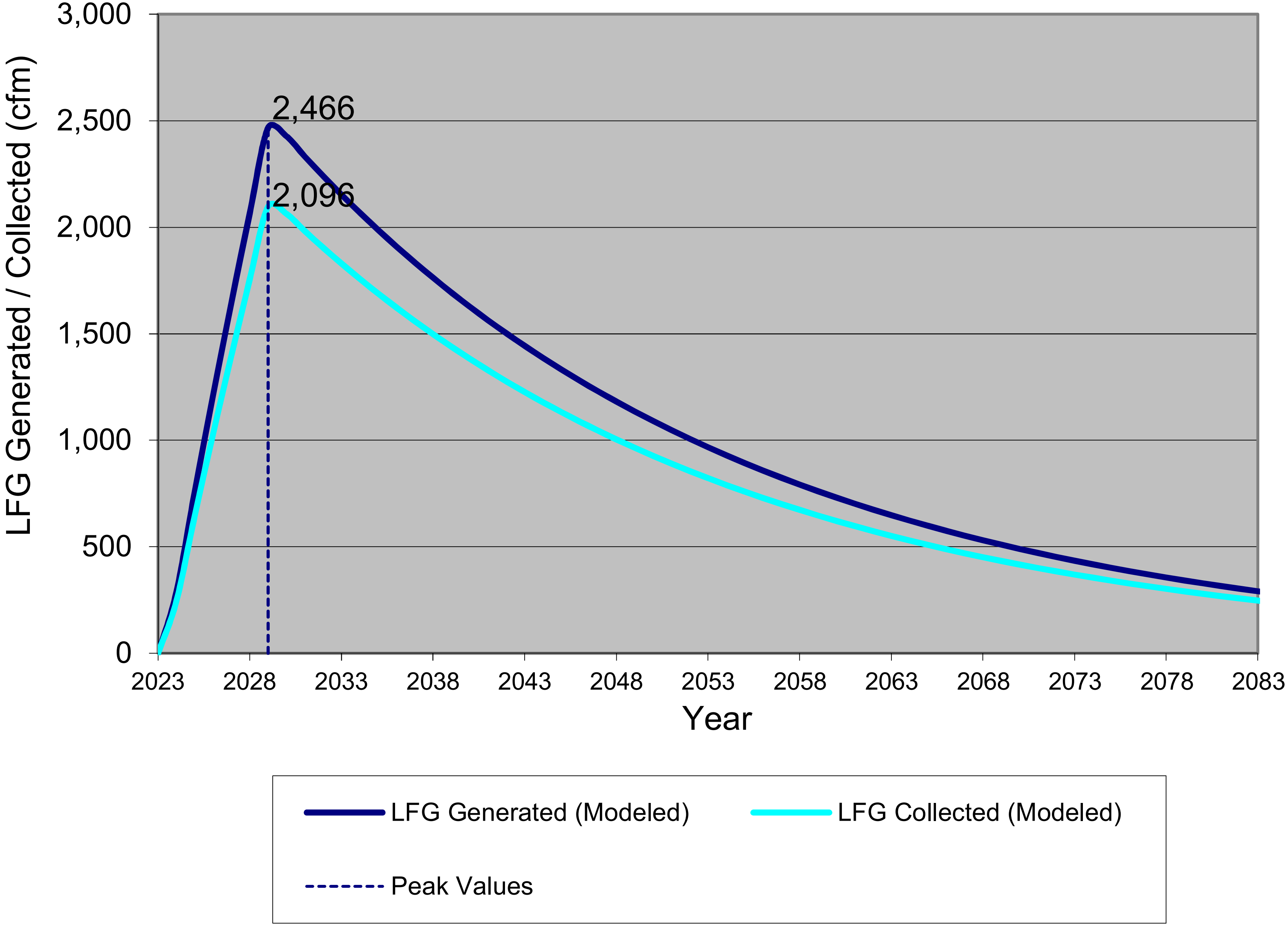

Figure 2

LandGEM - Modeled LFG Production from Existing Landfill Areas & Area 7/8 Development

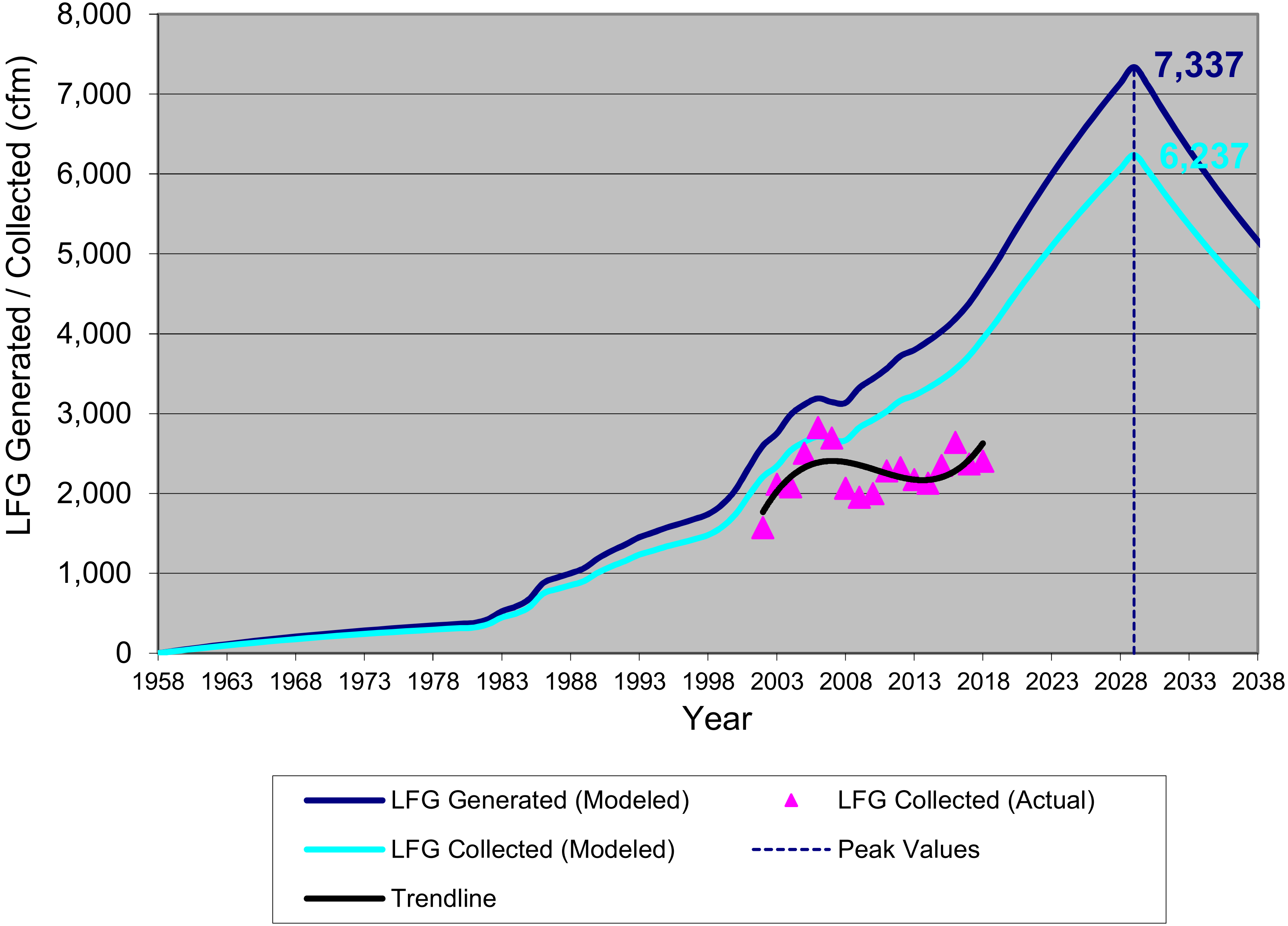

Table 1

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Project Emission Potential - Area 7/8 Development

Emission Unit ID	Process ID	Source ID	Emission Source	Potential Emissions (tons/year)									
				NMOC	VOCs	HAPs	Hi-HAP[1]	NO_X	CO	SO_2	PM_{10}	Anthropogenic GHG[2]	Biogenic CO_2 [2]
L-00001	301	LNDF4	Landfill Fugitive Emissions	12.7	5.0	1.2	0.4	---	---	---	---	38,557	7,049
L-00001	LGF	LNDF4	3,300 CFM Enclosed Flare Combustion Emissions	0.8	0.3	0.4	0.0	9.4	31.2	12.8	2.7	1,554	32,129
L-00001	LGF	LNDF4	910 CFM Open Flare Combustion Emissions	0.6	0.2	0.3	0.03	6.2	26.3	9.9	2.0	1,335	27,597
Totals				**14.2**	**5.5**	**1.8**	**0.5**	**15.6**	**57.5**	**22.7**	**4.7**	**41,446**	**66,775**

Notes:

[1] High HAP is Toluene
[2] Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table 2

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Landfill Gas Fugitive Emissions - Area 7/8 Development

Area 7/8 Development

Year	Total LFG Generated (cfm)	Collection Efficiency (%)	LFG to Collection System (cfm)	Fugitive LFG (cfm)	Fugitive LFG (ft^3/yr)	Fugitive LFG (m^3/yr)	Fugitive NMOC Emissions (TPY)	Fugitive VOC Emissions (TPY)	Fugitive HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Total Anthropogenic GHG Emissions (TPY)
2029	2,466	85%	2,096	370	194,454,477	5,506,338	12.7	5.0	1.2	1,542.3	1,409.8	7,049.0	38,557

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from USEPA LandGEM Model run (version 3.02)
Utilized LandGEM Model using the following parameters ($k = 0.04\ yr^{-1}$, $Lo = 139.6\ m^3/Mg$)
Collection efficiency of 85% assumed for gas collection system
LFG to Collection System = (Total LFG Generated) * (Collection Efficiency (%))
Fugitive LFG = (Total LFG Generated) * (100% - Collection Efficiency (%))
Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)
Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)
NMOC concentration of 595 ppm referenced from USEPA AP-42, Chapter 2.4 (11/98)

Conversion from NMOC in ppm to mg/m^3 = $\frac{595 \text{ ppm} \times 86.18 \text{ molecular wt}}{24.47}$ = 2,095.9 mg/m^3

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046×10^{-6} pounds per mg]
Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)
Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98)
Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table 2A)
Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]
Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]
Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] } + Oxidized CO_2 Emissions
Anthropogenic GHG Emissions (tons CO_2 equivalents / year) = [Fugitive CH4 Emissions (TPY)] * 25

Equations:

$$(mg/m^3) = \frac{(ppm) \times (\text{Molecular weight } (g/mol)) \times (1\ atm)}{(298.15\ K) \times (0.08206\ L{*}atm/K{*}mol)}$$ (assuming standard conditions of 1 atmosphere and 25^o Celsius)

(lb/yr) = (Fugitive LFG Emission rate [m^3/year]) x (mg/m^3) x (2.205×10^{-6} [lb/mg])

$$(TPY) = \frac{(lb/yr)}{(2{,}000\ lb/ton)}$$

Table 2A

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Fugitive HAP Emissions - Area 7/8 Development

Total LFG Generated =	2,466	cfm
LFG Collection Efficiency =	85%	
Average LFG Collected =	2,096	cfm
Fugitive Emission Estimates =	370	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	VOC?	HAP?	Molecular Weight	Median [1] ppmv	Fugitive Emissions [6] lb/hr	lb/yr	TPY	mg/m³	HAP (TPY)
71-55-6	1,1,1-Trichloroethane		X	133.41	0.168	0.001	8.34	0.00	0.92	0.004
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.070	0.000	4.37	0.00	0.48	0.002
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.003	27.29	0.01	3.00	0.014
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.000	3.32	0.00	0.36	0.002
107-06-2	1,2-Dichloroethane	X	X	98.96	0.120	0.001	4.42	0.00	0.49	0.002
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.000	0.97	0.00	0.11	0.000
67-63-0	2-Propanol	X		60.11	7.908	0.020	176.89	0.09	19.43	
67-64-1	Acetone			58.08	6.126	0.015	132.41	0.07	14.54	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.000	0.71	0.00	0.08	0.000
71-43-2	Benzene [3]	X	X	78.11	0.972	0.003	28.25	0.01	3.10	0.014
75-27-4	Bromodichloromethane	X		163.83	0.311	0.002	18.96	0.01	2.08	
106-97-8	Butane [4]	X		58.12	5.030	0.012	108.79	0.05	11.95	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.001	9.07	0.00	1.00	0.005
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	0.40	0.00	0.04	0.000
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.000	4.09	0.00	0.45	0.002
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.001	9.51	0.00	1.04	0.005
75-45-6	Chlorodifluoromethane			86.47	0.355	0.001	11.42	0.01	1.25	
75-00-3	Chloroethane	X	X	64.52	0.239	0.001	5.74	0.00	0.63	0.003
67-66-3	Chloroform	X	X	119.39	0.021	0.000	0.93	0.00	0.10	0.000
74-87-3	Chloromethane [2]	X	X	50.49	0.249	0.001	4.68	0.00	0.51	0.002
106-46-7	Dichlorobenzene	X	X	147.00	1.607	0.010	87.91	0.04	9.66	0.044
75-71-8	Dichlorodifluoromethane			120.91	1.751	0.009	78.79	0.04	8.65	
75-43-4	Dichlorofluoromethane [4]	X		102.92	2.620	0.011	100.35	0.05	11.02	
75-09-2	Dichloromethane		X	84.94	3.395	0.012	107.31	0.05	11.79	0.054
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.018	157.43	0.08	17.29	
64-17-5	Ethanol	X		46.08	118.618	0.232	2,034.06	1.02	223.41	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.004	31.35	0.02	3.44	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.031	268.21	0.13	29.46	0.134
106-93-4	Ethylene dibromide [2]	X	X	187.88	0.046	0.000	3.22	0.00	0.35	0.002
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.002	16.72	0.01	1.84	
110-54-3	Hexane	X	X	86.18	2.324	0.009	74.53	0.04	8.19	0.037
7783-06-4	Hydrogen Sulfide			34.08	252.000	0.365	3,195.96	1.60	351.03	
7439-97-6	Mercury [4]		X	200.61	0.000292	0.000	0.02	0.00	0.00	0.000
78-93-3	Methyl ethyl ketone [5]	X		72.11	10.557	0.032	283.29	0.14	31.12	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.750	0.003	27.95	0.01	3.07	0.014
74-93-1	Methyl mercaptan	X		48.11	1.292	0.003	23.13	0.01	2.54	
109-66-0	Pentane [4]	X		72.15	3.290	0.010	88.34	0.04	9.70	
127-18-4	Perchloroethylene		X	165.83	1.193	0.008	73.62	0.04	8.09	0.037
74-98-6	Propane	X		44.09	14.757	0.028	242.12	0.12	26.59	
108-88-3	Toluene [3]	X	X	92.13	25.405	0.099	871.01	0.44	95.67	0.436
79-01-6	Trichloroethene	X	X	131.40	0.681	0.004	33.30	0.02	3.66	0.017
75-01-4	Vinyl chloride	X	X	62.50	1.077	0.003	25.05	0.01	2.75	0.013
1330-20-7	Xylene	X	X	106.16	16.582	0.075	655.09	0.33	71.95	0.328
									Total HAPs	1.17

Notes:

1 Concentration of individual HAPs were taken from Waste Industry Air Coalition (WIAC)
2 Not designated as a HAP in Chapter 2.4 of AP-42 (11/98), but is listed in the USEPA National Emission Inventory (NEI) database
3 Used 'No or unknown co-disposal' concentration
4 No WIAC value given for compound; used USEPA AP-42 value
5 Delisted as a HAP by USEPA
6 Cover oxidation of 25% applied (based on 40 CFR 98, Subpart HH)

Equations:

$$(mg/m^3) = \frac{(\text{Molecular weight}) \times (1\ \text{atm}) \times (\text{Median ppmv})}{(298.15\ K) \times (0.08206\ L{*}atm/K{*}mol)}$$

$$(lb/hr) = \frac{(mg/m^3) \times (2.205 \times 10^{-6}\ [lb/mg]) \times (\text{Fugitive LFG Emission rate } [ft^3/min]) \times (60\ min/hr)}{(35.3147\ ft^3/m^3)}$$

$$(lb/yr) = (lb/hr) \times (8{,}760\ hours/yr)$$

$$(TPY) = \frac{(lb/yr)}{(2{,}000\ lb/ton)}$$

Table 3

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of LFG Flare Emissions - Area 7/8 Development

Total LFG Generated [B] =	2,466	cfm
Collection Efficiency =	85%	
Total LFG Combusted =	2,096	cfm
LFG to Flares =	2,096	cfm

Flare Type	Operating Conditions			Estimated Potential Flare Emissions (TPY)					
	CFM	MMSCF	Hours	PM_{10}	NMOC	CO	NO_X	SO_2	VOC[A]
Enclosed 3,300 CFM	1,186	623.6	8,760	2.7	0.8	31.2	9.4	12.8	0.3
Open 910 CFM	910	478.3	8,760	2.0	0.6	26.3	6.2	9.9	0.2
Total Emissions (TPY)				4.7	1.4	57.5	15.6	22.7	0.6
Total Emissions (lb/yr)				9,366.2	2,883.4	114,973.8	31,144.1	45,388.0	1,124.5

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	NMOC	CO	NO_X	SO_2
Enclosed Flare 3,300 CFM	8.50	2.62	100.00	30.00	41.19
Open Flare 910 CFM	8.50	2.62	110.00	26.00	41.19

Emission Factor Development

3,300 CFM Enclosed Flare

CO:	0.20	lb/MMBtu
NOx:	0.06	lb/MMBtu

910 CFM Open Flare

CO:	0.22	lb/MMBtu
NOx:	0.052	lb/MMBtu

LFG Data:

NMOC:	595	ppm
TRS:	252	ppm
CH_4:	50.0%	of total LFG
VOC:	39.0%	of NMOC

Notes:

[A] Per AP-42, VOC emissions are calculated as 39% of NMOC emissions.
[B] Based on amount of LFG generated in peak year of LFG production in existing and future landfill areas

PM	$17\ lb/10^6$ dscf methane per AP-42, section 2.4 (11/98)	
NMOC	Based on 595 ppm per AP-42, section 2.4 (11/98), and 98% destruction efficiency	
CO	Emission rates (in units fo lb/MMBtu) referenced from previous permit applications	
NO_X	Emission rates (in units fo lb/MMBtu) referenced from previous permit applications	
SO_2	Based on conservative TRS concentration of 252 ppm	
VOC	39% of NMOC per AP-42, section 2.4 (11/98)	
Heating value	500	Btu/scf
DE (of NMOC)	98.0	%

Table 3A

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Flare HAP Emissions - Area 7/8 Development

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	2,466	cfm
LFG Collection Efficiency =	85%	
Total LFG Collected =	2,096	cfm
Total LFG Collected to Flares =	2,096	cfm
Hours of Operation =	8,760	

						Uncontrolled Emissions					Controlled Emissions			
CAS #	**LFG Constituent**	**VOC?**	**HAP?**	**Molecular Weight**	**Median[1] ppmv**	**lb/hr**	**lb/yr**	**TPY**	**mg/m3**	**Avg. Control [6]**	**lb/hr**	**lb/yr**	**TPY**	**HAP (TPY)**
71-55-6	1,1,1-Trichloroethane		X	133.41	0.168	0.007	63.02	0.03	0.92	98.0%	0.000	1.26	0.00	0.001
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.070	0.004	33.04	0.02	0.48	98.0%	0.000	0.66	0.00	0.000
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.024	206.20	0.10	3.00	98.0%	0.000	4.12	0.00	0.002
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.003	25.08	0.01	0.36	98.0%	0.000	0.50	0.00	0.000
107-06-2	1,2-Dichloroethane	X	X	98.96	0.120	0.004	33.39	0.02	0.49	98.0%	0.000	0.67	0.00	0.000
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.001	7.31	0.00	0.11	98.0%	0.000	0.15	0.00	0.000
67-63-0	2-Propanol	X		60.11	7.908	0.153	1,336.54	0.67	19.43	98.0%	0.003	26.73	0.01	
67-64-1	Acetone			58.08	6.126	0.114	1,000.39	0.50	14.54	98.0%	0.002	20.01	0.01	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.001	5.37	0.00	0.08	98.0%	0.000	0.11	0.00	0.000
71-43-2	Benzene [4]	X	X	78.11	0.972	0.024	213.47	0.11	3.10	98.0%	0.000	4.27	0.00	0.002
75-27-4	Bromodichloromethane	X		163.83	0.311	0.016	143.26	0.07	2.08	98.0%	0.000	2.87	0.00	
106-97-8	Butane [3]	X		58.12	5.030	0.094	821.98	0.41	11.95	98.0%	0.002	16.44	0.01	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.008	68.50	0.03	1.00	98.0%	0.000	1.37	0.00	0.001
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	3.03	0.00	0.04	98.0%	0.000	0.06	0.00	0.000
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.004	30.91	0.02	0.45	98.0%	0.000	0.62	0.00	0.000
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.008	71.84	0.04	1.04	98.0%	0.000	1.44	0.00	0.001
75-45-6	Chlorodifluoromethane			86.47	0.355	0.010	86.31	0.04	1.25	98.0%	0.000	1.73	0.00	
75-00-3	Chloroethane	X	X	64.52	0.239	0.005	43.36	0.02	0.63	98.0%	0.000	0.87	0.00	0.000
67-66-3	Chloroform	X	X	119.39	0.021	0.001	7.05	0.00	0.10	98.0%	0.000	0.14	0.00	0.000
74-87-3	Chloromethane [2]	X	X	50.49	0.249	0.004	35.35	0.02	0.51	98.0%	0.000	0.71	0.00	0.000
106-46-7	Dichlorobenzene	X	X	147.00	1.607	0.076	664.20	0.33	9.66	98.0%	0.002	13.28	0.01	0.007
75-71-8	Dichlorodifluoromethane			120.91	1.751	0.068	595.27	0.30	8.65	98.0%	0.001	11.91	0.01	
75-43-4	Dichlorofluoromethane [3]	X		102.92	2.620	0.087	758.17	0.38	11.02	98.0%	0.002	15.16	0.01	
75-09-2	Dichloromethane		X	84.94	3.395	0.093	810.81	0.41	11.79	98.0%	0.002	16.22	0.01	0.008
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.136	1,189.47	0.59	17.29	98.0%	0.003	23.79	0.01	
64-17-5	Ethanol	X		46.08	118.618	1.754	15,368.46	7.68	223.41	98.0%	0.035	307.37	0.15	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.027	236.88	0.12	3.44	98.0%	0.001	4.74	0.00	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.231	2,026.44	1.01	29.46	98.0%	0.005	40.53	0.02	0.020
106-93-4	Ethylene dibromide [2]	X	X	187.88	0.046	0.003	24.30	0.01	0.35	98.0%	0.000	0.49	0.00	0.000
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.014	126.31	0.06	1.84	98.0%	0.000	2.53	0.00	
7647-01-0	Hydrogen Chloride [5]		X	36.46	9.430	0.110	966.71	0.48	14.05	0.0%	0.110	966.71	0.48	0.483
110-54-3	Hexane	X	X	86.18	2.324	0.064	563.13	0.28	8.19	98.0%	0.001	11.26	0.01	0.006
7783-06-4	Hydrogen Sulfide			34.08	252.000	2.757	24,147.24	12.07	351.03	98.0%	0.055	482.94	0.24	
7439-97-6	Mercury [3]		X	200.61	0.000292	0.000	0.16	0.00	0.00	0.0%	0.000	0.16	0.00	0.000
78-93-3	Methyl ethyl ketone [7]	X		72.11	10.557	0.244	2,140.44	1.07	31.12	98.0%	0.005	42.81	0.02	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.750	0.024	211.21	0.11	3.07	98.0%	0.000	4.22	0.00	0.002
74-93-1	Methyl mercaptan	X		48.11	1.292	0.020	174.77	0.09	2.54	98.0%	0.000	3.50	0.00	
109-66-0	Pentane [3]	X		72.15	3.290	0.076	667.42	0.33	9.70	98.0%	0.002	13.35	0.01	
127-18-4	Perchloroethylene		X	165.83	1.193	0.063	556.25	0.28	8.09	98.0%	0.001	11.13	0.01	0.006
74-98-6	Propane	X		44.09	14.757	0.209	1,829.39	0.91	26.59	98.0%	0.004	36.59	0.02	
108-88-3	Toluene [4]	X	X	92.13	25.405	0.751	6,580.94	3.29	95.67	98.0%	0.015	131.62	0.07	0.066
79-01-6	Trichloroethene	X	X	131.40	0.681	0.029	251.60	0.13	3.66	98.0%	0.001	5.03	0.00	0.003
75-01-4	Vinyl chloride	X	X	62.50	1.077	0.022	189.26	0.09	2.75	98.0%	0.000	3.79	0.00	0.002
1330-20-7	Xylene	X	X	106.16	16.582	0.565	4,949.54	2.47	71.95	98.0%	0.011	98.99	0.05	0.049
													Total HAPs	0.66

Notes:

1 Concentration of individual HAPs were taken from Waste Industry Air Coalition (WIAC)
2 Not designated as a HAP in Chapter 2.4 of AP-42 (11/98), but is listed in the USEPA National Emission Inventory (NEI) database
3 No WIAC concentration specified; used AP-42 value
4 Used 'No or unknown co-disposal' concentration
5 HCl Concentration was taken from "Measurement of Toxic Emissions from Landfill: History and Current Developments".
6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)
7 Delisted as a HAP by USEPA

Equations:

$$(\text{mg/m}^3) = \frac{(\text{Molecular weight}) \times (1\text{ atm}) \times (\text{Median ppmv})}{(298.15\text{ K}) \times (0.08206\text{ L*atm/K*mol})}$$

$$(\text{lb/hr}) = \frac{(\text{mg/m}^3) \times (2.205 \times 10^{-6}\text{ [lb/mg]}) \times (\text{LFG Combustion rate [ft}^3\text{/min]}) \times (60\text{ min/hr})}{(35.3147\text{ ft}^3/\text{m}^3)}$$

$$(\text{lb/yr}) = (\text{lb/hr}) \times (8{,}760\text{ hours/yr})$$

$$(\text{TPY}) = \frac{(\text{lb/yr})}{(2{,}000\text{ lb/ton})}$$

(Controlled Emissions) = (Uncontrolled Emissions) x (100% - Average Control [%])

Table 3B

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Flare Greenhouse Gas Emissions - Area 7/8 Development

LFG to 3,300 CFM Enclosed Flare =	1,186 cfm
LFG to 910 CFM Open Flare =	910 cfm

	Operating Hours	Estimated Potential Flare Emissions (TPY) Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthropogenic GHG
Enclosed 3,300 CFM	8,760	17,896.7	1.1	0.2	65.9	18,084.8	35,981.4	1,740.7
Open 910 CFM	8,760	13,726.3	0.8	0.2	50.6	13,870.6	27,596.9	1,335.1
	Total Emissions (TPY)	31,623.0	1.9	0.4	116.5	31,955.4	63,578.3	3,075.8
	Total Emissions (lb/yr)	6.32E+07	3.89E+03	7.65E+02	233,053.7	6.39E+07	1.27E+08	6.15E+06

Flare Combustion Factors

	Pounds per Hour of Operation CO_2	CH_4	N_2O
Enclosed 3,300 CFM	4,086.0	0.3	0.05
Open 910 CFM	3,133.9	0.2	0.04

Notes:

Combustion CO_2	Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
Combustion CH_4	Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
Combustion N_2O	Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
Escape CH_4	Collected methane that escapes destruction in engines (1% of methane processed)
Collected CO_2	Portion of collected LFG that already contains CO_2 (50% of collected LFG)
Biogenic CO_2	Sum of Combustion CO_2 and Collected CO_2
Anthropogenic GHG	Sum of Combustion CH_4, Combustion N_2O and Escape CH_4 expressed as tons of CO_2 equivalents

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99	% (manufacturer guarantee DE for LFG Enclosed Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (100 year)
CO_2	52.07	1
CH_4	3.20E-03	25
N_2O	6.30E-04	298

LFG Data:

Heat Input (3,300 CFM Flare):	35.6	MMBtu/hr
LFG combusted (3,300 CFM Flare):	1,186	cfm
Heat Input (910 CFM Flare):	27.3	MMBtu/hr
LFG combusted (910 CFM Flare):	910	cfm

Table 4

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Facility Potential Emissions

Emission Unit ID	Process ID	Emission Source	Potential Emissions (tons/year)									
			NMOC	VOCs	HAPs	Hi-HAP[1]	NO_X	CO	SO_2	PM_{10}	Anthropogenic GHG[2]	Biogenic CO_2 [2]
L-00001	183 / 301	Landfill Fugitive Emissions [3]	37.8	14.8	3.5	1.3	---	---	---	14.9	114,703	20,970
L-00001	LGF	3,300 CFM Enclosed Flare Combustion Emissions	2.0	0.8	0.9	0.1	23.1	76.9	31.7	6.5	4,294	88,761
L-00001	LGF	910 CFM Open Flare Combustion Emissions	0.6	0.2	0.3	0.03	7.2	23.9	9.9	2.0	1,335	27,597
P-00001	601 / 603	Caterpillar 3516 Engine Combustion Emissions	1.7	0.6	0.8	0.1	119.7	240.3	26.0	0.9	5,722	72,783
P-00001	602	Crankcase Ventilator Emissions	---	---	---	---	---	---	---	0.1	---	---
M-00001	PSB	Paint Booth Emissions	---	1.6	---	---	---	---	---	0.2	---	---
L-00001	LEA	Leachate Tanks	---	0.1	0.1	---	---	---	---	---	---	---
---	---	Exempt Source Emissions	---	7.6	0.01	---	0.9	0.4	0.0	0.1	293	---
Totals			**42.1**	**25.7**	**5.6**	**1.5**	**150.9**	**341.5**	**67.6**	**24.8**	**126,348**	**210,111**

Notes:

[1] High HAP is Toluene
[2] Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)
[3] Fugitive landfill dust emissions referenced from State Facility Permit Application (June 2004) for the Western Expansion Landfill

Table 5

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Landfill Gas Fugitive Emissions - Total Facility

Existing Landfill and Area 7/8 Development

Year	Total LFG Generated (cfm)	Collection Efficiency (%)	LFG to Collection System (cfm)	Fugitive LFG (cfm)	Fugitive LFG (ft^3/yr)	Fugitive LFG (m^3/yr)	Fugitive NMOC Emissions (TPY)	Fugitive VOC Emissions (TPY)	Fugitive HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Total Anthropogenic GHG Emissions (TPY)
2029	7,337	85%	6,237	1,101	578,486,514	16,380,914	37.8	14.8	3.5	4,588.1	4,194.0	20,970.1	114,703

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from USEPA LandGEM Model run (version 3.02)
Utilized LandGEM Model using the following parameters (k = 0.04 yr^{-1}, Lo = 139.6 m^3/Mg)
Collection efficiency of 85% assumed for gas collection system
LFG to Collection System = (Total LFG Generated) * (Collection Efficiency (%))
Fugitive LFG = (Total LFG Generated) * (100% - Collection Efficiency (%))
Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)
Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)
NMOC concentration of 595 ppm referenced from USEPA AP-42, Chapter 2.4 (11/98)

Conversion from NMOC in ppm to mg/m^3 = $\frac{595 \text{ ppm} \times 86.18 \text{ molecular wt}}{24.47}$ = 2,095.9 mg/m^3

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 x10^{-6} pounds per mg]
Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)
Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98)
Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table 2A)
Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]
Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]
Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] } + Oxidized CO_2 Emissions
Anthropogenic GHG Emissions (tons CO_2 equivalents / year) = [Fugitive CH4 Emissions (TPY)] * 25

Equations:

$$(mg/m^3) = \frac{(ppm) \times (\text{Molecular weight } (g / mol)) \times (1 \text{ atm})}{(298.15 \text{ K}) \times (0.08206 \text{ L*atm/K*mol})}$$ (assuming standard conditions of 1 atmosphere and 25^o Celsius)

(lb/yr) = (Fugitive LFG Emission rate [m^3/year]) x (mg/m^3) x (2.205 x 10^{-6} [lb/mg])

$$(TPY) = \frac{(lb/yr)}{(2,000 \text{ lb/ton})}$$

Table 5A

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Fugitive HAP Emissions - Total Facility

Total LFG Generated =	7,337	cfm
LFG Collection Efficiency =	85%	
Average LFG Collected =	6,237	cfm
Fugitive Emission Estimates =	1,101	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	VOC?	HAP?	Molecular Weight	Median [1] ppmv	Fugitive Emissions [6] lb/hr	lb/yr	TPY	mg/m³	HAP (TPY)
71-55-6	1,1,1-Trichloroethane		X	133.41	0.168	0.003	24.81	0.01	0.92	0.012
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.070	0.001	13.01	0.01	0.48	0.007
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.009	81.19	0.04	3.00	0.041
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.001	9.87	0.00	0.36	0.005
107-06-2	1,2-Dichloroethane	X	X	98.96	0.120	0.002	13.15	0.01	0.49	0.007
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.000	2.88	0.00	0.11	0.001
67-63-0	2-Propanol	X		60.11	7.908	0.060	526.25	0.26	19.43	
67-64-1	Acetone			58.08	6.126	0.045	393.89	0.20	14.54	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.000	2.11	0.00	0.08	0.001
71-43-2	Benzene [3]	X	X	78.11	0.972	0.010	84.05	0.04	3.10	0.042
75-27-4	Bromodichloromethane	X		163.83	0.311	0.006	56.41	0.03	2.08	
106-97-8	Butane [4]	X		58.12	5.030	0.037	323.65	0.16	11.95	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.003	26.97	0.01	1.00	0.013
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	1.19	0.00	0.04	0.001
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.001	12.17	0.01	0.45	0.006
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.003	28.29	0.01	1.04	0.014
75-45-6	Chlorodifluoromethane			86.47	0.355	0.004	33.98	0.02	1.25	
75-00-3	Chloroethane	X	X	64.52	0.239	0.002	17.07	0.01	0.63	0.009
67-66-3	Chloroform	X	X	119.39	0.021	0.000	2.78	0.00	0.10	0.001
74-87-3	Chloromethane [2]	X	X	50.49	0.249	0.002	13.92	0.01	0.51	0.007
106-46-7	Dichlorobenzene	X	X	147.00	1.607	0.030	261.52	0.13	9.66	0.131
75-71-8	Dichlorodifluoromethane			120.91	1.751	0.027	234.38	0.12	8.65	
75-43-4	Dichlorofluoromethane [4]	X		102.92	2.620	0.034	298.52	0.15	11.02	
75-09-2	Dichloromethane		X	84.94	3.395	0.036	319.25	0.16	11.79	0.160
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.053	468.34	0.23	17.29	
64-17-5	Ethanol	X		46.08	118.618	0.691	6,051.17	3.03	223.41	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.011	93.27	0.05	3.44	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.091	797.89	0.40	29.46	0.399
106-93-4	Ethylene dibromide [2]	X	X	187.88	0.046	0.001	9.57	0.00	0.35	0.005
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.006	49.73	0.02	1.84	
110-54-3	Hexane	X	X	86.18	2.324	0.025	221.73	0.11	8.19	0.111
7783-06-4	Hydrogen Sulfide			34.08	252.000	1.085	9,507.72	4.75	351.03	
7439-97-6	Mercury [4]		X	200.61	0.000292	0.000	0.06	0.00	0.00	0.000
78-93-3	Methyl ethyl ketone [5]	X		72.11	10.557	0.096	842.78	0.42	31.12	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.750	0.009	83.16	0.04	3.07	0.042
74-93-1	Methyl mercaptan	X		48.11	1.292	0.008	68.81	0.03	2.54	
109-66-0	Pentane [4]	X		72.15	3.290	0.030	262.79	0.13	9.70	
127-18-4	Perchloroethylene		X	165.83	1.193	0.025	219.02	0.11	8.09	0.110
74-98-6	Propane	X		44.09	14.757	0.082	720.30	0.36	26.59	
108-88-3	Toluene [3]	X	X	92.13	25.405	0.296	2,591.17	1.30	95.67	1.296
79-01-6	Trichloroethene	X	X	131.40	0.681	0.011	99.06	0.05	3.66	0.050
75-01-4	Vinyl chloride	X	X	62.50	1.077	0.009	74.52	0.04	2.75	0.037
1330-20-7	Xylene	X	X	106.16	16.582	0.222	1,948.83	0.97	71.95	0.974
									Total HAPs	3.48

Notes:

1. Concentration of individual HAPs were taken from Waste Industry Air Coalition (WIAC)
2. Not designated as a HAP in Chapter 2.4 of AP-42 (11/98), but is listed in the USEPA National Emission Inventory (NEI) database
3. Used 'No or unknown co-disposal' concentration
4. No WIAC value given for compound; used USEPA AP-42 value
5. Delisted as a HAP by USEPA
6. Cover oxidation of 25% applied (based on 40 CFR 98, Subpart HH)

Equations:

$$(mg/m^3) = \frac{(\text{Molecular weight}) \times (1\text{ atm}) \times (\text{Median ppmv})}{(298.15\text{ K}) \times (0.08206\text{ L*atm/K*mol})}$$

$$(lb/hr) = \frac{(mg/m^3) \times (2.205 \times 10^{-6}\text{ [lb/mg]}) \times (\text{Fugitive LFG Emission rate [ft}^3\text{/min]}) \times (60\text{ min/hr})}{(35.3147\text{ ft}^3/m^3)}$$

(lb/yr) = (lb/hr) x (8,760 hours/yr)

$$(TPY) = \frac{(lb/yr)}{(2{,}000\text{ lb/ton})}$$

Table 6

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of LFG Flare Emissions - Total Facility

Total LFG Generated [B] =	7,337	cfm
Collection Efficiency =	85%	
Total LFG Combusted =	6,237	cfm
LFG to Flares =	3,837	cfm

Flare Type	Operating Conditions			Estimated Potential Flare Emissions (TPY)					
	CFM	MMSCF	Hours	PM_{10}	NMOC	CO	NO_X	SO_2	VOC[A]
Enclosed 3,300 CFM	2,927	1,538.4	8,760	6.5	2.0	76.9	23.1	31.7	0.8
Open 910 CFM	910	478.3	8,760	2.0	0.6	23.9	7.2	9.9	0.2
	Total Emissions (TPY)			8.6	2.6	100.8	30.2	41.5	1.0
	Total Emissions (lb/yr)			17,141.5	5,277.1	201,665.0	60,499.5	83,066.6	2,058.1

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	NMOC	CO	NO_X	SO_2
Enclosed Flare 3,300 CFM	8.50	2.62	100.00	30.00	41.19
Open Flare 910 CFM	8.50	2.62	110.00	26.00	41.19

Emission Factor Development

3,300 CFM Enclosed Flare

CO:	0.20	lb/MMBtu
NOx:	0.06	lb/MMBtu

910 CFM Open Flare

CO:	0.22	lb/MMBtu
NOx:	0.052	lb/MMBtu

LFG Data:

NMOC:	595	ppm
TRS:	252	ppm
CH_4:	50.0%	of total LFG
VOC:	39.0%	of NMOC

Notes:

[A] Per AP-42, VOC emissions are calculated as 39% of NMOC emissions.
[B] Based on amount of LFG generated in peak year of LFG production in existing and future landfill areas

PM	17 lb/10^6 dscf methane per AP-42, section 2.4 (11/98)	
NMOC	Based on 595 ppm per AP-42, section 2.4 (11/98), and 98% destruction efficiency	
CO	Emission rates (in units fo lb/MMBtu) referenced from previous permit applications	
NO_X	Emission rates (in units fo lb/MMBtu) referenced from previous permit applications	
SO_2	Based on conservative TRS concentration of 252 ppm	
VOC	39% of NMOC per AP-42, section 2.4 (11/98)	
Heating value	500	Btu/scf
DE (of NMOC)	98.0	%

Table 6A

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Flare HAP Emissions - Total Facility

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	7,337	cfm
LFG Collection Efficiency =	85%	
Total LFG Collected =	6,237	cfm
Total LFG Collected to Flares =	3,837	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	VOC?	HAP?	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	Uncontrolled Emissions lb/yr	Uncontrolled Emissions TPY	Uncontrolled Emissions mg/m3	Avg. Control [6]	Controlled Emissions lb/hr	Controlled Emissions lb/yr	Controlled Emissions TPY	HAP (TPY)
71-55-6	1,1,1-Trichloroethane		X	133.41	0.168	0.013	115.33	0.06	0.92	98.0%	0.000	2.31	0.00	0.001
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.070	0.007	60.46	0.03	0.48	98.0%	0.000	1.21	0.00	0.001
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.043	377.38	0.19	3.00	98.0%	0.001	7.55	0.00	0.004
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.005	45.89	0.02	0.36	98.0%	0.000	0.92	0.00	0.000
107-06-2	1,2-Dichloroethane	X	X	98.96	0.120	0.007	61.11	0.03	0.49	98.0%	0.000	1.22	0.00	0.001
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.002	13.37	0.01	0.11	98.0%	0.000	0.27	0.00	0.000
67-63-0	2-Propanol	X		60.11	7.908	0.279	2,446.05	1.22	19.43	98.0%	0.006	48.92	0.02	
67-64-1	Acetone			58.08	6.126	0.209	1,830.86	0.92	14.54	98.0%	0.004	36.62	0.02	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.001	9.83	0.00	0.08	98.0%	0.000	0.20	0.00	0.000
71-43-2	Benzene [4]	X	X	78.11	0.972	0.045	390.68	0.20	3.10	98.0%	0.001	7.81	0.00	0.004
75-27-4	Bromodichloromethane	X		163.83	0.311	0.030	262.18	0.13	2.08	98.0%	0.001	5.24	0.00	
106-97-8	Butane [3]	X		58.12	5.030	0.172	1,504.34	0.75	11.95	98.0%	0.003	30.09	0.02	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.014	125.36	0.06	1.00	98.0%	0.000	2.51	0.00	0.001
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.001	5.54	0.00	0.04	98.0%	0.000	0.11	0.00	0.000
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.006	56.57	0.03	0.45	98.0%	0.000	1.13	0.00	0.001
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.015	131.48	0.07	1.04	98.0%	0.000	2.63	0.00	0.001
75-45-6	Chlorodifluoromethane			86.47	0.355	0.018	157.96	0.08	1.25	98.0%	0.000	3.16	0.00	
75-00-3	Chloroethane	X	X	64.52	0.239	0.009	79.35	0.04	0.63	98.0%	0.000	1.59	0.00	0.001
67-66-3	Chloroform	X	X	119.39	0.021	0.001	12.90	0.01	0.10	98.0%	0.000	0.26	0.00	0.000
74-87-3	Chloromethane [2]	X	X	50.49	0.249	0.007	64.69	0.03	0.51	98.0%	0.000	1.29	0.00	0.001
106-46-7	Dichlorobenzene	X	X	147.00	1.607	0.139	1,215.59	0.61	9.66	98.0%	0.003	24.31	0.01	0.012
75-71-8	Dichlorodifluoromethane			120.91	1.751	0.124	1,089.43	0.54	8.65	98.0%	0.002	21.79	0.01	
75-43-4	Dichlorofluoromethane [3]	X		102.92	2.620	0.158	1,387.57	0.69	11.02	98.0%	0.003	27.75	0.01	
75-09-2	Dichloromethane		X	84.94	3.395	0.169	1,483.90	0.74	11.79	98.0%	0.003	29.68	0.01	0.015
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.249	2,176.89	1.09	17.29	98.0%	0.005	43.54	0.02	
64-17-5	Ethanol	X		46.08	118.618	3.211	28,126.48	14.06	223.41	98.0%	0.064	562.53	0.28	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.049	433.52	0.22	3.44	98.0%	0.001	8.67	0.00	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.423	3,708.68	1.85	29.46	98.0%	0.008	74.17	0.04	0.037
106-93-4	Ethylene dibromide [2]	X	X	187.88	0.046	0.005	44.47	0.02	0.35	98.0%	0.000	0.89	0.00	0.000
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.026	231.17	0.12	1.84	98.0%	0.001	4.62	0.00	
7647-01-0	Hydrogen Chloride [5]		X	36.46	9.430	0.202	1,769.22	0.88	14.05	0.0%	0.202	1,769.22	0.88	0.885
110-54-3	Hexane	X	X	86.18	2.324	0.118	1,030.61	0.52	8.19	98.0%	0.002	20.61	0.01	0.010
7783-06-4	Hydrogen Sulfide			34.08	252.000	5.045	44,192.90	22.10	351.03	98.0%	0.101	883.86	0.44	
7439-97-6	Mercury [3]		X	200.61	0.000292	0.000	0.30	0.00	0.00	0.0%	0.000	0.30	0.00	0.000
78-93-3	Methyl ethyl ketone [7]	X		72.11	10.557	0.447	3,917.31	1.96	31.12	98.0%	0.009	78.35	0.04	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.750	0.044	386.55	0.19	3.07	98.0%	0.001	7.73	0.00	0.004
74-93-1	Methyl mercaptan	X		48.11	1.292	0.037	319.85	0.16	2.54	98.0%	0.001	6.40	0.00	
109-66-0	Pentane [3]	X		72.15	3.290	0.139	1,221.48	0.61	9.70	98.0%	0.003	24.43	0.01	
127-18-4	Perchloroethylene		X	165.83	1.193	0.116	1,018.02	0.51	8.09	98.0%	0.002	20.36	0.01	0.010
74-98-6	Propane	X		44.09	14.757	0.382	3,348.04	1.67	26.59	98.0%	0.008	66.96	0.03	
108-88-3	Toluene [4]	X	X	92.13	25.405	1.375	12,044.05	6.02	95.67	98.0%	0.027	240.88	0.12	0.120
79-01-6	Trichloroethene	X	X	131.40	0.681	0.053	460.46	0.23	3.66	98.0%	0.001	9.21	0.00	0.005
75-01-4	Vinyl chloride	X	X	62.50	1.077	0.040	346.38	0.17	2.75	98.0%	0.001	6.93	0.00	0.003
1330-20-7	Xylene	X	X	106.16	16.582	1.034	9,058.37	4.53	71.95	98.0%	0.021	181.17	0.09	0.091
													Total HAPs	1.208

Notes:

1. Concentration of individual HAPs were taken from Waste Industry Air Coalition (WIAC)
2. Not designated as a HAP in Chapter 2.4 of AP-42 (11/98), but is listed in the USEPA National Emission Inventory (NEI) database
3. No WIAC concentration specified; used AP-42 value
4. Used 'No or unknown co-disposal' concentration
5. HCl Concentration was taken from "Measurement of Toxic Emissions from Landfill: History and Current Developments".
6. Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)
7. Delisted as a HAP by USEPA

Equations:

$$(\text{mg/m}^3) = \frac{(\text{Molecular weight}) \times (1\ \text{atm}) \times (\text{Median ppmv})}{(298.15\ \text{K}) \times (0.08206\ \text{L*atm/K*mol})}$$

$$(\text{lb/hr}) = \frac{(\text{mg/m}^3) \times (2.205 \times 10^{-6}\ [\text{lb/mg}]) \times (\text{LFG Combustion rate } [\text{ft}^3/\text{min}]) \times (60\ \text{min/hr})}{(35.3147\ \text{ft}^3/\text{m}^3)}$$

(lb/yr) = (lb/hr) x (8,760 hours/yr)

$$(\text{TPY}) = \frac{(\text{lb/yr})}{(2{,}000\ \text{lb/ton})}$$

(Controlled Emissions) = (Uncontrolled Emissions) x (100% - Average Control [%])

Table 6B

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Flare Greenhouse Gas Emissions - Total Facility

LFG to 3,300 CFM Enclosed Flare = 2,927 cfm
LFG to 910 CFM Open Flare = 910 cfm

	Operating Hours	Estimated Potential Flare Emissions (TPY) Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthropogenic GHG
Enclosed 3,300 CFM	8,760	44,148.3	2.7	0.5	162.7	44,612.3	88,760.5	4,294.0
Open 910 CFM	8,760	13,726.3	0.8	0.2	50.6	13,870.6	27,596.9	1,335.1
	Total Emissions (TPY)	57,874.6	3.6	0.7	213.3	58,482.9	116,357.5	5,629.1
	Total Emissions (lb/yr)	1.16E+08	7.11E+03	1.40E+03	426,521.5	1.17E+08	2.33E+08	1.13E+07

Flare Combustion Factors

	Pounds per Hour of Operation CO_2	CH_4	N_2O
Enclosed 3,300 CFM	10,079.5	0.6	0.12
Open 910 CFM	3,133.9	0.2	0.04

Notes:

Combustion CO_2 Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
Combustion CH_4 Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
Combustion N_2O Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
Escape CH_4 Collected methane that escapes destruction in engines (1% of methane processed)
Collected CO_2 Portion of collected LFG that already contains CO_2 (50% of collected LFG)
Biogenic CO_2 Sum of Combustion CO_2 and Collected CO_2
Anthropogenic GHG Sum of Combustion CH_4, Combustion N_2O and Escape CH_4 expressed as tons of CO_2 equivalents

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99	% (manufacturer guarantee DE for LFG Enclosed Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (100 year)
CO_2	52.07	1
CH_4	3.20E-03	25
N_2O	6.30E-04	298

LFG Data:

Heat Input (3,300 CFM Flare):	87.8	MMBtu/hr
LFG combusted (3,300 CFM Flare):	2,927	cfm
Heat Input (910 CFM Flare):	27.3	MMBtu/hr
LFG combusted (910 CFM Flare):	910	cfm

Table 7

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Caterpillar 3516 Engine Emissions

Total Number of 3516 Engines = 8
LFG to Renewable Energy Facility = 2,400 cfm

	Operating Hours	Estimated Potential 3516 Engine Emissions (TPY)					
		PM_{10}	NMOC	CO	NO_X	SO_2	VOC[A]
Engine #1	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #2	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #3	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #4	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #5	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #6	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #7	8,760	0.1	0.2	30.0	15.0	3.2	0.1
Engine #8	8,760	0.1	0.2	30.0	15.0	3.2	0.1
	Total Emissions (TPY)	0.9	1.7	240.3	119.7	26.0	0.6
	Total Emissions (lb/yr)	1,802.1	3,300.9	480,656.8	239,441.6	51,959.2	1,287.3

3516 Engine Emission Factors

	Pounds per Hour of Operation				
	PM	NMOC	CO	NO_X	SO_2
3516 Engines	0.03	0.05	6.86	3.42	0.74

Notes:

[A] Per AP-42, VOC emissions are calculated as 39% of NMOC emissions.

PM Based on 0.01 grains/dscf LFG (1 grain = 1.43 x 10^{-4} lbs)
NMOC Based on 595 ppm per AP-42, section 2.4 (11/98), and 98% destruction efficiency
CO Based on February 2006 State Facility Application, prepared by McMahon & Mann
NO_X Based on February 2006 State Facility Application, prepared by McMahon & Mann
SO_2 Based on conservative TRS concentration of 252 ppm
VOC 39% of NMOC per AP-42, section 2.4 (11/98)

Heating value	500	Btu/scf
DE (of NMOC)	98.0	%
Engine Power	1,148	Bhp

Emission Factor Development

Caterpillar 3516 Engines

- referenced from *Chaffee Landfill PPP State Facility Permit Application* , prepared February 2006:

CO:	2.71	g/bhp-hr
NOx:	1.35	g/bhp-hr

LFG Data:

LFG combusted /engine:	300	cfm
NMOC:	595	ppm
TRS:	252	ppm
CH_4:	50.0%	of total LFG
VOC:	39.0%	of NMOC

Table 7A

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Caterpillar 3516 Engine HAPS Emissions

Landfill Gas Engines - HAP Emission Estimates

Total LFG Collected to Existing 3516 Engines = 2,400 cfm
Hours of Operation = 8,760

CAS #	LFG Constituent	VOC?	HAP?	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	Uncontrolled Emissions lb/yr	Uncontrolled Emissions TPY	mg/m3	Avg. Control[6]	Controlled Emissions lb/hr	Controlled Emissions lb/yr	Controlled Emissions TPY	HAP (TPY)
71-55-6	1,1,1-Trichloroethane		X	133.41	0.168	0.008	72.14	0.04	0.92	98.0%	0.000	1.44	0.00	0.001
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.070	0.004	37.82	0.02	0.48	98.0%	0.000	0.76	0.00	0.000
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.027	236.05	0.12	3.00	98.0%	0.001	4.72	0.00	0.002
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.003	28.71	0.01	0.36	98.0%	0.000	0.57	0.00	0.000
107-06-2	1,2-Dichloroethane	X	X	98.96	0.120	0.004	38.22	0.02	0.49	98.0%	0.000	0.76	0.00	0.000
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.001	8.36	0.00	0.11	98.0%	0.000	0.17	0.00	0.000
67-63-0	2-Propanol	X		60.11	7.908	0.175	1,530.04	0.77	19.43	98.0%	0.003	30.60	0.02	
67-64-1	Acetone			58.08	6.126	0.131	1,145.23	0.57	14.54	98.0%	0.003	22.90	0.01	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.001	6.15	0.00	0.08	98.0%	0.000	0.12	0.00	0.000
71-43-2	Benzene[4]	X	X	78.11	0.972	0.028	244.38	0.12	3.10	98.0%	0.001	4.89	0.00	0.002
75-27-4	Bromodichloromethane	X		163.83	0.311	0.019	164.00	0.08	2.08	98.0%	0.000	3.28	0.00	
106-97-8	Butane[3]	X		58.12	5.030	0.107	940.98	0.47	11.95	98.0%	0.002	18.82	0.01	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.009	78.41	0.04	1.00	98.0%	0.000	1.57	0.00	0.001
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	3.47	0.00	0.04	98.0%	0.000	0.07	0.00	0.000
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.004	35.38	0.02	0.45	98.0%	0.000	0.71	0.00	0.000
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.009	82.24	0.04	1.04	98.0%	0.000	1.64	0.00	0.001
75-45-6	Chlorodifluoromethane			86.47	0.355	0.011	98.81	0.05	1.25	98.0%	0.000	1.98	0.00	
75-00-3	Chloroethane	X	X	64.52	0.239	0.006	49.63	0.02	0.63	98.0%	0.000	0.99	0.00	0.000
67-66-3	Chloroform	X	X	119.39	0.021	0.001	8.07	0.00	0.10	98.0%	0.000	0.16	0.00	0.000
74-87-3	Chloromethane[2]	X	X	50.49	0.249	0.005	40.47	0.02	0.51	98.0%	0.000	0.81	0.00	0.000
106-46-7	Dichlorobenzene	X	X	147.00	1.607	0.087	760.36	0.38	9.66	98.0%	0.002	15.21	0.01	0.008
75-71-8	Dichlorodifluoromethane			120.91	1.751	0.078	681.45	0.34	8.65	98.0%	0.002	13.63	0.01	
75-43-4	Dichlorofluoromethane[3]	X		102.92	2.620	0.099	867.94	0.43	11.02	98.0%	0.002	17.36	0.01	
75-09-2	Dichloromethane		X	84.94	3.395	0.106	928.20	0.46	11.79	98.0%	0.002	18.56	0.01	0.009
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.155	1,361.67	0.68	17.29	98.0%	0.003	27.23	0.01	
64-17-5	Ethanol	X		46.08	118.618	2.008	17,593.47	8.80	223.41	98.0%	0.040	351.87	0.18	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.031	271.17	0.14	3.44	98.0%	0.001	5.42	0.00	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.265	2,319.82	1.16	29.46	98.0%	0.005	46.40	0.02	0.023
106-93-4	Ethylene dibromide[2]	X	X	187.88	0.046	0.003	27.82	0.01	0.35	98.0%	0.000	0.56	0.00	0.000
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.017	144.60	0.07	1.84	98.0%	0.000	2.89	0.00	
7647-01-0	Hydrogen Chloride[5]		X	36.46	9.430	0.126	1,106.67	0.55	14.05	0.0%	0.126	1,106.67	0.55	0.553
110-54-3	Hexane	X	X	86.18	2.324	0.074	644.66	0.32	8.19	98.0%	0.001	12.89	0.01	0.006
7783-06-4	Hydrogen Sulfide			34.08	252.000	3.156	27,643.21	13.82	351.03	98.0%	0.063	552.86	0.28	
7439-97-6	Mercury[3]		X	200.61	0.000292	0.000	0.19	0.00	0.00	0.0%	0.000	0.19	0.00	0.000
78-93-3	Methyl ethyl ketone[7]	X		72.11	10.557	0.280	2,450.33	1.23	31.12	98.0%	0.006	49.01	0.02	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.750	0.028	241.79	0.12	3.07	98.0%	0.001	4.84	0.00	0.002
74-93-1	Methyl mercaptan	X		48.11	1.292	0.023	200.07	0.10	2.54	98.0%	0.000	4.00	0.00	
109-66-0	Pentane[3]	X		72.15	3.290	0.087	764.05	0.38	9.70	98.0%	0.002	15.28	0.01	
127-18-4	Perchloroethylene		X	165.83	1.193	0.073	636.78	0.32	8.09	98.0%	0.001	12.74	0.01	0.006
74-98-6	Propane	X		44.09	14.757	0.239	2,094.24	1.05	26.59	98.0%	0.005	41.88	0.02	
108-88-3	Toluene[4]	X	X	92.13	25.405	0.860	7,533.71	3.77	95.67	98.0%	0.017	150.67	0.08	0.075
79-01-6	Trichloroethene	X	X	131.40	0.681	0.033	288.03	0.14	3.66	98.0%	0.001	5.76	0.00	0.003
75-01-4	Vinyl chloride	X	X	62.50	1.077	0.025	216.66	0.11	2.75	98.0%	0.000	4.33	0.00	0.002
1330-20-7	Xylene	X	X	106.16	16.582	0.647	5,666.13	2.83	71.95	98.0%	0.013	113.32	0.06	0.057
													Total HAPs	0.756

Notes:

1. Concentration of individual HAPs were taken from Waste Industry Air Coalition (WIAC)
2. Not designated as a HAP in Chapter 2.4 of AP-42 (11/98), but is listed in the USEPA National Emission Inventory (NEI) database
3. No WIAC concentration specified; used AP-42 value
4. Used 'No or unknown co-disposal' concentration
5. HCl Concentration was taken from "Measurement of Toxic Emissions from Landfill: History and Current Developments".
6. Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)
7. Delisted as a HAP by USEPA

Equations:

$$(mg/m^3) = \frac{\text{(Molecular weight) x (1 atm) x (Median ppmv)}}{\text{(298.15 K) x (0.08206 L*atm/K*mol)}}$$

$$(lb/hr) = \frac{(mg/m^3) \text{ x } (2.205 \text{ x } 10^{-6} \text{ [lb/mg]) x (LFG Combustion rate } [ft^3/min]) \text{ x (60 min/hr)}}{(35.3147 \; ft^3/m^3)}$$

(lb/yr) = (lb/hr) x (8,760 hours/yr)

$$(TPY) = \frac{\text{(lb/yr)}}{\text{(2,000 lb/ton)}}$$

(Controlled Emissions) = (Uncontrolled Emissions) x (100% - Average Control [%])

Table 7B

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Caterpillar 3516 Engine Greenhouse Gas Emissions

Total Number of 3516 Engines = 8
LFG to Existing Caterpillar 3516 Engines = 2,400 cfm

	Operating Hours	Estimated Potential 3516 Engine Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthropogenic GHG
Engine #1	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #2	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #3	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #4	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #5	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #6	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #7	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
Engine #8	8,760	4,525.2	0.3	0.1	27.7	4,572.7	9,097.9	715.3
	Total Emissions (TPY)	36,201.3	2.2	0.4	221.4	36,581.8	72,783.0	5,722.1
	Total Emissions (lb/yr)	7.24E+07	4.45E+03	8.76E+02	442,879.0	7.32E+07	1.46E+08	1.14E+07

3516 Engine Combustion Factors

	Pounds per Hour of Operation		
	CO_2	***CH_4***	***N_2O***
3516 Engines	1,033.1	0.1	0.01

Notes:

Combustion CO_2	Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
Combustion CH_4	Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
Combustion N_2O	Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
Escape CH_4	Collected methane that escapes destruction in engines (1.66% of methane processed)
Collected CO_2	Portion of collected LFG that already contains CO_2 (50% of collected LFG)
Biogenic CO_2	Sum of Combustion CO_2 and Collected CO_2
Anthropogenic GHG	Sum of Combustion CH_4, Combustion N_2O and Escape CH_4 expressed as tons of CO_2 equivalents

Emission Factor Development

Existing Caterpillar 3516 Engines

	EF (kg/MMBtu)	GWP (100 year)
CO_2	52.07	1
CH_4	3.20E-03	25
N_2O	6.30E-04	298

LFG Data:

Heat Input:	9.0	MMBtu/hr
LFG combusted /engine:	300	cfm

Engine Power	1,148	Bhp
Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	98.34	% (based on results of engine source tests; information gathered by the Solid Waste Industry for Climate Solutions (SWICS))
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

Table 8

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Crankcase Ventilator Emissions

Crankcase Ventilator (CCV) emissions (as particulate matter) can be estimated using the following equations:

$$E_{PM} = U * \rho_{oil} * f_{emitted} \qquad E_{controlled} = E_{PM} * \frac{(100-\psi)}{100}$$

where,

E_{PM} = Uncontrolled particulate matter emissions (in tons per year (TPY))
U = Oil consumption rate in 1 engine (in gallons per year (GPY))
ρ_{oil} = Density of Oil (in pounds per gallon (lb/gal)) = 8.33 lb/gal * SG_{oil} = 7.41 lb/gal
$f_{emitted}$ = Fraction of oil that is emitted through crankcase ventilator

$E_{controlled}$ = Controlled PM emissions [with Smog-Hog mist eliminator] (TPY)
ψ = Efficiency of Smog-Hog oil mist eliminator

Assumptions:

U_{3516} =	16 gal/month =	192	GPY
	Specific gravity (oil) =	0.89	
	$f_{emitted}$ =	0.5	
	$f_{combusted}$ =	0.5	
	ψ =	95	%

Estimated Crankcase Ventilator Emissions

CCV #1 (Engines 1 - 8 [3516 engines]):

	Uncontrolled PM Emissions					Controlled PM Emissions		
E_{PM} = (192 GPY) * (7.4 lb/gal) * (0.5) * 8 engines =	5,694	lb/year =	2.8	TPY	$E_{controlled}$ =	(1.4 TPY) * (0.05) =	0.14	TPY

Table 9

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Paint Booth Emissions

Manufacture/Paint Description CAS Number	Paint Number	Max Quantity (gal/yr)	Paint Density (Lb/gal)	VOC Weight (Lb/gal)	% Ammonia 7644-41-7	% Glycol Ether Compound 111-76-2	% Secondary Butyl Alcohol 78-92-2	Particulates (controlled)	Unspeciated VOC 0NY998-10-0
Sheboygan Paint Co. Premium WM Green Aqua Enamel	73-5184F	1,000	9.41	2.70	0.33%	7.26%	4.60%	35%	Contains VOC value from VOC weight and % Secondary Butyl Alcohol
Totals Lbs/yr				2,700	31.1	683.2	432.9	329.4	3,132.9
Totals Tons/yr				1.35	0.0155	0.34	0.22	0.16	1.57

Table 10

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Exempt Emission Sources

Trivial/Exempt Source	VOC (TPY)	CO (TPY)	NOx (TPY)	SO_2 (TPY)	PM_{10} (TPY)	NMOC (TPY)	HAPs (TPY)	CO_2 (TPY)
Heating Equipment (Propane)	0.002	0.02	0.03	0.0002	0.001	---	---	25.0
Heating Equipment (Natural Gas)	0.01	0.168	0.20	0.00	0.015	---	---	240.0
Portable Gasoline Generators	0.08	0.035	0.06	0.003	0.004	---	---	5.4
Dewatering Pump	0.05	0.134	0.62	0.04	0.044	---	---	23.0
Odor Neutralizers	4.04	---	---	---	---	---	---	---
Parts Washers	3.35	---	---	---	---	---	0.01	---
UST (Diesel Fuel)	0.004	---	---	---	---	---	---	---
AST (Gasoline)	0.02	---	---	---	---	---	---	---
New Oil Tanks	*	---	---	---	---	---	---	---
Used Oil Tanks	*	---	---	---	---	---	---	---
Coolant Tanks	*	---	---	---	---	---	---	---
Totals	**7.55**	**0.35**	**0.90**	**0.05**	**0.06**	**0.00**	**0.01**	**293.40**

Notes:

* Source emits a negligible amount of emissions

Table 10A

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Propane Heating Emissions

Maximum propane combusted per year **4.000** 10^3 gallons

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	4.000000 10^3 gal propane	=	**2.800**	**0.00140**
SO_X =	0.1 lb. X / 10^3 gal	4.000000 10^3 gal propane	=	**0.400**	**0.00020**
NO_X =	13 lb. X / 10^3 gal	4.000000 10^3 gal propane	=	**52.000**	**0.02600**
VOC =	1 lb. X / 10^3 gal	4.000000 10^3 gal propane	=	**4.000**	**0.00200**
CO =	7.5 lb. X / 10^3 gal	4.000000 10^3 gal propane	=	**30.000**	**0.01500**
CO_2 =	12,500 lb. X / 10^3 gal	4.000000 10^3 gal propane	=	**50,000**	**25.00000**

* Emissions factors from AP-42 7/2008, section 1.5 (Assume a sulfur content of 1%)

Table 10B

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Summary of Natural Gas Heating Emissions

Maximum Usage **4.00** MMScf per year

Emission Calculations:						
					Lbs/yr	TPY
PM_{10}=	7.6 Lb PM / MMscf	X	4.0 MMscf / Year	=	**30.4**	**0.015**
SO_X =	0.6 Lb SO_X / MMscf	X	4.0 MMscf / Year	=	**2.4**	**0.001**
NO_X =	100 Lb NO_X / MMscf	X	4.0 MMscf / Year	=	**400**	**0.200**
VOC =	5.5 Lb VOC / MMscf	X	4.0 MMscf / Year	=	**22**	**0.011**
CO =	84 Lb CO / MMscf	X	4.0 MMscf / Year	=	**336**	**0.168**
CO_2 =	120,000 Lb CO_2 / MMscf	X	4.0 MMscf / Year	=	**480,000**	**240.0**

* Emissions factors from AP-42 7/98 Section 1.4.

Table 10C

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Portable Gasoline Generators

Max. Hours of Operation **500** hours per year
Engine Power **20** HP

Emission Calculations:								
							Lbs/yr	TPY
PM_{10}=	0.000721 Lb PM / hp-hr	X	20 HP	X	500 Hours / Year	=	**7.21**	**0.004**
SO_X =	0.000591 Lb SO_X / hp-hr	X	20 HP	X	500 Hours / Year	=	**5.91**	**0.003**
NO_X =	0.011 Lb NO_X / hp-hr	X	20 HP	X	500 Hours / Year	=	**110**	**0.055**
VOC =	0.015 Lb VOC / hp-hr	X	20 HP	X	500 Hours / Year	=	**150**	**0.075**
CO =	0.00696 Lb CO / hp-hr	X	20 HP	X	500 Hours / Year	=	**69.6**	**0.035**
CO_2 =	1.08 Lb CO_2 / hp-hr	X	20 HP	X	500 Hours / Year	=	**10,800.0**	**5.4**

* Emissions factors from AP-42 10/96, section 3.3

Table 10D

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Diesel Dewatering Pump

Max. Hours of Operation	**500**	hours per year
Engine Power	**80**	HP

Emission Calculations:

							Lbs/yr	TPY
PM_{10}=	0.00220 Lb PM / hp-hr	X	80 HP	X	500 Hours / Year	=	**88**	**0.044**
SO_X =	0.00205 Lb SO_X / hp-hr	X	80 HP	X	500 Hours / Year	=	**82**	**0.041**
NO_X =	0.031 Lb NO_X / hp-hr	X	80 HP	X	500 Hours / Year	=	**1240**	**0.620**
VOC =	0.00247 Lb VOC / hp-hr	X	80 HP	X	500 Hours / Year	=	**98.8**	**0.049**
CO =	0.00668 Lb CO / hp-hr	X	80 HP	X	500 Hours / Year	=	**267.2**	**0.134**
CO_2 =	1.15 Lb CO_2 / hp-hr	X	80 HP	X	500 Hours / Year	=	**46,000.0**	**23.0**

* Emissions factors from AP-42 10/96, section 3.3

Table 10E

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Odor Neutralizers

Estimated Annual Usage	**1,000**	gallons per year	
Percent Volatilzation	**97**	%	(based on MSDS sheet)

Emission Calculations:		
	Lbs/yr	TPY
VOC = 1,850 gallons / year X 97 % volatilized X 8.34 lbs / gallon	**8,089.8**	**4.045**

Table 10F

Emissions Inventory
Chaffee Landfill
Waste Management of New York, LLC

Parts Washing Solvent Emissions

Manufacture/Solvent Description CAS Number	Max Quantity (gal/yr)	Density (Lb/gal)	VOC Weight (Lb/gal)	% Distillates 64742-47-8	% Perchloroethylene 127-18-4
Safety-Kleen 105 Solvent Recycled	1,000	6.70	6.70	99.8%	0.2%
Totals Lbs/yr			6,700.0	6,686.6	13.4
Totals Tons/yr			3.35	3.34	0.0067

Appendices

Appendix A
Title V Air Permit Application Forms

New York State Department of Environmental Conservation
Air Permit Application

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

DEC ID	Application ID	Application Type
9-1462-00001	9-1462-00001/00013	State Facility × Title V

Section I - Certification

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information required to complete this application, I believe the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Responsible Official	Steven Poggi	Title	Director of Disposal Operations-NE/UNY Area
Signature	Steven Poggi	Date	7/21/2020

Professional Engineer Certification

I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments as they pertain to the practice of engineering. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Professional Engineer	Richard Snyder	NYS License No.	066242
Signature	Richard J. Snyder	Date	7/21/2020

Section II - Identification Information

Type of Permit Action Requested

New Renewal × Significant Modification Administrative Amendment Minor Modification

Application for the construction of a new facility × Application involves the construction of new emission unit(s)

Facility Information

Name	Chaffee Landfill		
Location Address	10860 Olean Road		
City / × Town / Village	Chaffee	Zip	14030

Owner/Firm Information

Name	Waste Management of New York LLC - Chaffee Landfill					Business Taxpayer ID	364206797
Street Address	10860 Olean Road						
City	Chaffee	State/Province	NY	Country	USA	Zip	14030

Owner Classification: Federal State Municipal × Corporation/Partnership Individual

Owner/Firm Contact Information

Name	Michael Mahar					Phone	716-496-5192
E-mail Address	MMahar@wm.com					Fax	716-496-7325
Affiliation	WMNY Chaffee Landfill					Title	District Manager
Street Address	10860 Olean Road						
City	Chaffee	State/Province	NY	Country	USA	Zip	14030

Facility Contact Information

Name	Michael Mahar					Phone	716-496-5192
E-mail Address	MMahar@wm.com					Fax	716-496-7325
Affiliation	WMNY Chaffee Landfill					Title	District Manager
Street Address	10860 Olean Road						
City	Chaffee	State/Province	NY	Country	USA	Zip	14030

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Project Description ☐ Continuation Sheet(s)

Section III - Facility Information

Facility Classification

☐ Hospital ☐ Residential ☐ Educational/Institutional ☐ Commercial ☐ Industrial ☐ Utility

Affected States (Title V Applications Only)

☐ Vermont ☐ Massachusetts ☐ Rhode Island ☐ Pennsylvania Tribal Land: ___________________
☐ New Hampshire ☐ Connecticut ☐ New Jersey ☐ Ohio Tribal Land: ___________________

SIC Code(s)			NAICS Code(s)			

Facility Description ☐ Continuation Sheet(s)

Compliance Statements (Title V Applications Only)

I certify that as of the date of this application the facility is in compliance with all applicable requirements. ☐ Yes ☐ No

If one or more emission units at the facility are not in compliance with all applicable requirements at the time of signing this application (the 'NO' box must be checked), the noncomplying units must be identified in the "Compliance Plan" block on page 8 of this form along with the compliance plan information required. For all emission units at the facility that are operating in compliance with all applicable requirements, complete the following:

☐ This facility will continue to be operated and maintained in such a manner as to assure compliance for the duration of the permit, except those emission units referenced in the compliance plan portion of this application.

☐ For all emission units subject to any applicable requirements that will become effective during the term of the permit, this facility will meet such requirements on a timely basis.

☐ Compliance certification reports will be submitted at least once per year. Each report will certify compliance status with respect to each applicable requirement, and the method used to determine the status.

Facility Applicable Federal Requirements ☐ Continuation Sheet(s)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause

Facility State Only Requirements ☐ Continuation Sheet(s)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause

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Facility Compliance Certification ☐ Continuation Sheet(s)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause

☐ Applicable Federal Requirement ☐ State Only Requirement	☐ Capping	CAS Number	Contaminant Name

Monitoring Information

☐ Work Practice Involving Specific Operations ☐ Ambient Air Monitoring ☐ Record Keeping/Maintenance Procedures

Compliance Activity Description

Work Practice Type Code	Process Material		Reference Test Method
	Code	Description	

Monitored Parameter		Manufacturer's Name/Model Number
Code	Description	

Limit		Limit Units	
Upper	Lower	Code	Description

Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description

Facility Emissions Summary ☐ Continuation Sheet(s)			
CAS Number	Contaminant Name	Potential to Emit (tons/yr)	Actual Emissions (pounds/yr)
0NY075 - 00 - 5	PM-10		
0NY750 - 02 - 5	PM-2.5		
007446 - 09 - 5	Sulfur Dioxide		
0NY210 - 00 - 0	Oxides of Nitrogen		
000630 - 08 - 0	Carbon Monoxide		
007439 - 92 - 1	Lead (elemental)		
0NY998 - 00 - 0	Total Volatile Organic Compounds		
0NY100 - 00 - 0	Total Hazardous Air Pollutants		
0NY750 - 00 - 0	Carbon Dioxide Equivalents		

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Section III - Facility Information

Facility Description (continuation)

Chaffee Landfill presently operates eight (8) Caterpillar 3516 Internal Combustion (IC) engines at its Renewable Energy Facility (REF).

Chaffee Landfill also has on-site a 3,300 cfm enclosed flare and a 910 cfm open flare which are capable of combusting any excess landfill gas that is not being used by the engines. The enclosed flare comes with a manufacturer's maximum guarantee of 0.2 lb/MMBtu of Carbon Monoxide (CO).

Therefore, emission sources at the facility include fugitive emissions from the landfill; LFG combustion emissions from a 910-cfm flare, a 3,300 cfm enclosed flare, and eight IC engines; combustion emissions from heating equipment; emissions from surface coating operations; and evaporative emissions from fuel and oil storage tanks, leachate tanks, and parts washers.

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Section III - Facility Information

Facility Applicable Federal Requirements (continuation)									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
40	CFR	60	WWW	758	d				
40	CFR	60	WWW	758	e				
40	CFR	60	WWW	759	a				
40	CFR	60	WWW	759	b				
40	CFR	60	WWW	759	c				
40	CFR	61	M	154					
40	CFR	63	AAAA	1955	b				
40	CFR	60	A						
40	CFR	68							
40	CFR	82	F						
6	NYCRR	200		6					
6	NYCRR	200		7					
6	NYCRR	201	1	7					
6	NYCRR	201	1	8					
6	NYCRR	201	3	2	a				
6	NYCRR	201	3	3	a				
6	NYCRR	201	6						
6	NYCRR	202	1	1					
6	NYCRR	202	2	1					
6	NYCRR	202	2	5					
6	NYCRR	211		1					
6	NYCRR	212							
6	NYCRR	215		3					
6	NYCRR	208							

Continuation Sheet 1 of 1

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Section IV - Emission Unit Information

Emission Unit Description	☐ Continuation Sheet(s)
Emission Unit -	

Building Information				☐ Continuation Sheet(s)
Building ID	Building Name	Length (ft)	Width (ft)	Orientation

Emission Unit -	Emission Unit Emissions Summary			☐ Continuation Sheet(s)
CAS Number	Contaminant Name			
ERP (lbs/yr)	Potential to Emit		Actual Emissions	
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)
CAS Number	Contaminant Name			
ERP (lbs/yr)	Potential to Emit		Actual Emissions	
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)
CAS Number	Contaminant Name			
ERP (lbs/yr)	Potential to Emit		Actual Emissions	
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)
CAS Number	Contaminant Name			
ERP (lbs/yr)	Potential to Emit		Actual Emissions	
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)

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Emission Point Information

☐ Continuation Sheet(s)

Emission Point						
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (^{o}F)	Cross Section	
					Length (in)	Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal
Emission Point						
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (^{o}F)	Cross Section	
					Length (in)	Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal
Emission Point						
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (^{o}F)	Cross Section	
					Length (in)	Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal

Emission Source/Control Information

☐ Continuation Sheet(s)

Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description

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Process Information					☐ Continuation Sheet(s)
Emission Unit	-			Process	
Process Description					

Source Classification Code (SCC)	Total Throughput		Throughput Quantity Units	
	Quantity/Hr	Quantity/Yr	Code	Description

	Operating Schedule		Building	Floor/Location
☐ Confidential ☐ Operating at Maximum Capacity	Hours/Day	Days/Year		

Emission Point Identifier(s)						

Emission Source/Control Identifier(s)						

Emission Unit	-			Process	
Process Description					

Source Classification Code (SCC)	Total Throughput		Throughput Quantity Units	
	Quantity/Hr	Quantity/Yr	Code	Description

	Operating Schedule		Building	Floor/Location
☐ Confidential ☐ Operating at Maximum Capacity	Hours/Day	Days/Year		

Emission Point Identifier(s)						

Emission Source/Control Identifier(s)						

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Process Emissions Summary

☐ Continuation Sheet(s)

Emission Unit	-						Process	
CAS Number	Contaminant Name		% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined	
Potential to Emit			Standard Units		Potential to Emit How Determined	Actual Emissions		
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)	

Emission Unit	-						Process	
CAS Number	Contaminant Name		% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined	
Potential to Emit			Standard Units		Potential to Emit How Determined	Actual Emissions		
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)	

Emission Unit	-						Process	
CAS Number	Contaminant Name		% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined	
Potential to Emit			Standard Units		Potential to Emit How Determined	Actual Emissions		
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)	

Emission Source Emissions Summary

☐ Continuation Sheet(s)

Emission Source							Process	
CAS Number	Contaminant Name		% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined	
Potential to Emit			Standard Units		Potential to Emit How Determined	Actual Emissions		
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)	

Emission Source							Process	
CAS Number	Contaminant Name		% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined	
Potential to Emit			Standard Units		Potential to Emit How Determined	Actual Emissions		
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)	

Emission Source							Process	
CAS Number	Contaminant Name		% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined	
Potential to Emit			Standard Units		Potential to Emit How Determined	Actual Emissions		
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)	

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Emission Unit	Emission Point	Process	Emission Source	Emission Unit Applicable Federal Requirements							☐ Continuation Sheet(s)		
				Title	Type	Part	Subpart	Section	Subdiv.	Parag.	Subparag.	Cl.	Subcl.

Emission Unit	Emission Point	Process	Emission Source	Emission Unit State Only Requirements							☐ Continuation Sheet(s)		
				Title	Type	Part	Subpart	Section	Subdiv.	Parag.	Subparag.	Cl.	Subcl.

Emission Unit Compliance Certification

☐ Continuation Sheet(s)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause

☐ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS Number	Contaminant Name

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of a Process or Control Device Parameters as a Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Compliance Activity Description

Work Practice Type Code	Process Material		Reference Test Method
	Code	Description	

Monitored Parameter		Manufacturer's Name/Model Number
Code	Description	

Limit		Limit Units	
Upper	Lower	Code	Description

Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description

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Determination of Non-Applicability (Title V Applications Only) ☐ Continuation Sheet(s)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
Emission Unit	Emission Point	Process	Emission Source	☐ Applicable Federal Requirement ☐ State Only Requirement					
Non-Applicability Description									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
Emission Unit	Emission Point	Process	Emission Source	☐ Applicable Federal Requirement ☐ State Only Requirement					
Non- Applicability Description									

Compliance Plan ☐ Continuation Sheet(s)												
For any emission units which are not in compliance at the time of permit application, the applicant shall complete the following:												
Consent Order		Certified progress reports are to be submitted every 6 months beginning / /										
Emission Unit	Process	Emission Source	Applicable Federal Requirement									
			Title	Type	Part	Subpart	Section	Subdiv.	Parag.	Subparag.	Clause	Subcl.

Remedial Measures and Intermediate Milestones	R/I	Date Scheduled

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Request for Emission Reduction Credits

☐ Continuation Sheet(s)

Emission Source	

Emission Reduction Description

Contaminant Emission Reduction Data

Baseline Period ____ /____ /________ to ____ / ____ / ________		Reduction	
		Date	Method
CAS Number	Contaminant Name	ERC (lbs/yr)	
		Netting	Offset

Facility to Use Future Reduction

Name	Application ID: _ - _ _ _ _ - _ _ _ _ _ / _ _ _ _ _
Location Address	
☐ City/ ☐ Town / ☐ Village	State / Zip

Use of Emission Reduction Credits

☐ Continuation Sheet(s)

Emission Source	

Proposed Project Description

Contaminant Emissions Increase Data

CAS Number	Contaminant Name	Project Emission Potential (lbs/yr)

Statement of Compliance

☐ All facilities under the ownership of this "owner/firm" are operating in compliance with all applicable requirements and state regulations including any compliance certification requirements under Section 114(a)(3) of the Clean Air Act Amendments of 1990, or are meeting the schedule of a consent order.

Source of Emission Reduction Credit - Facility

Name	Permit ID: _ - _ _ _ _ - _ _ _ _ _ / _ _ _ _ _
Location Address	
☐ City/ ☐ Town / ☐ Village	State / Zip

Emission Source	CAS Number	Contaminant Name	ERC (lbs/yr)	
			Netting	Offset

DEC ID
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Supporting Documentation and Attachments	
Required Supporting Documentation	Date of Document
☐ List of Exempt Activities (attach form)	
☐ Plot Plan	
☐ Process Flow Diagram	
☐ Methods Used to Determine Compliance (attach form)	
☐ Emissions Calculations	
Optional Supporting Documentation	Date of Document
☐ Air Quality Model	
☐ Confidentiality Justification	
☐ Ambient Air Quality Monitoring Plan or Reports	
☐ Stack Test Protocol	
☐ Stack Test Report	
☐ Continuous Emissions Monitoring Plan	
☐ Lowest Achievable Emission Rate (LAER) Demonstration	
☐ Best Available Control Technology (BACT) Demonstration	
☐ Reasonably Available Control Technology (RACT) Demonstration	
☐ Toxic Impact Assessment (TIA)	
☐ Environmental Rating Demonstration	
☐ Operational Flexibility Protocol/Description of Alternate Operating Scenarios	
☐ Title IV Permit Application	
☐ Emission Reduction Credit (ERC) Quantification (attach form)	
☐ Baseline Period Demonstration	
☐ Use of Emission Reduction Credits (attach form)	
☐ Analysis of Contemporaneous Emissions Increase/Decrease	
Other Supporting Documentation	Date of Document

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Air Permit Application

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List of Exempt Activities

Instructions
Applicants for Title V facility permits must provide a listing of each exempt activity, as described in 6 NYCRR Part 201-3.2(c), that is currently operated at the facility. This form provides a means to fulfill this requirement. In order to complete this form, enter the number and building location of each exempt activity. Building IDs used on this form should match those used in the Title V permit application. If a listed activity is not operated at the facility, leave the corresponding information blank.

Combustion			
Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(1)	Stationary or portable combustion installations where the furnace has a maximum heat input capacity less than 10 mmBtu/hr burning fuels other than coal or wood; or a maximum heat input capacity of less than 1 mmBtu/hr burning coal or wood. This activity does not include combustion installations burning any material classified as solid waste, as defined in 6 NYCRR Part 360, or waste oil, as defined in 6 NYCRR Subpart 225-2.		
(2)	Space heaters burning waste oil at automotive service facilities, as defined in 6 NYCRR Subpart 225-2, generated on-site or at a facility under common control, alone or in conjunction with used oil generated by a do-it-yourself oil changer as defined in 6 NYCRR Subpart 374-2.		
(3)(i)	Stationary or portable internal combustion engines that are liquid or gaseous fuel powered and located within the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury, and have a maximum mechanical power rating of less than 200 brake horsepower.		
(3)(ii)	Stationary or portable internal combustion engines that are liquid or gaseous fuel powered and located outside of the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury, and have a maximum mechanical power rating of less than 400 brake horsepower.		
(3)(iii)	Stationary or portable internal combustion engines that are gasoline powered and have a maximum mechanical power rating of less than 50 brake horsepower.		
(4)	Reserved.		
(5)	Gas turbines with a heat input at peak load less then 10 mmBtu/hour		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(6)	Emergency power generating stationary internal combustion engines, as defined in 6 NYCRR Part 200.1(cq), and engine test cells at engine manufacturing facilities that are utilized for research and development, reliability performance testing, or quality assurance performance testing. Stationary internal combustion engines used for peak shaving and/or demand response programs are not exempt.		
Combustion Related			
(7)	Non-contact water cooling towers and water treatment systems for process cooling water and other water containers designed to cool, store or otherwise handle water that has not been in direct contact with gaseous or liquid process streams.		
Agricultural			
(8)	Feed and grain milling, cleaning, conveying, drying and storage operations including grain storage silos, where such silos exhaust to an appropriate emissions control device, excluding grain terminal elevators with permanent storage capacities over 2.5 million U.S. bushels, and grain storage elevators with capacities above one million bushels.		
(9)	Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment.		
Commercial - Food Service Industries			
(10)	Flour silos at bakeries, provided all such silos are exhausted through an appropriate emission control device.		
(11)	Emissions from flavorings added to a food product where such flavors are manually added to the product.		
Commercial - Graphic Arts			
(12)	Screen printing inks/coatings or adhesives which are applied by a hand-held squeegee. A hand-held squeegee is one that is not propelled though the use of mechanical conveyance and is not an integral part of the screen printing process.		
(13)	Graphic arts processes at facilities located outside the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury whose facility-wide total emissions of volatile organic compounds from inks, coatings, adhesives, fountain solutions and cleaning solutions are less than three tons during any 12-month period.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(14)	Graphic label and/or box labeling operations where the inks are applied by stamping or rolling.		
(15)	Graphic arts processes which are specifically exempted from regulation under 6 NYCRR Part 234, with respect to emissions of volatile organic compounds which are not given an A rating as described in 6 NYCRR Part 212.		
Commercial - Other			
(16)	Gasoline dispensing sites registered with the department pursuant to 6 NYCRR Part 612.		
(17)	Surface coating and related activities at facilities which use less than 25 gallons per month of total coating materials, or with actual volatile organic compound emissions of 1,000 pounds or less from coating materials in any 12-month period. Coating materials include all paints and paint components, other materials mixed with paints prior to application, and cleaning solvents, combined. This exemption is subject to the following: (i) The facility is located outside of the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury; and (ii) All abrasive cleaning and surface coating operations are performed in an enclosed building where such operations are exhausted into appropriate emission control devices.		
(18)	Abrasive cleaning operations which exhaust to an appropriate emission control device.		
(19)	Ultraviolet curing operations.		
Municipal/Public Health Related			
(20)	Landfill gas ventilating systems at landfills with design capacities less than 2.5 million megagrams (3.3 million tons) and 2.5 million cubic meters (2.75 million cubic yards), where the systems are vented directly to the atmosphere, and the ventilating system has been required by, and is operating under, the conditions of a valid 6 NYCRR Part 360 permit, or order on consent.		
Storage Vessels			
(21)	Distillate fuel oil, residual fuel oil, and liquid asphalt storage tanks with storage capacities below 300,000 barrels.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(22)	Pressurized fixed roof tanks which are capable of maintaining a working pressure at all times to prevent emissions of volatile organic compounds to the outdoor atmosphere.		
(23)	External floating roof tanks which are of welded construction and are equipped with a metallic-type shoe primary seal and a secondary seal from the top of the shoe seal to the tank wall.		
(24)	External floating roof tanks which are used for the storage of a petroleum or volatile organic liquid with a true vapor pressure less than 4.0 psi (27.6 kPa), are of welded construction and are equipped with one of the following: (i) a metallic-type shoe seal; (ii) a liquid-mounted foam seal; (iii) a liquid-mounted liquid-filled type seal; or (iv) equivalent control equipment or device.		
(25)	Storage tanks, including petroleum liquid storage tanks as defined in 6 NYCRR Part 229, with capacities less than 10,000 gallons, except those subject to 6 NYCRR Part 229 or Part 233.		
(26)	Horizontal petroleum or volatile organic liquid storage tanks.		
(27)	Storage silos storing solid materials, provided all such silos are exhausted through an appropriate emission control device. This exemption does not include raw material, clinker, or finished product storage silos at Portland cement plants.		
Industrial			
(28)	Processing equipment at existing sand and gravel and stone crushing plants which were installed or constructed before August 31, 1983, where water is used for operations such as wet conveying, separating, and washing. This exemption does not include processing equipment at existing sand and gravel and stone crushing plants where water is used for dust suppression.		
(29)(i)	Sand and gravel processing or crushed stone processing lines at a non-metallic mineral processing facility that are a permanent or fixed installation with a maximum rated processing capacity of 25 tons of minerals per hour or less.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(29)(ii)	Sand and gravel processing or crushed stone processing lines at a non-metallic mineral processing facility that are a portable emission source with a maximum rated processing capacity of 150 tons of minerals per hour or less.		
(29)(iii)	Sand and gravel processing or crushed stone processing lines at a non-metallic mineral processing facility that are used exclusively to screen minerals at a facility where no crushing or grinding takes place.		
(30)	Reserved.		
(31)	Surface coating operations which are specifically exempted from regulation under 6 NYCRR Part 228, with respect to emissions of volatile organic compounds which are not given an A rating pursuant to 6 NYCRR Part 212.		
(32)	Pharmaceutical tablet branding operations.		
(33)	Thermal packaging operations, including, but not limited to, therimage labeling, blister packing, shrink wrapping, shrink banding, and carton gluing.		
(34)	Powder coating operations.		
(35)	All tumblers used for the cleaning and/or deburring of metal products without abrasive blasting.		
(36)	Presses used exclusively for molding or extruding plastics except where halogenated carbon compounds or hydrocarbon solvents are used as foaming agents.		
(37)	Concrete batch plants where the cement weigh hopper and all bulk storage silos are exhausted through fabric filters, and the batch drop point is controlled by a shroud or other emission control device.		
(38)	Cement storage operations not located at Portland cement plants where materials are transported by screw or bucket conveyors.		
(39)(i)	Cold cleaning degreasers with an open surface area of 11 square feet or less and an internal volume of 93 gallons or less or, having an organic solvent loss of 3 gallons per day or less.		
39(ii)	Cold cleaning degreasers that use a solvent with a VOC content or five percent or less by weight, unless subject to the requirements of 40 CFR 63 Subpart T.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(39)(iii)	Conveyorized degreasers with an air/vapor interface smaller than 22 square feet (2 square meters), unless subject to the requirements of 40 CFR 63 Subpart T.		
(39)(iv)	Open-top vapor degreasers with an open-top area smaller than 11 square feet (1 square meter), unless subject to the requirements of 40 CFR 63 Subpart T.		
Miscellaneous			
(40)	Ventilating and exhaust systems for laboratory operations. Laboratory operations do not include processes having a primary purpose to produce commercial quantities of materials.		
(41)	Exhaust or ventilating systems for the melting of gold, silver, platinum and other precious metals.		
(42)	Exhaust systems for paint mixing, transfer, filling or sampling and/or paint storage rooms or cabinets, provided the paints stored within these locations are stored in closed containers when not in use.		
(43)	Exhaust systems for solvent transfer, filling or sampling, and/or solvent storage rooms provided the solvent stored within these locations are stored in containers when not in use.		
(44)	Research and development activities, including both stand-alone and activities within a major facility, until such time as the administrator completes a rule making to determine how the permitting program should be structured for these activities.		
(45)	The application of odor counteractants and/or neutralizers.		
(46)	Hydrogen fuel cells.		
(47)	Dry cleaning equipment that uses only water-based cleaning processes or those using liquid carbon dioxide.		
(48)	Manure spreading, handling and storage at farms and agricultural facilities.		

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Methods Used to Determine Compliance			
Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date

Appendix B
Air Quality Modeling Report

Air Quality Modeling Report

Chaffee Landfill
Chaffee, New York

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Attachment Index

Attachment 1 Vertical Leachate Storage Tank Calculations

1. Introduction

This document details the air dispersion modeling report to demonstrate that the Chaffee Landfill Facility (Facility or Site) is in compliance with the provisions of 6 NYCRR Part 212. The modeling report is intended as supporting information for the Title V Permit Modification for a proposed landfill expansion. This modeling report includes emissions from a proposed 5,081,955 cubic yard landfill expansion.

The modeling report has been developed based on the following documentation:

- Policy DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants under Part 212 (June 29, 2016)
- DAR-10/NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis (May 9, 2006)
- Appendix W of 40 CFR Part 51, USEPA (November 2005)
- Ambient Monitoring Guidelines for PSD, USEPA (May 1997)
- New Source Review Workshop Manual, USEPA (Draft, October 1990)

2. Facility Overview

2.1 Facility Description

WMNY owns and operates the solid waste management facility located at 10860 Olean Road in Chaffee, New York under NYSDEC Part 360, Permit #9-1462-00001/00013 (Facility or Site). The Facility accepts municipal solid waste (MSW) and other non-hazardous wastes. The landfill operations at the facility include tipping, covering, compacting, composting, solidification, landfill cell construction, hauling, leachate collection and discharge, and equipment maintenance operations. The landfill has an active LFG collection system that conveys collected LFG to on-site flares and the Renewable Energy Facility, consisting of eight internal combustion engines. The engines are operated by Waste Management Renewable Energy (WMRE) and are used to generate electricity for off-site use. The Standard Industrial Classification (SIC) for the Chaffee Landfill facility is 4953.

2.2 Land Use Classifications

The Facility is located in a predominantly rural area in the Town of Sardinia, New York.

The three nearest population centers are the Town of Sardinia (population 2,775; 2010 census), approximately 2.8 miles to the south; the Town of Yorkshire (population 3,913; 2010 census), approximately 3.8 miles to the south of southeast; and the Town of Holland (population 3,401; 2010 census), approximately 4.4 miles to the north of northwest. Land use in the vicinity of the Chaffee Landfill Facility primarily residential, agricultural, and commercial.

2.3 Topography

The topography around the Proposed Site is relatively flat. The base elevation of the Site is approximately 1,490 feet AMSL. However, the topography of the surrounding land ranges from approximately 1,430 feet AMSL to 1,525 feet AMSL.

3. Modeling Methodology

The modeling was performed using the most recent executable versions of the USEPA AERMOD modeling system:

- AERMET, version 18081
- AERSURFACE, version 13016
- AERMAP, version 18081
- AERMOD, version 18081R
- BPIP-PRIME, version 04274

Modeling was facilitated using the Lakes Environmental graphical user interface AERMOD View (version 9.3.0).

3.1 Modeled Compounds

WMNY modeled the high toxicity air contaminant (HTAC) compound emissions from the landfill that exceeded the thresholds listed in Table 2 of 6 NYCRR Part 212-2.2.

Total emission rates for the HTAC compounds that were modeled are provided in Table 5. The following HTAC compounds were included in the modeling analysis:

- Ethylene dibromide

In addition, WMNY modeled non-HTAC compounds that exceeded an annual emission rate of 100 pounds per year. The following non-HTAC compounds were included in the modeling analysis (see Table 5 for emission rates):

- 2-Propanol
- Acetone
- Butane
- Dichlorobenzene
- Dichlorodifluoromethane
- Dichlorofluoromethane
- Dichloromethane
- Dimethyl Sulfide
- Ethanol

- Ethylbenzene
- Ethylene dibromide
- Ethyl mercaptan
- Hydrogen Chloride
- Hexane
- Hydrogen Sulfide
- Methyl ethyl ketone
- Pentane
- Propane
- Toluene
- Trichloroethene
- Xylene

WMNY also modeled the following criteria pollutants from the flares to comply with 6 NYCRR Part 212:

- Carbon monoxide (CO)
- Oxides of Nitrogen (NOx)
- Sulfur Dioxide (SO_2)
- Particulate matter (PM)

At the request of NYSDEC, WMNY also modeled the following criteria pollutants from the engines to comply with 6 NYCRR Part 200.6:

- Oxides of Nitrogen (NOx)

3.2 Facility Source Inventory

The Section provides a summary of sources that were included in the modeling evaluation. A summary of the source inventory parameters is provided in Table 6. A plan site view of all emission sources is provided as Figure 1.

3.2.1 Landfill Areas

The following landfill areas were included in the modeling analysis:

- Original Landfill
- Western Expansion Landfill
- Valley Fill Expansion
- Area 7/8 Development

Emissions were calculated using a maximum estimated LFG generation rate of 7,337 cubic feet per minute (cfm) which will occur when the entire landfill reaches final grade. A collection efficiency of 85 percent and a cover oxidation factor of 25 percent (referenced from 40 CFR 98, Subpart HH) were utilized in the calculations.

Concentrations for each compound in the landfill gas were based on values compiled by the Waste Industry Air Coalition (WIAC). Table 1 presents a summary of fugitive emissions from the landfill areas.

3.2.2 Landfill Gas Flares

The Facility's site is the location for one enclosed flare and one open flare, used for controlling LFG. The two flares are owned and operated by WMNY at the Chaffee Landfill (one (1) 3,300 scfm enclosed flare and one (1) 910 scfm open flare).

3.2.2.1 3,300 SCFM Enclosed Flare

The existing 3,300 cfm enclosed flare has a physical release height of 40' with a 132" diameter flare tip. Per the USEPA document "Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants", an effective flare release height and effect flare stack diameter can be calculated, given the design heat release rate for the flare, as described below. Further, as described in the USEPA document, an assumed stack gas exit velocity of 20 m/s and gas exit temperature of 1,273 K will be used.

The effective flare release height was calculated using the following equation:

$$H_{eff} = H_s + [0.00456 \times (Q_T)^{0.478}]$$

Where,

H_{eff} = effective flare release height (m)

H_s = physical flare stack height (m)

Q_T = total heat released (calories per second) assuming 55 percent radiative heat loss for methane

The effective flare stack diameter was calculated using the following equation:

$$D_{eff} = (9.88 \times 10^{-4}) \times (Q_H)^{0.5}$$

Where,

D_{eff} = effective flare stack diameter (m)

Q_H = net heat available (calories per second) assuming 55 percent of total heat is lost to radiation

The design heat release used in the equations above for the effective release height and stack diameter of the 3,300 cfm flare is 87.8 MMBTU/hr, which is equivalent to 11.6 million Joules per second (11,579,935 Joules per second) and 2.8 million calories per second (2,765,767 calories per second).

Table 2 presents a summary of VOC emissions from the 3,300 cfm enclosed flare. Table 4 presents a summary of criteria pollutant emissions from the 3,300 cfm enclosed flare. Criteria pollutant emissions for the enclosed flare were referenced from the Title V Modification for the Area 7/8 Development.

3.2.2.2 910 SCFM Open Flare

The existing 910 cfm open flare has an actual release height of 23' with an 8" diameter flare tip. As with the enclosed flare, an assumed stack gas exit velocity of 20 meters per second (m/s) and gas exit temperature of 1,273 Kelvin (K) will be used.

The design heat release used in the equations above for the effective release height and stack diameter of the 910 cfm open flares is 27.3 MMBTU/hr, which is equivalent to 3.6 million Joules per second (3,600,365 Joules per second) and 0.9 million calories per second (859,916 calories per second).

Table 3 presents a summary of VOC emissions from the 910 scfm open flare. Table 4 presents a summary of criteria pollutant emissions from the 910 cfm open flare.

3.2.3 Landfill Gas Engines

The Landfill Gas-to-Energy (LFGTE) Facility consists of eight (8) CAT© Model G3516 gas fired reciprocating IC engines.

The CAT© G3516 IC engine has a power generation rating of 1,148 brake horsepower. Each engine is connected to a 0.825 MW generator, with a total electrical generation capacity of 6.6 MW for the G3516 IC engines. Engine #1 at the LFGTE Facility was source tested on September 26, 2011. The source tests indicated that, at operational capacity, the G3516 engine operates at 6,331 acfm at an exhaust temperature of 837 degrees F. Therefore, for the purposes of this report, all CAT© G3516 IC engines were assumed to operate at these conditions.

3.2.4 Leachate Storage Tank

The leachate storage system consists of two above ground storage tanks within a secondary containment tank; each tank has a capacity of approximately 405,000 gallons for a total storage volume of 810,000 gallons. There are also two small underground leachate storage tanks located on the east side of the Closed Landfill (one 12,000 gallon tank and one 25,000 gallon tank); however these two horizontal tanks are considered exempt under 6 NYCRR 201-3.2(c)(26).

Emissions from the vertical storage tanks were estimated using the methodology from AP-42, Section 7.1 (Organic Liquid Storage Tanks, 11/06). The following information was used in the calculations:

- The leachate analytical data for the period of June 2014 through June 2017 was evaluated and the maximum detection value was used
- A throughput of 15 million gallons per year was utilized in the calculations.

Attachment 1 presents the calculations for the vertical leachate storage tanks.

3.2.5 Sources Not Modeled

The following emissions sources were not included in the modeling analysis:

- Combustion sources, which include engines (these sources are not considered process operations as stated in 6 NYCRR 212 1.2(b)(18)). However, NOx emissions from the engines will be modeled only at the request of NYSDEC.
- Mobile sources (these sources are not considered process operations as stated in 6 NYCRR 212 1.2(b)(18))
- Temporary emission sources (as stated in 6 NYCRR 212 1.4(a))
- Exempt and trivial emission sources (as stated in 6 NYCRR 212 1.4(a))
- Paint Booth which is subject to 6 NYCRR Part 228-1 (as stated in 6 NYCRR 212-1.4(l), there are no A-listed contaminants in paint booth)

In addition, WMNY believes that criteria pollutants from the flares are exempt from modeling due to the following:

- 6 NYCRR Part 212-1.4 (i): process emission sources with emissions of oxides of sulfur, only with respect to oxides of sulfur emissions attributable solely to sulfur in fuel
- 6 NYCRR Part 212-1.4 (m): process emission sources with emissions of carbon monoxide or VOCs produced attributable solely to incomplete combustion of any fuel, except where material is heated, burned, combusted or otherwise chemically changed under oxygen deficient conditions by design
- 6 NYCRR Part 212-1.4 (r): process emission sources with respect to emissions of NOx produced by catalytic or thermal oxidizers used as air pollution control equipment
- The particulate matter emission rate from the exhaust of each of the flares is significantly less than 0.05 grains/dscf limit in 6 NYCRR Part 212-2.4 (b)(1)

However, WMNY has agreed to model CO, SO_2, NOx and PM from the enclosed flare and open flare.

3.3 Modeling Input Parameters

The model was run using the "regulatory default" mode, which specified the use of the following options:

- Stack-tip downwash-reduces effective stack height when plume exit velocity is less than 1.5 times the wind speed
- Plume buoyancy induces dispersion-increases the dispersion coefficient to account for the vertical movement of the plume
- Calms processing
- Allow missing meteorological data
- Elevated terrain

Source specific input parameters were entered into the Source Pathway of the model.

3.4 Building Downwash Analysis

Any Site structures that may impact the emission sources, with respect to influencing building downwash, were included and considered. Direction specific building dimensions were calculated utilizing BPIP-PRIME.

3.5 Meteorological Data

The 2014-2018 Buffalo, NY surface and profile meteorological data, as provided by the NYSDEC, was used in the analysis. Meteorological data from Buffalo, New York was utilized as representative meteorological data for the Facility as Buffalo, New York and the Facility have similar weather patterns.

The surface and profile meteorological data was processed using the ADJ_U* option in USEPA AERMET version 18081.

3.6 Modeled Receptors

For each pollutant, a multi-tier, uniform Cartesian grid centered on the Chaffee Landfill Facility was established.

Distance from Facility	Receptor Node Spacing
Up to 1 km	70 m
1 km to 2 km	200 m
2 km to 10 km	500 m

A property boundary receptor grid was established along the property boundary of the Chaffee Landfill Facility with a spacing of 20 m to capture the maximum property boundary concentration.

All receptors located within the Chaffee Landfill Facility property boundary were removed, as the site is fenced and public access is prohibited.

The need to evaluate elevated receptors within 2 km of the Chaffee Landfill Facility, such as rooftops, balconies and similar areas with public access, was not required.

3.7 Terrain Considerations

Although the topography of the region is relatively flat, the effects of terrain were considered as part of the modeling analyses. Elevations above mean sea level corresponding to the base elevation of the Chaffee Landfill Facility were assigned to all structures and sources modeled.

The digital terrain data was extracted from Multi-Resolution Land Characteristics (MRLC) Consortium viewer (https://www.mrlc.gov/viewerjs/). The data is available in the World Geodetic System (WGS84) at 1/9th arc second resolution in a geoTIFF format. The geoTIFF format is converted to the USGS DEM format (30 m resolution) before processing using the AERMAP executable.

4. Conclusion

Two copies of this modeling report were sent to the NYSDEC Region 9 Division of Environmental Permits for distribution to the appropriate NYSDEC personnel for technical review.

figure 1

MODELING REPORT
CHAFFEE LANDFILL
WASTE MANAGEMENT
Chaffee, New York

11192627-00(0001)GN-NI001 NOV 21/2019

Table 1
Landfill Fugitive VOC Emissions
Chaffee Landfill

Fugitive Emission Estimates

Average LFG Generated [4] =	7,337	cfm
Average LFG Collection Efficiency [4] =	85%	
Average LFG Collected =	6,237	cfm
Fugitive Emission Estimates =	1,101	cfm
Hours of Operation =	8760	

CAS #	LFG Constituent			Molecular	Median [1]	Fugitive Emissions			VOC	HAP
		VOC?	HAP?	Weight	ppmv	lb/hr	lb/yr	TPY	(TPY)	(TPY)
71-55-6	1,1,1-Trichloroethane	X	X	133.41	0.168	0.003	24.82	0.01	0.01	0.01
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.07	0.001	13.01	0.01	0.01	0.01
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.009	81.20	0.04	0.04	0.04
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.001	9.88	0.00	0.00	0.00
107-06-2	1,2-Dichloroethane	X	X	98.96	0.12	0.002	13.15	0.01	0.01	0.01
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.000	2.88	0.00	0.00	0.00
67-63-0	2-Propanol	X		60.11	7.908	0.060	526.34	0.26	0.26	
67-64-1	Acetone	X		58.08	6.126	0.045	393.97	0.20	0.20	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.000	2.12	0.00	0.00	0.00
71-43-2	Benzene	X	X	78.11	0.972	0.010	84.07	0.04	0.04	0.04
75-27-4	Bromodichloromethane	X		163.83	0.311	0.006	56.42	0.03	0.03	
106-97-8	Butane [3]	X		58.12	5.03	0.037	323.70	0.16	0.16	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.003	26.97	0.01	0.01	0.01
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	1.19	0.00	0.00	0.00
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.001	12.17	0.01	0.01	0.01
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.003	28.29	0.01	0.01	0.01
75-45-6	Chlorodifluoromethane	X		86.47	0.355	0.004	33.99	0.02	0.02	
75-00-3	Chloroethane	X	X	64.52	0.239	0.002	17.07	0.01	0.01	0.01
67-66-3	Chloroform	X	X	119.39	0.021	0.000	2.78	0.00	0.00	0.00
74-87-3	Chloromethane	X	X	50.49	0.249	0.002	13.92	0.01	0.01	0.01
106-46-7	Dichlorobenzene	X	X	147	1.607	0.030	261.57	0.13	0.13	0.13
75-71-8	Dichlorodifluoromethane	X		120.91	1.751	0.027	234.42	0.12	0.12	
75-43-4	Dichlorofluoromethane [3]	X		102.92	2.62	0.034	298.58	0.15	0.15	
75-09-2	Dichloromethane		X	84.94	3.395	0.036	319.31	0.16		0.16
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.053	468.42	0.23	0.23	
64-17-5	Ethanol	X		46.08	118.618	0.691	6052.26	3.03	3.03	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.011	93.29	0.05	0.05	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.091	798.03	0.40	0.40	0.40
106-93-4	Ethylene dibromide	X	X	187.88	0.046	0.001	9.57	0.00	0.00	0.00
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.006	49.74	0.02	0.02	
7647-01-0	HCl [2]		X	35.45	9.43					
110-54-3	Hexane	X	X	86.18	2.324	0.025	221.77	0.11	0.11	0.11
7783-06-4	Hydrogen Sulfide			34.076	252	1.085	9508.32	4.75		
7439-97-6	Mercury [3]		X	200.61	2.92E-04	0.000	0.06	0.00		0.00
78-93-3	Methyl ethyl ketone	X		72.11	10.557	0.096	842.93	0.42	0.42	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.75	0.009	83.18	0.04	0.04	0.04
74-93-1	Methyl mercaptan	X		48.11	1.292	0.008	68.83	0.03	0.03	
109-66-0	Pentane [3]	X		72.15	3.29	0.030	262.84	0.13	0.13	
127-18-4	Perchloroethylene	X	X	165.83	1.193	0.025	219.06	0.11	0.11	0.11
74-98-6	Propane	X		44.09	14.757	0.082	720.43	0.36	0.36	
108-88-3	Toluene	X	X	92.13	25.405	0.296	2591.64	1.30	1.30	1.30
79-01-6	Trichloroethene	X	X	131.4	0.681	0.011	99.08	0.05	0.05	0.05
75-01-4	Vinyl chloride	X	X	62.5	1.077	0.009	74.53	0.04	0.04	0.04
1330-20-7	Xylene	X	X	106.16	16.582	0.223	1949.18	0.97	0.97	0.97

Notes:

1. Concentration of individual HAPs were referenced from Waste Industry Air Coalition (WIAC)
2. HCL Concentration was taken from "Measurement of Toxic Emissions from Landfill: History and Current Developments".
3. No WIAC concentration specified for compound; referenced AP-42 concentration
4. Maximum LFG Generated and collection efficiency referenced from updated LFG model

Equations:

$$(mg/m^3) = \frac{\text{(Molecular weight) x (1 atm) x (Median ppmv)}}{\text{(298.15 K) x (0.08206 L*atm/K*mol)}}$$

$$(lb/hr) = \frac{(mg/m^3) \text{ x } (2.205 \text{ x } 10^{-6} \text{ [lb/mg]}) \text{ x (Fugitive LFG Emission rate } [ft^3/min]) \text{ x (60 min/hr)}}{(35.3147 \ ft^3/m^3)}$$

$$(lb/yr) = \text{(lb/hr) x (8,760 hours/yr)}$$

$$(TPY) = \frac{\text{(lb/yr)}}{\text{(2,000 lb/ton)}}$$

Table 2
Enclosed Flare VOC Emissions
Chaffee Landfill

Landfill Gas Flares - HAP Emission Estimates

Average LFG Generated [4] =	7,337	cfm
Average LFG Collection Efficiency [4] =	85%	
Total LFG Collected =	6,237	cfm
LFG Collected (Enclosed Flare) =	2,927	cfm
Hours of Operation =	8760	

						Uncontrolled Emissions				Controlled Emissions				
CAS #	**LFG Constituent**	**VOC?**	**HAP?**	**Molecular Weight**	**Median[1] ppmv**	**lb/hr**	**lb/yr**	**TPY**	**Avg. Control [5]**	**lb/hr**	**lb/yr**	**TPY**	**VOC (TPY)**	**HAP (TPY)**
71-55-6	1,1,1-Trichloroethane	X	X	133.41	0.168	0.010	87.99	0.04	98.0%	0.0002	1.76	0.00	0.00	0.00
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.07	0.005	46.13	0.02	98.0%	0.0001	0.92	0.00	0.00	0.00
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.033	287.92	0.14	98.0%	0.0007	5.76	0.00	0.00	0.00
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.004	35.01	0.02	98.0%	0.0001	0.70	0.00	0.00	0.00
107-06-2	1,2-Dichloroethane	X	X	98.96	0.12	0.005	46.62	0.02	98.0%	0.0001	0.93	0.00	0.00	0.00
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.001	10.20	0.01	98.0%	0.0000	0.20	0.00	0.00	0.00
67-63-0	2-Propanol	X		60.11	7.908	0.213	1866.25	0.93	98.0%	0.0043	37.33	0.02	0.02	
67-64-1	Acetone	X		58.08	6.126	0.159	1396.88	0.70	98.0%	0.0032	27.94	0.01	0.01	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.001	7.50	0.00	98.0%	0.0000	0.15	0.00	0.00	0.00
71-43-2	Benzene	X	X	78.11	0.972	0.034	298.08	0.15	98.0%	0.0007	5.96	0.00	0.00	0.00
75-27-4	Bromodichloromethane	X		163.83	0.311	0.023	200.04	0.10	98.0%	0.0005	4.00	0.00	0.00	
106-97-8	Butane [3]	X		58.12	5.03	0.131	1147.76	0.57	98.0%	0.0026	22.96	0.01	0.01	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.011	95.65	0.05	98.0%	0.0002	1.91	0.00	0.00	0.00
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	4.23	0.00	98.0%	0.0000	0.08	0.00	0.00	0.00
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.005	43.16	0.02	98.0%	0.0001	0.86	0.00	0.00	0.00
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.011	100.32	0.05	98.0%	0.0002	2.01	0.00	0.00	0.00
75-45-6	Chlorodifluoromethane	X		86.47	0.355	0.014	120.52	0.06	98.0%	0.0003	2.41	0.00	0.00	
75-00-3	Chloroethane	X	X	64.52	0.239	0.007	60.54	0.03	98.0%	0.0001	1.21	0.00	0.00	0.00
67-66-3	Chloroform	X	X	119.39	0.021	0.001	9.84	0.00	98.0%	0.0000	0.20	0.00	0.00	0.00
74-87-3	Chloromethane	X	X	50.49	0.249	0.006	49.36	0.02	98.0%	0.0001	0.99	0.00	0.00	0.00
106-46-7	Dichlorobenzene	X	X	147	1.607	0.106	927.45	0.46	98.0%	0.0021	18.55	0.01	0.01	0.01
75-71-8	Dichlorodifluoromethane	X		120.91	1.751	0.095	831.20	0.42	98.0%	0.0019	16.62	0.01	0.01	
75-43-4	Dichlorofluoromethane [3]	X		102.92	2.62	0.121	1058.66	0.53	98.0%	0.0024	21.17	0.01	0.01	
75-09-2	Dichloromethane		X	84.94	3.395	0.129	1132.16	0.57	98.0%	0.0026	22.64	0.01		0.01
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.190	1660.89	0.83	98.0%	0.0038	33.22	0.02	0.02	
64-17-5	Ethanol	X		46.08	118.618	2.450	21459.50	10.73	98.0%	0.0490	429.19	0.21	0.21	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.038	330.76	0.17	98.0%	0.0008	6.62	0.00	0.00	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.323	2829.59	1.41	98.0%	0.0065	56.59	0.03	0.03	0.03
106-93-4	Ethylene dibromide	X	X	187.88	0.046	0.004	33.93	0.02	98.0%	0.0001	0.68	0.00	0.00	0.00
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.020	176.37	0.09	98.0%	0.0004	3.53	0.00	0.00	
7647-01-0	HCl [2]		X	35.45	9.43	0.150	1312.46	0.66	0.0%	0.1498	1312.46	0.66		0.66
110-54-3	Hexane	X	X	86.18	2.324	0.090	786.32	0.39	98.0%	0.0018	15.73	0.01	0.01	0.01
7783-06-4	Hydrogen Sulfide			34.076	252	3.849	33713.64	16.86	98.0%	0.0770	674.27	0.34		
7439-97-6	Mercury [3]		X	200.61	2.92E-04	0.000	0.23	0.00	0.0%	0.0000	0.23	0.00		0.00
78-93-3	Methyl ethyl ketone	X		72.11	10.557	0.341	2988.77	1.49	98.0%	0.0068	59.78	0.03	0.03	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.75	0.034	294.93	0.15	98.0%	0.0007	5.90	0.00	0.00	0.00
74-93-1	Methyl mercaptan	X		48.11	1.292	0.028	244.04	0.12	98.0%	0.0006	4.88	0.00	0.00	
109-66-0	Pentane [3]	X		72.15	3.29	0.106	931.94	0.47	98.0%	0.0021	18.64	0.01	0.01	
127-18-4	Perchloroethylene	X	X	165.83	1.193	0.089	776.71	0.39	98.0%	0.0018	15.53	0.01	0.01	0.01
74-98-6	Propane	X		44.09	14.757	0.292	2554.43	1.28	98.0%	0.0058	51.09	0.03	0.03	
108-88-3	Toluene	X	X	92.13	25.405	1.049	9189.18	4.59	98.0%	0.0210	183.78	0.09	0.09	0.09
79-01-6	Trichloroethene	X	X	131.4	0.681	0.040	351.32	0.18	98.0%	0.0008	7.03	0.00	0.00	0.00
75-01-4	Vinyl chloride	X	X	62.5	1.077	0.030	264.27	0.13	98.0%	0.0006	5.29	0.00	0.00	0.00
1330-20-7	Xylene	X	X	106.16	16.582	0.789	6911.21	3.46	98.0%	0.0158	138.22	0.07	0.07	0.07

Notes:

1 Concentration of individual HAPs were referenced from Waste Industry Air Coalition (WIAC)

2 HCL Concentration was taken from "Measurement of Toxic Emissions from Landfill: History and Current Developments".

3 No WIAC concentration specified for compound; referenced AP-42 concentration

4 Maximum LFG Generated and collection efficiency referenced from updated LFG model

5 Control efficiency of 98% applied for enclosed flare

Equations:

$$(mg/m^3) = \frac{(\text{Molecular weight}) \times (1\text{ atm}) \times (\text{Median ppmv})}{(298.15\text{ K}) \times (0.08206\text{ L*atm/K*mol})}$$

$$(lb/hr) = \frac{(mg/m^3) \times (2.205 \times 10^{-6}\ [lb/mg]) \times (\text{Fugitive LFG Emission rate } [ft^3/min]) \times (60\text{ min/hr})}{(35.3147\ ft^3/m^3)}$$

$$(lb/yr) = (lb/hr) \times (8{,}760\text{ hours/yr})$$

$$(TPY) = \frac{(lb/yr)}{(2{,}000\text{ lb/ton})}$$

(Controlled Emissions) = (Uncontrolled Emissions) x (100% - Average Control [%])

Table 3
Open Flare VOC Emissions
Chaffee Landfill

Landfill Gas Flares - HAP Emission Estimates

Average LFG Generated [4] =	7,337	cfm
Average LFG Collection Efficiency [4] =	85%	
Total LFG Collected =	6,237	cfm
LFG Collected (Open Flare) =	910	cfm
Hours of Operation =	8760	

						Uncontrolled Emissions				Controlled Emissions				
CAS #	**LFG Constituent**	**VOC?**	**HAP?**	**Molecular Weight**	**Median[1] ppmv**	**lb/hr**	**lb/yr**	**TPY**	**Avg. Control [5]**	**lb/hr**	**lb/yr**	**TPY**	**VOC (TPY)**	**HAP (TPY)**
71-55-6	1,1,1-Trichloroethane	X	X	133.41	0.168	0.003	27.36	0.01	98.0%	0.0001	0.55	0.00	0.00	0.00
79-34-5	1,1,2,2-Tetrachloroethane	X	X	167.85	0.07	0.002	14.34	0.01	98.0%	0.0000	0.29	0.00	0.00	0.00
75-34-3	1,1-Dichloroethane	X	X	98.97	0.741	0.010	89.52	0.04	98.0%	0.0002	1.79	0.00	0.00	0.00
75-35-4	1,1-Dichloroethene	X	X	96.94	0.092	0.001	10.89	0.01	98.0%	0.0000	0.22	0.00	0.00	0.00
107-06-2	1,2-Dichloroethane	X	X	98.96	0.12	0.002	14.50	0.01	98.0%	0.0000	0.29	0.00	0.00	0.00
78-87-5	1,2-Dichloropropane	X	X	112.99	0.023	0.000	3.17	0.00	98.0%	0.0000	0.06	0.00	0.00	0.00
67-63-0	2-Propanol	X		60.11	7.908	0.066	580.24	0.29	98.0%	0.0013	11.60	0.01	0.01	
67-64-1	Acetone	X		58.08	6.126	0.050	434.31	0.22	98.0%	0.0010	8.69	0.00	0.00	
107-13-1	Acrylonitrile	X	X	53.06	0.036	0.000	2.33	0.00	98.0%	0.0000	0.05	0.00	0.00	0.00
71-43-2	Benzene	X	X	78.11	0.972	0.011	92.68	0.05	98.0%	0.0002	1.85	0.00	0.00	0.00
75-27-4	Bromodichloromethane	X		163.83	0.311	0.007	62.19	0.03	98.0%	0.0001	1.24	0.00	0.00	
106-97-8	Butane [3]	X		58.12	5.03	0.041	356.85	0.18	98.0%	0.0008	7.14	0.00	0.00	
75-15-0	Carbon disulfide	X	X	76.13	0.320	0.003	29.74	0.01	98.0%	0.0001	0.59	0.00	0.00	0.00
56-23-5	Carbon tetrachloride	X	X	153.84	0.007	0.000	1.31	0.00	98.0%	0.0000	0.03	0.00	0.00	0.00
463-58-1	Carbonyl sulfide	X	X	60.07	0.183	0.002	13.42	0.01	98.0%	0.0000	0.27	0.00	0.00	0.00
108-90-7	Chlorobenzene	X	X	112.56	0.227	0.004	31.19	0.02	98.0%	0.0001	0.62	0.00	0.00	0.00
75-45-6	Chlorodifluoromethane	X		86.47	0.355	0.004	37.47	0.02	98.0%	0.0001	0.75	0.00	0.00	
75-00-3	Chloroethane	X	X	64.52	0.239	0.002	18.82	0.01	98.0%	0.0000	0.38	0.00	0.00	0.00
67-66-3	Chloroform	X	X	119.39	0.021	0.000	3.06	0.00	98.0%	0.0000	0.06	0.00	0.00	0.00
74-87-3	Chloromethane	X	X	50.49	0.249	0.002	15.35	0.01	98.0%	0.0000	0.31	0.00	0.00	0.00
106-46-7	Dichlorobenzene	X	X	147	1.607	0.033	288.36	0.14	98.0%	0.0007	5.77	0.00	0.00	0.00
75-71-8	Dichlorodifluoromethane	X		120.91	1.751	0.030	258.43	0.13	98.0%	0.0006	5.17	0.00	0.00	
75-43-4	Dichlorofluoromethane [3]	X		102.92	2.62	0.038	329.15	0.16	98.0%	0.0008	6.58	0.00	0.00	
75-09-2	Dichloromethane		X	84.94	3.395	0.040	352.01	0.18	98.0%	0.0008	7.04	0.00		0.00
75-18-3	Dimethyl Sulfide	X		62.13	6.809	0.059	516.39	0.26	98.0%	0.0012	10.33	0.01	0.01	
64-17-5	Ethanol	X		46.08	118.618	0.762	6672.06	3.34	98.0%	0.0152	133.44	0.07	0.07	
75-08-1	Ethyl mercaptan	X		62.13	1.356	0.012	102.84	0.05	98.0%	0.0002	2.06	0.00	0.00	
100-41-4	Ethylbenzene	X	X	106.16	6.789	0.100	879.76	0.44	98.0%	0.0020	17.60	0.01	0.01	0.01
106-93-4	Ethylene dibromide	X	X	187.88	0.046	0.001	10.55	0.01	98.0%	0.0000	0.21	0.00	0.00	0.00
75-69-4	Fluorotrichloromethane	X		137.38	0.327	0.006	54.84	0.03	98.0%	0.0001	1.10	0.00	0.00	
7647-01-0	HCl [2]		X	35.45	9.43	0.047	408.06	0.20	0.0%	0.0466	408.06	0.20		0.20
110-54-3	Hexane	X	X	86.18	2.324	0.028	244.48	0.12	98.0%	0.0006	4.89	0.00	0.00	0.00
7783-06-4	Hydrogen Sulfide			34.076	252	1.197	10482.05	5.24	98.0%	0.0239	209.64	0.10		
7439-97-6	Mercury [3]		X	200.61	2.92E-04	0.000	0.07	0.00	0.0%	0.0000	0.07	0.00		0.00
78-93-3	Methyl ethyl ketone	X		72.11	10.557	0.106	929.25	0.46	98.0%	0.0021	18.59	0.01	0.01	
108-10-1	Methyl isobutyl ketone	X	X	100.16	0.75	0.010	91.70	0.05	98.0%	0.0002	1.83	0.00	0.00	0.00
74-93-1	Methyl mercaptan	X		48.11	1.292	0.009	75.87	0.04	98.0%	0.0002	1.52	0.00	0.00	
109-66-0	Pentane [3]	X		72.15	3.29	0.033	289.75	0.14	98.0%	0.0007	5.80	0.00	0.00	
127-18-4	Perchloroethylene	X	X	165.83	1.193	0.028	241.49	0.12	98.0%	0.0006	4.83	0.00	0.00	0.00
74-98-6	Propane	X		44.09	14.757	0.091	794.21	0.40	98.0%	0.0018	15.88	0.01	0.01	
108-88-3	Toluene	X	X	92.13	25.405	0.326	2857.05	1.43	98.0%	0.0065	57.14	0.03	0.03	0.03
79-01-6	Trichloroethene	X	X	131.4	0.681	0.012	109.23	0.05	98.0%	0.0002	2.18	0.00	0.00	0.00
75-01-4	Vinyl chloride	X	X	62.5	1.077	0.009	82.17	0.04	98.0%	0.0002	1.64	0.00	0.00	0.00
1330-20-7	Xylene	X	X	106.16	16.582	0.245	2148.79	1.07	98.0%	0.0049	42.98	0.02	0.02	0.02

Notes:

1 Concentration of individual HAPs were referenced from Waste Industry Air Coalition (WIAC)

2 HCL Concentration was taken from "Measurement of Toxic Emissions from Landfill: History and Current Developments".

3 No WIAC concentration specified for compound; referenced AP-42 concentration

4 Maximum LFG Generated and collection efficiency referenced from updated LFG model

5 Control efficiency of 98% applied for open flare

Equations:

$$(\text{mg/m}^3) = \frac{(\text{Molecular weight}) \times (1\ \text{atm}) \times (\text{Median ppmv})}{(298.15\ \text{K}) \times (0.08206\ \text{L*atm/K*mol})}$$

$$(\text{lb/hr}) = \frac{(\text{mg/m}^3) \times (2.205 \times 10^{-6}\ [\text{lb/mg}]) \times (\text{Fugitive LFG Emission rate } [\text{ft}^3/\text{min}]) \times (60\ \text{min/hr})}{(35.3147\ \text{ft}^3/\text{m}^3)}$$

$$(\text{lb/yr}) = (\text{lb/hr}) \times (8{,}760\ \text{hours/yr})$$

$$(\text{TPY}) = \frac{(\text{lb/yr})}{(2{,}000\ \text{lb/ton})}$$

(Controlled Emissions) = (Uncontrolled Emissions) x (100% - Average Control [%])

Table 4

Summary of Criteria Pollutant Emission Rates
Chaffee Landfill
Chaffee, New York

CAS #	Compound	Enclosed Flare [1] TPY	Open Flare [1] TPY	Engines [1] TPY	Totals TPY	Totals lb/year	Totals lb/hr	1-hour standard (ug/m^3)	8-hour standard (ug/m^3)	24-hour standard (µg/m3)	Annual Standard (ug/m^3)
630-08-0	Carbon Monoxide	76.92	23.91	---	100.83	201,665	23.02	40,000	10,000	---	---
---	Oxides of Nitrogen	23.08	7.17	119.72	149.97	299,941	34.24	---	---	---	---
10102-44-0	Nitrogen Dioxide (annual) [2]	17.31	5.38	89.79	112.48	224,956	25.68	---	---	---	100
10102-44-0	Nitrogen Dioxide (1-hour) [2]	18.46	5.74	95.78	119.98	239,953	27.39	188	---	---	---
	Sulfur Dioxide	31.68	9.85	---	41.53	83,067	9.48	196	---	---	80
	PM-10	6.54	2.03	---	8.57	17,142	1.96	---	---	150	---
	PM-2.5	6.54	2.03	---	8.57	17,142	1.96	---	---	35	12

Notes:

1 Emissions referenced from 2019 Title V Modification - Southern Landifll Expansion
2 Tier II for NOx, per USEPA guidance

Table 4A

Modeling Protocol
Chaffee Landfill
Chaffee, NY

Summary of LFG Flare Emissions

Total LFG Generated [A] =	7,337	cfm
Collection Efficiency =	85%	
Total LFG Combusted =	6,237	cfm
LFG to Flares =	3,837	cfm

Flare Type	***Operating Conditions***			***Estimated Flare Emissions (TPY)***				
	CFM	***MMSCF***	***Hours***	***PM_{10}***	***NMOC***	***CO***	***NO_X***	***SO_2***
Enclosed 3,300 CFM	2,927	1,538.4	8,760	6.5	2.0	76.9	23.1	31.7
Open 910 CFM	910	478.3	8,760	2.0	0.6	23.9	7.2	9.9
			Total Emissions (TPY)	8.6	2.6	100.8	30.2	41.5
			Total Emissions (lb/yr)	17,141.5	5,277.1	201,665.0	60,499.5	83,066.6

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	***NMOC***	***CO***	***NO_X***	***SO_2***
Enclosed Flare 3,300 CFM	8.50	2.62	100.00	30.00	41.19
Open Flare 910 CFM	8.50	2.62	110.00	26.00	41.19

Notes: [A] Based on amount of LFG generated in peak year of LFG production in existing and future landfill areas

PM 17 lb/10^6 dscf methane per AP-42, section 2.4 (11/98)
NMOC Based on 595 ppm per AP-42, section 2.4 (11/98), and 98% destruction efficiency
CO Emission rates (in units fo lb/MMBtu) referenced from previous permit applications
NO_X Emission rates (in units fo lb/MMBtu) referenced from previous permit applications
SO_2 252 ppm TRS concentration and 0% destruction efficiency, per AP-42, section 2.4 (11/98)

Heating value	500	Btu/scf
DE (of NMOC)	98.0	%

Emission Factor Development

3,300 CFM Enclosed Flare

CO:	0.20	lb/MMBtu
NOx:	0.06	lb/MMBtu

910 CFM Open Flare

CO:	0.22	lb/MMBtu
NOx:	0.052	lb/MMBtu

LFG Data:

NMOC:	595	ppm
TRS:	252	ppm
CH_4:	50.0%	of total LFG
VOC:	39.0%	of NMOC

Table 4B

Modeling Protocol
Chaffee Landfill
Chaffee, NY

Summary of Caterpillar 3516 Engine Emissions

Total Number of 3516 Engines = 8
LFG to Renewable Energy Facility = 2,400 cfm

	Operating Hours	***Estimated Potential 3516 Engine Emissions (TPY)***				
		PM_{10}	***NMOC***	***CO***	***NO_X***	***SO_2***
Engine #1	8,760	0.1	0.2	30.0	15.0	3.2
Engine #2	8,760	0.1	0.2	30.0	15.0	3.2
Engine #3	8,760	0.1	0.2	30.0	15.0	3.2
Engine #4	8,760	0.1	0.2	30.0	15.0	3.2
Engine #5	8,760	0.1	0.2	30.0	15.0	3.2
Engine #6	8,760	0.1	0.2	30.0	15.0	3.2
Engine #7	8,760	0.1	0.2	30.0	15.0	3.2
Engine #8	8,760	0.1	0.2	30.0	15.0	3.2
	Total Emissions (TPY)	0.9	1.7	240.3	119.7	26.0
	Total Emissions (lb/yr)	1,802.1	3,300.9	480,656.8	239,441.6	51,959.2

3516 Engine Emission Factors

	Pounds per Hour of Operation				
	PM	***NMOC***	***CO***	***NO_X***	***SO_2***
3516 Engines	0.03	0.05	6.86	3.42	0.74

Emission Factor Development

Caterpillar 3516 Engines

- referenced from *Chaffee Landfill PPP State Facility* Permit Application, prepared February 2006:

CO:	2.71	g/bhp-hr
NOx:	1.35	g/bhp-hr

Notes:

PM Based on 0.01 grains/dscf LFG (1 grain = 1.43 x 10^{-4} lbs)
NMOC Based on 595 ppm per AP-42, section 2.4 (11/98), and 98% destruction efficiency
CO Based on February 2006 State Facility Application, prepared by McMahon & Mann
NO_X Based on February 2006 State Facility Application, prepared by McMahon & Mann
SO_2 Based on conservative TRS concentration of 252 ppm

LFG Data:

LFG combusted /engine:	300	cfm
NMOC:	595	ppm
TRS:	252	ppm
CH_4:	50.0%	of total LFG
VOC:	39.0%	of NMOC

Heating value	500	Btu/scf
DE (of NMOC)	98.0	%
Engine Power	1,148	Bhp

Table 5

Summary of Landfill Source VOC Emission Rates
Chaffee Landfill
Chaffee, New York

CAS #	Compound	Landfill Emissions	Enclosed Flare	Open Flare	AG Leachate Tank 1	AG Leachate Tank 2	Totals	Totals	Part 212 MEL	Totals	SGC	AGC	Compound Modeled?	Reason
		lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/hr	lb/yr	(lb/year)	TPY	(ug/m^3)	(ug/m^3)	(Y/N)	
71-55-6	1,1,1-Trichloroethane	24.82	1.76	0.55	---	---	0.0031	27.1	---	0.01	9000.0	5000.0	No	Not an HTAC & less than 100 lb/year
79-34-5	1,1,2,2-Tetrachloroethane [2]	13.01	0.92	0.29	---	---	0.0016	14.2	1000	0.01	---	16.0	No	HTAC, but emissions are less than Part 212 limit
75-34-3	1,1-Dichloroethane	81.20	5.76	1.79	---	---	0.0101	88.8	---	0.04	---	0.63	No	Not an HTAC & less than 100 lb/year
75-35-4	1,1-Dichloroethene	9.88	0.70	0.22	---	---	0.0012	10.8	---	0.01	---	200.0	No	Not an HTAC & less than 100 lb/year
107-06-2	1,2-Dichloroethane	13.15	0.93	0.29	---	---	0.0016	14.4	100	0.01	---	0.038	No	HTAC, but emissions are less than Part 212 limit
78-87-5	1,2-Dichloropropane	2.88	0.20	0.06	---	---	0.0004	3.1	1000	0.00	---	4.0	No	HTAC, but emissions are less than Part 212 limit
67-63-0	2-Propanol	526.34	37.33	11.60	---	---	0.0657	575.3	---	0.29	98000.0	7000.0	Yes	Not an HTAC but greater than 100 lb/year
67-64-1	Acetone	393.97	27.94	8.69	0.06	0.06	0.0492	430.7	---	0.22	180000.0	30000.0	Yes	Not an HTAC but greater than 100 lb/year
107-13-1	Acrylonitrile [2]	2.12	0.15	0.05	---	---	0.0003	2.3	25	0.00	---	0.015	No	HTAC, but emissions are less than Part 212 limit
71-43-2	Benzene	84.07	5.96	1.85	---	---	0.0105	91.9	100	0.05	1300.0	0.13	No	HTAC, but emissions are less than Part 212 limit
75-27-4	Bromodichloromethane [2]	56.42	4.00	1.24	---	---	0.0070	61.7	---	0.03	---	70.0	No	Not an HTAC & less than 100 lb/year
106-97-8	Butane	323.70	22.96	7.14	---	---	0.0404	353.8	---	0.18	238000.0	---	Yes	Not an HTAC but greater than 100 lb/year
75-15-0	Carbon disulfide	26.97	1.91	0.59	---	---	0.0034	29.5	---	0.01	6200.0	700.0	No	Not an HTAC & less than 100 lb/year
56-23-5	Carbon tetrachloride [2]	1.19	0.08	0.03	---	---	0.0001	1.3	100	0.00	1900.0	0.17	No	HTAC, but emissions are less than Part 212 limit
463-58-1	Carbonyl sulfide	12.17	0.86	0.27	---	---	0.0015	13.3	---	0.01	250.0	28.0	No	Not an HTAC & less than 100 lb/year
108-90-7	Chlorobenzene	28.29	2.01	0.62	---	---	0.0035	30.9	---	0.02	---	60.0	No	Not an HTAC & less than 100 lb/year
75-45-6	Chlorodifluoromethane	33.99	2.41	0.75	---	---	0.0042	37.1	---	0.02	---	50000.0	No	Not an HTAC & less than 100 lb/year
75-00-3	Chloroethane	17.07	1.21	0.38	---	---	0.0021	18.7	---	0.01	---	10000.0	No	Not an HTAC & less than 100 lb/year
67-66-3	Chloroform [2]	2.78	0.20	0.06	---	---	0.0003	3.0	100	0.00	150.0	14.7	No	HTAC, but emissions are less than Part 212 limit
74-87-3	Chloromethane	13.92	0.99	0.31	---	---	0.0017	15.2	---	0.01	22000.0	90.0	No	Not an HTAC & less than 100 lb/year
106-46-7	Dichlorobenzene	261.57	18.55	5.77	---	---	0.0326	285.9	---	0.14	---	0.09	Yes	Not an HTAC but greater than 100 lb/year
75-71-8	Dichlorodifluoromethane	234.42	16.62	5.17	---	---	0.0292	256.2	---	0.13	---	12000.0	Yes	Not an HTAC but greater than 100 lb/year
75-43-4	Dichlorofluoromethane [5]	298.58	21.17	6.58	---	---	0.0373	326.3	---	0.16	---	100.0	Yes	Not an HTAC but greater than 100 lb/year
75-09-2	Dichloromethane	319.31	22.64	7.04	---	---	0.0398	349.0	---	0.17	14000.0	60.0	Yes	Not an HTAC but greater than 100 lb/year
75-18-3	Dimethyl Sulfide	468.42	33.22	10.33	---	---	0.0584	512.0	---	0.26	14.0	4.8	Yes	Not an HTAC but greater than 100 lb/year
64-17-5	Ethanol	6,052.26	429.19	133.44	---	---	0.7551	6,614.9	---	3.31	---	45000.0	Yes	Not an HTAC but greater than 100 lb/year
75-08-1	Ethyl mercaptan	93.29	6.62	2.06	---	---	0.0116	102.0	---	0.05	---	3.1	Yes	Not an HTAC but greater than 100 lb/year
100-41-4	Ethylbenzene	798.03	56.59	17.60	---	---	0.0996	872.2	---	0.44	---	1000.0	Yes	Not an HTAC but greater than 100 lb/year
106-93-4	Ethylene dibromide [2]	9.57	0.68	0.21	---	---	0.0012	10.5	5	0.01	---	0.0017	Yes	HTAC & Emissions are greater than Part 212 limit
75-69-4	Fluorotrichloromethane	49.74	3.53	1.10	---	---	0.0062	54.4	---	0.03	---	5000.0	No	Not an HTAC & less than 100 lb/year
7647-01-0	HCl	0.00	1312.46	408.06	---	---	0.1964	1,720.5	---	0.86	---	20.0	Yes	Not an HTAC but greater than 100 lb/year
110-54-3	Hexane	221.77	15.73	4.89	---	---	0.0277	242.4	---	0.12	---	700.0	Yes	Not an HTAC but greater than 100 lb/year
7783-06-4	Hydrogen Sulfide	9,508.32	674.27	209.64	---	---	1.1863	10,392.2	---	5.20	14.0	2.0	Yes	Not an HTAC but greater than 100 lb/year
7439-97-6	Mercury [3]	0.06	0.23	0.07	---	---	0.0000	0.4	5	0.00	0.6	0.3	No	HTAC, but emissions are less than Part 212 limit
78-93-3	Methyl ethyl ketone	842.93	59.78	18.59	0.02	0.02	0.1052	921.3	---	0.46	13000.0	5000.0	Yes	Not an HTAC but greater than 100 lb/year
108-10-1	Methyl isobutyl ketone	83.18	5.90	1.83	---	---	0.0104	90.9	---	0.05	31000.0	3000.0	No	Not an HTAC & less than 100 lb/year
74-93-1	Methyl mercaptan	68.83	4.88	1.52	---	---	0.0086	75.2	---	0.04	14.0	2.3	No	Not an HTAC & less than 100 lb/year
109-66-0	Pentane	262.84	18.64	5.80	---	---	0.0328	287.3	---	0.14	---	42000.0	Yes	Not an HTAC but greater than 100 lb/year
127-18-4	Perchloroethylene	219.06	15.53	4.83	---	---	0.0273	239.4	1000	0.12	300.0	4.0	No	HTAC, but emissions are less than Part 212 limit
74-98-6	Propane	720.43	51.09	15.88	---	---	0.0899	787.4	---	0.39	---	43000.0	Yes	Not an HTAC but greater than 100 lb/year
108-88-3	Toluene	2,591.64	183.78	57.14	---	---	0.3234	2,832.6	---	1.42	37000.0	5000.0	Yes	Not an HTAC but greater than 100 lb/year
79-01-6	Trichloroethene	99.08	7.03	2.18	---	---	0.0124	108.3	---	0.05	14000.0	0.2	Yes	Not an HTAC but greater than 100 lb/year
75-01-4	Vinyl chloride	74.53	5.29	1.64	---	---	0.0093	81.5	100	0.04	180000.0	0.110	No	HTAC, but emissions are less than Part 212 limit
1330-20-7	Xylene	1,949.18	138.22	42.98	---	---	0.2432	2,130.4	---	1.07	22000.0	100.0	Yes	Not an HTAC but greater than 100 lb/year
	Tetrahydrofuran	---	---	---	0.01	0.01	3.1284E-06	0.03	---	0.00	30000.0	350.0	No	Not an HTAC & less than 100 lb/year
108-39-4	3-Methylphenol	---	---	---	0.00001	0.00001	2.0832E-09	0.00002	---	0.00	---	180.0	No	Not an HTAC & less than 100 lb/year
106-44-5	4-Methylphenol	---	---	---	0.000004	0.000004	8.4766E-10	0.00001	---	0.00	---	18.0	No	Not an HTAC & less than 100 lb/year
108-95-2	Phenol	---	---	---	0.00001	0.00001	1.9344E-09	0.00002	---	0.00	5800.0	20.0	No	Not an HTAC & less than 100 lb/year

Table 6

Summary of Modeling Input Parameters
Chaffee Landfill
Chaffee, New York

Source ID	Description	UTM Coordinates, NAD83 X (m)	UTM Coordinates, NAD83 Y (m)	Release Height (m)	Gas Exit Temperature (K)	Gas Exit Velocity (m/s)	Inside Diameter (m)
EFLARE01	Enclosed Flare [(1)]	705,725.77	4,717,314.93	17.67	1,273.00	20.00	1.64
OFLARE01	Open Flare [(1)]	705,737.80	4,717,334.36	10.14	1,273.00	20.00	0.92
ENG01-ENG08	Engines (8 total, per engine)	various	various	8.84	720.40	58.94	0.25
LF	Landfill	various	various	38.38	Ambient	---	---
LTANK01	Leachate Tank	704,773.02	4,717,028.24	7.01	Ambient	0.001	0.10
LTANK02	Leachate Tank	704,793.21	4,717,021.90	7.01	Ambient	0.001	0.10

Notes:

(1) Calculated effective flare parameters

Table 7

Summary of Criteria Pollutant Ground Level Concentrations
Chaffee Landfill
Chaffee, New York

CAS No.	Compound	Total Landfill Site Emission Rate (lb/hr)	Total Landfill Site Emission Rate (g/s)	AERMOD Version	Maximum Predicted GLC 1-Hour (µg/m3)	Maximum Predicted GLC 8-Hour (µg/m3)	Maximum Predicted GLC 24-Hour (µg/m3)	Maximum Predicted GLC 2014 (µg/m3)	Maximum Predicted GLC 2015 (µg/m3)	Maximum Predicted GLC 2016 (µg/m3)	Maximum Predicted GLC 2017 (µg/m3)	Maximum Predicted GLC 2018 (µg/m3)	Maximum Predicted GLC Annual (µg/m3)	Standards 1-Hour (µg/m3)	Standards 8-Hour (µg/m3)	Standards 24-Hour (µg/m3)	Standards Annual (µg/m3)	Percent of Standards 1-Hour (%)	Percent of Standards 8-Hour (%)	Percent of Standards 24-Hour (%)	Percent of Standards Annual (%)
630-08-0	Carbon Monoxide	2.30E+01	2.90E+00	v.18081	2.07E+01	1.69E+01	---	---	---	---	---	---	---	40,000	10,000	---	---	0.1%	0.2%	---	---
10102-44-0	Nitrogen Dioxide, Tier 1, annual	2.57E+01	3.24E+00	v.18081	---	---	---	5.44E+00	5.59E+00	4.41E+00	4.52E+00	4.68E+00	5.59E+00	---	---	---	100	---	---	---	5.6%
10102-44-0	Nitrogen Dioxide, Tier 1, 1-hour	2.74E+01	3.45E+00	v.18081	7.61E+01	---	---	---	---	---	---	---	---	188	---	---	---	40.5%	---	---	---
7446-09-5	Sulfur Dioxide	9.48E+00	1.19E+00	v.18081	7.54E+00	---	---	5.81E-01	5.47E-01	5.12E-01	5.12E-01	4.72E-01	5.81E-01	196	---	---	80	3.8%	---	---	0.7%
NA	PM-10	1.96E+00	2.47E-01	v.18081	---	---	1.03E+00	---	---	---	---	---	---	---	---	150	---	---	---	0.7%	---
NA	PM-2.5	1.96E+00	2.47E-01	v.18081	---	---	4.57E-01	1.20E-01	1.13E-01	1.06E-01	1.06E-01	9.75E-02	1.13E-01 (1)	---	---	35	12	---	---	1.3%	0.9%

Note:
(1) PM-2.5 annual GLC is based on a three year average over five years.

Table 8

Summary of VOC Ground Level Concentrations
Chaffee Landfill
Chaffee, New York

CAS No.	Compound	Total Landfill Site Emission Rate (lb/hr)	Total Landfill Site Emission Rate (g/s)	AERMOD Version	Maximum Predicted GLC 1-Hour (ug/m3)	2014 (ug/m3)	2015 (ug/m3)	2016 (ug/m3)	2017 (ug/m3)	2018 (ug/m3)	Max Annual (ug/m3)	SGC (ug/m3)	AGC (ug/m3)	Percent of SGC (%)	Percent of AGC (%)
67-63-0	2-Propanol		0.00E+00	v.18081	4.38E-01	5.01E-03	5.10E-03	4.40E-03	4.52E-03	4.39E-03	5.10E-03	98000	7000	0.0%	0.0%
67-64-1	Acetone		0.00E+00	v.18081	3.28E-01	3.76E-03	3.82E-03	3.30E-03	3.39E-03	3.29E-03	3.82E-03	180000	30000	0.0%	0.0%
71-43-2	Benzene		0.00E+00	v.18081	7.01E-02	8.20E-04	8.30E-04	7.30E-04	7.40E-04	7.30E-04	8.30E-04	1300	0.13	0.0%	0.6%
106-97-8	Butane		0.00E+00	v.18081	2.70E-01	---	---	---	---	---	---	238000	---	0.0%	---
75-45-6	Dichlorobenzene		0.00E+00	v.18081	---	2.50E-03	2.54E-03	2.20E-03	2.26E-03	2.19E-03	2.54E-03	---	0.09	---	2.8%
106-46-7	Dichlorodifluoromethane		0.00E+00	v.18081	---	2.24E-03	2.28E-03	1.98E-03	2.02E-03	1.97E-03	2.28E-03	---	12000	---	0.0%
75-71-8	Dichlorofluoromethane		0.00E+00	v.18081	---	2.85E-03	2.90E-03	2.51E-03	2.57E-03	2.50E-03	2.90E-03	---	100	---	0.0%
75-09-2	Dichloromethane		0.00E+00	v.18081	2.66E-01	3.05E-03	3.10E-03	2.68E-03	2.75E-03	2.67E-03	3.10E-03	14000	60	0.0%	0.0%
75-18-3	Dimethyl Sulfide		0.00E+00	v.18081	3.90E-01	4.46E-03	4.54E-03	3.92E-03	4.03E-03	3.91E-03	4.54E-03	14	4.8	2.8%	0.1%
64-17-5	Ethanol		0.00E+00	v.18081	---	5.75E-02	5.84E-02	5.03E-02	5.19E-02	5.03E-02	5.84E-02	---	45000	---	0.0%
106-93-4	Ethylbenzene		0.00E+00	v.18081	---	7.59E-03	7.72E-03	6.66E-03	6.85E-03	6.65E-03	7.72E-03	---	1000	---	0.0%
75-69-4	Ethylene dibromide		0.00E+00	v.18081	---	1.30E-04	1.50E-04	1.60E-04	1.50E-04	1.60E-04	1.60E-04	---	0.0017	---	9.4%
7647-01-0	HCl		0.00E+00	v.18081	---	1.20E-02	1.14E-02	1.06E-02	1.06E-02	9.79E-03	1.20E-02	---	20	---	0.1%
110-54-3	Hexane		0.00E+00	v.18081	---	2.12E-03	2.16E-03	1.87E-03	1.91E-03	1.87E-03	2.16E-03	---	700	---	0.0%
7783-06-4	Hydrogen Sulfide		0.00E+00	v.18081	7.91E+00	9.03E-02	9.18E-02	7.91E-02	8.15E-02	7.91E-02	9.18E-02	14	2	56.5%	4.6%
78-93-3	Methyl ethyl ketone		0.00E+00	v.18081	7.02E-01	8.02E-03	8.15E-03	7.03E-03	7.24E-03	7.02E-03	8.15E-03	13000	5000	0.0%	0.0%
74-93-1	Pentane		0.00E+00	v.18081	---	2.51E-03	2.55E-03	2.21E-03	2.27E-03	2.21E-03	2.55E-03	---	42000	---	0.0%
109-66-0	Propane		0.00E+00	v.18081	---	6.86E-03	6.97E-03	6.02E-03	6.19E-03	6.00E-03	6.97E-03	---	43000	---	0.0%
74-98-6	Toluene		0.00E+00	v.18081	2.15702	2.46E-02	2.50E-02	2.16E-02	2.22E-02	2.16E-02	2.50E-02	37000	5000	0.0%	0.0%
108-88-3	Trichloroethene		0.00E+00	v.18081	8.26E-02	9.60E-04	9.70E-04	8.50E-04	8.70E-04	8.50E-04	9.70E-04	14000	0.2	0.0%	0.5%
79-01-6	Xylene		0.00E+00	v.18081	1.62E+00	1.85E-02	1.88E-02	1.62E-02	1.67E-02	1.62E-02	1.88E-02	22000	100	0.0%	0.0%

Attachment 1
Vertical Leachate Storage Tank Calculations

TANKS 4.0.9d

Emissions Report - Detail Format

Tank Indentification and Physical Characteristics

Identification	
User Identification	AG Leachate Tank
City	Chaffee
State	New York
Company	WMNY
Type of Tank	Vertical Fixed Roof Tank
Description	Leachate Storage
Tank Dimensions	
Shell Length (ft)	23.00
Diameter (ft)	56.00
Liquid Height (ft)	23.00
Avg. Liquid Height (ft)	11.50
Volume (gal)	405,366.00
Turnovers	18.50
Net Throughput (gal/yr)	7,500,000
Is tank heated (y/n)	N
Paint Characteristics	
Shell Color/Shade	White/White
Shell Condition	Good
Roof Color/Shade	White/White
Roof Condition	Good
Roof Characteristics	
Type	Cone
Height (ft)	0.00
Slope (ft/ft) Cone Roof)	0.00
Breather Vent Settings	
Vacuum Settings (psig)	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Vertical Fixed Roof Tank
Chaffee, New York

Annual Emission Calculations	**FROM TANKS DETAILED PDF**	**AP-42 EQUATIONS**	**CALCULATIONS**					
Standing Losses (lb)		$L_S = 365\ V_V\ W_V\ K_E\ K_S$	L_S =	359.7439	lbs			
V_V = Vapor Space Volume (cu ft)			V_V =	37785.1768	cu ft			
W_V = Vapor Density (lb/cu ft)			W_V =	0.0011	lb / cu ft			
K_E = Vapor Space Expansion Factor			K_E =	0.0298				
K_S = Vented Vapor Saturation Factor			K_S =	0.7848				
Tank Vapor Space Volume								
V_V = Vapor Space Volume		$V_V = [(Pi/4)\ D^2]\ H_{VO}$	V_V =	37785.1768	cu ft			
D = Tank Diameter								
H_{VO} = Vapor Space Outage		$H_{VO} = H_S - H_L + H_{RO}$	H_{VO} =	15.3411	ft			$H_{VO} = H_E/2$ for horizontal tank
Hs = Tank Shell Length								
H_L = Average Liquid Height								
Roof Outage								
Roof Outage (Cone Roof)								
Roof Outage		$H_{RO} = 1/3\ H_R$	H_{RO} =	3.8411	ft			
Roof Height								
S_R = Roof Slope		$H_R = S_R{*}R_S$	H_R =	0.5000	ft			
R_S = Shell Radius								
Vapor Density								
W_V = Vapor Density		$W_V = M_v\ P_{VA} / R\ T_{LA}$	W_V =	0.0011	lb / cu ft			0 deg F = 459.67 R
M_V = Vapor Molecular Weight			M_V =	18.0008	lb/lb-mole			
Vapor Pressure at Daily Average Liquid Surface Temperature								
T_{LA} = Daily Avg. Liquid Surface Temp		$T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079{*}alpha{*}I$	T_{LA} =	508.9255	R =	9.59	deg C	
T_{AA} = Daily Average Ambient Temp		$T_{AA} = T_{AX}+T_{AN} / 2$	T_{AA} =	47.6792	deg F =	507.35	R	
Ideal Gas Constant R				10.7310				
T_B = Liquid Bulk Temperature		$T_B = T_{AA} + 6\ alpha - 1$	T_B =	507.3692	R			
Tank Paint Solar Absorptance (Shell)				0.17				As per Table 7.1-6: White/Good = .17
Tank Paint Solar Absorptance (Roof)				0.17				
I = Daily Total Solar Insulation Factor				1,165.412	Btu/sqft d			I_{AVG} = 1,165 Btu/ft^2-d as per sources mentioned on page 6-5 of TANKS user manual

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

RS = Shell Radius
0

Annual Emission Calculations	FROM TANKS DETAILED PDF	AP-42 EQUATIONS	CALCULATIONS			
Vapor Space Expansion Factor						As per sources listed on page 6-5 of TANKS user manual:
K_E = Vapor Space Expansion Factor		K_E = [delta T_V/T_{LA}]+ [(deltaP_V-delta P_B)/(P_A-P_{VA})]	K_E =	0.0298		T_{AX} = 515.4867
delta T_V = Daily Vapor Temperature Range		delta T_V = 0.72(T_{AX}-T_{AN})+0.028*alpha*I]	delta T_V =	17.2654	R	T_{AN} = 499.2117
delta P_V = Daily Vapor Pressure Range			delta P_V =	0.0007	psia	
delta P_B = Breather Vent Press. Setting Range			delta P_B =	0.06	psia	
Vapor Pressure at Daily Average Liquid Surface Temperature						
Vapor Pressure at Daily Minimum Liquid Surface Temperature						
Vapor Pressure at Daily Maximum Liquid Surface Temperature						
Daily Avg. Liquid Surface Temp.				508.9255	R	
Daily Min. Liquid Surface Temp		$T_{LN} = T_{LA}$ - 0.25 delta T_V	T_{LN} =	504.6092	R	
Daily Max. Liquid Surface Temp		$T_{LX} = T_{LA}$ + 0.25 delta T_V	T_{LX} =	513.2419	R	
delta T_A = Daily Ambient Temp. Range			delta T_A =	16.2750	R	
Vented Vapor Saturation Factor						
Vented Vapor Saturation Factor		K_S = 1/[1+ (.053*P_{VA}*H_{VO})]	K_S =	0.7842		
Vapor Pressure at Daily Average Liquid Surface Temperature						
Vapor Space Outage						
Working Losses		L_W = 0.0010 M_V P_{VA} Q K_N K_P	L_W =	1087.7588	lbs	
M_V = Vapor Molecular Weight			M_V =	18.0008	lb/lb-mole	Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr
P_{VA} = Vapor Pressure at Daily Average Liquid Surface Temperature						K_N = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18
Q = Annual Net Throughput		1 bbl/yr = 42 US gal/yr	Q =	178,571.43	bbl/yr	for turnovers >36, K_N = (180 + N)/6N
Annual Turnovers			N =	18.5018		for turnovers <36, K_N = 1
K_N = Turnover Factor		K_N = (180 + N)/6N	K_N =	1.0000		K_P = working loss product factor, dimensionless
Maximum Liquid Volume						for crude oils K_P = 0.75
Maximum Liquid Height						
Tank Diameter						
K_P = Working Loss Product Factor			K_P =	1.00		
Total Losses			L_T =	1447.5028	lbs	

TANKS 4.0.9d

Emissions Report - Detail Format

Individual Tank Emission Totals

Emissions Report for: Annual

Vertical Fixed Roof Tank
Chaffee, New York

CALCULATED VALUES

Losses (lbs)			
	Working Loss	*Breathing Loss*	*Total Emissions*
Total Leachate	1087.75883	359.74392	1447.50275
2-Butanone	0.01791	0.00592	0.02383
Acetone	0.04253	0.01406	0.05659
Tetrahydrofuran	0.01030	0.00341	0.01370
3-Methylphenol	0.00001	0.00000	0.00001
4-Methylphenol	0.00000	0.00000	0.00000
Phenol	0.00001	0.00000	0.00001
Water	1087.68808	359.72052	1447.40860

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Vertical Fixed Roof Tank

Chaffee, New York

CALCULATED VALUES

Mixture/Component	Month	Daily Liquid Surface Temperature (deg F) Avg.	Min	Max	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min	Max	Vapor Mol Weight g/mol	Liquid Mass Fraction	Vapor Mass Fraction	Mol Weight g/mol	Basis for Vapor Pressure Calculations	Table 7.1-3 A	B	C	Detected Compounds CAS Number	MW_i (g/mol)	Leachate Concentration[1] (ug/L)	C_i	C_i / MW_i	X_i	$M_V = M_i [(P X_i)/P_{VA}]$
Leachate	All	49.26	-	-	47.70	0.3384	-	-	18.0008	-	-	18.00	-	-	-	-			-	-	-	-	18.0008
2-Butanone						0.7848	-	-	72.1100	0.0000	0.0000	72.11		6.8645	1150.207	209.246		72.11	7100	0.0000071	0.000000	0.000002	0.0003
Acetone						2.2051	-	-	58.0800	0.0000	0.0000	58.08		7.117	1210.595	229.664		58.08	6000	0.000006	0.000000	0.000002	0.0007
Tetrahydrofuran						1.5255	-	-	72.1100	0.0000	0.0000	72.11		6.995	1202.29	226.25		72.11	2100	0.0000021	0.000000	0.000001	0.0002
3-Methylphenol						0.0008	-	-	108.1400	0.0000	0.0000	108.14		7.508	1856.36	199.07		108.14	2700	0.0000027	0.000000	0.000000	0.0000
4-Methylphenol						0.0003	-	-	108.1400	0.0000	0.0000	108.14		7.035	1511.08	161.85		108.14	2700	0.0000027	0.000000	0.000000	0.0000
Phenol						0.0016	-	-	94.1100	0.0000	0.0000	94.11		7.1330	1516.790	174.95		94.11	1250	0.00000125	0.000000	0.000000	0.0000
Water						0.3384	-	-	18.0000	1.0000	0.9999	18.00	0.3384 psia at 68 deg F via engineeringtoolbox.com	-	-	-		18.00	999978150	0.99997815	0.055554	0.999995	17.9997
									check:	1.0000	1.0000										check:	1.00000	

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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22 December 2021

Mr. Alan Zylinski
New York State Department of Environmental Conservation
Region 9
270 Michigan Avenue
Buffalo, NY 14203

Closeout of Comments on Air Permit Application, dated March 10, 2021 - Chaffee Landfill
Title V Permit Number 9-1462-00001/00013

Dear Mr. Zylinski:

On behalf of Waste Management of New York LLC (WMNY), GHD hereby presents this follow-up to comments provided by the New York State Department of Environmental Conservation (NYSDEC), dated March 10, 2021. GHD provided a response to the March 10, 2021, comments by NYSDEC on May 5, 2021. Based on an email from Mr. Michael Emery, dated October 25, 2021, NYSDEC indicated that all of the March 10, 2021, comments have been adequately addressed except for Comment 11. Comment 11 pertains to the applicability of the parts cleaners to 6NYCRR Part 226-1, Solvent Cleaning Processes. If the parts cleaners fit the trivial source citation under 6 NYCRR 201-3.3(c)(49), they do not need to be permitted but may still be subject to Part 226-1. The exceptions listed under 6 NYCRR 226-1.7 do not include cold cleaning degreasers. Therefore, NYSDEC requested that GHD re-evaluate the applicability of 6 NYCRR Part 226-1 to the Chaffee Landfill facility.

In response to this request, GHD is in agreement that even though the parts washers are trivial units, they will still be subject to 6 NYCRR Part 226-1. WMNY is currently assessing options being provided by the vendor in order to ensure compliance no later than December 1, 2022. A link to the vendor website with additional information is provided as: https://www.safety-kleen.com/new-york-solvent-conversion.

It is our understanding that the addressing of NYSDEC comments, dated March 10, 2021, did not result in any changes to the emissions information provided in the modelling report, dated July 2020. Therefore, there are no changes required to the AERMOD model evaluation that has already been provided to NYSDEC (that was done in accordance with 6 NYCRR Part 212). Please confirm that NYSDEC agrees with this assessment and that no more information is required as part of the air permit application process.

We appreciate your time and consideration in this matter. Please feel free to contact the undersigned if you have any questions, or if you would like clarification or additional information. We will quickly respond to any questions you have, and we appreciate your timely review.

Regards,

Steven Wilsey
Vice President

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Engineer

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cc: J. Rizzo, WMNY Chaffee
M. Mahar, WMNY Chaffee

Attachment 1
Water9 Model Evaluation

High Acres Landfill Condensate Storage Tank Actual Emissions
Water9 Model Calculations

Compound	HAP	VOM	Estimated Concentration (% w)	Condensate Storage Tank Air Emissions (g/s)	(lbs/hr)	(ton/yr)
1,4-dichlorobenzene (-p)	X	X	0.08	3.58E-05	2.83E-04	1.24E-03
Ethylbenzene	X	X	0.086	2.00E-04	1.58E-03	6.95E-03
Tetrachloroethane	X		0.013	2.11E-04	1.67E-03	7.33E-03
Toluene	X	X	0.037	3.06E-04	2.42E-03	1.06E-02
Xylene (total)	X	X	0.042	1.66E-04	1.31E-03	5.77E-03
Total VOM			**2.58E-01**	**9.19E-04**	**7.27E-03**	**3.19E-02**
Total HAPs			**0.245**	**7.08E-04**	**5.60E-03**	**2.46E-02**

ISSUED 03/08/91
GENERIC LANDFILL GAS CONDENSATE (AQUEOUS PHASE) MSDS
THIS DATA APPLIES TO MUNICIPAL SOLID WASTE LANDFILLS ONLY

MATERIAL SAFETY DATA SHEET (MSDS)

SECTION I

TRADE NAME: LANDFILL GAS CONDENSATE (AQUEOUS PHASE)

CHEMICAL NAME AND SYNONYMS: N/A - MIXTURE

LANDFILL NAME:

ADDRESS:

CITY:

EMERGENCY TELEPHONE NUMBER: (800) 424-9300

INFORMATION TELEPHONE NUMBER: (708) 572-3088

TELEPHONE NUMBER:

STATE:

ZIP CODE:

SECTION II - HAZARDOUS INGREDIENTS

	% (WT)	TLV	PEL	UNITS
XYLENE (XYLOL, DIMETHYLBENZENE) CAS# 1330-20-7	<0.01-0.042	100	100	PPM
TOLUENE (TOLUOL, METHYLBENZENE) CAS# 108-88-3	<0.01-0.037	100	100	PPM
ETHYL BENZENE (PHENYL ETHANE) CAS# 100-41-4	<0.01-0.086	100	100	PPM
1,4 DICHLOROBENZENE (P-DICHLOROBENZENE) CAS# 106-46-7	<0.01-0.080	75	75	PPM
PERCHLOROETHYLENE (TETRACHLOROETHYLENE) CAS# 127-18-4	<0.01-0.013	25	50	PPM
WATER CAS# 7732-18-5	BALANCE	NE	NE	NA

LANDFILL GAS CONDENSATE MAY ALSO CONTAIN TRACE QUANTITIES (<0.1%) OF VARIOUS COMPOUNDS NOT LISTED ABOVE. ABSOLUTE CONCENTRATIONS VARY BY SITE.

SECTION III - PHYSICAL DATA

BOILING POINT (F): 212 DEGREES (AS WATER)

VAPOR PRESSURE (mm/Hg): 760 AT 212 DEGREE F.

VAPOR DENSITY (AIR = 1): NE

SOLUBILITY IN WATER: 100%

APPEARANCE AND ODOR: CLEAR TO CLOUDY LIQUID - ODOR VARIES FROM NONE TO A CHARACTERISTIC ODOR

SPECIFIC GRAVITY (WATER = 1): APPROXIMATELY 1

PERCENT VOLATILE BY VOLUME (%): NE

pH: 3.5 - 5.6

EVAPORATION RATE: NE

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (F): NA

EXTINGUISHING MEDIA: NA

SPECIAL FIRE FIGHTING PROCEDURES: NA

UNUSUAL FIRE & EXPLOSION HAZARDS: NONE

FLAMMABLE LIMITS: LEL NA UEL NA

MSDS Dates
Acquired 12-94
Archived ______

NA - NOT APPLICABLE NE - NOT ESTABLISHED UN - UNAVAILABLE

,ECTION V - HEALTH HAZARD INFORMATION

GAS CONDENSATE (AQUEOUS PHASE) IS A MIXTURE OF WATER WITH VERY LOW CONCENTRATIONS OF ORGANIC MATERIALS. THE COMPOSITE HEALTH EFFECTS OF THIS MATERIAL MAY BE RELATED TO THE EFFECTS OF THESE COMPOUNDS AT DILUTED OR LOW CONCENTRATIONS.

XYLENE

INHALATION OF 200 PPM MAY RESULT IN MILDLY IRRITATIVE EFFECTS. HIGHER CONCENTRATIONS MAY CAUSE CENTRAL NERVOUS SYSTEM (CNS) DEPRESSION FOLLOWING TRANSIENT EUPHORIA. VERY SEVERE EXPOSURES MAY CAUSE COMA. CONCENTRATIONS OF 1,000 PPM ARE IMMEDIATELY DANGEROUS TO LIFE.

SKIN CONTACT MAY CAUSE IRRITATIVE SYMPTOMS INCLUDING BLISTERING AND ERYTHEMA OF THE SKIN.

EYE CONTACT MAY CAUSE CONJUNCTIVITIS. REVERSIBLE DAMAGE TO CORNEAL TISSUE HAS BEEN REPORTED.

CHRONIC EFFECTS OF EXPOSURE CONSIST OF REVERSIBLE DECREASES IN RED AND WHITE BLOOD CELL COUNTS WHICH HAVE BEEN REPORTED AT HIGH EXPOSURE LEVELS. ELEVATIONS IN LIVER AND KIDNEY ENZYME FUNCTIONS HAVE ALSO BEEN SEEN AT HIGH LEVELS. CHRONIC EXPOSURES MAY RESULT IN REVERSIBLE HEADACHE.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE CONSIST OF CONJUNCTIVITIS DERMATITIS AND ALLERGIC RHINITIS. IN RARE CASES PATIENTS WITH ABNORMAL LIVER FUNCTION TESTS MAY HAVE INCREASED LEVELS OF LIVER FUNCTION ENZYMES. EXPOSURES TO HIGH LEVELS OVER A LONG PERIOD OF TIME MAY WORSEN KIDNEY FUNCTION IN INDIVIDUALS WITH PRE-EXISTING KIDNEY DISEASE.

TOLUENE

INHALATION OF 200-600 PPM MAY CAUSE UPPER RESPIRATORY TRACT IRRITATION. DEPRESSION OF CENTRAL NERVOUS SYSTEM MANIFESTED BY HEADACHE, FATIGUE AND CONFUSION MAY OCCUR.

SKIN CONTACT MAY RESULT IN IRRITATION.

E CONTACT MAY CAUSE IRRITATIVE SYMPTOMS, RANGING FROM CONJUNCTIVITIS TO CORNEAL BURNS.

CHRONIC EFFECTS OF INHALATION CONSIST OF LOSS OF COORDINATION, DIZZINESS AND WEAKNESS. REPEATED INHALATION OF EXTREMELY HIGH LEVELS MAY RESULT IN ENCEPHALOPATHY MANIFESTED BY BIZARRE BEHAVIOR AND ATAXIA. INHALATION OF HIGH LEVELS OVER A LONG PERIOD OF TIME MAY CAUSE AN ENLARGED LIVER.

PRE-EXISTING MEDICAL CONDITIONS POTENTIALLY WORSENED BY EXPOSURE CONSIST OF CONJUNCTIVITIS AND ALLERGIC RHINITIS. PATIENTS WITH ABNORMAL LIVER FUNCTIONS MAY SHOW TRANSIENT ELEVATIONS IN LIVER FUNCTION TESTS. ANEMIA MAY BE WORSENED (THIS MAY BE DUE TO CONTAMINATION WITH BENZENE). PATIENTS WITH NEUROLOGIC CONDITIONS SECONDARY TO ALCOHOL MAY RESULT IN WORSENED SYMPTOMS SECONDARY TO CHRONIC EXPOSURE TO HIGH LEVELS OF TOLUENE.

ETHYL BENZENE

INHALATION MAY RESULT IN IRRITATION OF THE UPPER AIRWAYS. AT HIGHER CONCENTRATIONS CNS DEPRESSION SIMILAR TO THAT OF XYLENE AND TOLUENE MAY OCCUR.

CHRONIC EXPOSURE TO HIGH LEVELS MAY CAUSE FATIGUE, HEADACHE AND IRRITABILITY. CHEMICAL HEPATITIS AND ELEVATION OF KIDNEY FUNCTION ENZYME LEVELS TESTS HAVE BEEN REPORTED WITH EXTREMELY HIGH EXPOSURES.

SKIN CONTACT MAY CAUSE IRRITATION. HIGH CONCENTRATIONS MAY RESULT IN A FIRST OR SECOND DEGREE BURN.

EYE CONTACT RESULTS IN IRRITATION AT LEVELS ABOVE 200 PPM.

PRE-EXISTING MEDICAL CONDITIONS POTENTIALLY WORSENED BY EXPOSURE CONSIST OF DERMATITIS, CONJUNCTIVITIS, ALLERGIC RHINITIS. PATIENTS WITH ABNORMAL LIVER OR KIDNEY FUNCTION TESTS MAY HAVE FURTHER ELEVATION OF LEVELS WITH EXTREMELY HIGH EXPOSURES TO ETHYL BENZENE.

1,4 DICHLOROBENZENE

EXPOSURE (INHALATION) TO LEVELS GREATER THAN 50 PPM MAY RESULT IN UPPER AIRWAY IRRITATION, HEADACHE AND TREMORS. EXTREMELY HIGH LEVELS MAY CAUSE ACUTE GLOMERULAR NEPHRITIS (KIDNEY DAMAGE) AND SEVERE LIVER DAMAGE LEADING TO CIRRHOSIS AND DEATH.

IN CONTACT MAY CAUSE IRRITATION. ONE CASE OF ALLERGIC DERMATITIS HAS BEEN REPORTED.

E CONTACT TO LEVELS ABOVE 50 PM MAY CAUSE CONJUNCTIVITIS.

CHRONIC EXPOSURE MAY CAUSE HEMOLYTIC ANEMIA.

1,4 DICHLOROBENZENE (continued)

DICHLOROBENZENE IS CLASSIFIED AS IARC GROUP 2B. IT IS DESCRIBED AS AN ANTICIPATED HUMAN CARCINOGEN ANIMAL SUFFICIENT EVIDENCE, HUMAN INADEQUATE EVIDENCE BY THE NTP. TUMORS OF THE KIDNEYS, LIVER, ADRENAL AND BLOOD HAVE BEEN REPORTED IN ANIMALS.

CONDITIONS WORSENED POTENTIALLY BY EXPOSURE CONSIST OF CONJUNCTIVITIS, DERMATITIS AND PRE-EXISTING LIVER FUNCTION ABNORMALITIES.

PERCHLORETHYLENE

EXPOSURE BY INHALATION TO CONCENTRATIONS ABOVE 100 PPM MAY CAUSE IRRITATION OF THE UPPER AIRWAYS. CNS DEPRESSION MANIFESTED BY HEADACHE, DIZZINESS, LIGHT-HEADEDNESS, CONFUSION AND DECREASED COORDINATION MAY OCCUR.

EXTREMELY HIGH EXPOSURES MAY CAUSE UNCONSCIOUSNESS, COMA AND DEATH (OVER 1,000 PPM). ELEVATION IN LIVER FUNCTION ENZYMES HAVE ALSO BEEN REPORTED AT HIGH CONCENTRATIONS.

CHRONIC EXPOSURES (7.5 YEARS) TO LEVELS OF 1-40 PPM HAVE RESULTED IN DECREASED "NEUROLOGIC RATING SCORES." THIS MAY MEAN IMPAIRMENT IN COGNITIVE FUNCTION. LONG-TERM EXPOSURES TO HIGHER LEVELS MAY RESULT IN CHRONIC HEADACHE AND DIZZINESS. PERIPHERAL NEUROPATHY HAS BEEN REPORTED AT THESE LEVELS. PERSISTENT LIVER DAMAGE HAS BEEN REPORTED AT LEVELS OF 60-450 PPM FOR SEVERAL YEARS.

PERCHLORETHYLENE IS ALSO CLASSIFIED AS (IARC - 2B). IT IS DESCRIBED AS AN ANTICIPATED HUMAN CARCINOGEN. ANIMAL EVIDENCE IS SUFFICIENT, HUMAN EVIDENCE IS INADEQUATE PER NTP. LIVER TUMORS IN MICE RESULTED FROM INHALATION AND INGESTION AND LEUKEMIA WAS FOUND INCREASED IN RATS EXPOSED BY INHALATION.

SKIN CONTACT WITH PERCHLORETHYLENE CAN PRODUCE AN IRRITATION WHICH MAY CAUSE A BURNING SENSATION AND ERYTHEMA.

EYE CONTACT WITH LEVELS ABOVE 100 PPM MAY RESULT IN IRRITATION.

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT CONSIST OF CONJUNCTIVITIS, ALLERGIC RHINITIS, DERMATITIS. PATIENTS WITH PRE-EXISTING ABNORMALITIES OF LIVER FUNCTION MAY HAVE FURTHER ELEVATIONS WITH EXPOSURE TO HIGH LEVELS. NEUROLOGIC SYMPTOMS SUCH AS ATAXIA MAY ALSO BE WORSENED BY EXPOSURE TO HIGH LEVELS OVER LONG PERIODS OF TIME.

EMERGENCY FIRST-AID PROCEDURES

INHALATION: REMOVE TO FRESH AIR. PERFORM CARDIO-PULMONARY RESUSCITATION (CPR) IF PATIENT IS NOT BREATHING OR IF THERE IS NO PULSE. SEEK MEDICAL ATTENTION IF PATIENT IS/HAS BEEN UNCONSCIOUS OR EXPERIENCES DIFFICULTY IN BREATHING.

SKIN CONTACT: AFTER REMOVING ANY CONTAMINATED CLOTHING, WASH EFFECTED AREA THOROUGHLY WITH SOAP AND WATER. SEEK MEDICAL ATTENTION IF IRRITATION DEVELOPS OR PERSISTS.

EYE CONTACT: FLUSH EYES AND EYELIDS THOROUGHLY UNDER GENTLY RUNNING WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL ATTENTION IF IRRITATION DEVELOPS OR PERSISTS.

INGESTION: SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT GIVE ANYTHING BY MOUTH TO A PERSON THAT IS UNCONSCIOUS OR CONVULSING. KEEP PATIENTS HEAD AT LEVEL OF HIS/HER HIPS TO PREVENT BREATHING LIQUID INTO THE LUNGS. REPEAT EMESIS IN 20 MINUTES.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE. AVOID INCOMPATIBLE MATERIALS.

INCOMPATIBLE MATERIALS: OXIDIZING AGENTS, CAUSTIC SODA, NITRIC ACID AND SULFURIC ACID AND WATER ACTIVE MATERIALS, SUCH AS METALLIC SODIUM AND MAGNESIUM.

HAZARDOUS DECOMPOSITION PRODUCTS: COMBUSTION MAY PRODUCE WATER VAPOR (STEAM) AND LOW LEVELS OF CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE, SULFUR DIOXIDE OR HYDROCARBON GASES/VAPORS.

SECTION VII - SPILL OR LEAK PROCEDURES

PROCEDURES: NOTIFY APPROPRIATE RESPONSE PERSONNEL. RESTRICT ACCESS TO AREA. KEEP AWAY FROM ANY INCOMPATIBLE MATERIALS. CONTAIN LARGE SPILLS/LEAKS. ABSORB SPILLED MATERIAL WITH SAND, EARTH, VERMICULITE OR OTHER ABSORBENTS DESIGNED TO COLLECT WATER BASED PRODUCTS.

WASTE DISPOSAL METHOD: HANDLE AS A MUNICIPAL WASTEWATER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY: USE A NIOSH/MSHA APPROVED ORGANIC VAPOR RESPIRATOR FOR CONCENTRATIONS ABOVE THE PEL/TLV, BUT BELOW 10X THE PEL/TLV FOR THE INDICATED COMPOUNDS. WEAR A NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS (SCBA) IN UNKNOWN ATMOSPHERES.

EYEWEAR: CHEMICAL SAFETY GOGGLES OR A FACESHIELD WHEN TRANSFERRING OR HANDLING OPEN CONTAINERS OF LIQUID. FULL FACEPIECE.

CLOTHING/GLOVES: NITRILE GLOVES AND BOOTS. NITRILE APRON FOR ROUTINE SPLASH PROTECTION. POLYETHYLENE OR SARANEX LAMINATED OVERALLS FOR SPILL CLEANUP.

VENTILATION: LOCAL EXHAUST MAY BE NECESSARY UNDER SOME HANDLING/USE CONDITIONS. SPECIFIC NEEDS SHOULD BE ADDRESSED BY SUPERVISORY OR HEALTH/SAFETY PERSONNEL.

ˋECTION IX - SPECIAL PRECAUTIONS

CHARACTERISTIC ODOR PROVIDES GOOD WARNING PROPERTIES AT LOW VAPOR CONCENTRATIONS. GAS CONDENSATE CAN OCCUR IN TWO PHASES (ORGANIC AND AQUEOUS). THE ORGANIC PHASE IS A FLAMMABLE OR COMBUSTIBLE LIQUID (DEPENDENT ON THE LANDFILL SOURCE) WHICH WILL SEPARATE AND FLOAT ON TOP OF THE AQUEOUS PHASE. AN MSDS IS AVAILABLE FOR GAS CONDENSATE (ORGANIC PHASE).

APPROVAL: ____

NAME TITLE DATE

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