



Memorandum

September 30, 2024

To	Syracuse Haulers Inc.		
From	Steve Wilsey, Bryan Szalda/cs/1	Tel	716-297-6150
Subject	Syracuse Haulers – CLCPA GHG Assessment	Project no.	12593296

1. Introduction

Syracuse Haulers Waste Removal Inc. (Syracuse Haulers) operates a solid waste transfer facility located in an industrial zone in the Town of Dewitt, New York, pursuant to a Solid Waste Facility Permit (the Solid Waste Permit). The lot is approximately six acres in all and surrounded by other industrial and commercial uses, including the Metalico metal recycling facility on an adjoining lot. The location on Thompson Road is just off the auxiliary Interstate Highway 690. Syracuse Haulers filed an application on September 27, 2022, and resubmission on August 23, 2023, with the New York State Department of Environmental Conservation to modify its Article 27 Solid Waste Permit (Application ID: 7-3126-00070/00039). By notice of incomplete application, dated May 16, 2024 (the “NOIA”), the NYSDEC identified the requirement for an assessment in accordance with the New York State Climate Leadership and Community Protection Act (CLCPA), among other items, for the application to deemed complete. Syracuse Haulers and GHD conferred with NYSDEC staff on the performing the CLCPA analysis on June 13, 2024. Since then, Syracuse Haulers and GHD have complied the information and performed the analysis. This memorandum provides the results of the data collection and analysis in response to the NOIA with respect to the CLCPA analysis required.

This CLCPA Assessment evaluates whether the approval of the application to increase the waste processing throughput of the facility is inconsistent with, or will interfere with, the attainment of the statewide greenhouse gas (GHG) emission limits established in Article 75 of the environmental conservation law. Syracuse Haulers is proposing to expand its operations within the existing lot by the use of a new prefabricated steel building and a recycling sorter, referred to as the Green Machine (the “Project”). The Project will allow the facility to accept more materials that can be recovered / recycled in lieu of being landfilled. While the Project will result in a slight increase in truck traffic emissions due to increased throughput, overall there is a significant reduction in downstream anthropogenic methane emissions due to the increased amount of organic materials that are diverted from landfills. Therefore, as detailed in the data and analysis below, the project provides an overall benefit in terms of reducing greenhouse gas (GHG) emissions.

For guidance, this CLCPA Assessment draws on NYSDEC guidance and policies. Many of these policies have been issued or updated since Syracuse Hauler’s initial filed its application and thus were not addressed until this submission. Specifically, the analysis draws on Commissioner’s Policy 49 (CP 49) Climate Change and DEC Action, last updated December 14, 2022, which applies to Article 27, Title 7, Solid Waste Management permit modifications and renewals, as well as other permitting programs. DEP 24-1 / Permitting and Disadvantaged Communities, issued May 8, 2024, has been relied upon as well the directions in the NOIA and assistance from staff. The analysis also considers DAR-21 The Climate Leadership and Community Protection Act and Air Permit Applications, issued December 12, 2022, although it is not directly applicable.

This document provides an estimate of the GHG emissions from the entire Facility, including direct, upstream and downstream emissions, as required under CLCPA Section 7(2). In addition, this submittal addresses the CLCPA Section 7(3) analysis requirement because the facility is located in and near Disadvantaged Communities¹. It should be noted that while GHG emissions are generated from the facility, the Syracuse Haulers operation serves to manage waste generated in the local region, with approximately ninety percent of its service provided in Onondaga County, and the remaining in the rest of Central New York.

In 2010, NYSDEC adopted the State Solid Waste Management Plan entitled "Sustainable Materials Management Strategy for New York State Beyond Waste" ("Beyond Waste"). In 2023, NYSDEC adopted the latest version of the New York State Solid Waste Management Plan entitled "Building the Circular Economy Through Sustainable Materials Management" ("2023 New York State Waste Management Plan" or the "Plan") that builds upon New York State's 2010 Beyond Waste Plan. The Plan is intended to guide actions over the next decade, 2023-2032, to change New York State's current linear economy to a circular economy. The linear economy consumes raw materials and results in the majority of materials being landfilled, while a circular economy supports processes, activities and systems that make effective use of materials and keeping valuable materials circulating in the economy.

The Plan sets forth six major Focus Areas, each with 2 to 10 goals for a total of 31 goals. The Focus Areas are Waste Reduction and Reuse, Recycling and Recycling Market Development and Resiliency, Product Stewardship and Extended Producer Responsibility, Organics Reduction and Recycling, Toxics Reduction in Products, and Advanced Design and Operation of Solid Waste Management Facilities and Related Activities. Each goal has set 1 to 17 identified Action Items for a total of 175 Action Items. Together, these Action Items are intended to increase New York State's recycling of its waste stream to 85% by 2050. As described in Section 6 of the Plan, diversion of organics away from landfills will reduce the methane generated in them, therefore, reduce the uncaptured emissions of methane.

As discussed in the 2023 New York State Waste Management Plan, approximately 54% of the C&D waste generated within Region 7 was disposed of or processed within the region in 2018. About 43% of the C&D waste was sent to Region 8 and about 3% was sent to Region 9. Minimal amounts of waste were sent to Region 5 and out of state (Pennsylvania and Maryland). C&D waste was also imported to the region accounting for 78% of all imported waste to the region. Hauling of C&D waste across regions results in higher GHG emissions compared to locally serving and disposing of C&D waste. Syracuse Haulers serves local clients and disposes C&D waste locally through organics diversion, recycling, and OCRA waste-to-energy plant.

The emissions calculated in this Memorandum (refer to Table 1 for a summary of total GHG emissions for the Syracuse Haulers) are associated with the amount of waste managed at the Syracuse Haulers facility which will be accepted from the nearby communities. The estimated emissions reflect the hauling of the waste and materials, and typical facility operational activities.

2. GHG Emissions from Stationary Sources

The following sections detail the methodology for calculating total GHG and hazardous air pollutant (HAP) emissions from stationary sources at the Syracuse Haulers. Tables 2 through 7 provides the full supporting calculations for the estimated total facility emissions. It should be noted that the estimated emissions presented in in this document were calculated using the 20-year global warming potential (GWP) values stated in 6 NYCRR 496.5 in accordance with draft DAR-21, as directed by the NOIA and consistent with DEP 24-1.

We note that we have prepared the following estimates for GHG emissions from the Facility:

- Potential-to-Emit (maximum).
- Estimated actual expected emissions based on the Facility's operational data and plans.

¹ <https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria>

The PTE emissions estimates are based on many conservative assumptions that are used in order to estimate worst-case not-to-exceed values on an annual basis (these assumptions are discussed in Section 2.1). These conservative assumptions result in estimates that are much higher than what is actually expected to occur from the facility. Further discussion on the differences in the two estimates is provided in Section 2.2.

2.1 PTE Emissions for Syracuse Haulers

2.1.1 Recyclables Sorter

The Facility is proposing to install a recyclables sorter (the “Green Machine”) with a permitted capacity of 12,400 tons per year (TPY). The Green Machine is an electrically powered sorter; upstream emissions are included in Table 4.

2.1.2 Baling Operations

Materials processed from the Green Machine are loaded to a conveyor pit for the baler. The Baler is electrically powered; upstream emissions are included in Table 4. Finished bales (approximately 30”x45”x60”) are stored for shipment.

2.1.3 Exempt Sources

The following emission sources are considered exempt under 6 NYCRR 201-3.2(c) for State Air Permitting:

- Natural Gas Furnace
- Natural Gas Heaters
- Storage of Diesel

However, for the purposes of this CLCPA assessment, the GHG emissions from these exempt sources have been considered and included in the totals shown in Tables 5 through 7.

2.2 Estimated Actual Emissions

Below is a comparison of the assumptions used for calculating expected emissions for the years 2024 (actuals), 2028 (peak year), 2030 (projected) and 2050 (projected):

Table 1 Estimated Actual Emissions

Parameter	Existing 2024 Emissions (20-year GWP)	Project 2028 Emissions (20-year GWP)	Expected 2030 Emissions (20-year GWP)	Expected 2050 Emissions* (20-year GWP)
Total Anthropogenic GHG Emissions (TPY CO ₂ eq) ²	5,303	8,273	8,273	8,273
Landfill Fugitive Emissions Avoided (TPY CO ₂ eq) ³	381	2,170	3,208	10,070
Net Change from Existing (TPY CO ₂ eq) ⁴	-	1,182	2,138	-675
Total HAPs Emissions (TPY)	0.3	0.5	0.5	0.5
Landfill Fugitive HAPs Emissions Avoided (TPY)	0.00	0.02	0.04	0.11
Net Change from Existing HAPs Emissions (TPY)	-	0.20	0.21	0.18
Total PM Emissions (TPY)	0.2	0.5	0.5	0.5
Landfill Fugitive PM Emissions Avoided (TPY)	0.01	0.04	0.06	0.18
Net Change from Existing PM Emissions (TPY)	-	0.23	0.25	0.20

3. GHG Emissions from Non-Stationary Sources

This section of the CLCPA Assessment addresses GHG and HAP emissions from direct and indirect non-stationary sources (diesel/gasoline exhaust from on-site and off-site mobile equipment) during the construction and off construction seasons. The estimated emissions calculated from these sources are shown in the attached Tables 2 and 2. The assumptions used in the calculations and provided in the footnotes for attached Tables 2 and 2 and are also discussed in the following sections.

The typical operation activities of the site that generate GHG emissions from direct non-stationary sources include waste transportation and unloading, operation and maintenance, and indirect emissions from mobile sources. Typical operation activities that result in indirect non-stationary GHG and HAP emissions are from transportation of employees.

² Global warming potential values over 100 years: CO₂ = 1, CH₄ = 25, N₂O = 298
 Global warming potential values over 20 years = CO₂ = 1, CH₄ = 84, N₂O = 264
 (Global warming potential values over 20 years are significantly higher than over 100 years)
³ Global warming potential values over 100 years: CO₂ = 1, CH₄ = 25, N₂O = 298
 Global warming potential values over 20 years = CO₂ = 1, CH₄ = 84, N₂O = 264
 (Global warming potential values over 20 years are significantly higher than over 100 years)
⁴ Global warming potential values over 100 years: CO₂ = 1, CH₄ = 25, N₂O = 298
 Global warming potential values over 20 years = CO₂ = 1, CH₄ = 84, N₂O = 264
 (Global warming potential values over 20 years are significantly higher than over 100 years)

3.1.1 Waste Transportation and Unloading

Syracuse Haulers 's permitted capacity is 12,400 TPY. Syracuse Haulers is increasing the existing annual permitted waste tonnage to 32,000 TPY.

Most of this waste capacity serves the surrounding communities within Onondaga County. The GHG and HAP emissions associated with the transportation and unloading of waste from these areas can be accounted for by distance travelled by trash/recycling trucks, tractors, roll-off trucks, and the equipment used at the facility to unload the waste at the Facility. Calculations for the associated GHG and HAP emissions are provided in Tables 2 and 3.

Transportation of waste from off-site to the Facility assumes the annual total distance travelled by trucks is approximately 627,811 miles and that the average truck spends 30 minutes on-site from when they enter, weighs in, unloads, and travels back to the entrance as they leave. During waste unloading, equipment is used to manage the waste.

3.1.2 Recyclables Sorter

Mixed recyclable loads are dumped onto the Bay 2 floor where front end loaders process and load the waste into the Green Machine. Associated emissions for the front end loader are shown in Tables 2 and 3.

3.1.3 Baling Operations

Materials processed from the Green Machine are transferred by front end loader to a conveyor pit for the baler. Associated emissions for the front end loader are shown in Tables 2 and 3.

3.1.4 C&D processing

C&D loads are processed in Bay 1 using a wheel loader (Komatsu WA70-5). Loads are dispersed using the wheel loader and visually inspected for separation and consolidation into designated bins based on material. Associated emissions for the front end loader are shown in Tables 2 and 3.

3.1.5 Operation and Maintenance

Typical operation and maintenance activities that result in GHG and HAP emissions (such as supervision) include use of a one light-duty vehicle. The light-duty vehicles are used to transport employees and equipment around the site for routine maintenance and operations. Calculations are provided in Tables 2 and 3.

3.1.6 Indirect Emissions from Mobile Sources

Indirect emissions are attributed to employee commutes to and from Syracuse Haulers have been considered and provided in Table 2 and 3. There are typically 93 employees traveling to and from the site at an average travel distance of 14.9 miles.

4. Insignificant Emissions

The following activities were not included in this assessment since they are considered "insignificant activities":

- Equipment used maintenance/cleaning of the facility

5. GHG Impact Analysis

5.1 Alternative Facilities

As discussed in Section 3.1.1 of this assessment, the majority of waste accepted at the site originates from Onondaga County and the rest of the Central New York area. Therefore, the alternative waste disposal options if Syracuse Haulers were not operating would need to consider the waste transportation and disposal at more distant locations. There are limited local alternatives (within Onondaga County) for the waste streams that Syracuse Haulers handles on an annual basis.

Alternative transfer options would lead to increased GHG and HAP emissions from hauling waste over longer distances and more trips. Accordingly, Syracuse Haulers facility provides the least GHG impact alternative for handling this waste that will be generated by this community.

5.2 Emissions from Off-site Fossil Fuel Based Energy Consumption

As noted in DAR-21, as part of the assessment of indirect emissions from stationary sources, estimated emissions generated by off-site energy plants supplying energy used on the site of Syracuse Haulers have been assessed. As the off-site fossil fuel-based energy consumption for Syracuse Haulers is not expected to increase or change from historic values or use, current fossil fuel-based energy consumption rates were used to calculate the GHG emissions associated with indirect emissions from stationary sources. There are 11 sources of indirect emissions from stationary sources for off-site fossil fuel-based energy consumption: natural gas for heating, diesel and electrical power.

5.2.1 Natural Gas, Propane, Gasoline and Diesel Energy Consumption

Table 4 provides an estimate of upstream GHG emissions that occur due to the importing of fossil fuels onsite. Quantities of fossil fuels imported are based on information given by the Facility. Emission factors for the estimation of upstream fossil fuel emissions were provided by NYSDEC (Appendix. Emission Factors for Use by State Agencies and Applicants. 2023 NYS State-wide GHG Emissions Report).

5.2.2 Off-site Electrical Energy Consumption

Electricity is used throughout Syracuse Haulers for lighting and powering of tools, equipment, and office appliances. The typical annual amount of electricity used by the Syracuse Haulers is estimated to be approximately 1,214,136 kWh (based on historical records at the Facility). To calculate the indirect emissions for electricity used at this facility, EPA's eGRID Power Profiler was used to determine how electricity is generated in this region. Gas, nuclear, hydro, wind, and solar power generation accounts for over 97.7 percent of electricity generation for the region of NYUP. According to the Power Profiler, the eGRID subregion of NYUP (NPCC Upstate New York) has a 4.88 percent line loss and the annual use of approximately 1,214,136 kWh of electricity results in 368 tons of CO₂. A summary of indirect stationary emissions from electricity is provided in Table 4.

5.3 Emission Reduction Opportunities

This section identifies opportunities to increase gas collection and reduce potential emissions during construction, operation, and maintenance activities described in Sections 2 and 3 of this assessment. Each proposed measure will reduce GHG, HAPs and PM emissions, however, not each one is quantifiable. Where possible, emissions reductions estimates have been included.

Activities that will be implemented to reduce emissions associated with the Syracuse Haulers include:

- Landfill offset for paper
- Load consolidation

5.3.1 Landfill Gas Generation Offset

Based on information provided by Syracuse Haulers, GHD calculated LFG generation offset estimates for the existing operations and the expanded operations. These estimates were based on historical actual and projected waste acceptance values utilizing the United States Environmental Protection Agency ("USEPA") Landfill Gas Emissions Model (LandGEM) Version 3.03.

The calculations to prepare these emission estimates consider the amount of waste that would be managed, the type of waste that would be managed (organic or non-organic), and several other relevant factors about how LFG is captured to reduce emissions to the atmosphere. Importantly, of the waste managed at the site, only organic waste is relevant to the assessment of the Landfill's impacts on GHG emissions under the CLCPA.

- Regarding LFG collection factors for these emission calculations:
 - Methane generation potential (Lo) value of 100 m³/Mg were used. Lo is defined as the potential methane generation capacity. Lo the total amount of methane gas potentially produced by a metric ton of waste as it decays. The higher the organic content of the waste, the higher the value of Lo. A generation rate (k) of 0.04 yr⁻¹ was utilized. These modeling parameters were referenced from AP 42, Section 2.4 (08/24) and are considered conservative estimates.
 - A 75 percent collection efficiency was used to determine the amount of gas collected and the resulting fugitive emissions.

Landfill Gas offset emissions are shown in Table 1 of Section 2.2.

5.3.2 Load Consolidation

As discussed in Sections 3.1.2 through 3.1.4, the Facility has designated areas for recyclable, sorting and C&D processing with limited processing capacity and storage areas for waste. Load consolidation can reduce GHG, HAPs and PM emissions associated with the operation expansion, however, it is not quantifiable. The expansion of operations would allow additional processing capacity and storage area for waste consolidation and can improve waste hauling efficiency.

5.4 Disproportionate Burden Analysis of GHG, HAPs and PM

The Town of Dewitt Industrial Zone in which Syracuse Haulers is located within a census tract designated as a disadvantaged community (DAC) (Census Tract 36067014400. Additional DAC designated census tracts lie to the southeast and southwest (Census Tract 36067014300 and 36067001900). To address Section 7(3) of CLCPA, the DEC is required to prioritize the reduction of GHG emissions and co-pollutants in Disadvantaged Communities. As defined under ECL 75-0101(3), co-pollutants are hazardous air pollutants ("HAPs") and particulate matter (PM) that are emitted by GHG sources. Therefore, HAPs and PM emissions have been evaluated as part of this assessment.

The most heavily travelled roads for the Syracuse Haulers trucks in the area of the facility are Thompson Road and I-690. The primary local truck delivery and return routes within a quarter mile of the facility is shown in Figure 1. Thompson Road is mostly industrial and commercial or vacant throughout the DAC. Syracuse Hauler's trucks are not servicing the Town of Dewitt residences and thus are operating within a relatively small area of the DAC Census Tract within the Town. Approximately 36 percent of the waste sources are within DACs and, therefore, these mobile emission would occur regardless of the Facility's operations. The hauling from these sources results in an estimated 2,547 TPY of GHG, 0.18 TPY of HAPs, and 0.18 TPY of PM emissions.

To further mitigate GHG, HAPs and PM emissions, Syracuse Haulers is working to improve recycling and landfill diversion. Syracuse Haulers is also working to improve waste management practices which will further reduce GHG emissions.

The latest New York State Ambient Air Quality Report for 2022 provides a summary of the ambient monitoring stations located throughout New York State. There are currently 4 active monitoring stations located within

Region 7 (Syracuse) one of which of located in close proximity to the Facility (the Syracuse monitoring station is located within the Syracuse area near of the Facility). A summary of 2022 ambient monitoring results for these stations with a comparison to the national ambient air quality standard is shown in the embedded Table 2 below:

Table 2 Summary of 2022 Air Monitoring Results – NYSDEC Region 7

Compound	Avg. Period	Station	2020 Result	Air Quality Standard	Percent of Standard
PM-2.5	24-hour	Syrause	15.0 µg/m ³	35 µg/m ³	42.9 percent
PM-2.5	Annual	Syrause	6.5 µg/m ³	12 µg/m ³	54.2 percent
PM-2.5	24-hour	Syrause	11.9 µg/m ³	35 µg/m ³	34.0 percent
PM-2.5	Annual	Syrause	5.2 µg/m ³	12 µg/m ³	43.3 percent
Ozone	8-hour	Syrause	0.060 ppm	0.070 ppm	85.7 percent

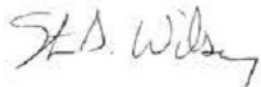
The monitoring results for 2022 indicate good air quality in the vicinity of the Facility (all of the monitoring results are in compliance with the ambient air quality standards). For these reasons, it is concluded that the Facility does not provide a significant or disproportionate burden to the Disadvantaged Communities surrounding the facility, and the implementation of the activities listed above will only further improve the air quality.

An outline of the Public Participation Plan is included as Appendix B, the full plan will be submitted for DEC review following receipt of comments on this CLCPA submittal.

6. Conclusion

Table 1 provides an estimate of the overall GHG, HAP and PM emissions associated with Syracuse Haulers.

Regards,

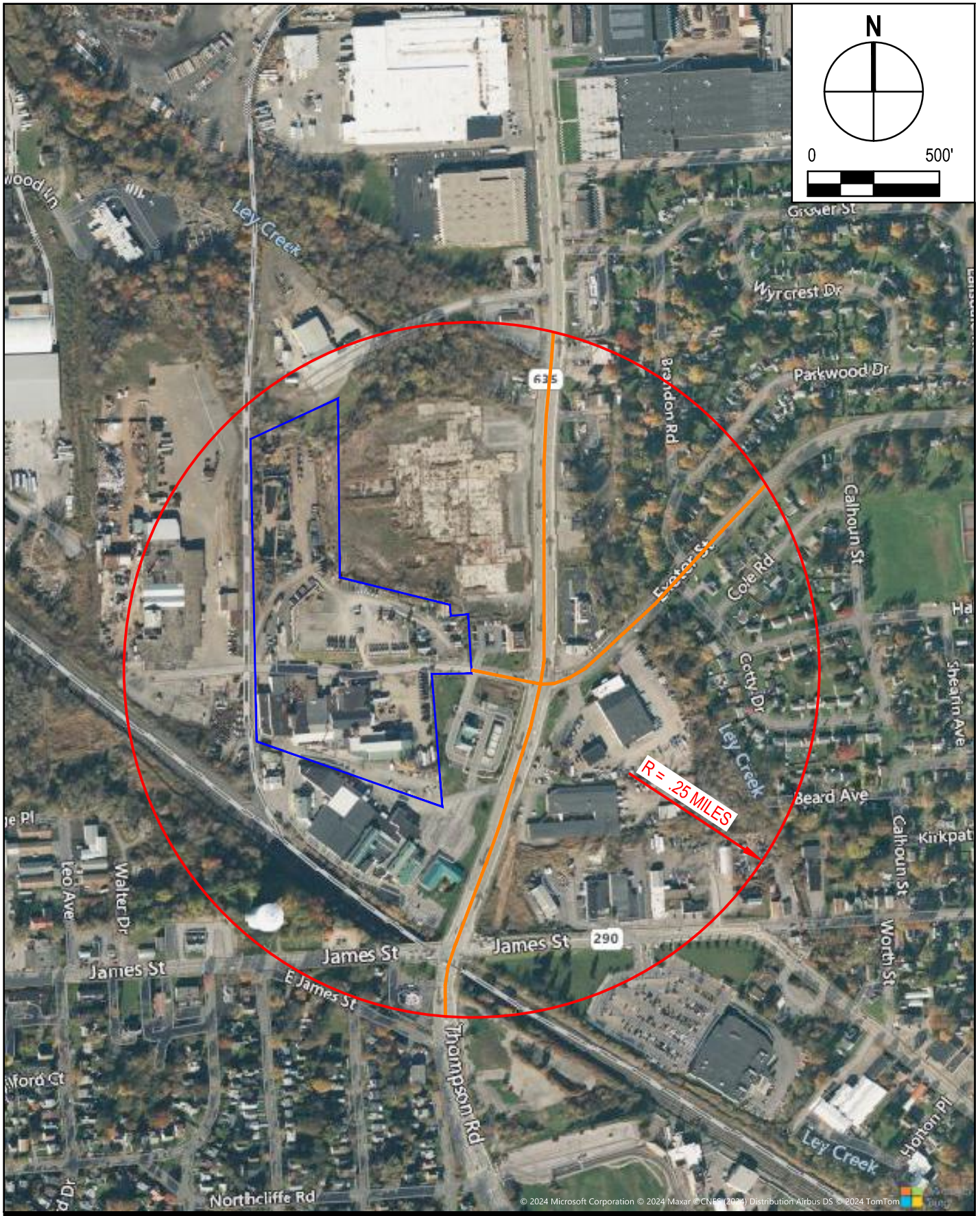


Steven D. Wilsey
Project Director



Bryan P. Szalda
Engineer

Figures



LEGEND

- APPROXIMATE PROPERTY LINE
- TRUCK ROUTE



SYRACUSE HAULERS INC
6223 THOMPSON ROAD
SYRACUSE, NEW YORK 13206

Project No. **12645193**
 Date **9/26/2024**

SITE PLAN

FIGURE 1

Tables

Table 1

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC
 Summary of Projected Actual Emissions

Emission Source	Existing			Project (2028)			2030						2050					
	Existing Total CO ₂ Equivalents	Existing HAPs	Existing PM	Mod. Total CO ₂ Equivalents	Mod. HAPs	Mod. PM	Existing Total CO ₂ Equivalents	Existing HAPs	Existing PM	Mod. Total CO ₂ Equivalents	Mod. HAPs	Mod. PM	Existing Total CO ₂ Equivalents	Existing HAPs	Existing PM	Mod. Total CO ₂ Equivalents	Mod. HAPs	Mod. PM
	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)
Upstream Emissions																		
Off-Site Fossil Fuel Consumption	1,829.3	---	---	2,964.5	---	---	1,829.3	---	---	2,964.5	---	---	1,829.3	---	---	2,964.5	---	---
Direct / Indirect Emissions																		
Mobile Emissions	4,207.6	0.3	0.2	7,076.2	0.5	0.5	4,207.6	0.3	0.2	7,076.2	0.5	0.5	4,207.6	0.3	0.2	7,076.2	0.5	0.5
Furnace	709.8	---	0.0	709.8	---	0.0	709.8	---	0.0	709.8	---	0.0	709.8	---	0.0	709.8	---	0.0
Heaters	385.3	---	0.0	486.7	---	0.0	385.3	---	0.0	486.7	---	0.0	385.3	---	0.0	486.7	---	0.0
Diesel Tank	---	0.0	---	---	0.0	---	---	0.0	---	---	0.0	---	---	0.0	---	---	0.0	---
Existing Totals (TPY)	5,303	0.30	0.29	8,273	0.52	0.56	5,303	0.30	0.29	8,273	0.52	0.56	5,303	0.30	0.29	8,273	0.52	0.56
Existing Totals (lb/yr)	10,605,398.7	594.7	585.0	16,545,443.3	1,040.4	1,118.5	10,605,398.7	594.7	585.0	16,545,443.3	1,040.4	1,118.5	10,605,398.7	594.7	585.0	16,545,443.3	1,040.4	1,118.5

Emissions Reduction in GHG Due to Diversion	Existing			Project (2028)			Existing (2030)			Project (2030)			Existing (2050)			Project (2050)		
	Existing Total CO ₂ Equivalents	Existing HAPs	Existing PM	Mod. Total CO ₂ Equivalents	Mod. HAPs	Mod. PM	Existing Total CO ₂ Equivalents	Existing HAPs	Existing PM	Mod. Total CO ₂ Equivalents	Mod. HAPs	Mod. PM	Existing Total CO ₂ Equivalents	Existing HAPs	Existing PM	Mod. Total CO ₂ Equivalents	Mod. HAPs	Mod. PM
	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)	(ton/year) ¹	(ton/year)	(ton/year)
Landfill Fugitive Emissions	381	0.00	0.01	2,170	0.02	0.04	2,376	0.03	0.04	3,208	0.04	0.06	6,425	0.07	0.12	10,070	0.11	0.18
Net Project Emissions	4,921	0.29	0.29	6,103	0.50	0.52	2,927	0.27	0.25	5,065	0.48	0.50	-1,123	0.23	0.18	-1,797	0.41	0.38
Net Change from Existing				1,182	0.20	0.23				2,138	0.21	0.25				-675	0.18	0.20

Notes:

¹ - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO₂ eq)

t - Trace

Table 2
CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
Existing Mobile Emissions

	CO ₂	CH ₄	N ₂ O	
CO ₂ emissions (Diesel Fuel - Non-Road) ¹ =	22.5	0.002	0.001	lb / gallon of diesel combusted
CO ₂ emissions (Motor Gasoline - Non-Road) ¹ =	19.4	0.006	0.003	lb / gallon of gasoline combusted
CO ₂ emissions (Motor Gasoline - On-Road) ¹ =	19.4	0.002	0.001	lb / gallon of gasoline combusted

Annual (January 1 - December 31)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Clients to Transfer Station

Equipment Needed	Activity	Annual Distance ² (miles)	Estimated Fuel Economy ⁴ (miles / gal)	Annual Fuel Consumption (gal / year)	Idling Factor ⁴ (%)	Annual Fuel Consumption (gal / year)	Annual CO ₂ Emissions ¹ (tons / year)	Annual CH ₄ Emissions ¹ (tons / year)	Annual N ₂ O Emissions ¹ (tons / year)	Total CO ₂ Equivalents ¹¹ (tons / year)	Total HAP Emissions ¹² (tons / year)	Total PM Emissions ¹² (tons / year)
Diesel Dump Trucks	Transport Home Waste to Transfer Station	638,027	2.1	303,822	0	303,822	3,419.4	0.30	0.19	3,494.5	0.07	0.12
Totals							3,419.4	0.30	0.19	3,494.5	0.1	0.1

Sorting, Baling, and C&D Processing

Equipment Needed	Activity	Daily Hours of Operation ⁵ (hours)	Weekly Hours of Operation ⁶ (hours)	Operating Weeks (weeks)	Fuel Consumption Per Unit ⁷ (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO ₂ Emissions ¹ (tons/year)	Annual CH ₄ Emissions ¹ (tons/year)	Annual N ₂ O Emissions ¹ (tons/year)	Total CO ₂ Equivalents ¹¹ (tons/year)	Total HAP Emissions ¹² (tons/year)	Total PM Emissions ¹² (tons / year)
Loader	Sorting and Transferring of C&D Waste	5	30	52	6.20	31	9,668	108.8	0.01	0.01	111.2	0.03	0.02
Loader	Transfer and Loading into the Sorter	7	42	52	6.20	43	13,535	152.3	0.01	0.01	155.7	0.04	0.03
Loader	Transfer of Processed Materials to Baler	3	18	52	6.20	19	5,801	65.3	0.01	0.00	66.7	0.02	0.01
Forklift	Transfer of Bales to Storage Areas	3	18	52	1.00	3	936	10.5	0.00	0.00	10.8	0.00	0.00
Light-Duty Vehicle	Supervise operations	10	60	52	1.00	10	3,120	35.1	0.00	0.00	35.9	0.00	0.00
Totals							372.1	0.03	0.02	380.2	0.1	0.1	

Indirect Emissions From Mobile Sources

Equipment Needed	Quantity of workers (# employees)	Operating Days per Week (days)	Total Operating Days ⁸ (days)	Average Distance to Site (miles)	Estimated Fuel Economy ⁹ (miles / gal)	Daily Fuel Consumption [All Units] (gal / day)	Annual Fuel Consumption [All Units] (gal / year)	Annual CO ₂ Emissions ¹ (tons / year)	Annual CH ₄ Emissions ¹ (tons / year)	Annual N ₂ O Emissions ¹ (tons / year)	Total CO ₂ Equivalents ¹¹ (tons / year)	Total HAP Emissions ¹² (tons / year)	Total PM Emissions ¹² (tons / year)
Light Duty Vehicles	93	6	312	14.9	25.7	107.8	33,645	325.6	0.03	0.02	332.9	0.13	0.04
Totals							325.6	0.03	0.02	332.9	0.13	0.04	
Subtotal							4,117.1	0.37	0.23	4,207.6	0.30	0.22	

Notes:

- 1 CO₂, CH₄ and N₂O emission factors for diesel fuel and gasoline combustion referenced from <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>
- 2 Distance from customers to Syracuse Haulers Transfer Station is estimated as XX miles
- 3 Based on an engineering estimate and an analysis of past fuel usage by this equipment; average of loaded and unloaded conditions
- 4 Idling factor added to account for wait time, where vehicle is immobile.
- 5 A workday consists of one 12-hour shift; however, equipment is only operating for a total of 3 to 10 hours during a 12-hour shift
- 6 Operating schedule is 6 days per week (12 hours/day Monday through Saturday)
- 7 Based on an engineering estimate and an analysis of past fuel usage by this equipment; since no fuel usage data is available for on-site forklifts and light-duty trucks, an assumption of 1.0 gallons per hour of gasoline was utilized
- 8 Total Operating Days = (6 days per week) x (52 weeks per year)
- 9 For light-duty vehicles (cars, minivans, sport utility vehicles, and pickup trucks), USEPA projects average real-world fuel economy for Model Year 2020 to be 25.7 miles per gallon
- 10 Annual Emissions = (Annual Fuel Consumption [gal/yr]) x (Emission Factor from note 1 [lb per gallon of fuel combusted])
- 11 20-yr GWP values assumed to calculate CO₂ equivalents: CO₂ = 1, CH₄ = 84, N₂O = 264.
- 12 HAP emissions calculated using <https://afleet.es.anl.gov/afleet/>
- 13 https://afdc.energy.gov/vehicles/electric_emissions.html
- 14 https://afdc.energy.gov/files/u/publication/casestudy_cng_refuse_feb2014.pdf?f418a58254
- 15 <https://www.energy.ca.gov/sites/default/files/2023-03/CEC-600-2023-010.pdf>

Table 3

**CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
Modification Mobile Emissions**

	CO ₂	CH ₄	N ₂ O	
CO ₂ emissions (Diesel Fuel) ¹ =	22.5	0.002	0.001	lb / gallon of diesel combusted
CO ₂ emissions (Motor Gasoline) ¹ =	19.4	0.006	0.003	lb / gallon of gasoline combusted
CO ₂ emissions (Motor Gasoline - On-Road) ¹ =	19.4	0.002	0.001	lb / gallon of gasoline combusted

Annual (January 1 - December 31)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Homes to Transfer Station

Equipment Needed	Activity	Annual Distance ² (miles)	Estimated Fuel Economy ⁴ (miles / gal)	Annual Fuel Consumption ¹³ (gal / year)	Idling Factor ⁴ (%)	Annual Fuel Consumption (gal / year) (mmbtu / year)	Annual CO ₂ Emissions ¹ (tons / year)	Annual CH ₄ Emissions ¹ (tons / year)	Annual N ₂ O Emissions ¹ (tons / year)	Total CO ₂ Equivalents ¹¹ (tons / year)	Total HAP Emissions ¹² (tons / year)	Total PM Emissions ¹² (tons / year)
Diesel Dump Trucks	Transport Home Waste to Transfer Station	1,084,518	2.1	516,437	0	516,437	5,812.2	0.52	0.32	5,939.9	0.17	0.32
Totals							5,812.2	0.52	0.32	5,939.9	0.2	0.3

Existing Sorting, Baling, and C&D Processing

Equipment Needed	Activity	Daily Hours of Operation ⁵ (hours)	Weekly Hours of Operation ⁶ (hours)	Operating Weeks (weeks)	Fuel Consumption Per Unit ⁷ (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO ₂ Emissions ¹ (tons/year)	Annual CH ₄ Emissions ¹ (tons/year)	Annual N ₂ O Emissions ¹ (tons/year)	Total CO ₂ Equivalents ¹¹ (tons/year)	Total HAP Emissions ¹² (tons/year)	Total PM Emissions ¹² (tons / year)
Loader	Sorting and Transferring of C&D Waste	5	30	52	6.20	31	9,668	108.8	0.01	0.01	111.2	0.03	0.02
Loader	Transfer and Loading into the Sorter	7	42	52	6.20	43	13,535	152.3	0.01	0.01	155.7	0.04	0.03
Loader	Transfer of Processed Materials to Baler	3	18	52	6.20	19	5,801	65.3	0.01	0.00	66.7	0.02	0.01
Forklift	Transfer of Bales to Storage Areas	3	18	52	1.00	3	936	10.5	0.00	0.00	10.8	0.00	0.00
Light-Duty Vehicle	Supervise operations	10	60	52	1.00	10	3,120	35.1	0.00	0.00	35.9	0.00	0.00
Totals								372.1	0.03	0.02	380.2	0.1	0.1

Modification - Sorting, Baling, and C&D Processing

Equipment Needed	Activity	Daily Hours of Operation ⁵ (hours)	Weekly Hours of Operation ⁶ (hours)	Operating Weeks (weeks)	Fuel Consumption Per Unit ⁷ (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO ₂ Emissions ¹ (tons/year)	Annual CH ₄ Emissions ¹ (tons/year)	Annual N ₂ O Emissions ¹ (tons/year)	Total CO ₂ Equivalents ¹¹ (tons/year)	Total HAP Emissions ¹² (tons/year)	Total PM Emissions ¹² (tons / year)
Loader	Sorting and Transferring of C&D Waste	5	30	52	6.20	31	9,668	108.8	0.01	0.01	111.2	0.03	0.02
Loader	Transfer and Loading into the Sorter	7	42	52	6.20	43	13,535	152.3	0.01	0.01	155.7	0.04	0.03
Loader	Transfer of Processed Materials to Baler	3	18	52	6.20	19	5,801	65.3	0.01	0.00	66.7	0.02	0.01
Forklift	Transfer of Bales to Storage Areas	3	18	52	1.00	3	936	10.5	0.00	0.00	10.8	0.00	0.00
Light-Duty Vehicle	Supervise operations	10	60	52	1.00	10	3,120	35.1	0.00	0.00	35.9	0.00	0.00
Totals								372.1	0.03	0.02	380.2	0.1	0.1

	CO ₂	CH ₄	N ₂ O	
CO ₂ emissions (Diesel Fuel) ¹ =	22.5	0.002	0.001	lb / gallon of diesel combusted
CO ₂ emissions (Motor Gasoline) ¹ =	19.4	0.006	0.003	lb / gallon of gasoline combusted
CO ₂ emissions (Motor Gasoline - On-Road) ¹ =	19.4	0.002	0.001	lb / gallon of gasoline combusted

Indirect Emissions From Mobile Sources

Equipment Needed	Quantity of workers (# employees)	Operating Days per Week (days)	Total Operating Days ⁸ (days)	Average Distance to Site (miles)	Estimated Fuel Economy ⁹ (miles / gal)	Daily Fuel Consumption [All Units] (gal / day)	Annual Fuel Consumption [All Units] (gal / year)	Annual CO ₂ Emissions ¹ (tons / year)	Annual CH ₄ Emissions ¹ (tons / year)	Annual N ₂ O Emissions ¹ (tons / year)	Total CO ₂ Equivalents ¹¹ (tons / year)	Total HAP Emissions ¹² (tons / year)	Total PM Emissions ¹² (tons / year)
Light Duty Vehicles	105	6	312	14.9	25.7	121.8	37,986	367.6	0.03	0.02	375.8	0.15	0.05

Totals	367.6	0.03	0.02	375.8	0.15	0.05
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Subtotal	6,924.0	0.6	0.4	7,076.2	0.5	0.5
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Notes:

- 1 CO₂, CH₄ and N₂O emission factors for diesel fuel and gasoline combustion referenced from <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>
- 2 Distance from customers to Syracuse Haulers Transfer Station is estimated as XX miles
- 3 Based on an engineering estimate and an analysis of past fuel usage by this equipment; average of loaded and unloaded conditions
- 4 Idling factor added to account for wait time, where vehicle is immobile.
- 5 A workday consists of one 12-hour shift; however, equipment is only operating for a total of 3 to 10 hours during a 12-hour shift
- 6 Operating schedule is 6 days per week (12 hours/day Monday through Saturday)
- 7 Based on an engineering estimate and an analysis of past fuel usage by this equipment; since no fuel usage data is available for on-site forklifts and light-duty trucks, an assumption of 1.0 gallons per hour of gasoline was utilized
- 8 Total Operating Days = (6 days per week) x (52 weeks per year)
- 9 For light-duty vehicles (cars, minivans, sport utility vehicles, and pickup trucks), USEPA projects average real-world fuel economy for Model Year 2020 to be 25.7 miles per gallon
- 10 Annual Emissions = (Annual Fuel Consumption [gal/yr]) x (Emission Factor from note 1 [lb per gallon of fuel combusted])
- 11 20-yr GWP values assumed to calculate CO₂ equivalents: CO₂ = 1, CH₄ = 84, N₂O = 264.
- 12 HAP emissions calculated using <https://afleet.es.anl.gov/afleet/>
- 13 Annual fuel consumption estimated using current annual fuel use and percent thruput increase to 32,000 TPY.
- 16 https://afdc.energy.gov/vehicles/electric_emissions.html
- 17 https://afdc.energy.gov/files/u/publication/casestudy_cng_refuse_feb2014.pdf?f418a58254
- 18 <https://www.energy.ca.gov/sites/default/files/2023-03/CEC-600-2023-010.pdf>

Table 4

**CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
Off-Site Fossil Fuel Consumption**

Existing Off-Site Fossil Fuel Consumption					
Energy	Amount Imported (MMBTU/yr) or (kWh)	Emission Factor (g / MMBTU) or (lb/kWh)	GHG Emissions (Off-Site Fossil Fuel Usage)		
			Emission	lb/year	tpy
Electricity Consumption	404,712	275	CO2e	245,004	123
Diesel	46,220	24,214	CO2e	2,467,320	1,234
Natural Gas	10,061	42,661	CO2e	946,216	473
Total CO2 Equ.				3,658,539	1,829

Modification Off-Site Fossil Fuel Consumption					
Energy	Amount Imported (MMBTU/yr) or (kWh)	Emission Factor (g / MMBTU) or (lb/kWh)	GHG Emissions (Off-Site Fossil Fuel Usage)		
			Emission	lb/year	tpy
Electricity Consumption	1,044,418	275	CO2e	632,269	316
Diesel	79,927	24,214	CO2e	4,266,634	2,133
Natural Gas	10,952	42,661	CO2e	1,030,007	515
Total CO2 Equ.				5,928,910	2,964

Notes:

- The yearly electrical use for the facility is taken from meter readings provided by Syracuse Haulers Waste Removal Inc. for the period of MONTH YEAR through MONTH YEAR. NYUP (NPCC Upstate NY) sources included Oil (0.5%), Gas (29.2%) and other Fossil Fuels (0.3%), while the remaining sources are a mixture of renewable sources.
<https://www.epa.gov/egrid/power-profiler#/NYUP>

Table 5

**CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
Summary of Natural Gas Usage and Emissions**

Hours of Operation	3,360	Hours
Heat Content	1,000	Btu/scf
Amount of Natural Gas combusted in furnace in the office	11.760	MMscf

Emission Calculations:						
				Lbs/yr	Tons/yr	
PM=	<u>7.60 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	89.376	0.04469
SO_x=	<u>0.6 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	7.056	0.00353
NO_x=	<u>94 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	1105.440	0.55272
VOC =	<u>5.5 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	64.680	0.03234
CO =	<u>40 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	470.400	0.23520
CO₂ =	<u>120,000 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	1,411,200.000	705.60000
CH₄ =	<u>2.3 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	27.048	0.01352
N₂O =	<u>2.2 lb. X</u> MMSCF	11.760000	MMSCF NG X	=	25.872	0.01294

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

Table 6A - Existing

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
Summary of Natural Gas Usage and Emissions

Hours of Operation	3,360	Hours
Heat Content	1,000	Btu/scf
Average amount of Natural Gas combusted per Heater	0.709	MMscf/Heater
Number of Heaters	9	Heater
Amount of Natural Gas combusted in Heaters	6.384	MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	<u>7.60 lb.</u> X	6.384000 MMSCF NG X	=	48.518	0.02426
	MMSCF				
SO_x=	<u>0.6 lb.</u> X	6.384000 MMSCF NG X	=	3.830	0.00192
	MMSCF				
NO_x=	<u>100 lb.</u> X	6.384000 MMSCF NG X	=	638.400	0.31920
	MMSCF				
VOC =	<u>5.5 lb.</u> X	6.384000 MMSCF NG X	=	35.112	0.01756
	MMSCF				
CO =	<u>84 lb.</u> X	6.384000 MMSCF NG X	=	536.256	0.26813
	MMSCF				
CO₂ =	<u>120,000 lb.</u> X	6.384000 MMSCF NG X	=	766,080.000	383.04000
	MMSCF				
CH₄ =	<u>2.3 lb.</u> X	6.384000 MMSCF NG X	=	14.683	0.00734
	MMSCF				
N₂O =	<u>2.2 lb.</u> X	6.384000 MMSCF NG X	=	14.045	0.00702
	MMSCF				

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

Table 6B - Modification

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
Summary of Natural Gas Usage and Emissions

Hours of Operation	3,360	Hours
Heat Content	1,000	Btu/scf
Average amount of Natural Gas combusted per Heater	0.733	MMscf/Heater
Number of Heaters	11	Heater
Amount of Natural Gas combusted in Heaters	8.064	MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	$\frac{7.60 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	61.286	0.03064
SO_x=	$\frac{0.6 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	4.838	0.00242
NO_x=	$\frac{100 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	806.400	0.40320
VOC =	$\frac{5.5 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	44.352	0.02218
CO =	$\frac{84 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	677.376	0.33869
CO₂ =	$\frac{120,000 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	967,680.000	483.84000
CH₄ =	$\frac{2.3 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	18.547	0.00927
N₂O =	$\frac{2.2 \text{ lb.}}{\text{MMSCF}} \times$	8.064000 MMSCF NG	=	17.741	0.00887

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

Table 7

**Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC
TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics**

Identification

User Identification Diesel Fuel Storage
City Syracuse
State New York
Company Syracuse Haulers Waste Removal Inc.
Type of Tank Horizontal Tank
Description Horizontal Tank

Tank Dimensions

Shell Length (ft) 28.00
Diameter (ft) 8.00
Volume (gal) 15,000
Turnovers 22.46
Net Throughput (gal/yr) 336,882
Is tank heated (y/n) N
Is tank underground (y/n) N

Paint Characteristics

Shell Color/Shade Blue/Blue
Shell Condition Good

Breather Vent Settings

Vacuum Settings (psig) -0.03
Pressure Settings (psig) 0.03

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

**Horizontal Tank
Syracuse, New York**

CALCULATED VALUES

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol Weight g/mol	Liquid Mass Fraction	Vapor Mass Fraction	Mol Weight g/mol	Basis for Vapor Pressure Calculations
		Avg.	Min	Max		Avg.	Min	Max					
Distillate Fuel Oil #2	All	49.16	44.483175	53.831574	47.6	0.0044	0.0037	0.0053	130.0000	1	1	188.00	

Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC
 TANKS 4.0.9d
 Emissions Report - Detail Format
 Tank Identification and Physical Characteristics

Horizontal Tank
 Rochester, New York

Annual Emission Calculations

AP-42 EQUATIONS

CALCULATIONS

Standing Losses (lb)
 V_V = Vapor Space Volume (cu ft)
 W_V = Vapor Density (lb/cu ft)
 K_E = Vapor Space Expansion Factor
 K_S = Vented Vapor Saturation Factor

Tank Vapor Space Volume
 V_V = Vapor Space Volume (cu ft)
 D = Tank Diameter (ft)
 D_E = Effective Diameter (ft)
 H_{VO} = Vapor Space Outage (ft)
 H_s = Tank Shell Length (ft)

Vapor Density
 W_V = Vapor Density (lb/cu ft)
 M_V = Vapor Molecular Weight
 Vapor Pressure at Daily Average
 Liquid Surface Temperature (psia)
 T_{LA} = Daily Avg. Liquid Surface Temp.
 (deg. R)
 T_{AA} = Daily Average Ambient Temp.
 (deg. F)
 Ideal Gas Constant R
 (psia cuft / (lb-mol-deg R))
 T_B = Liquid Bulk Temperature (deg. R)
 Tank Paint Solar Absorptance (Shell)
 I = Daily Total Solar Insulation
 Factor (Btu/sqft day)

$$L_S = 365 V_V W_V K_E K_S$$

$L_S = 1.1192$ lbs
 $V_V = 896.4545$ cu ft
 $W_V = 0.0001$ lb / cu ft
 $K_E = 0.0327$
 $K_S = 0.9991$

$$V_V = [(Pi/4) D_E^2] H_{VO}$$

$V_V = 896.4545$ cu ft

$$D_E = (L * D / (pi/4))^{1/2}$$

$D_E = 16.8923$ ft

$$H_{VO} = H_E / 2 \text{ for horizontal tank}$$

$H_{VO} = 4.0000$ ft

Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$

$$W_V = M_V P_{VA} / R T_{LA}$$

$W_V = 0.0001$ lb / cu ft
 $M_V = 130.0000$ lb/lb-mole

0 deg F = 459.67 R

$$T_{LA} = 0.44 T_{AA} + 0.56 T_B + 0.0079 * \alpha * I$$

$T_{LA} = 508.8274$ R = 9.53 deg C

$$T_{AA} = T_{AX} + T_{AN} / 2$$

$T_{AA} = 47.5750$ deg F = 507.24 R

10.7310

$$T_B = T_{AA} + 6 \alpha - 1$$

$T_B = 507.264985$

0.17

1,169.910 Btu/sqft d

As per Table 7.1-6: White/White = .17
 $I_{AVG} = 1,165 \text{ Btu/ft}^2\text{-d}$ as per sources mentioned
 on page 6-5 of TANKS user manual

Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

As per sources listed on page 6-5 of TANKS user manual:

Vapor Space Expansion Factor

$K_E = \text{Vapor Space Expansion Factor}$	$K_E = [\Delta T_V / T_{LA}] + [(\Delta P_V - \Delta P_B) / (P_A - P_{VA})]$	$K_E = 0.0327$		$T_{AX} = 516.36167$
$\Delta T_V = \text{Daily Vapor Temperature Range (deg. R)}$	$\Delta T_V = 0.72(T_{AX} - T_{AN}) + 0.028 \cdot \alpha \cdot I$	$\Delta T_V = 18.6968$	R	$T_{AN} = 498.1283$
$\Delta P_V = \text{Daily Vapor Pressure Range (psia)}$		$\Delta P_V = 0.0016$	psia	
$\Delta P_B = \text{Breather Vent Press. Setting Range (psia)}$		$\Delta P_B = 0.06$	psia	
$P_{VA} = \text{Vapor Pressure at Daily Average Liquid Surface Temperature (psia)}$				
$P_{VM} = \text{Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)}$				
$P_{VMX} = \text{Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)}$				
$T_{LA} = \text{Daily Avg. Liquid Surface Temp. (deg R)}$			508.8274	R
$T_{LM} = \text{Daily Min. Liquid Surface Temp. (deg R)}$	$T_{LN} = T_{LA} - 0.25 \Delta T_V$	$T_{LN} = 504.1531746$	R	44.4831746
$T_{LMX} = \text{Daily Max. Liquid Surface Temp. (deg R)}$	$T_{LX} = T_{LA} + 0.25 \Delta T_V$	$T_{LX} = 513.5016$	R	53.8315736
$\Delta T_A = \text{Daily Ambient Temp. Range (deg. R)}$		$\Delta T_A = 18.2334$	R	

Vented Vapor Saturation Factor

$K_S = \text{Vented Vapor Saturation Factor}$	$K_S = 1 / [1 + (.053 \cdot P_{VA} \cdot H_{VO})]$	$K_S = 0.9991$
$P_{VA} = \text{Vapor Pressure at Daily Average Liquid Surface Temperature (psia)}$		
$H_{VO} = \text{Vapor Space Outage (ft)}$		

Working Losses (lb)

$L_W = \text{Working Losses (lb)}$	$L_W = 0.0010 M_V P_{VA} Q K_N K_P$	$L_W = 4.5880$	lbs	
$M_V = \text{Vapor Molecular Weight}$		$M_V = 130.0000$	lb/lb-mole	
$P_{VA} = \text{Vapor Pressure at Daily Average Liquid Surface Temperature (psia)}$				
$Q = \text{Annual Net Throughput (gal/yr)}$	$1 \text{ bbl/yr} = 42 \text{ US gal/yr}$	$Q = 8,021.00$	bbl/yr	$Q = \text{annual net throughput} = \text{tank capacity [bbl]} \cdot \text{annual turnover rate, bbl/yr}$
$N = \text{Annual Turnovers}$		$N = 22.46$		
$K_N = \text{Turnover Factor}$	$K_N = (180 + N) / 6N$	$K_N = 1.00$		$K_N = \text{working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18}$ for turnovers >36, $K_N = (180 + N) / 6N$ for turnovers <36, $K_N = 1$
$K_P = \text{Working Loss Product Factor}$		$K_P = 1.00$		$K_P = \text{working loss product factor, dimensionless}$ for crude oils $K_P = 0.75$ for all other organic liquids, $K_P = 1$
$L_T = \text{Total Losses (lb)}$		$L_T = 5.7072$	lbs	

Emissions Report for: Annual

Horizontal Tank
Rochester, New York

CALCULATED VALUES

Losses (lbs)		
Working Loss	Breathing Loss	Total Emissions
4.59	1.12	5.71

Table 8

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Landfill Gas Fugitive Emissions

Existing and Expansion Landfill Areas

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)
2024	4	75%	3	1	544,330	15,414	0.0	0.01	0.00	4.3	3.9	15.8	367
2028	24	75%	18	6	3,095,950	87,668	0.2	0.08	0.02	24.6	22.4	89.8	2,085
2030	35	75%	26	9	4,576,844	129,602	0.3	0.12	0.04	36.3	33.2	132.7	3,082
2050	109	75%	82	27	14,368,111	406,860	0.9	0.37	0.11	114.0	104.2	416.7	9,677

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from USEPA LandGEM Model run (version 3.02)

Collection efficiency of 75% assumed for gas collection system

LFG to Collection System = (Total LFG Generated) * (Collection Efficiency (%))

Fugitive LFG = (Total LFG Generated) * (100% - Collection Efficiency (%))

Fugitive LFG (ft³/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m³/yr) = (Fugitive LFG (ft³/yr)) / (35.3147 cubic feet per cubic meter)

NMOC concentration of 595 ppm referenced from USEPA AP-42, Chapter 2.4 (11/98)

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m³/yr)] * [2,095.9 mg of NMOC per m³ of LFG] * [2.2046 x 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 Tables 10,13, 16, and 19)

Fugitive CH₄ emissions (TPY) = [Fugitive LFG (ft³/yr)] * [50% CH₄] * [0.0423 lb CH₄ / ft³ CH₄] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO₂ emissions (TPY) = [Fugitive LFG (ft³/yr)] * [50% CH₄] * [0.116 lb CO₂ / ft³ CH₄] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft³/yr)] * [50% CO₂] * [0.116 lb CO₂ / ft³ CO₂] / [2,000 lb/ton] } + Oxidized CO₂ Emissions

Total Fugitive Anthropogenic GHG Emissions (tons CO₂ equivalents / year) = [Fugitive CH₄ Emissions (TPY)] * 84

Equations:

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

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

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

Table 9

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Flare GHG Emissions (2024)

LFG to Flares = 1.6 MMscf

Flare Combustion Factors

	Pounds per MMScf		
	CO ₂	CH ₄	N ₂ O
Flare	57,396.8	3.5	0.69

	MMscf Combusted	Estimated Actual 2021 Emissions (TPY)					Anthropogenic GHG
		Oxidation CO ₂	Oxidation CH ₄	Oxidation N ₂ O	Escape CH ₄	Collected CO ₂	
Flares	2	46.9	0.0	0.0	0.2	47.4	14.9
Total Emissions (TPY)		46.9	0.0	0.0	0.2	47.4	14.9
Total Emissions (lb/yr)		9.37E+04	5.76E+00	1.13E+00	3.45E+02	9.47E+04	2.98E+04

Notes:

- Oxidation CO₂ Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
- Oxidation CH₄ Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Oxidation N₂O Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Collected CO₂ Portion of collected LFG that already contains CO₂

Emission Factor Development

Flares - CH₄ Oxidation Emission Factors

	EF (kg/MMBtu)	GWP (20 year)
CO ₂	52.07	1
CH ₄	3.20E-03	84
N ₂ O	6.30E-04	264

	Flare	Enclosed	
Heating value	500	Btu/scf	
LFG CH ₄ Concentration	50	%	
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 10

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Fugitive HAP Emissions (2024)

Total LFG Generated = 4 cfm
LFG Collection Efficiency = 85%
Average LFG Collected = 4 cfm
Fugitive Emission Estimates = 1 cfm
Hours of Operation = 8,760

CAS #	LFG Constituent	Molecular Weight	Median ¹ ppmv	Uncontrolled Emissions			
				lb/hr	lb/yr	TPY	mg/m ³
71-55-6	1,1,1-Trichloroethane	133.41	0.48	0.000	0.05	0.00	2.62
79-34-5	1,1,2,2-Tetrachloroethane	167.85	1.11	0.000	0.16	0.00	7.62
75-34-3	1,1-Dichloroethane	98.97	2.35	0.000	0.19	0.00	9.51
75-35-4	1,1-Dichloroethene	96.94	0.20	0.000	0.02	0.00	0.79
107-06-2	1,2-Dichloroethane	98.96	0.41	0.000	0.03	0.00	1.66
78-87-5	1,2-Dichloropropane	112.99	0.18	0.000	0.02	0.00	0.83
107-13-1	Acrylonitrile	53.06	6.33	0.000	0.28	0.00	13.73
75-15-0	Carbon disulfide	76.13	0.58	0.000	0.04	0.00	1.80
56-23-5	Carbon tetrachloride	153.84	0.00	0.000	0.00	0.00	0.03
463-58-1	Carbonyl sulfide	60.07	0.49	0.000	0.02	0.00	1.20
108-90-7	Chlorobenzene	112.56	0.25	0.000	0.02	0.00	1.15
75-00-3	Chloroethane	64.52	1.25	0.000	0.07	0.00	3.30
67-66-3	Chloroform	119.39	0.03	0.000	0.00	0.00	0.15
74-87-3	Chloromethane ²	50.49	1.21	0.000	0.05	0.00	2.50
106-46-7	Dichlorobenzene	147.00	0.21	0.000	0.03	0.00	1.26
75-09-2	Dichloromethane	84.94	14.30	0.000	1.01	0.00	49.65
100-41-4	Ethylbenzene	106.16	4.61	0.000	0.41	0.00	20.00
106-93-4	Ethylene dibromide ²	187.88	0.001	0.000	0.00	0.00	0.01
110-54-3	Hexane	86.18	6.57	0.000	0.47	0.00	23.14
7439-97-6	Mercury	200.61	0.000292	0.000	0.00	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	1.87	0.000	0.16	0.00	7.66
127-18-4	Perchloroethylene	165.83	3.73	0.000	0.52	0.00	25.28
79-01-6	Trichloroethene	131.40	2.82	0.000	0.31	0.00	15.15
75-01-4	Vinyl chloride	62.50	7.34	0.000	0.38	0.00	18.75
1330-20-7	Xylene	106.16	12.10	0.000	1.07	0.00	52.50
71-43-2	Benzene ³	78.11	1.91	0.000	0.12	0.00	6.10
108-88-3	Toluene ³	92.13	39.30	0.000	3.02	0.00	147.99
Total HAPs						0.00	

Notes:

- ¹ Concentration of individual HAPs were taken from AP-42, Chapter 2.4, 11/98
- 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

Equations:

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

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

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

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

Table 11

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC

Summary of LFG Flare Emissions (2024)

Total LFG to Flares in 2021 = 1.63E+06 ft³
 Average flow = 3.1 cfm

Flare Type	LFG Combusted MMscf	Estimated Actual Emissions for 2021 (TPY)					
		PM	NMOC	CO	NO _x	SO ₂	VOC
Open	1.63	0.01	0.01	0.13	0.03	0.01	0.00
Total Emissions (TPY)		0.01	0.01	0.13	0.03	0.01	0.00
Total Emissions (lb/yr)		13.88	17.24	253.11	55.52	12.52	6.72

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	NMOC	CO	NO _x	SO ₂
Open Flare	8.50	10.55	155.0	34.0	7.67

Emission Factor Development

Open Flare

- based on AP-42, Section 13.5

CO: 0.31 lb/MMBtu

NO_x: 0.068 lb/MMBtu

LFG Data:

NMOC: 2400 ppm

TRS: 46.9 ppm

CH₄: 50.0% of total LFG

VOC: 39.0% of NMOC

DE (of NMOC) 98.0 %

Notes:

PM 17 lb/10⁶ dscf methane per AP-42, section 2.4 (8/24)

NMOC Based on 2,400 ppm per AP-42, section 2.4 (8/24), and 98% destruction effi

CO Based on AP-42, Section 13.5 (02/2018)

NO_x Based on AP-42, Section 13.5 (02/2018)

SO₂ 46.9 ppm TRS concentration and 0% destruction efficiency, AP-42, section 2

VOC 39% of NMOC per AP-42, section 2.4 (11/98)

Heat Value 500 Btu/scf

Table 12

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC

Summary of Flare GHG Emissions (2028)

LFG to Flares = 9.3 MMscf

Flare Combustion Factors

	Pounds per MMScf		
	CO ₂	CH ₄	N ₂ O
Flare	57,396.8	3.5	0.69

	MMscf Combusted	Estimated Actual 2021 Emissions (TPY)					Anthropogenic GHG
		Oxidation CO ₂	Oxidation CH ₄	Oxidation N ₂ O	Escape CH ₄	Collected CO ₂	
Flares	9	266.5	0.0	0.0	1.0	269.3	84.7
Total Emissions (TPY)		266.5	0.0	0.0	1.0	269.3	84.7
Total Emissions (lb/yr)		5.33E+05	3.28E+01	6.45E+00	1.96E+03	5.39E+05	1.69E+05

Notes:

- Oxidation CO₂ Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
- Oxidation CH₄ Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Oxidation N₂O Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Collected CO₂ Portion of collected LFG that already contains CO₂

	Flare	Enclosed	
Heating value	500	Btu/scf	
LFG CH ₄ Concentration	50	%	
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

Flares - CH₄ Oxidation Emission Factors

	EF (kg/MMBtu)	GWP (20 year)
CO ₂	52.07	1
CH ₄	3.20E-03	84
N ₂ O	6.30E-04	264

Table 13

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Fugitive HAP Emissions (2028)

Total LFG Generated = 24 cfm
LFG Collection Efficiency = 85%
Average LFG Collected = 20 cfm
Fugitive Emission Estimates = 4 cfm
Hours of Operation = 8,760

CAS #	LFG Constituent	Molecular Weight	Median ¹ ppmv	Uncontrolled Emissions			
				lb/hr	lb/yr	TPY	mg/m ³
71-55-6	1,1,1-Trichloroethane	133.41	0.48	0.000	0.30	0.00	2.62
79-34-5	1,1,2,2-Tetrachloroethane	167.85	1.11	0.000	0.88	0.00	7.62
75-34-3	1,1-Dichloroethane	98.97	2.35	0.000	1.10	0.00	9.51
75-35-4	1,1-Dichloroethene	96.94	0.20	0.000	0.09	0.00	0.79
107-06-2	1,2-Dichloroethane	98.96	0.41	0.000	0.19	0.00	1.66
78-87-5	1,2-Dichloropropane	112.99	0.18	0.000	0.10	0.00	0.83
107-13-1	Acrylonitrile	53.06	6.33	0.000	1.59	0.00	13.73
75-15-0	Carbon disulfide	76.13	0.58	0.000	0.21	0.00	1.80
56-23-5	Carbon tetrachloride	153.84	0.00	0.000	0.00	0.00	0.03
463-58-1	Carbonyl sulfide	60.07	0.49	0.000	0.14	0.00	1.20
108-90-7	Chlorobenzene	112.56	0.25	0.000	0.13	0.00	1.15
75-00-3	Chloroethane	64.52	1.25	0.000	0.38	0.00	3.30
67-66-3	Chloroform	119.39	0.03	0.000	0.02	0.00	0.15
74-87-3	Chloromethane ²	50.49	1.21	0.000	0.29	0.00	2.50
106-46-7	Dichlorobenzene	147.00	0.21	0.000	0.15	0.00	1.26
75-09-2	Dichloromethane	84.94	14.30	0.001	5.76	0.00	49.65
100-41-4	Ethylbenzene	106.16	4.61	0.000	2.32	0.00	20.00
106-93-4	Ethylene dibromide ²	187.88	0.001	0.000	0.00	0.00	0.01
110-54-3	Hexane	86.18	6.57	0.000	2.68	0.00	23.14
7439-97-6	Mercury	200.61	0.000292	0.000	0.00	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	1.87	0.000	0.89	0.00	7.66
127-18-4	Perchloroethylene	165.83	3.73	0.000	2.93	0.00	25.28
79-01-6	Trichloroethene	131.40	2.82	0.000	1.76	0.00	15.15
75-01-4	Vinyl chloride	62.50	7.34	0.000	2.17	0.00	18.75
1330-20-7	Xylene	106.16	12.10	0.001	6.09	0.00	52.50
71-43-2	Benzene ³	78.11	1.91	0.000	0.71	0.00	6.10
108-88-3	Toluene ³	92.13	39.30	0.002	17.16	0.01	147.99
Total HAPs						0.02	

Notes:

- ¹ Concentration of individual HAPs were taken from AP-42, Chapter 2.4, 11/98
- 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

Equations:

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

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

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

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

Table 14

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC

Summary of LFG Flare Emissions (2028)

Total LFG to Flares in 2021 = 9.29E+06 ft³
 Average flow = 17.7 cfm

Flare Type	LFG Combusted MMscf	Estimated Actual Emissions for 2021 (TPY)					
		PM	NMOC	CO	NO _x	SO ₂	VOC
Open	9.29	0.04	0.05	0.72	0.16	0.04	0.02
Total Emissions (TPY)		0.04	0.05	0.72	0.16	0.04	0.02
Total Emissions (lb/yr)		78.95	98.03	1,439.62	315.79	71.20	38.23

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	NMOC	CO	NO _x	SO ₂
Open Flare	8.50	10.55	155.0	34.0	7.67

Emission Factor Development

Notes:

PM 17 lb/10⁶ dscf methane per AP-42, section 2.4 (8/24)
 NMOC Based on 2,400 ppm per AP-42, section 2.4 (8/24), and 98% destruction effi
 CO Based on AP-42, Section 13.5 (02/2018)
 NO_x Based on AP-42, Section 13.5 (02/2018)
 SO₂ 46.9 ppm TRS concentration and 0% destruction efficiency, AP-42, section 2
 VOC 39% of NMOC per AP-42, section 2.4 (11/98)
 Heat Value 500 Btu/scf

Open Flare

- based on AP-42, Section 13.5
 CO: 0.31 lb/MMBtu
 NO_x: 0.068 lb/MMBtu

LFG Data:

NMOC: 2400 ppm
 TRS: 46.9 ppm
 CH₄: 50.0% of total LFG
 VOC: 39.0% of NMOC
 DE (of NMOC) 98.0 %

Table 15

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Flare GHG Emissions (2030)

LFG to Flares = 13.7 MMscf

Flare Combustion Factors			
Pounds per MMScf			
	CO ₂	CH ₄	N ₂ O
Flare	57,396.8	3.5	0.69

	MMscf Combusted	Estimated Actual 2021 Emissions (TPY)					Anthropogenic GHG
		Oxidation CO ₂	Oxidation CH ₄	Oxidation N ₂ O	Escape CH ₄	Collected CO ₂	
Flares	14	394.0	0.0	0.0	1.5	398.2	125.3
Total Emissions (TPY)		394.0	0.0	0.0	1.5	398.2	125.3
Total Emissions (lb/yr)		7.88E+05	4.84E+01	9.54E+00	2.90E+03	7.96E+05	2.51E+05

Notes:

- Oxidation CO₂ Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
- Oxidation CH₄ Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Oxidation N₂O Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Collected CO₂ Portion of collected LFG that already contains CO₂

	Flare	Enclosed	
Heating value	500	Btu/scf	
LFG CH ₄ Concentration	50	%	
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

Flares - CH₄ Oxidation Emission Factors

	EF (kg/MMBtu)	GWP (20 year)
CO ₂	52.07	1
CH ₄	3.20E-03	84
N ₂ O	6.30E-04	264

Table 16

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Fugitive HAP Emissions (2030)

Total LFG Generated = 35 cfm
LFG Collection Efficiency = 85%
Average LFG Collected = 30 cfm
Fugitive Emission Estimates = 5 cfm
Hours of Operation = 8,760

CAS #	LFG Constituent	Molecular Weight	Median ¹ ppmv	Uncontrolled Emissions			
				lb/hr	lb/yr	TPY	mg/m ³
71-55-6	1,1,1-Trichloroethane	133.41	0.48	0.000	0.45	0.00	2.62
79-34-5	1,1,2,2-Tetrachloroethane	167.85	1.11	0.000	1.31	0.00	7.62
75-34-3	1,1-Dichloroethane	98.97	2.35	0.000	1.63	0.00	9.51
75-35-4	1,1-Dichloroethene	96.94	0.20	0.000	0.14	0.00	0.79
107-06-2	1,2-Dichloroethane	98.96	0.41	0.000	0.28	0.00	1.66
78-87-5	1,2-Dichloropropane	112.99	0.18	0.000	0.14	0.00	0.83
107-13-1	Acrylonitrile	53.06	6.33	0.000	2.35	0.00	13.73
75-15-0	Carbon disulfide	76.13	0.58	0.000	0.31	0.00	1.80
56-23-5	Carbon tetrachloride	153.84	0.00	0.000	0.00	0.00	0.03
463-58-1	Carbonyl sulfide	60.07	0.49	0.000	0.21	0.00	1.20
108-90-7	Chlorobenzene	112.56	0.25	0.000	0.20	0.00	1.15
75-00-3	Chloroethane	64.52	1.25	0.000	0.57	0.00	3.30
67-66-3	Chloroform	119.39	0.03	0.000	0.03	0.00	0.15
74-87-3	Chloromethane ²	50.49	1.21	0.000	0.43	0.00	2.50
106-46-7	Dichlorobenzene	147.00	0.21	0.000	0.22	0.00	1.26
75-09-2	Dichloromethane	84.94	14.30	0.001	8.51	0.00	49.65
100-41-4	Ethylbenzene	106.16	4.61	0.000	3.43	0.00	20.00
106-93-4	Ethylene dibromide ²	187.88	0.001	0.000	0.00	0.00	0.01
110-54-3	Hexane	86.18	6.57	0.000	3.97	0.00	23.14
7439-97-6	Mercury	200.61	0.000292	0.000	0.00	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	1.87	0.000	1.31	0.00	7.66
127-18-4	Perchloroethylene	165.83	3.73	0.000	4.33	0.00	25.28
79-01-6	Trichloroethene	131.40	2.82	0.000	2.60	0.00	15.15
75-01-4	Vinyl chloride	62.50	7.34	0.000	3.21	0.00	18.75
1330-20-7	Xylene	106.16	12.10	0.001	9.00	0.00	52.50
71-43-2	Benzene ³	78.11	1.91	0.000	1.05	0.00	6.10
108-88-3	Toluene ³	92.13	39.30	0.003	25.37	0.01	147.99
Total HAPs						0.04	

Notes:

- ¹ Concentration of individual HAPs were taken from AP-42, Chapter 2.4, 11/98
- 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

Equations:

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

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

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

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

Table 17

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC

Summary of LFG Flare Emissions (2030)

Total LFG to Flares in 2021 = 1.37E+07 ft³
 Average flow = 26.1 cfm

Flare Type	LFG Combusted MMscf	Estimated Actual Emissions for 2021 (TPY)					
		PM	NMOC	CO	NO _x	SO ₂	VOC
Open	13.73	0.06	0.07	1.06	0.23	0.05	0.03
Total Emissions (TPY)		0.06	0.07	1.06	0.23	0.05	0.03
Total Emissions (lb/yr)		116.71	144.93	2,128.23	466.84	105.26	56.52

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	NMOC	CO	NO _x	SO ₂
Open Flare	8.50	10.55	155.0	34.0	7.67

Emission Factor Development

Open Flare

- based on AP-42, Section 13.5

CO: 0.31 lb/MMBtu

NO_x: 0.068 lb/MMBtu

LFG Data:

NMOC: 2400 ppm

TRS: 46.9 ppm

CH₄: 50.0% of total LFG

VOC: 39.0% of NMOC

DE (of NMOC) 98.0 %

Notes:

PM 17 lb/10⁶ dscf methane per AP-42, section 2.4 (8/24)

NMOC Based on 2,400 ppm per AP-42, section 2.4 (8/24), and 98% destruction effi

CO Based on AP-42, Section 13.5 (02/2018)

NO_x Based on AP-42, Section 13.5 (02/2018)

SO₂ 46.9 ppm TRS concentration and 0% destruction efficiency, AP-42, section 2

VOC 39% of NMOC per AP-42, section 2.4 (11/98)

Heat Value 500 Btu/scf

Table 18

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC

Summary of Flare GHG Emissions (2050)

LFG to Flares = 43.1 MMscf

Flare Combustion Factors

	Pounds per MMScf		
	CO ₂	CH ₄	N ₂ O
Flare	57,396.8	3.5	0.69

	MMscf Combusted	Estimated Actual 2021 Emissions (TPY)					Anthropogenic GHG
		Oxidation CO ₂	Oxidation CH ₄	Oxidation N ₂ O	Escape CH ₄	Collected CO ₂	
Flares	43	1,237.0	0.1	0.0	4.6	1,250.0	393.2
Total Emissions (TPY)		1,237.0	0.1	0.0	4.6	1,250.0	393.2
Total Emissions (lb/yr)		2.47E+06	1.52E+02	2.99E+01	9.12E+03	2.50E+06	7.86E+05

Notes:

- Oxidation CO₂ Combustion emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C
- Oxidation CH₄ Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Oxidation N₂O Combustion emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C
- Collected CO₂ Portion of collected LFG that already contains CO₂

	Flare	Enclosed	
Heating value	500	Btu/scf	
LFG CH ₄ Concentration	50	%	
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

Flares - CH₄ Oxidation Emission Factors

	EF (kg/MMBtu)	GWP (20 year)
CO ₂	52.07	1
CH ₄	3.20E-03	84
N ₂ O	6.30E-04	264

Table 19

CLCPA Assessment
Syracuse Haulers Waste Removal Inc.
Haulers Facility, LLC

Summary of Fugitive HAP Emissions (2050)

Total LFG Generated = 109 cfm
LFG Collection Efficiency = 85%
Average LFG Collected = 93 cfm
Fugitive Emission Estimates = 16 cfm
Hours of Operation = 8,760

CAS #	LFG Constituent	Molecular Weight	Median ¹ ppmv	Uncontrolled Emissions			
				lb/hr	lb/yr	TPY	mg/m ³
71-55-6	1,1,1-Trichloroethane	133.41	0.48	0.000	1.41	0.00	2.62
79-34-5	1,1,2,2-Tetrachloroethane	167.85	1.11	0.000	4.10	0.00	7.62
75-34-3	1,1-Dichloroethane	98.97	2.35	0.001	5.12	0.00	9.51
75-35-4	1,1-Dichloroethene	96.94	0.20	0.000	0.43	0.00	0.79
107-06-2	1,2-Dichloroethane	98.96	0.41	0.000	0.89	0.00	1.66
78-87-5	1,2-Dichloropropane	112.99	0.18	0.000	0.45	0.00	0.83
107-13-1	Acrylonitrile	53.06	6.33	0.001	7.39	0.00	13.73
75-15-0	Carbon disulfide	76.13	0.58	0.000	0.97	0.00	1.80
56-23-5	Carbon tetrachloride	153.84	0.00	0.000	0.01	0.00	0.03
463-58-1	Carbonyl sulfide	60.07	0.49	0.000	0.65	0.00	1.20
108-90-7	Chlorobenzene	112.56	0.25	0.000	0.62	0.00	1.15
75-00-3	Chloroethane	64.52	1.25	0.000	1.77	0.00	3.30
67-66-3	Chloroform	119.39	0.03	0.000	0.08	0.00	0.15
74-87-3	Chloromethane ²	50.49	1.21	0.000	1.34	0.00	2.50
106-46-7	Dichlorobenzene	147.00	0.21	0.000	0.68	0.00	1.26
75-09-2	Dichloromethane	84.94	14.30	0.003	26.72	0.01	49.65
100-41-4	Ethylbenzene	106.16	4.61	0.001	10.77	0.01	20.00
106-93-4	Ethylene dibromide ²	187.88	0.001	0.000	0.00	0.00	0.01
110-54-3	Hexane	86.18	6.57	0.001	12.46	0.01	23.14
7439-97-6	Mercury	200.61	0.000292	0.000	0.00	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	1.87	0.000	4.12	0.00	7.66
127-18-4	Perchloroethylene	165.83	3.73	0.002	13.61	0.01	25.28
79-01-6	Trichloroethene	131.40	2.82	0.001	8.15	0.00	15.15
75-01-4	Vinyl chloride	62.50	7.34	0.001	10.09	0.01	18.75
1330-20-7	Xylene	106.16	12.10	0.003	28.26	0.01	52.50
71-43-2	Benzene ³	78.11	1.91	0.000	3.28	0.00	6.10
108-88-3	Toluene ³	92.13	39.30	0.009	79.65	0.04	147.99
Total HAPs						0.11	

Notes:

- ¹ Concentration of individual HAPs were taken from AP-42, Chapter 2.4, 11/98
- 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

Equations:

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

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

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

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

Table 20

CLCPA Assessment
 Syracuse Haulers Waste Removal Inc.
 Haulers Facility, LLC

Summary of LFG Flare Emissions (2050)

Total LFG to Flares in 2021 = 4.31E+07 ft³
 Average flow = 82.0 cfm

Flare Type	LFG Combusted MMscf	Estimated Actual Emissions for 2021 (TPY)					
		PM	NMOC	CO	NO _x	SO ₂	VOC
Open	43.10	0.18	0.23	3.34	0.73	0.17	0.09
Total Emissions (TPY)		0.18	0.23	3.34	0.73	0.17	0.09
Total Emissions (lb/yr)		366.39	454.96	6,681.17	1,465.55	330.44	177.44

Flare Emission Factors

	Pounds per Million Standard Cubic Feet				
	PM	NMOC	CO	NO _x	SO ₂
Open Flare	8.50	10.55	155.0	34.0	7.67

Emission Factor Development

Open Flare

- based on AP-42, Section 13.5

CO: 0.31 lb/MMBtu

NO_x: 0.068 lb/MMBtu

LFG Data:

NMOC: 2400 ppm

TRS: 46.9 ppm

CH₄: 50.0% of total LFG

VOC: 39.0% of NMOC

DE (of NMOC) 98.0 %

Notes:

PM 17 lb/10⁶ dscf methane per AP-42, section 2.4 (8/24)

NMOC Based on 2,400 ppm per AP-42, section 2.4 (8/24), and 98% destruction effi

CO Based on AP-42, Section 13.5 (02/2018)

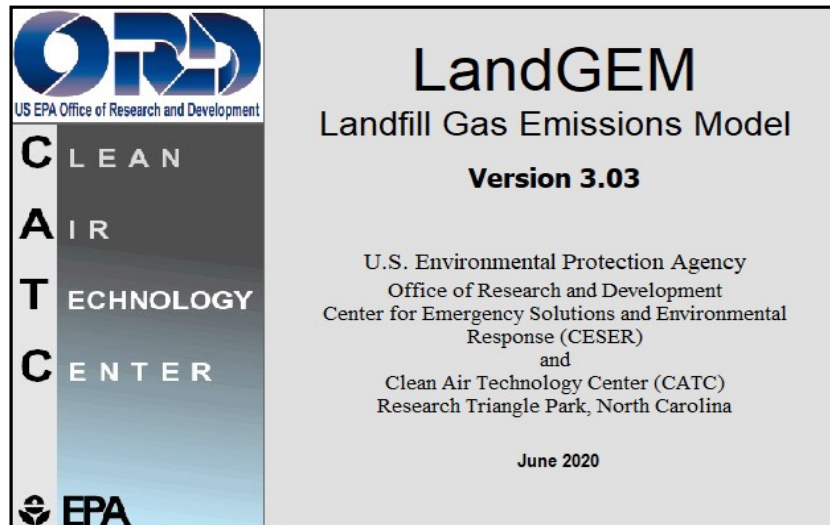
NO_x Based on AP-42, Section 13.5 (02/2018)

SO₂ 46.9 ppm TRS concentration and 0% destruction efficiency, AP-42, section 2

VOC 39% of NMOC per AP-42, section 2.4 (11/98)

Heat Value 500 Btu/scf

Appendix A



Summary Report

Landfill Name or Identifier: Syracuse Haulers - Existing Operation

Date: Monday, September 30, 2024

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:
$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH_4} = annual methane generation in the year of the calculation ($m^3/year$)

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate ($year^{-1}$)

L_o = potential methane generation capacity (m^3/Mg)

M_i = mass of waste accepted in the i^{th} year (Mg)

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/ttnatw01/landfill/landflpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	2023	
Landfill Closure Year (with 80-year limit)	2049	
Actual Closure Year (without limit)	2049	
Have Model Calculate Closure Year?	No	
Waste Design Capacity		<i>megagrams</i>

MODEL PARAMETERS

Methane Generation Rate, k	0.040	<i>year⁻¹</i>
Potential Methane Generation Capacity, L ₀	100	<i>m³/Mg</i>
NMOC Concentration	595	<i>ppmv as hexane</i>
Methane Content	50	<i>% by volume</i>

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	Total landfill gas
Gas / Pollutant #2:	Methane
Gas / Pollutant #3:	Carbon dioxide
Gas / Pollutant #4:	NMOC

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2023	7,846	8,631	0	0
2024	7,846	8,631	7,846	8,631
2025	7,846	8,631	15,692	17,262
2026	7,846	8,631	23,539	25,893
2027	7,846	8,631	31,385	34,523
2028	7,846	8,631	39,231	43,154
2029	7,846	8,631	47,077	51,785
2030	7,846	8,631	54,924	60,416
2031	7,846	8,631	62,770	69,047
2032	7,846	8,631	70,616	77,678
2033	7,846	8,631	78,462	86,309
2034	7,846	8,631	86,309	94,939
2035	7,846	8,631	94,155	103,570
2036	7,846	8,631	102,001	112,201
2037	7,846	8,631	109,847	120,832
2038	7,846	8,631	117,694	129,463
2039	7,846	8,631	125,540	138,094
2040	7,846	8,631	133,386	146,725
2041	7,846	8,631	141,232	155,355
2042	7,846	8,631	149,078	163,986
2043	7,846	8,631	156,925	172,617
2044	7,846	8,631	164,771	181,248
2045	7,846	8,631	172,617	189,879
2046	7,846	8,631	180,463	198,510
2047	7,846	8,631	188,310	207,141
2048	7,846	8,631	196,156	215,772
2049	7,846	8,631	204,002	224,402
2050	0	0	211,848	233,033
2051	0	0	211,848	233,033
2052	0	0	211,848	233,033
2053	0	0	211,848	233,033
2054	0	0	211,848	233,033
2055	0	0	211,848	233,033
2056	0	0	211,848	233,033
2057	0	0	211,848	233,033
2058	0	0	211,848	233,033
2059	0	0	211,848	233,033
2060	0	0	211,848	233,033
2061	0	0	211,848	233,033
2062	0	0	211,848	233,033

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2063	0	0	211,848	233,033
2064	0	0	211,848	233,033
2065	0	0	211,848	233,033
2066	0	0	211,848	233,033
2067	0	0	211,848	233,033
2068	0	0	211,848	233,033
2069	0	0	211,848	233,033
2070	0	0	211,848	233,033
2071	0	0	211,848	233,033
2072	0	0	211,848	233,033
2073	0	0	211,848	233,033
2074	0	0	211,848	233,033
2075	0	0	211,848	233,033
2076	0	0	211,848	233,033
2077	0	0	211,848	233,033
2078	0	0	211,848	233,033
2079	0	0	211,848	233,033
2080	0	0	211,848	233,033
2081	0	0	211,848	233,033
2082	0	0	211,848	233,033
2083	0	0	211,848	233,033
2084	0	0	211,848	233,033
2085	0	0	211,848	233,033
2086	0	0	211,848	233,033
2087	0	0	211,848	233,033
2088	0	0	211,848	233,033
2089	0	0	211,848	233,033
2090	0	0	211,848	233,033
2091	0	0	211,848	233,033
2092	0	0	211,848	233,033
2093	0	0	211,848	233,033
2094	0	0	211,848	233,033
2095	0	0	211,848	233,033
2096	0	0	211,848	233,033
2097	0	0	211,848	233,033
2098	0	0	211,848	233,033
2099	0	0	211,848	233,033
2100	0	0	211,848	233,033
2101	0	0	211,848	233,033
2102	0	0	211,848	233,033

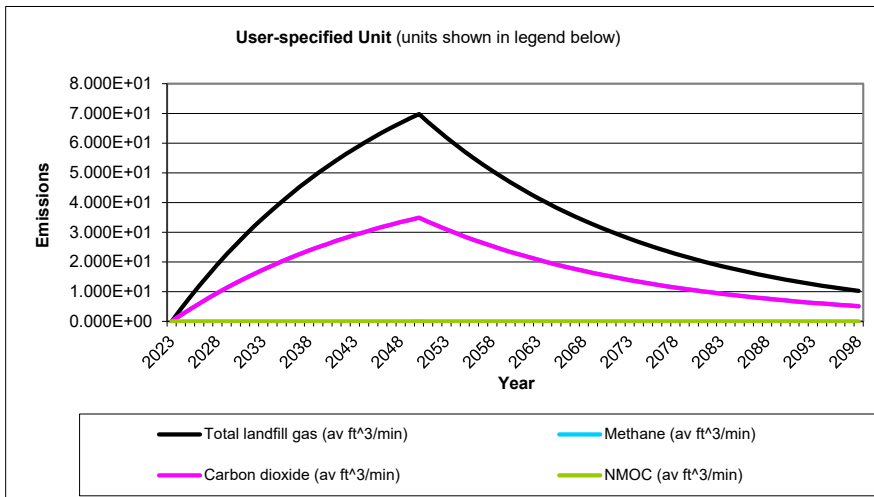
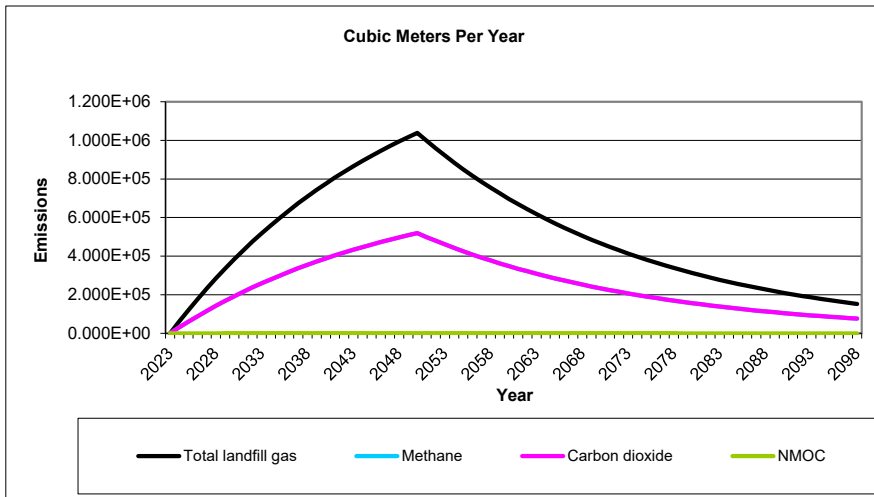
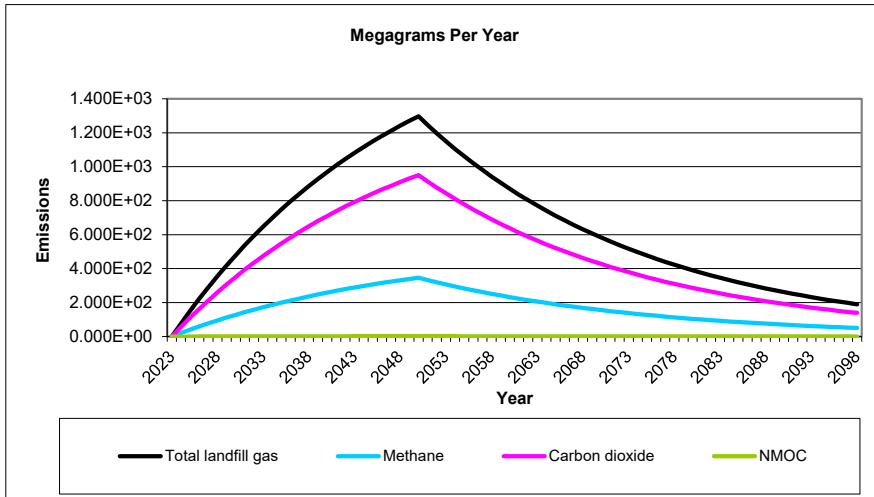
Pollutant Parameters

Gas / Pollutant Default Parameters:				User-specified Pollutant Parameters:	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

<i>Gas / Pollutant Default Parameters:</i>				<i>User-specified Pollutant Parameters:</i>	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs



Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2023	0	0	0	0	0	0
2024	7.700E+01	6.165E+04	4.143E+00	2.057E+01	3.083E+04	2.071E+00
2025	1.510E+02	1.209E+05	8.123E+00	4.033E+01	6.045E+04	4.061E+00
2026	2.220E+02	1.778E+05	1.195E+01	5.931E+01	8.890E+04	5.973E+00
2027	2.903E+02	2.325E+05	1.562E+01	7.755E+01	1.162E+05	7.810E+00
2028	3.559E+02	2.850E+05	1.915E+01	9.508E+01	1.425E+05	9.575E+00
2029	4.190E+02	3.355E+05	2.254E+01	1.119E+02	1.678E+05	1.127E+01
2030	4.796E+02	3.840E+05	2.580E+01	1.281E+02	1.920E+05	1.290E+01
2031	5.377E+02	4.306E+05	2.893E+01	1.436E+02	2.153E+05	1.447E+01
2032	5.937E+02	4.754E+05	3.194E+01	1.586E+02	2.377E+05	1.597E+01
2033	6.474E+02	5.184E+05	3.483E+01	1.729E+02	2.592E+05	1.742E+01
2034	6.990E+02	5.597E+05	3.761E+01	1.867E+02	2.799E+05	1.880E+01
2035	7.486E+02	5.994E+05	4.027E+01	2.000E+02	2.997E+05	2.014E+01
2036	7.962E+02	6.376E+05	4.284E+01	2.127E+02	3.188E+05	2.142E+01
2037	8.420E+02	6.742E+05	4.530E+01	2.249E+02	3.371E+05	2.265E+01
2038	8.860E+02	7.094E+05	4.767E+01	2.367E+02	3.547E+05	2.383E+01
2039	9.282E+02	7.433E+05	4.994E+01	2.479E+02	3.716E+05	2.497E+01
2040	9.688E+02	7.758E+05	5.213E+01	2.588E+02	3.879E+05	2.606E+01
2041	1.008E+03	8.070E+05	5.422E+01	2.692E+02	4.035E+05	2.711E+01
2042	1.045E+03	8.370E+05	5.624E+01	2.792E+02	4.185E+05	2.812E+01
2043	1.081E+03	8.659E+05	5.818E+01	2.888E+02	4.329E+05	2.909E+01
2044	1.116E+03	8.936E+05	6.004E+01	2.981E+02	4.468E+05	3.002E+01
2045	1.149E+03	9.202E+05	6.183E+01	3.070E+02	4.601E+05	3.091E+01
2046	1.181E+03	9.458E+05	6.355E+01	3.155E+02	4.729E+05	3.177E+01
2047	1.212E+03	9.703E+05	6.520E+01	3.237E+02	4.852E+05	3.260E+01
2048	1.241E+03	9.939E+05	6.678E+01	3.316E+02	4.970E+05	3.339E+01
2049	1.270E+03	1.017E+06	6.831E+01	3.391E+02	5.083E+05	3.415E+01
2050	1.297E+03	1.038E+06	6.977E+01	3.464E+02	5.192E+05	3.489E+01
2051	1.246E+03	9.977E+05	6.704E+01	3.328E+02	4.988E+05	3.352E+01
2052	1.197E+03	9.586E+05	6.441E+01	3.198E+02	4.793E+05	3.220E+01
2053	1.150E+03	9.210E+05	6.188E+01	3.072E+02	4.605E+05	3.094E+01
2054	1.105E+03	8.849E+05	5.945E+01	2.952E+02	4.424E+05	2.973E+01
2055	1.062E+03	8.502E+05	5.712E+01	2.836E+02	4.251E+05	2.856E+01
2056	1.020E+03	8.168E+05	5.488E+01	2.725E+02	4.084E+05	2.744E+01
2057	9.801E+02	7.848E+05	5.273E+01	2.618E+02	3.924E+05	2.637E+01
2058	9.417E+02	7.540E+05	5.066E+01	2.515E+02	3.770E+05	2.533E+01
2059	9.047E+02	7.245E+05	4.868E+01	2.417E+02	3.622E+05	2.434E+01
2060	8.693E+02	6.961E+05	4.677E+01	2.322E+02	3.480E+05	2.338E+01
2061	8.352E+02	6.688E+05	4.493E+01	2.231E+02	3.344E+05	2.247E+01
2062	8.024E+02	6.426E+05	4.317E+01	2.143E+02	3.213E+05	2.159E+01
2063	7.710E+02	6.174E+05	4.148E+01	2.059E+02	3.087E+05	2.074E+01
2064	7.407E+02	5.932E+05	3.985E+01	1.979E+02	2.966E+05	1.993E+01
2065	7.117E+02	5.699E+05	3.829E+01	1.901E+02	2.849E+05	1.915E+01
2066	6.838E+02	5.475E+05	3.679E+01	1.826E+02	2.738E+05	1.839E+01
2067	6.570E+02	5.261E+05	3.535E+01	1.755E+02	2.630E+05	1.767E+01
2068	6.312E+02	5.054E+05	3.396E+01	1.686E+02	2.527E+05	1.698E+01
2069	6.065E+02	4.856E+05	3.263E+01	1.620E+02	2.428E+05	1.631E+01
2070	5.827E+02	4.666E+05	3.135E+01	1.556E+02	2.333E+05	1.568E+01
2071	5.598E+02	4.483E+05	3.012E+01	1.495E+02	2.241E+05	1.506E+01
2072	5.379E+02	4.307E+05	2.894E+01	1.437E+02	2.154E+05	1.447E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2073	5.168E+02	4.138E+05	2.780E+01	1.380E+02	2.069E+05	1.390E+01
2074	4.965E+02	3.976E+05	2.671E+01	1.326E+02	1.988E+05	1.336E+01
2075	4.771E+02	3.820E+05	2.567E+01	1.274E+02	1.910E+05	1.283E+01
2076	4.584E+02	3.670E+05	2.466E+01	1.224E+02	1.835E+05	1.233E+01
2077	4.404E+02	3.526E+05	2.369E+01	1.176E+02	1.763E+05	1.185E+01
2078	4.231E+02	3.388E+05	2.276E+01	1.130E+02	1.694E+05	1.138E+01
2079	4.065E+02	3.255E+05	2.187E+01	1.086E+02	1.628E+05	1.094E+01
2080	3.906E+02	3.128E+05	2.101E+01	1.043E+02	1.564E+05	1.051E+01
2081	3.753E+02	3.005E+05	2.019E+01	1.002E+02	1.503E+05	1.010E+01
2082	3.606E+02	2.887E+05	1.940E+01	9.631E+01	1.444E+05	9.699E+00
2083	3.464E+02	2.774E+05	1.864E+01	9.253E+01	1.387E+05	9.319E+00
2084	3.328E+02	2.665E+05	1.791E+01	8.890E+01	1.333E+05	8.954E+00
2085	3.198E+02	2.561E+05	1.721E+01	8.542E+01	1.280E+05	8.603E+00
2086	3.072E+02	2.460E+05	1.653E+01	8.207E+01	1.230E+05	8.265E+00
2087	2.952E+02	2.364E+05	1.588E+01	7.885E+01	1.182E+05	7.941E+00
2088	2.836E+02	2.271E+05	1.526E+01	7.576E+01	1.136E+05	7.630E+00
2089	2.725E+02	2.182E+05	1.466E+01	7.279E+01	1.091E+05	7.331E+00
2090	2.618E+02	2.097E+05	1.409E+01	6.993E+01	1.048E+05	7.043E+00
2091	2.516E+02	2.014E+05	1.353E+01	6.719E+01	1.007E+05	6.767E+00
2092	2.417E+02	1.935E+05	1.300E+01	6.456E+01	9.677E+04	6.502E+00
2093	2.322E+02	1.859E+05	1.249E+01	6.203E+01	9.297E+04	6.247E+00
2094	2.231E+02	1.787E+05	1.200E+01	5.959E+01	8.933E+04	6.002E+00
2095	2.144E+02	1.716E+05	1.153E+01	5.726E+01	8.582E+04	5.767E+00
2096	2.060E+02	1.649E+05	1.108E+01	5.501E+01	8.246E+04	5.540E+00
2097	1.979E+02	1.585E+05	1.065E+01	5.286E+01	7.923E+04	5.323E+00
2098	1.901E+02	1.522E+05	1.023E+01	5.078E+01	7.612E+04	5.114E+00
2099	1.827E+02	1.463E+05	9.828E+00	4.879E+01	7.313E+04	4.914E+00
2100	1.755E+02	1.405E+05	9.442E+00	4.688E+01	7.027E+04	4.721E+00
2101	1.686E+02	1.350E+05	9.072E+00	4.504E+01	6.751E+04	4.536E+00
2102	1.620E+02	1.297E+05	8.716E+00	4.327E+01	6.486E+04	4.358E+00
2103	1.557E+02	1.246E+05	8.375E+00	4.158E+01	6.232E+04	4.187E+00
2104	1.496E+02	1.198E+05	8.046E+00	3.995E+01	5.988E+04	4.023E+00
2105	1.437E+02	1.151E+05	7.731E+00	3.838E+01	5.753E+04	3.865E+00
2106	1.381E+02	1.105E+05	7.428E+00	3.688E+01	5.527E+04	3.714E+00
2107	1.326E+02	1.062E+05	7.136E+00	3.543E+01	5.311E+04	3.568E+00
2108	1.274E+02	1.020E+05	6.857E+00	3.404E+01	5.102E+04	3.428E+00
2109	1.224E+02	9.805E+04	6.588E+00	3.271E+01	4.902E+04	3.294E+00
2110	1.176E+02	9.420E+04	6.329E+00	3.142E+01	4.710E+04	3.165E+00
2111	1.130E+02	9.051E+04	6.081E+00	3.019E+01	4.525E+04	3.041E+00
2112	1.086E+02	8.696E+04	5.843E+00	2.901E+01	4.348E+04	2.921E+00
2113	1.043E+02	8.355E+04	5.614E+00	2.787E+01	4.178E+04	2.807E+00
2114	1.002E+02	8.027E+04	5.394E+00	2.678E+01	4.014E+04	2.697E+00
2115	9.632E+01	7.713E+04	5.182E+00	2.573E+01	3.856E+04	2.591E+00
2116	9.254E+01	7.410E+04	4.979E+00	2.472E+01	3.705E+04	2.489E+00
2117	8.891E+01	7.120E+04	4.784E+00	2.375E+01	3.560E+04	2.392E+00
2118	8.543E+01	6.841E+04	4.596E+00	2.282E+01	3.420E+04	2.298E+00
2119	8.208E+01	6.572E+04	4.416E+00	2.192E+01	3.286E+04	2.208E+00
2120	7.886E+01	6.315E+04	4.243E+00	2.106E+01	3.157E+04	2.121E+00
2121	7.577E+01	6.067E+04	4.076E+00	2.024E+01	3.033E+04	2.038E+00
2122	7.280E+01	5.829E+04	3.917E+00	1.944E+01	2.915E+04	1.958E+00
2123	6.994E+01	5.601E+04	3.763E+00	1.868E+01	2.800E+04	1.881E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2124	6.720E+01	5.381E+04	3.615E+00	1.795E+01	2.690E+04	1.808E+00
2125	6.456E+01	5.170E+04	3.474E+00	1.725E+01	2.585E+04	1.737E+00
2126	6.203E+01	4.967E+04	3.337E+00	1.657E+01	2.484E+04	1.669E+00
2127	5.960E+01	4.772E+04	3.207E+00	1.592E+01	2.386E+04	1.603E+00
2128	5.726E+01	4.585E+04	3.081E+00	1.530E+01	2.293E+04	1.540E+00
2129	5.502E+01	4.406E+04	2.960E+00	1.470E+01	2.203E+04	1.480E+00
2130	5.286E+01	4.233E+04	2.844E+00	1.412E+01	2.116E+04	1.422E+00
2131	5.079E+01	4.067E+04	2.732E+00	1.357E+01	2.033E+04	1.366E+00
2132	4.880E+01	3.907E+04	2.625E+00	1.303E+01	1.954E+04	1.313E+00
2133	4.688E+01	3.754E+04	2.522E+00	1.252E+01	1.877E+04	1.261E+00
2134	4.504E+01	3.607E+04	2.424E+00	1.203E+01	1.803E+04	1.212E+00
2135	4.328E+01	3.466E+04	2.328E+00	1.156E+01	1.733E+04	1.164E+00
2136	4.158E+01	3.330E+04	2.237E+00	1.111E+01	1.665E+04	1.119E+00
2137	3.995E+01	3.199E+04	2.149E+00	1.067E+01	1.600E+04	1.075E+00
2138	3.838E+01	3.074E+04	2.065E+00	1.025E+01	1.537E+04	1.033E+00
2139	3.688E+01	2.953E+04	1.984E+00	9.851E+00	1.477E+04	9.921E-01
2140	3.543E+01	2.837E+04	1.906E+00	9.465E+00	1.419E+04	9.532E-01
2141	3.404E+01	2.726E+04	1.832E+00	9.093E+00	1.363E+04	9.158E-01
2142	3.271E+01	2.619E+04	1.760E+00	8.737E+00	1.310E+04	8.799E-01
2143	3.143E+01	2.516E+04	1.691E+00	8.394E+00	1.258E+04	8.454E-01
2144	3.019E+01	2.418E+04	1.625E+00	8.065E+00	1.209E+04	8.123E-01
2145	2.901E+01	2.323E+04	1.561E+00	7.749E+00	1.162E+04	7.804E-01
2146	2.787E+01	2.232E+04	1.500E+00	7.445E+00	1.116E+04	7.498E-01
2147	2.678E+01	2.144E+04	1.441E+00	7.153E+00	1.072E+04	7.204E-01
2148	2.573E+01	2.060E+04	1.384E+00	6.873E+00	1.030E+04	6.922E-01
2149	2.472E+01	1.980E+04	1.330E+00	6.603E+00	9.898E+03	6.650E-01
2150	2.375E+01	1.902E+04	1.278E+00	6.344E+00	9.510E+03	6.389E-01
2151	2.282E+01	1.827E+04	1.228E+00	6.096E+00	9.137E+03	6.139E-01
2152	2.193E+01	1.756E+04	1.180E+00	5.857E+00	8.778E+03	5.898E-01
2153	2.107E+01	1.687E+04	1.133E+00	5.627E+00	8.434E+03	5.667E-01
2154	2.024E+01	1.621E+04	1.089E+00	5.406E+00	8.104E+03	5.445E-01
2155	1.945E+01	1.557E+04	1.046E+00	5.194E+00	7.786E+03	5.231E-01
2156	1.868E+01	1.496E+04	1.005E+00	4.991E+00	7.481E+03	5.026E-01
2157	1.795E+01	1.437E+04	9.658E-01	4.795E+00	7.187E+03	4.829E-01
2158	1.725E+01	1.381E+04	9.279E-01	4.607E+00	6.905E+03	4.640E-01
2159	1.657E+01	1.327E+04	8.916E-01	4.426E+00	6.635E+03	4.458E-01
2160	1.592E+01	1.275E+04	8.566E-01	4.253E+00	6.374E+03	4.283E-01
2161	1.530E+01	1.225E+04	8.230E-01	4.086E+00	6.125E+03	4.115E-01
2162	1.470E+01	1.177E+04	7.907E-01	3.926E+00	5.884E+03	3.954E-01
2163	1.412E+01	1.131E+04	7.597E-01	3.772E+00	5.654E+03	3.799E-01

Results (Continued)

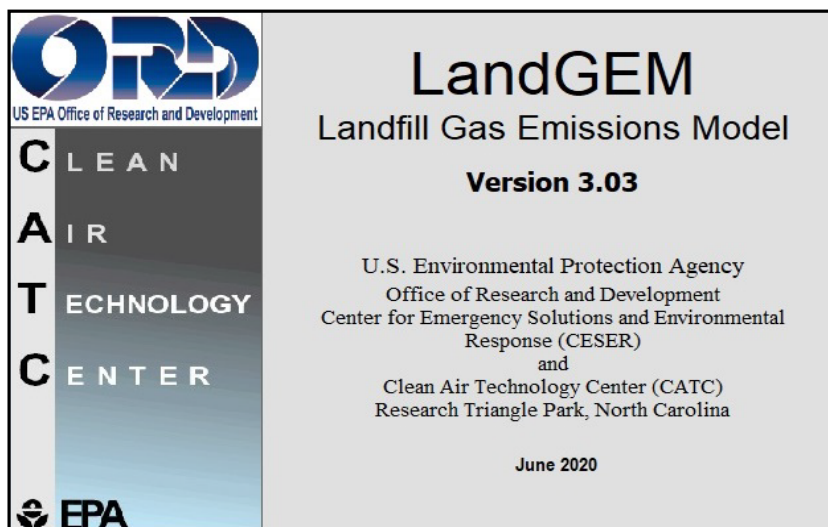
Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2023	0	0	0	0	0	0
2024	5.643E+01	3.083E+04	2.071E+00	1.315E-01	3.668E+01	2.465E-03
2025	1.106E+02	6.045E+04	4.061E+00	2.578E-01	7.193E+01	4.833E-03
2026	1.627E+02	8.890E+04	5.973E+00	3.792E-01	1.058E+02	7.108E-03
2027	2.128E+02	1.162E+05	7.810E+00	4.958E-01	1.383E+02	9.294E-03
2028	2.609E+02	1.425E+05	9.575E+00	6.079E-01	1.696E+02	1.139E-02
2029	3.071E+02	1.678E+05	1.127E+01	7.155E-01	1.996E+02	1.341E-02
2030	3.515E+02	1.920E+05	1.290E+01	8.190E-01	2.285E+02	1.535E-02
2031	3.941E+02	2.153E+05	1.447E+01	9.184E-01	2.562E+02	1.721E-02
2032	4.351E+02	2.377E+05	1.597E+01	1.014E+00	2.828E+02	1.900E-02
2033	4.745E+02	2.592E+05	1.742E+01	1.106E+00	3.084E+02	2.072E-02
2034	5.123E+02	2.799E+05	1.880E+01	1.194E+00	3.330E+02	2.238E-02
2035	5.486E+02	2.997E+05	2.014E+01	1.278E+00	3.567E+02	2.396E-02
2036	5.835E+02	3.188E+05	2.142E+01	1.360E+00	3.794E+02	2.549E-02
2037	6.171E+02	3.371E+05	2.265E+01	1.438E+00	4.012E+02	2.695E-02
2038	6.493E+02	3.547E+05	2.383E+01	1.513E+00	4.221E+02	2.836E-02
2039	6.803E+02	3.716E+05	2.497E+01	1.585E+00	4.423E+02	2.971E-02
2040	7.100E+02	3.879E+05	2.606E+01	1.655E+00	4.616E+02	3.101E-02
2041	7.386E+02	4.035E+05	2.711E+01	1.721E+00	4.802E+02	3.226E-02
2042	7.661E+02	4.185E+05	2.812E+01	1.785E+00	4.980E+02	3.346E-02
2043	7.925E+02	4.329E+05	2.909E+01	1.847E+00	5.152E+02	3.462E-02
2044	8.178E+02	4.468E+05	3.002E+01	1.906E+00	5.317E+02	3.572E-02
2045	8.422E+02	4.601E+05	3.091E+01	1.963E+00	5.475E+02	3.679E-02
2046	8.656E+02	4.729E+05	3.177E+01	2.017E+00	5.627E+02	3.781E-02
2047	8.881E+02	4.852E+05	3.260E+01	2.069E+00	5.773E+02	3.879E-02
2048	9.097E+02	4.970E+05	3.339E+01	2.120E+00	5.914E+02	3.974E-02
2049	9.305E+02	5.083E+05	3.415E+01	2.168E+00	6.049E+02	4.064E-02
2050	9.504E+02	5.192E+05	3.489E+01	2.215E+00	6.179E+02	4.151E-02
2051	9.131E+02	4.988E+05	3.352E+01	2.128E+00	5.936E+02	3.989E-02
2052	8.773E+02	4.793E+05	3.220E+01	2.044E+00	5.704E+02	3.832E-02
2053	8.429E+02	4.605E+05	3.094E+01	1.964E+00	5.480E+02	3.682E-02
2054	8.099E+02	4.424E+05	2.973E+01	1.887E+00	5.265E+02	3.538E-02
2055	7.781E+02	4.251E+05	2.856E+01	1.813E+00	5.059E+02	3.399E-02
2056	7.476E+02	4.084E+05	2.744E+01	1.742E+00	4.860E+02	3.266E-02
2057	7.183E+02	3.924E+05	2.637E+01	1.674E+00	4.670E+02	3.138E-02
2058	6.901E+02	3.770E+05	2.533E+01	1.608E+00	4.487E+02	3.015E-02
2059	6.631E+02	3.622E+05	2.434E+01	1.545E+00	4.311E+02	2.896E-02
2060	6.371E+02	3.480E+05	2.338E+01	1.485E+00	4.142E+02	2.783E-02
2061	6.121E+02	3.344E+05	2.247E+01	1.426E+00	3.979E+02	2.674E-02
2062	5.881E+02	3.213E+05	2.159E+01	1.370E+00	3.823E+02	2.569E-02
2063	5.650E+02	3.087E+05	2.074E+01	1.317E+00	3.673E+02	2.468E-02
2064	5.429E+02	2.966E+05	1.993E+01	1.265E+00	3.529E+02	2.371E-02
2065	5.216E+02	2.849E+05	1.915E+01	1.215E+00	3.391E+02	2.278E-02
2066	5.011E+02	2.738E+05	1.839E+01	1.168E+00	3.258E+02	2.189E-02
2067	4.815E+02	2.630E+05	1.767E+01	1.122E+00	3.130E+02	2.103E-02
2068	4.626E+02	2.527E+05	1.698E+01	1.078E+00	3.007E+02	2.021E-02
2069	4.445E+02	2.428E+05	1.631E+01	1.036E+00	2.890E+02	1.941E-02
2070	4.270E+02	2.333E+05	1.568E+01	9.951E-01	2.776E+02	1.865E-02
2071	4.103E+02	2.241E+05	1.506E+01	9.561E-01	2.667E+02	1.792E-02
2072	3.942E+02	2.154E+05	1.447E+01	9.186E-01	2.563E+02	1.722E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2073	3.788E+02	2.069E+05	1.390E+01	8.826E-01	2.462E+02	1.654E-02
2074	3.639E+02	1.988E+05	1.336E+01	8.480E-01	2.366E+02	1.590E-02
2075	3.496E+02	1.910E+05	1.283E+01	8.147E-01	2.273E+02	1.527E-02
2076	3.359E+02	1.835E+05	1.233E+01	7.828E-01	2.184E+02	1.467E-02
2077	3.228E+02	1.763E+05	1.185E+01	7.521E-01	2.098E+02	1.410E-02
2078	3.101E+02	1.694E+05	1.138E+01	7.226E-01	2.016E+02	1.355E-02
2079	2.979E+02	1.628E+05	1.094E+01	6.943E-01	1.937E+02	1.301E-02
2080	2.863E+02	1.564E+05	1.051E+01	6.670E-01	1.861E+02	1.250E-02
2081	2.750E+02	1.503E+05	1.010E+01	6.409E-01	1.788E+02	1.201E-02
2082	2.642E+02	1.444E+05	9.699E+00	6.158E-01	1.718E+02	1.154E-02
2083	2.539E+02	1.387E+05	9.319E+00	5.916E-01	1.651E+02	1.109E-02
2084	2.439E+02	1.333E+05	8.954E+00	5.684E-01	1.586E+02	1.065E-02
2085	2.344E+02	1.280E+05	8.603E+00	5.461E-01	1.524E+02	1.024E-02
2086	2.252E+02	1.230E+05	8.265E+00	5.247E-01	1.464E+02	9.836E-03
2087	2.163E+02	1.182E+05	7.941E+00	5.041E-01	1.406E+02	9.450E-03
2088	2.079E+02	1.136E+05	7.630E+00	4.844E-01	1.351E+02	9.080E-03
2089	1.997E+02	1.091E+05	7.331E+00	4.654E-01	1.298E+02	8.724E-03
2090	1.919E+02	1.048E+05	7.043E+00	4.471E-01	1.247E+02	8.381E-03
2091	1.844E+02	1.007E+05	6.767E+00	4.296E-01	1.199E+02	8.053E-03
2092	1.771E+02	9.677E+04	6.502E+00	4.128E-01	1.152E+02	7.737E-03
2093	1.702E+02	9.297E+04	6.247E+00	3.966E-01	1.106E+02	7.434E-03
2094	1.635E+02	8.933E+04	6.002E+00	3.810E-01	1.063E+02	7.142E-03
2095	1.571E+02	8.582E+04	5.767E+00	3.661E-01	1.021E+02	6.862E-03
2096	1.509E+02	8.246E+04	5.540E+00	3.517E-01	9.813E+01	6.593E-03
2097	1.450E+02	7.923E+04	5.323E+00	3.379E-01	9.428E+01	6.335E-03
2098	1.393E+02	7.612E+04	5.114E+00	3.247E-01	9.058E+01	6.086E-03
2099	1.339E+02	7.313E+04	4.914E+00	3.120E-01	8.703E+01	5.848E-03
2100	1.286E+02	7.027E+04	4.721E+00	2.997E-01	8.362E+01	5.618E-03
2101	1.236E+02	6.751E+04	4.536E+00	2.880E-01	8.034E+01	5.398E-03
2102	1.187E+02	6.486E+04	4.358E+00	2.767E-01	7.719E+01	5.186E-03
2103	1.141E+02	6.232E+04	4.187E+00	2.658E-01	7.416E+01	4.983E-03
2104	1.096E+02	5.988E+04	4.023E+00	2.554E-01	7.125E+01	4.788E-03
2105	1.053E+02	5.753E+04	3.865E+00	2.454E-01	6.846E+01	4.600E-03
2106	1.012E+02	5.527E+04	3.714E+00	2.358E-01	6.578E+01	4.419E-03
2107	9.721E+01	5.311E+04	3.568E+00	2.265E-01	6.320E+01	4.246E-03
2108	9.340E+01	5.102E+04	3.428E+00	2.176E-01	6.072E+01	4.080E-03
2109	8.974E+01	4.902E+04	3.294E+00	2.091E-01	5.834E+01	3.920E-03
2110	8.622E+01	4.710E+04	3.165E+00	2.009E-01	5.605E+01	3.766E-03
2111	8.284E+01	4.525E+04	3.041E+00	1.930E-01	5.385E+01	3.618E-03
2112	7.959E+01	4.348E+04	2.921E+00	1.855E-01	5.174E+01	3.476E-03
2113	7.647E+01	4.178E+04	2.807E+00	1.782E-01	4.971E+01	3.340E-03
2114	7.347E+01	4.014E+04	2.697E+00	1.712E-01	4.776E+01	3.209E-03
2115	7.059E+01	3.856E+04	2.591E+00	1.645E-01	4.589E+01	3.083E-03
2116	6.782E+01	3.705E+04	2.489E+00	1.580E-01	4.409E+01	2.962E-03
2117	6.516E+01	3.560E+04	2.392E+00	1.518E-01	4.236E+01	2.846E-03
2118	6.261E+01	3.420E+04	2.298E+00	1.459E-01	4.070E+01	2.735E-03
2119	6.015E+01	3.286E+04	2.208E+00	1.402E-01	3.911E+01	2.627E-03
2120	5.779E+01	3.157E+04	2.121E+00	1.347E-01	3.757E+01	2.524E-03
2121	5.553E+01	3.033E+04	2.038E+00	1.294E-01	3.610E+01	2.425E-03
2122	5.335E+01	2.915E+04	1.958E+00	1.243E-01	3.468E+01	2.330E-03
2123	5.126E+01	2.800E+04	1.881E+00	1.194E-01	3.332E+01	2.239E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2124	4.925E+01	2.690E+04	1.808E+00	1.148E-01	3.202E+01	2.151E-03
2125	4.732E+01	2.585E+04	1.737E+00	1.103E-01	3.076E+01	2.067E-03
2126	4.546E+01	2.484E+04	1.669E+00	1.059E-01	2.956E+01	1.986E-03
2127	4.368E+01	2.386E+04	1.603E+00	1.018E-01	2.840E+01	1.908E-03
2128	4.197E+01	2.293E+04	1.540E+00	9.779E-02	2.728E+01	1.833E-03
2129	4.032E+01	2.203E+04	1.480E+00	9.396E-02	2.621E+01	1.761E-03
2130	3.874E+01	2.116E+04	1.422E+00	9.028E-02	2.519E+01	1.692E-03
2131	3.722E+01	2.033E+04	1.366E+00	8.674E-02	2.420E+01	1.626E-03
2132	3.576E+01	1.954E+04	1.313E+00	8.333E-02	2.325E+01	1.562E-03
2133	3.436E+01	1.877E+04	1.261E+00	8.007E-02	2.234E+01	1.501E-03
2134	3.301E+01	1.803E+04	1.212E+00	7.693E-02	2.146E+01	1.442E-03
2135	3.172E+01	1.733E+04	1.164E+00	7.391E-02	2.062E+01	1.385E-03
2136	3.047E+01	1.665E+04	1.119E+00	7.101E-02	1.981E+01	1.331E-03
2137	2.928E+01	1.600E+04	1.075E+00	6.823E-02	1.903E+01	1.279E-03
2138	2.813E+01	1.537E+04	1.033E+00	6.555E-02	1.829E+01	1.229E-03
2139	2.703E+01	1.477E+04	9.921E-01	6.298E-02	1.757E+01	1.181E-03
2140	2.597E+01	1.419E+04	9.532E-01	6.051E-02	1.688E+01	1.134E-03
2141	2.495E+01	1.363E+04	9.158E-01	5.814E-02	1.622E+01	1.090E-03
2142	2.397E+01	1.310E+04	8.799E-01	5.586E-02	1.558E+01	1.047E-03
2143	2.303E+01	1.258E+04	8.454E-01	5.367E-02	1.497E+01	1.006E-03
2144	2.213E+01	1.209E+04	8.123E-01	5.157E-02	1.439E+01	9.666E-04
2145	2.126E+01	1.162E+04	7.804E-01	4.954E-02	1.382E+01	9.287E-04
2146	2.043E+01	1.116E+04	7.498E-01	4.760E-02	1.328E+01	8.923E-04
2147	1.963E+01	1.072E+04	7.204E-01	4.573E-02	1.276E+01	8.573E-04
2148	1.886E+01	1.030E+04	6.922E-01	4.394E-02	1.226E+01	8.237E-04
2149	1.812E+01	9.898E+03	6.650E-01	4.222E-02	1.178E+01	7.914E-04
2150	1.741E+01	9.510E+03	6.389E-01	4.056E-02	1.132E+01	7.603E-04
2151	1.672E+01	9.137E+03	6.139E-01	3.897E-02	1.087E+01	7.305E-04
2152	1.607E+01	8.778E+03	5.898E-01	3.744E-02	1.045E+01	7.019E-04
2153	1.544E+01	8.434E+03	5.667E-01	3.598E-02	1.004E+01	6.744E-04
2154	1.483E+01	8.104E+03	5.445E-01	3.457E-02	9.643E+00	6.479E-04
2155	1.425E+01	7.786E+03	5.231E-01	3.321E-02	9.265E+00	6.225E-04
2156	1.369E+01	7.481E+03	5.026E-01	3.191E-02	8.902E+00	5.981E-04
2157	1.316E+01	7.187E+03	4.829E-01	3.066E-02	8.553E+00	5.747E-04
2158	1.264E+01	6.905E+03	4.640E-01	2.946E-02	8.217E+00	5.521E-04
2159	1.214E+01	6.635E+03	4.458E-01	2.830E-02	7.895E+00	5.305E-04
2160	1.167E+01	6.374E+03	4.283E-01	2.719E-02	7.586E+00	5.097E-04
2161	1.121E+01	6.125E+03	4.115E-01	2.612E-02	7.288E+00	4.897E-04
2162	1.077E+01	5.884E+03	3.954E-01	2.510E-02	7.002E+00	4.705E-04
2163	1.035E+01	5.654E+03	3.799E-01	2.412E-02	6.728E+00	4.520E-04



Summary Report

Landfill Name or Identifier: Syracuse Haulers - Expanded Operation

Date: Monday, September 30, 2024

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:
$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH_4} = annual methane generation in the year of the calculation ($m^3/year$)

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate ($year^{-1}$)

L_o = potential methane generation capacity (m^3/Mg)

M_i = mass of waste accepted in the i^{th} year (Mg)

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/ttnatw01/landfill/landflpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year **2023**
 Landfill Closure Year (with 80-year limit) **2049**
 Actual Closure Year (without limit) **2049**
 Have Model Calculate Closure Year? **No**
 Waste Design Capacity *megagrams*

MODEL PARAMETERS

Methane Generation Rate, k **0.040** *year⁻¹*
 Potential Methane Generation Capacity, L₀ **100** *m³/Mg*
 NMOC Concentration **595** *ppmv as hexane*
 Methane Content **50** *% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1: **Total landfill gas**
 Gas / Pollutant #2: **Methane**
 Gas / Pollutant #3: **Carbon dioxide**
 Gas / Pollutant #4: **NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2023	7,846	8,631	0	0
2024	8,631	9,494	7,846	8,631
2025	9,494	10,443	16,477	18,125
2026	10,443	11,488	25,971	28,568
2027	11,488	12,636	36,414	40,056
2028	12,636	13,900	47,902	52,692
2029	12,636	13,900	60,538	66,592
2030	12,636	13,900	73,175	80,492
2031	12,636	13,900	85,811	94,393
2032	12,636	13,900	98,448	108,293
2033	12,636	13,900	111,084	122,193
2034	12,636	13,900	123,721	136,093
2035	12,636	13,900	136,357	149,993
2036	12,636	13,900	148,994	163,893
2037	12,636	13,900	161,630	177,793
2038	12,636	13,900	174,266	191,693
2039	12,636	13,900	186,903	205,593
2040	12,636	13,900	199,539	219,493
2041	12,636	13,900	212,176	233,393
2042	12,636	13,900	224,812	247,293
2043	12,636	13,900	237,449	261,194
2044	12,636	13,900	250,085	275,094
2045	12,636	13,900	262,722	288,994
2046	12,636	13,900	275,358	302,894
2047	12,636	13,900	287,994	316,794
2048	12,636	13,900	300,631	330,694
2049	12,636	13,900	313,267	344,594
2050	0	0	325,904	358,494
2051	0	0	325,904	358,494
2052	0	0	325,904	358,494
2053	0	0	325,904	358,494
2054	0	0	325,904	358,494
2055	0	0	325,904	358,494
2056	0	0	325,904	358,494
2057	0	0	325,904	358,494
2058	0	0	325,904	358,494
2059	0	0	325,904	358,494
2060	0	0	325,904	358,494
2061	0	0	325,904	358,494
2062	0	0	325,904	358,494

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2063	0	0	325,904	358,494
2064	0	0	325,904	358,494
2065	0	0	325,904	358,494
2066	0	0	325,904	358,494
2067	0	0	325,904	358,494
2068	0	0	325,904	358,494
2069	0	0	325,904	358,494
2070	0	0	325,904	358,494
2071	0	0	325,904	358,494
2072	0	0	325,904	358,494
2073	0	0	325,904	358,494
2074	0	0	325,904	358,494
2075	0	0	325,904	358,494
2076	0	0	325,904	358,494
2077	0	0	325,904	358,494
2078	0	0	325,904	358,494
2079	0	0	325,904	358,494
2080	0	0	325,904	358,494
2081	0	0	325,904	358,494
2082	0	0	325,904	358,494
2083	0	0	325,904	358,494
2084	0	0	325,904	358,494
2085	0	0	325,904	358,494
2086	0	0	325,904	358,494
2087	0	0	325,904	358,494
2088	0	0	325,904	358,494
2089	0	0	325,904	358,494
2090	0	0	325,904	358,494
2091	0	0	325,904	358,494
2092	0	0	325,904	358,494
2093	0	0	325,904	358,494
2094	0	0	325,904	358,494
2095	0	0	325,904	358,494
2096	0	0	325,904	358,494
2097	0	0	325,904	358,494
2098	0	0	325,904	358,494
2099	0	0	325,904	358,494
2100	0	0	325,904	358,494
2101	0	0	325,904	358,494
2102	0	0	325,904	358,494

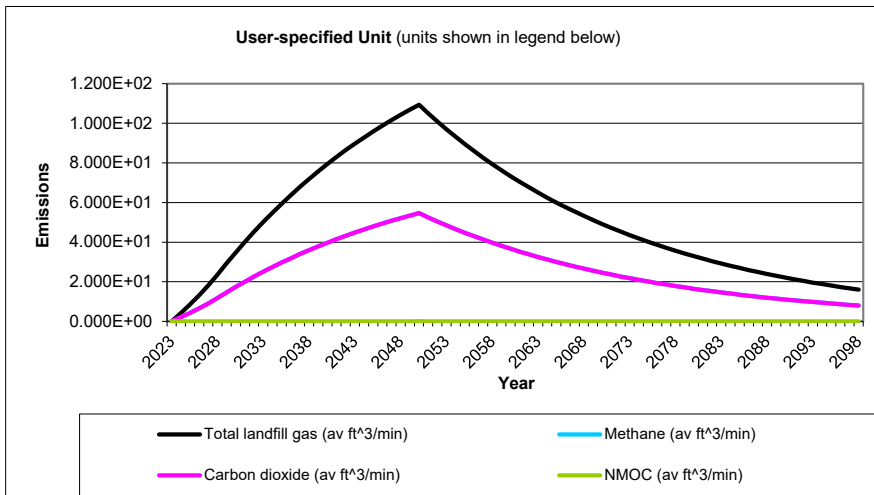
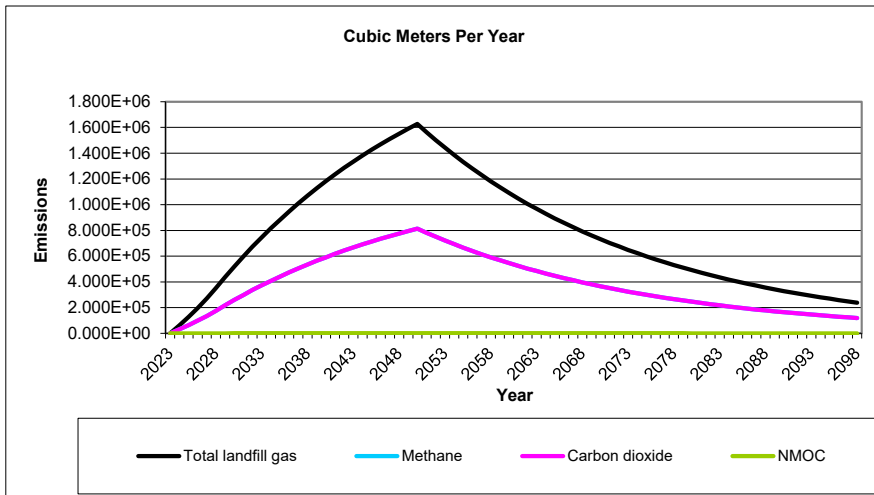
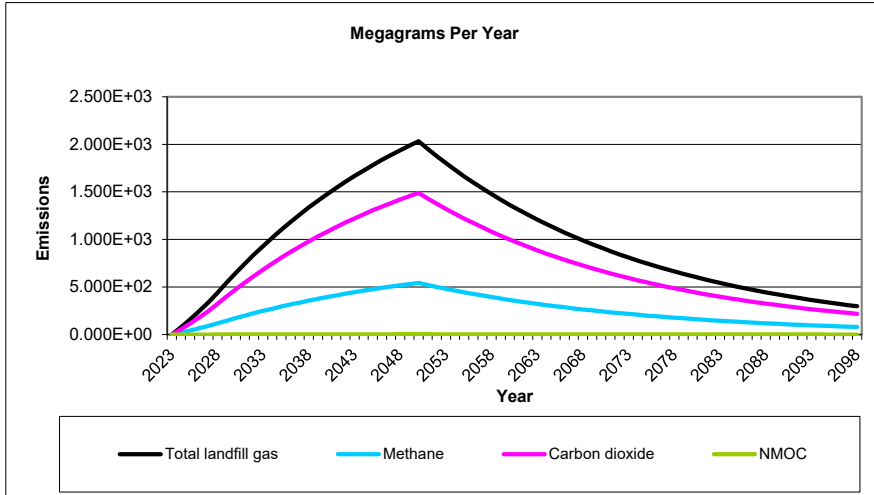
Pollutant Parameters

Gas / Pollutant Default Parameters:				User-specified Pollutant Parameters:	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

<i>Gas / Pollutant Default Parameters:</i>				<i>User-specified Pollutant Parameters:</i>	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs



Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2023	0	0	0	0	0	0
2024	7.700E+01	6.165E+04	4.143E+00	2.057E+01	3.083E+04	2.071E+00
2025	1.587E+02	1.271E+05	8.537E+00	4.238E+01	6.353E+04	4.268E+00
2026	2.456E+02	1.967E+05	1.321E+01	6.561E+01	9.834E+04	6.607E+00
2027	3.385E+02	2.710E+05	1.821E+01	9.041E+01	1.355E+05	9.105E+00
2028	4.379E+02	3.507E+05	2.356E+01	1.170E+02	1.753E+05	1.178E+01
2029	5.448E+02	4.362E+05	2.931E+01	1.455E+02	2.181E+05	1.465E+01
2030	6.474E+02	5.184E+05	3.483E+01	1.729E+02	2.592E+05	1.742E+01
2031	7.460E+02	5.974E+05	4.014E+01	1.993E+02	2.987E+05	2.007E+01
2032	8.408E+02	6.732E+05	4.524E+01	2.246E+02	3.366E+05	2.262E+01
2033	9.318E+02	7.461E+05	5.013E+01	2.489E+02	3.731E+05	2.507E+01
2034	1.019E+03	8.162E+05	5.484E+01	2.723E+02	4.081E+05	2.742E+01
2035	1.103E+03	8.835E+05	5.936E+01	2.947E+02	4.417E+05	2.968E+01
2036	1.184E+03	9.481E+05	6.370E+01	3.163E+02	4.741E+05	3.185E+01
2037	1.262E+03	1.010E+06	6.788E+01	3.370E+02	5.051E+05	3.394E+01
2038	1.336E+03	1.070E+06	7.189E+01	3.569E+02	5.350E+05	3.594E+01
2039	1.408E+03	1.127E+06	7.574E+01	3.760E+02	5.636E+05	3.787E+01
2040	1.477E+03	1.182E+06	7.944E+01	3.944E+02	5.912E+05	3.972E+01
2041	1.543E+03	1.235E+06	8.300E+01	4.121E+02	6.176E+05	4.150E+01
2042	1.606E+03	1.286E+06	8.642E+01	4.290E+02	6.431E+05	4.321E+01
2043	1.667E+03	1.335E+06	8.970E+01	4.453E+02	6.675E+05	4.485E+01
2044	1.726E+03	1.382E+06	9.285E+01	4.610E+02	6.910E+05	4.643E+01
2045	1.782E+03	1.427E+06	9.588E+01	4.760E+02	7.135E+05	4.794E+01
2046	1.836E+03	1.470E+06	9.880E+01	4.905E+02	7.352E+05	4.940E+01
2047	1.888E+03	1.512E+06	1.016E+02	5.044E+02	7.560E+05	5.080E+01
2048	1.938E+03	1.552E+06	1.043E+02	5.177E+02	7.760E+05	5.214E+01
2049	1.986E+03	1.590E+06	1.069E+02	5.305E+02	7.952E+05	5.343E+01
2050	2.032E+03	1.627E+06	1.093E+02	5.429E+02	8.137E+05	5.467E+01
2051	1.953E+03	1.564E+06	1.051E+02	5.216E+02	7.818E+05	5.253E+01
2052	1.876E+03	1.502E+06	1.009E+02	5.011E+02	7.512E+05	5.047E+01
2053	1.803E+03	1.443E+06	9.698E+01	4.815E+02	7.217E+05	4.849E+01
2054	1.732E+03	1.387E+06	9.318E+01	4.626E+02	6.934E+05	4.659E+01
2055	1.664E+03	1.332E+06	8.953E+01	4.445E+02	6.662E+05	4.476E+01
2056	1.599E+03	1.280E+06	8.601E+01	4.270E+02	6.401E+05	4.301E+01
2057	1.536E+03	1.230E+06	8.264E+01	4.103E+02	6.150E+05	4.132E+01
2058	1.476E+03	1.182E+06	7.940E+01	3.942E+02	5.909E+05	3.970E+01
2059	1.418E+03	1.135E+06	7.629E+01	3.787E+02	5.677E+05	3.814E+01
2060	1.362E+03	1.091E+06	7.330E+01	3.639E+02	5.454E+05	3.665E+01
2061	1.309E+03	1.048E+06	7.042E+01	3.496E+02	5.241E+05	3.521E+01
2062	1.258E+03	1.007E+06	6.766E+01	3.359E+02	5.035E+05	3.383E+01
2063	1.208E+03	9.675E+05	6.501E+01	3.227E+02	4.838E+05	3.250E+01
2064	1.161E+03	9.296E+05	6.246E+01	3.101E+02	4.648E+05	3.123E+01
2065	1.115E+03	8.931E+05	6.001E+01	2.979E+02	4.466E+05	3.001E+01
2066	1.072E+03	8.581E+05	5.766E+01	2.862E+02	4.291E+05	2.883E+01
2067	1.030E+03	8.245E+05	5.540E+01	2.750E+02	4.122E+05	2.770E+01
2068	9.893E+02	7.922E+05	5.322E+01	2.642E+02	3.961E+05	2.661E+01
2069	9.505E+02	7.611E+05	5.114E+01	2.539E+02	3.805E+05	2.557E+01
2070	9.132E+02	7.312E+05	4.913E+01	2.439E+02	3.656E+05	2.457E+01
2071	8.774E+02	7.026E+05	4.721E+01	2.344E+02	3.513E+05	2.360E+01
2072	8.430E+02	6.750E+05	4.535E+01	2.252E+02	3.375E+05	2.268E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2073	8.099E+02	6.486E+05	4.358E+01	2.163E+02	3.243E+05	2.179E+01
2074	7.782E+02	6.231E+05	4.187E+01	2.079E+02	3.116E+05	2.093E+01
2075	7.477E+02	5.987E+05	4.023E+01	1.997E+02	2.993E+05	2.011E+01
2076	7.183E+02	5.752E+05	3.865E+01	1.919E+02	2.876E+05	1.932E+01
2077	6.902E+02	5.527E+05	3.713E+01	1.844E+02	2.763E+05	1.857E+01
2078	6.631E+02	5.310E+05	3.568E+01	1.771E+02	2.655E+05	1.784E+01
2079	6.371E+02	5.102E+05	3.428E+01	1.702E+02	2.551E+05	1.714E+01
2080	6.121E+02	4.902E+05	3.293E+01	1.635E+02	2.451E+05	1.647E+01
2081	5.881E+02	4.710E+05	3.164E+01	1.571E+02	2.355E+05	1.582E+01
2082	5.651E+02	4.525E+05	3.040E+01	1.509E+02	2.262E+05	1.520E+01
2083	5.429E+02	4.347E+05	2.921E+01	1.450E+02	2.174E+05	1.461E+01
2084	5.216E+02	4.177E+05	2.806E+01	1.393E+02	2.088E+05	1.403E+01
2085	5.012E+02	4.013E+05	2.696E+01	1.339E+02	2.007E+05	1.348E+01
2086	4.815E+02	3.856E+05	2.591E+01	1.286E+02	1.928E+05	1.295E+01
2087	4.626E+02	3.705E+05	2.489E+01	1.236E+02	1.852E+05	1.245E+01
2088	4.445E+02	3.559E+05	2.392E+01	1.187E+02	1.780E+05	1.196E+01
2089	4.271E+02	3.420E+05	2.298E+01	1.141E+02	1.710E+05	1.149E+01
2090	4.103E+02	3.286E+05	2.208E+01	1.096E+02	1.643E+05	1.104E+01
2091	3.942E+02	3.157E+05	2.121E+01	1.053E+02	1.578E+05	1.061E+01
2092	3.788E+02	3.033E+05	2.038E+01	1.012E+02	1.517E+05	1.019E+01
2093	3.639E+02	2.914E+05	1.958E+01	9.721E+01	1.457E+05	9.790E+00
2094	3.497E+02	2.800E+05	1.881E+01	9.340E+01	1.400E+05	9.406E+00
2095	3.359E+02	2.690E+05	1.807E+01	8.974E+01	1.345E+05	9.037E+00
2096	3.228E+02	2.585E+05	1.737E+01	8.622E+01	1.292E+05	8.683E+00
2097	3.101E+02	2.483E+05	1.669E+01	8.284E+01	1.242E+05	8.343E+00
2098	2.980E+02	2.386E+05	1.603E+01	7.959E+01	1.193E+05	8.015E+00
2099	2.863E+02	2.292E+05	1.540E+01	7.647E+01	1.146E+05	7.701E+00
2100	2.751E+02	2.202E+05	1.480E+01	7.347E+01	1.101E+05	7.399E+00
2101	2.643E+02	2.116E+05	1.422E+01	7.059E+01	1.058E+05	7.109E+00
2102	2.539E+02	2.033E+05	1.366E+01	6.782E+01	1.017E+05	6.830E+00
2103	2.439E+02	1.953E+05	1.313E+01	6.516E+01	9.767E+04	6.563E+00
2104	2.344E+02	1.877E+05	1.261E+01	6.261E+01	9.384E+04	6.305E+00
2105	2.252E+02	1.803E+05	1.212E+01	6.015E+01	9.016E+04	6.058E+00
2106	2.164E+02	1.733E+05	1.164E+01	5.779E+01	8.663E+04	5.820E+00
2107	2.079E+02	1.665E+05	1.118E+01	5.553E+01	8.323E+04	5.592E+00
2108	1.997E+02	1.599E+05	1.075E+01	5.335E+01	7.997E+04	5.373E+00
2109	1.919E+02	1.537E+05	1.032E+01	5.126E+01	7.683E+04	5.162E+00
2110	1.844E+02	1.476E+05	9.920E+00	4.925E+01	7.382E+04	4.960E+00
2111	1.771E+02	1.418E+05	9.531E+00	4.732E+01	7.092E+04	4.765E+00
2112	1.702E+02	1.363E+05	9.157E+00	4.546E+01	6.814E+04	4.579E+00
2113	1.635E+02	1.309E+05	8.798E+00	4.368E+01	6.547E+04	4.399E+00
2114	1.571E+02	1.258E+05	8.453E+00	4.197E+01	6.290E+04	4.226E+00
2115	1.510E+02	1.209E+05	8.122E+00	4.032E+01	6.044E+04	4.061E+00
2116	1.450E+02	1.161E+05	7.803E+00	3.874E+01	5.807E+04	3.902E+00
2117	1.393E+02	1.116E+05	7.497E+00	3.722E+01	5.579E+04	3.749E+00
2118	1.339E+02	1.072E+05	7.203E+00	3.576E+01	5.360E+04	3.602E+00
2119	1.286E+02	1.030E+05	6.921E+00	3.436E+01	5.150E+04	3.460E+00
2120	1.236E+02	9.896E+04	6.649E+00	3.301E+01	4.948E+04	3.325E+00
2121	1.187E+02	9.508E+04	6.389E+00	3.172E+01	4.754E+04	3.194E+00
2122	1.141E+02	9.136E+04	6.138E+00	3.047E+01	4.568E+04	3.069E+00
2123	1.096E+02	8.777E+04	5.897E+00	2.928E+01	4.389E+04	2.949E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2124	1.053E+02	8.433E+04	5.666E+00	2.813E+01	4.217E+04	2.833E+00
2125	1.012E+02	8.102E+04	5.444E+00	2.703E+01	4.051E+04	2.722E+00
2126	9.722E+01	7.785E+04	5.231E+00	2.597E+01	3.892E+04	2.615E+00
2127	9.341E+01	7.480E+04	5.025E+00	2.495E+01	3.740E+04	2.513E+00
2128	8.974E+01	7.186E+04	4.828E+00	2.397E+01	3.593E+04	2.414E+00
2129	8.622E+01	6.904E+04	4.639E+00	2.303E+01	3.452E+04	2.320E+00
2130	8.284E+01	6.634E+04	4.457E+00	2.213E+01	3.317E+04	2.229E+00
2131	7.960E+01	6.374E+04	4.282E+00	2.126E+01	3.187E+04	2.141E+00
2132	7.647E+01	6.124E+04	4.115E+00	2.043E+01	3.062E+04	2.057E+00
2133	7.348E+01	5.884E+04	3.953E+00	1.963E+01	2.942E+04	1.977E+00
2134	7.059E+01	5.653E+04	3.798E+00	1.886E+01	2.826E+04	1.899E+00
2135	6.783E+01	5.431E+04	3.649E+00	1.812E+01	2.716E+04	1.825E+00
2136	6.517E+01	5.218E+04	3.506E+00	1.741E+01	2.609E+04	1.753E+00
2137	6.261E+01	5.014E+04	3.369E+00	1.672E+01	2.507E+04	1.684E+00
2138	6.016E+01	4.817E+04	3.237E+00	1.607E+01	2.409E+04	1.618E+00
2139	5.780E+01	4.628E+04	3.110E+00	1.544E+01	2.314E+04	1.555E+00
2140	5.553E+01	4.447E+04	2.988E+00	1.483E+01	2.223E+04	1.494E+00
2141	5.335E+01	4.272E+04	2.871E+00	1.425E+01	2.136E+04	1.435E+00
2142	5.126E+01	4.105E+04	2.758E+00	1.369E+01	2.052E+04	1.379E+00
2143	4.925E+01	3.944E+04	2.650E+00	1.316E+01	1.972E+04	1.325E+00
2144	4.732E+01	3.789E+04	2.546E+00	1.264E+01	1.895E+04	1.273E+00
2145	4.547E+01	3.641E+04	2.446E+00	1.214E+01	1.820E+04	1.223E+00
2146	4.368E+01	3.498E+04	2.350E+00	1.167E+01	1.749E+04	1.175E+00
2147	4.197E+01	3.361E+04	2.258E+00	1.121E+01	1.680E+04	1.129E+00
2148	4.032E+01	3.229E+04	2.170E+00	1.077E+01	1.614E+04	1.085E+00
2149	3.874E+01	3.102E+04	2.084E+00	1.035E+01	1.551E+04	1.042E+00
2150	3.722E+01	2.981E+04	2.003E+00	9.943E+00	1.490E+04	1.001E+00
2151	3.576E+01	2.864E+04	1.924E+00	9.553E+00	1.432E+04	9.621E-01
2152	3.436E+01	2.752E+04	1.849E+00	9.178E+00	1.376E+04	9.244E-01
2153	3.301E+01	2.644E+04	1.776E+00	8.819E+00	1.322E+04	8.881E-01
2154	3.172E+01	2.540E+04	1.707E+00	8.473E+00	1.270E+04	8.533E-01
2155	3.048E+01	2.440E+04	1.640E+00	8.141E+00	1.220E+04	8.199E-01
2156	2.928E+01	2.345E+04	1.575E+00	7.821E+00	1.172E+04	7.877E-01
2157	2.813E+01	2.253E+04	1.514E+00	7.515E+00	1.126E+04	7.568E-01
2158	2.703E+01	2.164E+04	1.454E+00	7.220E+00	1.082E+04	7.271E-01
2159	2.597E+01	2.080E+04	1.397E+00	6.937E+00	1.040E+04	6.986E-01
2160	2.495E+01	1.998E+04	1.342E+00	6.665E+00	9.990E+03	6.712E-01
2161	2.397E+01	1.920E+04	1.290E+00	6.404E+00	9.598E+03	6.449E-01
2162	2.303E+01	1.844E+04	1.239E+00	6.153E+00	9.222E+03	6.196E-01
2163	2.213E+01	1.772E+04	1.191E+00	5.911E+00	8.861E+03	5.953E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2023	0	0	0	0	0	0
2024	5.643E+01	3.083E+04	2.071E+00	1.315E-01	3.668E+01	2.465E-03
2025	1.163E+02	6.353E+04	4.268E+00	2.710E-01	7.560E+01	5.079E-03
2026	1.800E+02	9.834E+04	6.607E+00	4.195E-01	1.170E+02	7.863E-03
2027	2.481E+02	1.355E+05	9.105E+00	5.780E-01	1.613E+02	1.084E-02
2028	3.209E+02	1.753E+05	1.178E+01	7.479E-01	2.086E+02	1.402E-02
2029	3.992E+02	2.181E+05	1.465E+01	9.303E-01	2.595E+02	1.744E-02
2030	4.745E+02	2.592E+05	1.742E+01	1.106E+00	3.084E+02	2.072E-02
2031	5.467E+02	2.987E+05	2.007E+01	1.274E+00	3.554E+02	2.388E-02
2032	6.162E+02	3.366E+05	2.262E+01	1.436E+00	4.006E+02	2.691E-02
2033	6.829E+02	3.731E+05	2.507E+01	1.591E+00	4.440E+02	2.983E-02
2034	7.470E+02	4.081E+05	2.742E+01	1.741E+00	4.856E+02	3.263E-02
2035	8.086E+02	4.417E+05	2.968E+01	1.884E+00	5.257E+02	3.532E-02
2036	8.678E+02	4.741E+05	3.185E+01	2.022E+00	5.641E+02	3.790E-02
2037	9.246E+02	5.051E+05	3.394E+01	2.155E+00	6.011E+02	4.039E-02
2038	9.792E+02	5.350E+05	3.594E+01	2.282E+00	6.366E+02	4.277E-02
2039	1.032E+03	5.636E+05	3.787E+01	2.404E+00	6.707E+02	4.507E-02
2040	1.082E+03	5.912E+05	3.972E+01	2.522E+00	7.035E+02	4.727E-02
2041	1.131E+03	6.176E+05	4.150E+01	2.635E+00	7.350E+02	4.938E-02
2042	1.177E+03	6.431E+05	4.321E+01	2.743E+00	7.653E+02	5.142E-02
2043	1.222E+03	6.675E+05	4.485E+01	2.847E+00	7.943E+02	5.337E-02
2044	1.265E+03	6.910E+05	4.643E+01	2.947E+00	8.223E+02	5.525E-02
2045	1.306E+03	7.135E+05	4.794E+01	3.044E+00	8.491E+02	5.705E-02
2046	1.346E+03	7.352E+05	4.940E+01	3.136E+00	8.749E+02	5.878E-02
2047	1.384E+03	7.560E+05	5.080E+01	3.225E+00	8.997E+02	6.045E-02
2048	1.421E+03	7.760E+05	5.214E+01	3.310E+00	9.235E+02	6.205E-02
2049	1.456E+03	7.952E+05	5.343E+01	3.392E+00	9.463E+02	6.358E-02
2050	1.489E+03	8.137E+05	5.467E+01	3.471E+00	9.683E+02	6.506E-02
2051	1.431E+03	7.818E+05	5.253E+01	3.335E+00	9.303E+02	6.251E-02
2052	1.375E+03	7.512E+05	5.047E+01	3.204E+00	8.939E+02	6.006E-02
2053	1.321E+03	7.217E+05	4.849E+01	3.078E+00	8.588E+02	5.770E-02
2054	1.269E+03	6.934E+05	4.659E+01	2.958E+00	8.251E+02	5.544E-02
2055	1.219E+03	6.662E+05	4.476E+01	2.842E+00	7.928E+02	5.327E-02
2056	1.172E+03	6.401E+05	4.301E+01	2.730E+00	7.617E+02	5.118E-02
2057	1.126E+03	6.150E+05	4.132E+01	2.623E+00	7.318E+02	4.917E-02
2058	1.082E+03	5.909E+05	3.970E+01	2.520E+00	7.031E+02	4.724E-02
2059	1.039E+03	5.677E+05	3.814E+01	2.422E+00	6.756E+02	4.539E-02
2060	9.984E+02	5.454E+05	3.665E+01	2.327E+00	6.491E+02	4.361E-02
2061	9.593E+02	5.241E+05	3.521E+01	2.235E+00	6.236E+02	4.190E-02
2062	9.217E+02	5.035E+05	3.383E+01	2.148E+00	5.992E+02	4.026E-02
2063	8.855E+02	4.838E+05	3.250E+01	2.064E+00	5.757E+02	3.868E-02
2064	8.508E+02	4.648E+05	3.123E+01	1.983E+00	5.531E+02	3.716E-02
2065	8.175E+02	4.466E+05	3.001E+01	1.905E+00	5.314E+02	3.571E-02
2066	7.854E+02	4.291E+05	2.883E+01	1.830E+00	5.106E+02	3.431E-02
2067	7.546E+02	4.122E+05	2.770E+01	1.758E+00	4.906E+02	3.296E-02
2068	7.250E+02	3.961E+05	2.661E+01	1.689E+00	4.713E+02	3.167E-02
2069	6.966E+02	3.805E+05	2.557E+01	1.623E+00	4.528E+02	3.043E-02
2070	6.693E+02	3.656E+05	2.457E+01	1.560E+00	4.351E+02	2.923E-02
2071	6.430E+02	3.513E+05	2.360E+01	1.498E+00	4.180E+02	2.809E-02
2072	6.178E+02	3.375E+05	2.268E+01	1.440E+00	4.016E+02	2.699E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2073	5.936E+02	3.243E+05	2.179E+01	1.383E+00	3.859E+02	2.593E-02
2074	5.703E+02	3.116E+05	2.093E+01	1.329E+00	3.708E+02	2.491E-02
2075	5.480E+02	2.993E+05	2.011E+01	1.277E+00	3.562E+02	2.393E-02
2076	5.265E+02	2.876E+05	1.932E+01	1.227E+00	3.423E+02	2.300E-02
2077	5.058E+02	2.763E+05	1.857E+01	1.179E+00	3.288E+02	2.209E-02
2078	4.860E+02	2.655E+05	1.784E+01	1.132E+00	3.159E+02	2.123E-02
2079	4.669E+02	2.551E+05	1.714E+01	1.088E+00	3.036E+02	2.040E-02
2080	4.486E+02	2.451E+05	1.647E+01	1.045E+00	2.917E+02	1.960E-02
2081	4.310E+02	2.355E+05	1.582E+01	1.004E+00	2.802E+02	1.883E-02
2082	4.141E+02	2.262E+05	1.520E+01	9.650E-01	2.692E+02	1.809E-02
2083	3.979E+02	2.174E+05	1.461E+01	9.272E-01	2.587E+02	1.738E-02
2084	3.823E+02	2.088E+05	1.403E+01	8.908E-01	2.485E+02	1.670E-02
2085	3.673E+02	2.007E+05	1.348E+01	8.559E-01	2.388E+02	1.604E-02
2086	3.529E+02	1.928E+05	1.295E+01	8.224E-01	2.294E+02	1.541E-02
2087	3.391E+02	1.852E+05	1.245E+01	7.901E-01	2.204E+02	1.481E-02
2088	3.258E+02	1.780E+05	1.196E+01	7.591E-01	2.118E+02	1.423E-02
2089	3.130E+02	1.710E+05	1.149E+01	7.294E-01	2.035E+02	1.367E-02
2090	3.007E+02	1.643E+05	1.104E+01	7.008E-01	1.955E+02	1.314E-02
2091	2.889E+02	1.578E+05	1.061E+01	6.733E-01	1.878E+02	1.262E-02
2092	2.776E+02	1.517E+05	1.019E+01	6.469E-01	1.805E+02	1.213E-02
2093	2.667E+02	1.457E+05	9.790E+00	6.215E-01	1.734E+02	1.165E-02
2094	2.563E+02	1.400E+05	9.406E+00	5.972E-01	1.666E+02	1.119E-02
2095	2.462E+02	1.345E+05	9.037E+00	5.737E-01	1.601E+02	1.075E-02
2096	2.366E+02	1.292E+05	8.683E+00	5.512E-01	1.538E+02	1.033E-02
2097	2.273E+02	1.242E+05	8.343E+00	5.296E-01	1.478E+02	9.928E-03
2098	2.184E+02	1.193E+05	8.015E+00	5.089E-01	1.420E+02	9.538E-03
2099	2.098E+02	1.146E+05	7.701E+00	4.889E-01	1.364E+02	9.164E-03
2100	2.016E+02	1.101E+05	7.399E+00	4.697E-01	1.310E+02	8.805E-03
2101	1.937E+02	1.058E+05	7.109E+00	4.513E-01	1.259E+02	8.460E-03
2102	1.861E+02	1.017E+05	6.830E+00	4.336E-01	1.210E+02	8.128E-03
2103	1.788E+02	9.767E+04	6.563E+00	4.166E-01	1.162E+02	7.809E-03
2104	1.718E+02	9.384E+04	6.305E+00	4.003E-01	1.117E+02	7.503E-03
2105	1.650E+02	9.016E+04	6.058E+00	3.846E-01	1.073E+02	7.209E-03
2106	1.586E+02	8.663E+04	5.820E+00	3.695E-01	1.031E+02	6.926E-03
2107	1.524E+02	8.323E+04	5.592E+00	3.550E-01	9.904E+01	6.655E-03
2108	1.464E+02	7.997E+04	5.373E+00	3.411E-01	9.516E+01	6.394E-03
2109	1.406E+02	7.683E+04	5.162E+00	3.277E-01	9.143E+01	6.143E-03
2110	1.351E+02	7.382E+04	4.960E+00	3.149E-01	8.784E+01	5.902E-03
2111	1.298E+02	7.092E+04	4.765E+00	3.025E-01	8.440E+01	5.671E-03
2112	1.247E+02	6.814E+04	4.579E+00	2.907E-01	8.109E+01	5.448E-03
2113	1.198E+02	6.547E+04	4.399E+00	2.793E-01	7.791E+01	5.235E-03
2114	1.151E+02	6.290E+04	4.226E+00	2.683E-01	7.486E+01	5.030E-03
2115	1.106E+02	6.044E+04	4.061E+00	2.578E-01	7.192E+01	4.832E-03
2116	1.063E+02	5.807E+04	3.902E+00	2.477E-01	6.910E+01	4.643E-03
2117	1.021E+02	5.579E+04	3.749E+00	2.380E-01	6.639E+01	4.461E-03
2118	9.812E+01	5.360E+04	3.602E+00	2.286E-01	6.379E+01	4.286E-03
2119	9.427E+01	5.150E+04	3.460E+00	2.197E-01	6.129E+01	4.118E-03
2120	9.058E+01	4.948E+04	3.325E+00	2.111E-01	5.888E+01	3.956E-03
2121	8.702E+01	4.754E+04	3.194E+00	2.028E-01	5.657E+01	3.801E-03
2122	8.361E+01	4.568E+04	3.069E+00	1.948E-01	5.436E+01	3.652E-03
2123	8.033E+01	4.389E+04	2.949E+00	1.872E-01	5.222E+01	3.509E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2124	7.718E+01	4.217E+04	2.833E+00	1.799E-01	5.018E+01	3.371E-03
2125	7.416E+01	4.051E+04	2.722E+00	1.728E-01	4.821E+01	3.239E-03
2126	7.125E+01	3.892E+04	2.615E+00	1.660E-01	4.632E+01	3.112E-03
2127	6.846E+01	3.740E+04	2.513E+00	1.595E-01	4.450E+01	2.990E-03
2128	6.577E+01	3.593E+04	2.414E+00	1.533E-01	4.276E+01	2.873E-03
2129	6.319E+01	3.452E+04	2.320E+00	1.473E-01	4.108E+01	2.760E-03
2130	6.072E+01	3.317E+04	2.229E+00	1.415E-01	3.947E+01	2.652E-03
2131	5.833E+01	3.187E+04	2.141E+00	1.359E-01	3.792E+01	2.548E-03
2132	5.605E+01	3.062E+04	2.057E+00	1.306E-01	3.644E+01	2.448E-03
2133	5.385E+01	2.942E+04	1.977E+00	1.255E-01	3.501E+01	2.352E-03
2134	5.174E+01	2.826E+04	1.899E+00	1.206E-01	3.363E+01	2.260E-03
2135	4.971E+01	2.716E+04	1.825E+00	1.158E-01	3.232E+01	2.171E-03
2136	4.776E+01	2.609E+04	1.753E+00	1.113E-01	3.105E+01	2.086E-03
2137	4.589E+01	2.507E+04	1.684E+00	1.069E-01	2.983E+01	2.004E-03
2138	4.409E+01	2.409E+04	1.618E+00	1.027E-01	2.866E+01	1.926E-03
2139	4.236E+01	2.314E+04	1.555E+00	9.871E-02	2.754E+01	1.850E-03
2140	4.070E+01	2.223E+04	1.494E+00	9.484E-02	2.646E+01	1.778E-03
2141	3.910E+01	2.136E+04	1.435E+00	9.112E-02	2.542E+01	1.708E-03
2142	3.757E+01	2.052E+04	1.379E+00	8.755E-02	2.442E+01	1.641E-03
2143	3.610E+01	1.972E+04	1.325E+00	8.411E-02	2.347E+01	1.577E-03
2144	3.468E+01	1.895E+04	1.273E+00	8.082E-02	2.255E+01	1.515E-03
2145	3.332E+01	1.820E+04	1.223E+00	7.765E-02	2.166E+01	1.455E-03
2146	3.201E+01	1.749E+04	1.175E+00	7.460E-02	2.081E+01	1.398E-03
2147	3.076E+01	1.680E+04	1.129E+00	7.168E-02	2.000E+01	1.344E-03
2148	2.955E+01	1.614E+04	1.085E+00	6.887E-02	1.921E+01	1.291E-03
2149	2.839E+01	1.551E+04	1.042E+00	6.617E-02	1.846E+01	1.240E-03
2150	2.728E+01	1.490E+04	1.001E+00	6.357E-02	1.774E+01	1.192E-03
2151	2.621E+01	1.432E+04	9.621E-01	6.108E-02	1.704E+01	1.145E-03
2152	2.518E+01	1.376E+04	9.244E-01	5.868E-02	1.637E+01	1.100E-03
2153	2.420E+01	1.322E+04	8.881E-01	5.638E-02	1.573E+01	1.057E-03
2154	2.325E+01	1.270E+04	8.533E-01	5.417E-02	1.511E+01	1.015E-03
2155	2.234E+01	1.220E+04	8.199E-01	5.205E-02	1.452E+01	9.756E-04
2156	2.146E+01	1.172E+04	7.877E-01	5.001E-02	1.395E+01	9.374E-04
2157	2.062E+01	1.126E+04	7.568E-01	4.805E-02	1.340E+01	9.006E-04
2158	1.981E+01	1.082E+04	7.271E-01	4.616E-02	1.288E+01	8.653E-04
2159	1.903E+01	1.040E+04	6.986E-01	4.435E-02	1.237E+01	8.314E-04
2160	1.829E+01	9.990E+03	6.712E-01	4.261E-02	1.189E+01	7.988E-04
2161	1.757E+01	9.598E+03	6.449E-01	4.094E-02	1.142E+01	7.675E-04
2162	1.688E+01	9.222E+03	6.196E-01	3.934E-02	1.097E+01	7.374E-04
2163	1.622E+01	8.861E+03	5.953E-01	3.779E-02	1.054E+01	7.085E-04

Appendix B

Public Participation Plan

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