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Our ref: 12593296

June 30, 2025

Ms. Kris Carlson
Environmental Analyst
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 9
700 Delaware Ave.
Buffalo, NY 14209

Response to Request for Additional Information (dated November 8, 2024)

Dear Ms. Carlson:

On behalf of Modern Landfill, Inc. (Modern), GHD Services, Inc. (GHD) hereby submits the following responses to the Request for Additional Information issued by the New York State Department of Environmental Conservation (NYSDEC) on November 8, 2024. Also included with this response letter are a State Environmental Quality Review (SEQR) Long Environmental Assessment Form (attached in Section 1) and a revised Climate Leadership and Community Protection Act (CLCPA) Evaluation for the Modern Landfill (attached in Section 2).

State Environmental Quality Review

Comment 1:

In accordance with State Environmental Quality Review (SEQR, 6 NYCRR Part 617), the NYSDEC has identified the proposed action as Unlisted. Due to the nature of the facility, the NYSDEC intends to act as SEQR Lead Agency and coordinate review with the Town of Lewiston. Before the NYSDEC can deem this permit application 'complete' in accordance with UPA, a SEQR Lead Agency must be established and must accept a draft Environmental Impact Statement (EIS) or issue a negative declaration (6 NYCRR Part 621.6).

Please submit a long Environmental Assessment Form that includes the proposed modifications from both the Air Title V and Solid Waste permit modification applications using DEC's EAF Mapper: https://gisservices.dec.ny.gov/eafmapper/.

Response: **The Long Environmental Assessment Form (Long EAF) has been completed for the proposed modification to the Title V Permit to operate a new 3,000 standard cubic feet per minute (scfm) utility flare to be located at the central blower station adjacent to the landfill (refer to attached Section 1 for the completed and signed form).The Long EAF also includes a small number of enhancements or updates for the solid waste operating permit including a direct forcemain drain for leachate into the Town of Lewiston Water Pollution Control System, an improved residential waste dropoff and recycling center, and a new centralized blower for the landfill gas collection system.**

Climate Leadership and Community Protection Act Section 7(2)

Comment 2:

As Modern Landfill, Inc. has submitted applications for the renewal and modification of both their Air Title V and Solid Waste applications, the CLCPA analysis must include all emissions from both permit modifications. Please revise the CLCPA 7(2) analysis to include emissions associated with the Solid Waste permit modification, if applicable.

Response: The proposed modification to the Title V Permit for the installation of the utility flare will not result in an increase to greenhouse gas emissions since the utility flare is being installed in order to provide redundant capacity in the event that collected landfill gas cannot not be combusted in the off-site landfill gas-to-energy (LFGTE) facility.

In addition, the proposed enhancements or updates for the solid waste operating permit will not result in an increase to greenhouse gas emissions at the Facility.

Comment 3:

In the Introduction section, please revise Landfill Gas to Energy (LFGTE) to Renewable Natural Gas and include a sentence on the status of that project.

Response: It is our understanding that the off-site facility will continue to be an electricity generating plant and that the proposed Renewable Natural Gas project is on hold indefinitely.

Comment 4:

DAR-21 and the Disadvantaged Community map are no longer drafts, please revise accordingly.

Response: The word "draft" has been removed from the citation for both sources of information.

Comment 5:

Please remove (page 5) or replace (Tables A.2, B.2, C.2) all references to the 100-year Global Warming Potential (GWP) values with reference to the 20-year GWP values. The tables appear to use the correct 20-year GWP values but label them as 100-year GWPs.

Response: The reference to 100-year GWP values has been replaced with a referenced to 20-year GWP values.

Comment 6:

Potential to Emit (PTE) should be added to Table 1, and PTE calculation tables should be included in the CLCPA Attachments.

Response: Table 1 presents projected greenhouse gas (GHG) emissions for 2030 and 2050, baseline GHG emissions for 2023 and the PTE estimate for the year 2035 when the landfill gas generation rate from the landfill is expected to peak (calendar year 2035 is when uncontrolled emissions peak for the facility). The supporting calculations for 2035 are provided in Attachment D of Section 2.

Comment 7:

All GHG emissions summary tables should include total anthropogenic CO2, total CH4, and total N2O emissions in addition to total anthropogenic CO2e.

<u>Response</u>: All GHG emissions summary tables include the requested headers.

<u>Comment 8:</u>

The Peak Year Emissions shown in Table 2D (and corresponding Table D.1), are much lower than the Peak Year Emissions values in Table 1. Please verify whether these values are correct.

<u>Response</u>: The estimated anthropogenic GHG emissions for 2035 shown in Table 1 (stationary sources) has been corrected to match what was provided in Table 2D and Attachment D of Section 2.

<u>Comment 9:</u>

Do Table 3 and 4 represent PTE, actual emissions, or both? Please specify in the table description. All emissions need to be included in both a PTE and actuals basis.

<u>Response</u>: The emissions in Tables 3 and 4 represent PTE totals. For simplicity, actual emissions are assumed to be equal to PTE totals but are expected to be less in any given year. A note has been added to the bottom of Tables 3 and 4 as requested.

<u>Comment 10:</u>

Are the 2030 and 2050 projected emissions based on PTE or projected emissions? Please specify and/or move all discussion of 2030/2050 projected emissions to the relevant section of the analysis.

<u>Response</u>: Projected actual emissions and PTE emissions have been prepared for the calendar years 2023, 2030, 2035 and 2050.

<u>Comment 11:</u>

Section 5.2 seems to be discussing upstream emissions but calls them indirect emissions. Please replace "indirect" with "upstream" in this section (including 5.2.2).

<u>Response</u>: The requested change has been made to Sections 5.2 and 5.2.2.

<u>Comment 12:</u>

Section 5.2.1 states that Table 6 represents upstream emissions, but Table 6 does not include the words "upstream emissions". Please add "upstream emissions" to the Table 6 description. It would also be helpful to add "Upstream" in parentheses next to "Off-site Fossil Fuel Combustion" in Table 1.

<u>Response</u>: The requested change has been made to Tables 1 and 6.

<u>Comment 13:</u>

Upstream emissions should include CO2, CH4 and N2O in addition to CO2e, and should include both PTE and actual emissions. Section 5.2.2 states the emission factors are from the 2023 Statewide GHG Emissions report – it would be helpful to add a footnote to Table 6 stating this also. In addition, the emission factor values appear to be an average of those from the 2023 and 2022 reports; please update the emission factors to those in the 2023 Statewide GHG Emissions Report.

<u>Response</u>: The upstream emissions in Table 6 represent PTE totals. For simplicity, actual emissions are assumed to be equal to PTE totals but are expected to be less in any given year. A footnote has

been added to the bottom of Tables 6 as requested. The emission factors were referenced from the 2023 Statewide GHG Emissions Report.

<u>Comment 14:</u>

Indirect emissions from mobile sources should include waste dump trucks and haul trucks. Direct emissions are for equipment that generally stays on-site.

<u>Response</u>: The document has been revised accordingly.

<u>Comment 15:</u>

For mobile emissions calculations, please utilize the CLCPA 7(3) Addendum for Mobile Emissions from DEC Program Policy DEP-24-1.

<u>Response</u>: GHD utilized the Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) tool in order to estimate emissions from mobile equipment. The AFLEET tool output is provided in Attachment G of Section 2.

<u>Comment 16:</u>

Why was the Hi-HAP (Tables A.1, B.1, C.1, D.1) changed from Toluene to Hydrogen Chloride?

<u>Response</u>: NYSDEC previously requested that hazardous air pollutant (HAP) emissions be re-calculated using a more recent landfill gas sample. Therefore, concentrations of HAPs were referenced from a 2021 landfill gas sample. Using the more recent data, hydrogen chloride becomes the "highest" HAP (rather than toluene).

<u>Comment 17:</u>

In Attachment E, please label the collection efficiency tables with their corresponding years.

<u>Response</u>: The calendar year has been added to the heading of each table in Attachment E of Section 2.

<u>Comment 18:</u>

It would be helpful to add a footnote under every relevant table listing the 20-yr GWP values.

<u>Response</u>: The requested footnote has been added to the relevant tables.

Climate Leadership and Community Protection Act Section 7(3)

<u>Comment 19:</u>

As Modern Landfill, Inc. has submitted applications for the renewal and modification of both their Air Title V and Solid Waste applications, the CLCPA analysis must include all emissions from both permit modifications. Please revise the CLCPA 7(3) Disproportionate Burden Analysis to include emissions associated with the Solid Waste permit modification, if applicable. The proposed modifications are likely to impact the Disadvantaged Community designated as Census Tract 3606302450. Please note that Census Tract 36063940001 is located more than 1.5 miles from the landfill and does not need to be included in the Disproportionate Burden Analysis.

<u>Response</u>: As stated previously, the proposed enhancements/ updates to the solid waste permit will not result in an increase to greenhouse gas emissions at the facility. The proposed modification to the Title V Permit for the installation of the utility flare will not result in an increase to emissions since the utility flare in being installed in order to provide redundant capacity in the event that collected landfill gas cannot not combusted in the off-site landfill gas-to-energy (LFGTE) facility. The utility flare will provide an environmental benefit to the surrounding community by helping to minimize collection system downtime (thereby reducing emissions and potential odors from the facility).

In addition, Section V.2 of Policy DEP 24-1 indicates that "projects subject to this policy include sources and activities of a continuing nature associated with any new emission sources, permit renewals, or permit modifications <u>that would result in actual increases of GHG and co-pollutants</u>." Since the addition of a new 3,000 scfm utility flare will not result in any emissions increases of GHG or co-pollutants as a result of continued operations, this policy does not apply to the Modern Landfill facility. The utility flare will provide sufficient flare capacity for Modern Landfill to combust all collected landfill gas from the Facility in the event that the off-site engine plant is down or undergoing maintenance. Therefore, actual GHG and co-pollutant emissions are expected to decrease as a result of the modification since the new control devices will help to minimize fugitive emissions that would have occurred during collection system downtime.

<u>Comment 20:</u>

The Disproportionate Burden Analysis must also include the potential impacts of mobile emissions from trucks driving to and from the facility.

<u>Response</u>: Since the only modification being proposed (installation of the utility flare) has the potential to reduce emissions from the facility, this analysis is not necessary.

<u>Comment 21:</u>

The CLCPA Section 7(3) Disproportionate Burden Analysis Worksheet may be completed and included in the Disproportionate Burden Analysis: https://dec.ny.gov/regulatory/permits-licenses/notable-projects-documentation/permitting-disadvantages-communities-under-climate-leadership-and-community-protection-act. This information from the worksheet can be used in the narrative description of the existing (baseline) conditions (see item 22 below) as well as in the evaluation of how project GHG and co-pollutant emissions would impact the Disadvantaged Community (see item 23 below).

<u>Response</u>: It is our understanding that based on our recent conversations with NYSDEC, this worksheet is no longer required.

<u>Comment 22:</u>

Identify the relevant baseline data on existing burdens using the Disadvantaged Communities Criteria Map: https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria, including the DAC Indicators used to designate the disadvantaged community that are related to air quality and air-related effects. Tables 2 and 3 of the attached New York State Climate Justice Working Group Draft Disadvantaged Communities Criteria and List Technical Documentation (March 9, 2022): https://climate.ny.gov/-/media/Project/Climate/Files/Disadvantaged-Communities-Criteria/Technical-Documentation-on-Disadvantaged-Community-Criteria.pdf, identify various potential pollution exposures, land use and facilities associated with historical discrimination or disinvestment, and health outcomes & sensitivities that relate to air quality or air-related health effects.

<u>Response</u>: Since the only modification being proposed (installation of the utility flare) has the potential to reduce emissions from the facility, this analysis is not necessary.

<u>Comment 23:</u>

Revise the evaluation of how project GHG and co-pollutant emissions would impact the Disadvantaged Community. The evaluation should qualitatively, and to the extent possible quantitatively, explain whether the project's GHG and co-pollutant emissions could positively or negatively impact air quality and air-related health effects, or other relevant DAC Indicators, resulting from an increase in GHG or co-pollutants from the proposed action.

<u>Response</u>: Since the only modification being proposed (installation of the utility flare) has the potential to reduce emissions from the facility, this analysis is not necessary.

<u>Comment 24:</u>

Revise the project design considerations discussion to specifically address how these considerations will decrease GHG and co-pollutant emissions and lessen the disproportionate burden on Census Tract 3606302450. The design considerations must be additional measures taken beyond regulatory requirements to reduce GHG and co-pollutant emissions levels equivalent to at least the proposed modification increases. The design considerations must be real, quantifiable, permanent, verifiable, and enforceable. You may include proposed permit conditions.

<u>Response</u>: Since the only modification being proposed (installation of the utility flare) has the potential to reduce emissions from the facility, this analysis is not necessary.

Environmental Justice

<u>Comment 25:</u>

The project site is located in a potential Environmental Justice Area. In accordance with NYSDEC CP-29 Environmental Justice and Permitting, additional public outreach will be required for this application. In addition to the procedural requirements of CP-29, DEP 24-1 requires an Enhanced Public Participation Plan (PPP) in which the applicant solicits input from members of the DAC regarding the proposed project design considerations and the existing and potential benefits of the project, as identified by the applicant.

Please submit an Enhanced PPP for this application that meets the minimum requirements specified within CP-29 and DEP 24-1. A DAC PPP template has been enclosed as an example. For additional information, please visit the NYSDEC's web site at https://www.dec.ny.gov/public/36929.html. The PPP must be approved by the NYSDEC before your permit application can deemed 'complete' in accordance with UPA [6 NYCRR 621.3(a)(3)].

<u>Response</u>: Since the only modification being proposed (installation of the utility flare) has the potential to reduce emissions from the facility, a public participation plan (PPP) is not needed.

Monitoring Condition

<u>Comment 26:</u>

The "Updates to CLCPA Assessment" letter from June 6, 2024, states "based on the landfill gas model shown in Section 2.2 of the updated CLCPA Assessment, the LFG generation rate is not expected to increase by *more than 100 scfm in a given year. Therefore, a 12-month timeline for installation of the second utility flare is expected to result in the rate of total LFG collected surpassing the capacity of 4,500 scfm within the same year.*

Is this meant to say: "…is not expected to result in the rate of total LFG collected surpassing the capacity of 4,500 scfm within the same year"?

Response: Correct. The full sentence should read "Therefore, a 12-month timeline for installation of the second utility flare is not expected to result in the rate of total LFG collected surpassing the capacity of 4,500 scfm within the same year."

Comment 27:

The monitoring description states, "Upon reaching 90 percent of 4,500 scfm (or 4,050 scfm), the Facility will be required to install a second utility flair within 1 year of surpassing the threshold."

Response: Acknowledged.

Comment 28:

The monitoring description would be acceptable if this sentence is changed to: "Upon reaching 85 percent of 4,500 scfm (or 3,825 scfm), the Facility will be required to install a second utility flair within 1 year of surpassing the threshold."

Response: The Facility agrees to implement this timeline.

If you have any questions, or would like additional information, please feel free to contact the undersigned at the telephone numbers listed at your convenience.

Regards

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Project Director

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SW/BPS/cs/1

Full Environmental Assessment Form
Part 1 - Project and Setting

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Modern Landfill Title V Renewal & Installation of New Utility Flare, Part 360 Renewal		
Project Location (describe, and attach a general location map): Modern Landfill, Inc., 1445 Pletcher Road, Model City, NY 14107		
Brief Description of Proposed Action (include purpose or need): Renewal of Title V Permit for Modern Landfill as well as modification to install a new utility flare at the Facility. The utility flare will be installed at a new central blower station located adjacent to the landfill. Modern Landfill is also requesting a renewal of their existing Solid Waste Facility (SWF) Permit. The permit renewal will generally maintain the operating conditions at the landfill so that waste disposal capacity in the area of New York can be maintained and the remaining permitted airspace of the facility can be utilized. Project is a renewal of existing permit. Accepted waste types and tonnage will not change from existing. See supplemental information attachment for further explanation.		
Name of Applicant/Sponsor: Josh Ennis (Modern Landfill, Inc.)	Telephone: (716) 421-9401 E-Mail: joshe@modern-corp.com	
Address: 4746 Model City Rd. PO Box 209		
City/PO: Model City	State: NY	Zip Code: 14107
Project Contact (if not same as sponsor; give name and title/role):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:
Property Owner (if not same as sponsor): Modern Landfill, Inc.	Telephone: 716-754-8226 E-Mail:	
Address: 1445 Pletcher Road		
City/PO: Model City	State: NY	Zip Code: 14107

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity		**If Yes: Identify Agency and Approval(s) Required**	**Application Date (Actual or projected)**
a. City Counsel, Town Board, or Village Board of Trustees	☑Yes ☐No	Lewiston Town Board - Part 360 Permit	May 2023
b. City, Town or Village Planning Board or Commission	☐Yes ☑No		
c. City, Town or Village Zoning Board of Appeals	☐Yes ☑No		
d. Other local agencies	☐Yes ☑No		
e. County agencies	☐Yes ☑No		
f. Regional agencies	☐Yes ☑No		
g. State agencies	☑Yes ☐No	New York State Department of Environmental Conservation - Title V and Part 360 Renewal	June 30, 2025 (Title V), April 26, 2023 (Part 360)
h. Federal agencies	☑Yes ☐No	United States Environmental Protection Agency - Title V Renewal	June 30, 2025

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes ☑No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☐ Yes ☑No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐ Yes ☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes ☑No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☑Yes ☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☐Yes ☑No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☑Yes ☐No

If Yes, identify the plan(s):

Remediaton Sites:932045, Remediaton Sites:932023, NYS Heritage Areas:West Erie Canal Corridor

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☐Yes ☑No

If Yes, identify the plan(s):

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No
If Yes, what is the zoning classification(s) including any applicable overlay district?
The permitted limits of waste disposal at Modern Landfill will remain the same. These limits are within the zone designated "I2 Industrial - Housing Not Permitted." Areas of this project that are outside the limits of waste are also in the "I2 Industrial - Housing Not Permitted" zone.

b. Is the use permitted or allowed by a special or conditional use permit? ☐ Yes ☑ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☑ No
If Yes,
i. What is the proposed new zoning for the site? ______

C.4. Existing community services.

a. In what school district is the project site located? Lewiston-Porter Central School District

b. What police or other public protection forces serve the project site?
Lewiston Police, New York State Police

c. Which fire protection and emergency medical services serve the project site?
Lewiston No. 1 Fire Company and/or Pekin Fire Company; Mount St. Mary's Hospital, Lewiston, NY

d. What parks serve the project site?
Bond Lake Park is approximately 2.7 miles to the southeast; Joseph Davis State Park is approximately 2.7 miles to the west.

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Industrial, commercial. Renewal of the operating permits (Title V and Solid Waste Permit) for a solid waste disposal facility within an industrially zoned area.

b. a. Total acreage of the site of the proposed action? 290 acres
b. Total acreage to be physically disturbed? 232 acres *No acreage will be disturbed which has not already been permitted as part of the existing SWF permit.
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 455 acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☑ No
i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % ______ Units: ______

d. Is the proposed action a subdivision, or does it include a subdivision? ☐ Yes ☑ No
If Yes,
i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)
______
ii. Is a cluster/conservation layout proposed? ☐ Yes ☐ No
iii. Number of lots proposed? ______
iv. Minimum and maximum proposed lot sizes? Minimum ______ Maximum ______

e. Will the proposed action be constructed in multiple phases? ☑ Yes ☐ No
i. If No, anticipated period of construction: ______ months
ii. If Yes:
- Total number of phases anticipated *
- Anticipated commencement date of phase 1 (including demolition) * month ______ year
- Anticipated completion date of final phase April month 2038 year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases: ______

* Phased project is ongoing. Permit action is renewal of existing project

f. Does the project include new residential uses? ☐ Yes ☑ No
If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase	___	___	___	___
At completion of all phases	___	___	___	___

g. Does the proposed action include new non-residential construction (including expansions)? ☑ Yes ☐ No
If Yes,
i. Total number of structures 1
ii. Dimensions (in feet) of largest proposed structure: ________height; ________width; and _______ length
*Proposed blower is the same size as existing.
iii. Approximate extent of building space to be heated or cooled: 0 square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☑ Yes ☐ No
If Yes,
i. Purpose of the impoundment: ____________
ii. If a water impoundment, the principal source of the water: ☐ Ground water ☐ Surface water streams ☑ Other specify:
Leachate - See iii
iii. If other than water, identify the type of impounded/contained liquids and their source.
Leachate will be collected in landfill cells and stored in existing tanks.
iv. Approximate size of the proposed impoundment. Volume: ____________ million gallons; surface area: ____________ acres
v. Dimensions of the proposed dam or impounding structure: ________ height; _______ length
vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete):
____

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? ☐ Yes ☑ No
(Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite)
If Yes:
i .What is the purpose of the excavation or dredging? ____________
ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?
- Volume (specify tons or cubic yards): ____________
- Over what duration of time? ____________

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.
____
____
iv. Will there be onsite dewatering or processing of excavated materials? ☐ Yes ☐ No
If yes, describe. ____________
____
v. What is the total area to be dredged or excavated? ____________acres
vi. What is the maximum area to be worked at any one time? ____________ acres
vii. What would be the maximum depth of excavation or dredging? ____________ feet
viii. Will the excavation require blasting? ☐ Yes ☐ No
ix. Summarize site reclamation goals and plan: ____________
____
____

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐ Yes ☑ No
If Yes:
i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description): ____________
____

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres:

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes☐No
If Yes, describe:

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes☐No
If Yes:

- acres of aquatic vegetation proposed to be removed:
- expected acreage of aquatic vegetation remaining after project completion:
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access):
- proposed method of plant removal:
- if chemical/herbicide treatment will be used, specify product(s):

v. Describe any proposed reclamation/mitigation following disturbance:

c. Will the proposed action use, or create a new demand for water? ☐Yes☑No
If Yes:
i. Total anticipated water usage/demand per day: ______ gallons/day
ii. Will the proposed action obtain water from an existing public water supply? ☐Yes☐No
If Yes:

- Name of district or service area:
- Does the existing public water supply have capacity to serve the proposal? ☐Yes☐No
- Is the project site in the existing district? ☐Yes☐No
- Is expansion of the district needed? ☐Yes☐No
- Do existing lines serve the project site? ☐Yes☐No

iii. Will line extension within an existing district be necessary to supply the project? ☐Yes☐No
If Yes:

- Describe extensions or capacity expansions proposed to serve this project:
- Source(s) of supply for the district:

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes☐No
If, Yes:

- Applicant/sponsor for new district:
- Date application submitted or anticipated:
- Proposed source(s) of supply for new district:

v. If a public water supply will not be used, describe plans to provide water supply for the project:

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: ______ gallons/minute.

d. Will the proposed action generate liquid wastes? ☑Yes☐No
If Yes:
i. Total anticipated liquid waste generation per day: 0 gallons/day
ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each):
The existing permitted facility will generate leachate, as described in existing permit documents. The permit renewal will not generate any additional leachate above that which is projected to be generated by currently permitted operations.

iii. Will the proposed action use any existing public wastewater treatment facilities? ☑Yes☐No
If Yes:

- Name of wastewater treatment plant to be used: Lewiston (T) Water Polution Control system, Buffalo Sewer Auth via leachate trucking
- Name of district: Town of Lewiston, Buffalo Sewer Authority via trucks for leachate disposal is additional disposal capacity is needed.
- Does the existing wastewater treatment plant have capacity to serve the project? ☑Yes☐No
- Is the project site in the existing district? ☑Yes☐No
- Is expansion of the district needed? ☐Yes☑No

- Do existing sewer lines serve the project site? ☐Yes ☑No
- Will a line extension within an existing district be necessary to serve the project? ☐Yes ☑No

  If Yes:
  - Describe extensions or capacity expansions proposed to serve this project: Lewiston district already serves the site by treating trucked leachate.

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐Yes ☑No

If Yes:
- Applicant/sponsor for new district: ______
- Date application submitted or anticipated: ______
- What is the receiving water for the wastewater discharge? ______

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

N/A

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: ______

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☐Yes ☑No

If Yes:

*No new disturbed areas are proposed. Landfill construction will proceed under previously approved permit plans.

i. How much impervious surface will the project create in relation to total size of project parcel?

0 Square feet or ______ acres (impervious surface)

0 Square feet or ______ acres (parcel size)

ii. Describe types of new point sources. ______

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

- If to surface waters, identify receiving water bodies or wetlands: ______
- Will stormwater runoff flow to adjacent properties? ☐Yes ☐No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☐Yes ☐No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☑Yes ☐No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

General pickup trucks to and from utility flare

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

None

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

Operation of new utility flare (that combusts collected landfill gas) at central blower station, new leachate tank

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☑Yes ☐No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☑Yes ☐No

ii. In addition to emissions as calculated in the application, the project will generate:
- 136,230 Tons/year (short tons) of Carbon Dioxide (CO_2)
- 0.5 Tons/year (short tons) of Nitrous Oxide (N_2O)
- 0 Tons/year (short tons) of Perfluorocarbons (PFCs)
- 0 Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- 0 Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- 0.2 Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☑ Yes ☐ No

If Yes:

i. Estimate methane generation in tons/year (metric): 8.6 metric tons

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): Flaring - Destruction of methane in a new utility flare.

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☑ Yes ☐ No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

Utility flare combusts collected landfill gas from the Modern Landfill. Emissions from the utility flare include criteria pollutants, greenhouse gases, and hazardous air pollutants.

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☐ Yes ☑ No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☐ Morning ☐ Evening ☐ Weekend

☐ Randomly between hours of __________ to ________.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): ____________

iii. Parking spaces: Existing ____________ Proposed ___________ Net increase/decrease ____________

iv. Does the proposed action include any shared use parking? ☐ Yes ☐ No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe:

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☐ Yes ☐ No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☐ Yes ☐ No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐ Yes ☐ No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☑ Yes ☐ No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action:

New electrical service will be required for new landfill gas blowers, however, overall site electricity demand is not anticipated to change significantly.

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other):

Grid / local utility (National Grid)

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐ Yes ☑ No

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: 7:00 AM - Dusk
- Saturday: 7:00 AM - 5:30 PM
- Sunday: 7:00 AM - 12:00 PM
- Holidays: Consistent with hours above

ii. During Operations:

- Monday - Friday: 7:00 AM - 5:30 PM
- Saturday: 7:00 AM - 3:00 PM
- Sunday: Closed
- Holidays: Closed

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☐ Yes ☑ No

If yes:

i. Provide details including sources, time of day and duration:

____

____

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☐ No

Describe: ____

____

n. Will the proposed action have outdoor lighting? ☐ Yes ☑ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

____

____

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☐ No

Describe: ____

____

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☐ Yes ☑ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures: ____

____

____

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☐ Yes ☑ No

If Yes:

i. Product(s) to be stored ____

ii. Volume(s) ______ per unit time ____________ (e.g., month, year)

iii. Generally, describe the proposed storage facilities:____

____

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☐ Yes ☑ No

If Yes:

i. Describe proposed treatment(s):

____

____

____

____

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☐ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☑ Yes ☐ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

*Landfill will continue to dispose of MSW under its currently permitted tonnages.

- Construction: ______________________ tons per ________________ (unit of time)
- Operation : 815,000 tons per year (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: ____

____

- Operation: ____

____

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: Solid wastes generated by construction of proposed enhancements will be managed by disposal within solid waste cells permitted on-site. To the extent practical, wastes will be recycled or reused.
- Operation: ____

____

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☑ No
If Yes:
i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): ______
ii. Anticipated rate of disposal/processing:
- ________ Tons/month, if transfer or other non-combustion/thermal treatment, or
- ________ Tons/hour, if combustion or thermal treatment

*Project includes renewal of existing permit.

iii. If landfill, anticipated site life: ______ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☑ No
If Yes:
i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: ______
ii. Generally describe processes or activities involving hazardous wastes or constituents: ______
iii. Specify amount to be handled or generated _____ tons/month
iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: ______
v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No
If Yes: provide name and location of facility: ______
If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility: ______

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.
i. Check all uses that occur on, adjoining and near the project site.
☐ Urban ☑ Industrial ☑ Commercial ☑ Residential (suburban) ☑ Rural (non-farm)
☐ Forest ☑ Agriculture ☐ Aquatic ☐ Other (specify): ______
ii. If mix of uses, generally describe:
______

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	~ 30	~36	+6
• Forested	0	0	0
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	~149	~248	+99
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	0
• Surface water features (lakes, ponds, streams, rivers, etc.)	~10	~6	-4
• Wetlands (freshwater or tidal)	0 (functional)	0	0
• Non-vegetated (bare rock, earth or fill)	~101 acres exposed fill	0 (will be meadow)	-101
• Other Describe: ______			

c. Is the project site presently used by members of the community for public recreation? ☐ Yes ☑ No

i. If Yes: explain: ______

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☐ Yes ☑ No

If Yes,

i. Identify Facilities:

______

e. Does the project site contain an existing dam? ☐ Yes ☑ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: ______ feet
- Dam length: ______ feet
- Surface area: ______ acres
- Volume impounded: ______ gallons OR acre-feet

ii. Dam's existing hazard classification: ______

iii. Provide date and summarize results of last inspection:

______

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☑ Yes ☐ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☑ No

- If yes, cite sources/documentation: ______

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

New Utility flare to be installed at central blower station adjacent to the landfill. Project includes renewal of a solid waste facility permit with no expansion of previous permitted operational areas.

iii. Describe any development constraints due to the prior solid waste activities: ______

None Site is also the former Lewiston Town Dump, which has no related administration restrictions or actions.

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☑ Yes ☐ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

CWM Chemical Services Landfill is a hazardous waste mangement facility located to the north of the Modern Landfill facility. The adjoining facility accepted hazardous waste from 1971 to 2015.

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☑ Yes ☐ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☑ Yes ☐ No

☐ Yes – Spills Incidents database   Provide DEC ID number(s): ______

☑ Yes – Environmental Site Remediation database   Provide DEC ID number(s): 932045, 932023

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: ______

NA

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☑ Yes ☐ No

If yes, provide DEC ID number(s): 932061B, 932061A, 932045, 932023

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

Site lies adjacent to the Niagara Falls Storage Site, a 191 acre Class A site owned bt the US Government and being monitored and remediated for radioactive wastes. Site is adjacent to CWM Chemical site, a 630 acre Class A site being remediated for heavy metals, sludges, and other compounds. Site is adjacent to US Air Force Plant 68 site, a roughly 1-acres Class 02 site where boron, helium, and hydrocarbon contamination has been detected.

v. Is the project site subject to an institutional control limiting property uses? ☐ Yes ☑ No

- If yes, DEC site ID number: ____
- Describe the type of institutional control (e.g., deed restriction or easement): ____
- Describe any use limitations: ____
- Describe any engineering controls: ____
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☐ No
- Explain: ____

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? 20 - 25 feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☑ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? ____%

c. Predominant soil type(s) present on project site:

Madalin silt loam, 0-3% slopes	52.2 %
Madalin silt loam, loamy subsoil	23.0 %
Churchville silt loam, 0-2% slopes	8 .9 %

d. What is the average depth to the water table on the project site? Average: ____ feet

e. Drainage status of project site soils:
- ☐ Well Drained: ____% of site
- ☑ Moderately Well Drained: 4.2 % of site
- ☑ Poorly Drained 94.8 % of site

f. Approximate proportion of proposed action site with slopes:
- ☑ 0-10%: 100 % of site
- ☐ 10-15%: ____% of site
- ☐ 15% or greater: ____% of site

g. Are there any unique geologic features on the project site? ☐ Yes ☑ No
If Yes, describe: ____

h. Surface water features.

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☑ Yes ☐ No

ii. Do any wetlands or other waterbodies adjoin the project site? ☑ Yes ☐ No

*Action includes a Part 360 Permit Renewal - operations would continue in the manner approved with no additional surface water impacts.

If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☑ Yes ☐ No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:
- Streams: Name 848-30, 848-31, 848-40, 848-42, 848-45 Classification C
- Lakes or Ponds: Name ____ Classification ____
- Wetlands: Name Federal Waters, Federal Waters, Federal Waters,... Approximate Size 20 acres
- Wetland No. (if regulated by DEC) ____

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☐ Yes ☑ No
If yes, name of impaired water body/bodies and basis for listing as impaired: ____

i. Is the project site in a designated Floodway? ☐ Yes ☑ No

j. Is the project site in the 100-year Floodplain? ☑ Yes ☐ No

k. Is the project site in the 500-year Floodplain? ☐ Yes ☑ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☐ Yes ☑ No
If Yes:
i. Name of aquifer: ____

m. Identify the predominant wildlife species that occupy or use the project site:

Deer	Birds (Gulls, Falcons, etc.)	Racoons
Skunk	Mice and Rats	Opposums
Rabbit	Insects	Wildlife typical near human activity

n. Does the project site contain a designated significant natural community? ☐ Yes ☑ No

If Yes:

i. Describe the habitat/community (composition, function, and basis for designation): ______

ii. Source(s) of description or evaluation: ______

iii. Extent of community/habitat:

- Currently: ______ acres
- Following completion of project as proposed: ______ acres
- Gain or loss (indicate + or -): ______ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☐ Yes ☑ No

If Yes:

i. Species and listing (endangered or threatened): ______

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☑ No

If Yes:

i. Species and listing: ______

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐ Yes ☑ No

If yes, give a brief description of how the proposed action may affect that use: ______

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☑ Yes ☐ No

*See Supplemental Information Sheet.

If Yes, provide county plus district name/number: NIAGc07

b. Are agricultural lands consisting of highly productive soils present? ☐ Yes ☑ No

i. If Yes: acreage(s) on project site? ______

ii. Source(s) of soil rating(s): ______

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☑ No

If Yes:

i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature

ii. Provide brief description of landmark, including values behind designation and approximate size/extent: ______

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐ Yes ☑ No

If Yes:

i. CEA name: ______

ii. Basis for designation: ______

iii. Designating agency and date: ______

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☑ Yes ☐ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: Eligible property:Niagara Falls Storage Site (Building 401) (DEMOLIS

iii. Brief description of attributes on which listing is based:

---

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☐ Yes ☑ No

---

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☑ No

If Yes:

i. Describe possible resource(s):

ii. Basis for identification:

---

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☑ Yes ☐ No

If Yes:

i. Identify resource: Great Lakes Seaway Trail (scenic Highway)

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): Scenic byway. Permit Renewal will not cause any visual impacts to this resource, as enhancements will not be visible from the roadway.

iii. Distance between project and resource: ~3.5 miles.

---

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☑ No

If Yes:

i. Identify the name of the river and its designation:

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

---

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

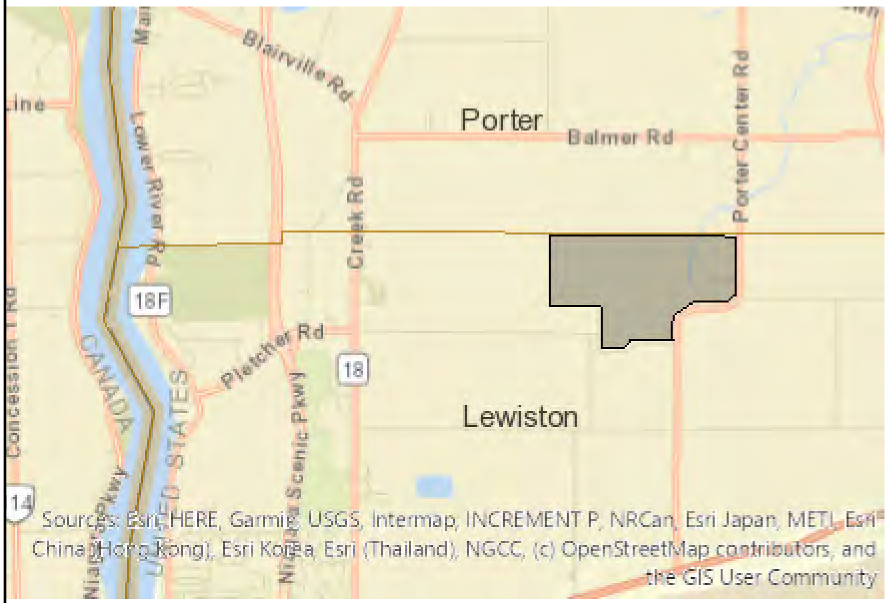
Applicant/Sponsor Name Josh Ennis Date 06/30/2025

Signature [signature] Title Sr. Env. Manager

PRINT FORM

EAF Mapper Summary Report

Wednesday, May 28, 2025 12:16 PM



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources to confirm data provided by the Mapper or to obtain data not provided by the Mapper.

B.i.i [Coastal or Waterfront Area]	No
B.i.ii [Local Waterfront Revitalization Area]	No
C.2.b. [Special Planning District]	Yes - Digital mapping data are not available for all Special Planning Districts. Refer to EAF Workbook.
C.2.b. [Special Planning District - Name]	Remediaton Sites:932045, Remediaton Sites:932023, NYS Heritage Areas:West Erie Canal Corridor
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Yes - Digital mapping data for Spills Incidents are not available for this location. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Yes
E.1.h.i [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Yes
E.1.h.i [DEC Spills or Remediation Site - DEC ID Number]	932045, 932023
E.1.h.iii [Within 2,000' of DEC Remediation Site]	Yes
E.1.h.iii [Within 2,000' of DEC Remediation Site - DEC ID]	932061B, 932061A, 932045, 932023
E.2.g [Unique Geologic Features]	No
E.2.h.i [Surface Water Features]	Yes - Digital mapping information on local, New York State, and federal wetlands and waterbodies is known to be incomplete. Refer to the EAF Workbook.
E.2.h.ii [Surface Water Features]	Yes - Digital mapping information on local, New York State, and federal wetlands and waterbodies is known to be incomplete. Refer to the EAF Workbook.
E.2.h.iii [Surface Water Features]	Yes - Digital mapping information on local, New York State, and federal wetlands and waterbodies is known to be incomplete. Refer to the EAF Workbook.

E.2.h.iv [Surface Water Features - Stream Name]	848-30, 848-31, 848-40, 848-42, 848-45
E.2.h.iv [Surface Water Features - Stream Classification]	C
E.2.h.iv [Surface Water Features - Wetlands Name]	Federal Waters
E.2.h.v [Impaired Water Bodies]	No
E.2.i. [Floodway]	No
E.2.j. [100 Year Floodplain]	Yes
E.2.k. [500 Year Floodplain]	No
E.2.l. [Aquifers]	No
E.2.n. [Natural Communities]	No
E.2.o. [Endangered or Threatened Species]	No
E.2.p. [Rare Plants or Animals]	No
E.3.a. [Agricultural District]	Yes
E.3.a. [Agricultural District]	NIAGc07
E.3.c. [National Natural Landmark]	No
E.3.d [Critical Environmental Area]	No
E.3.e. [National or State Register of Historic Places or State Eligible Sites]	Yes - Digital mapping data for archaeological site boundaries are not available. Refer to EAF Workbook.
E.3.e.ii [National or State Register of Historic Places or State Eligible Sites - Name]	Eligible property:Niagara Falls Storage Site (Building 401) (DEMOLIS
E.3.f. [Archeological Sites]	No
E.3.i. [Designated River Corridor]	No

EAF Supplemental Information Sheet for the Modern Landfill Permit Renewal Project

D.2.s – Additional construction of the previously permitted facility will continue in accordance with previously approved plans.

E.1.h.i – Spills at the site are managed/controlled/cleaned-up as part of the Facility O&M Program. The site is the location of some minor spills in the DEC Spill Incidents Database, including those with ID Numbers 704026, 890609, 890811, 909009 1203908, 1301855, 1309024, 1400741, 1401271, 1401375, 1403586, 1406992, 1500372, 1501522, 1512404, 1604462, 1608408, 1710364, 1802829, 1805521, 1911156, 2009631, 2101609, and 2203006.

E.3.a – A small portion of the already permitted and constructed site is located within NYS Agricultural District NIAGc07 as stated. Since the associated action is a Permit Renewal with no planned site expansion, no expansion of the site will occur and no impacts to agricultural lands are expected. The only offsite work will involve the enhancement with a new sewer line, which will follow existing roadways and will not impact any agricultural lands or farm operations.

Memorandum

June 30, 2025

To	Modern Landfill Inc.		
From	Steve Wilsey, Bryan Szalda/cs/2	**Tel**	716-297-6150
Subject	**Modern Landfill – CLCPA GHG Assessment**	**Project no.**	12593296

1. Introduction

Modern Landfill Inc. currently operates the Modern Municipal Solid Waste (MSW) Landfill located in Model City, New York (Modern Landfill) under several permits, including a Solid Waste Facility Permit under 6 NYCRR Parts 360 and 363 (the Solid Waste Permit) and a Title V air permit under Article 19 of the Environmental Conservation Law (the Title V Permit). This submittal serves to address NYSDEC's request (in a letter dated April 1, 2022) that Modern Landfill Inc. complete an assessment in accordance with the New York State Climate Leadership and Community Protection Act (CLCPA) that was adopted in 2019 and took effect on January 1, 2020. NYSDEC requested the assessment as part of the renewal process for the Title V Permit.

The New York State CLCPA sets goals to reduce greenhouse gas (GHG) emissions across the state and to increase the amount of energy from renewable resources. This CLCPA Assessment draws on related policies NYSDEC has issued including DAR-21 guidance and Commissioner's Policy 49 (CP-49) to guide assessments of a proposed project's GHG emission impacts relative to the goals of CLCPA.

This document provides an estimate of the GHG emissions from the entire Modern Landfill 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 due to the Facility being located in or near Disadvantaged Communities[1]. It should be noted that while greenhouse gas emissions are generated from the landfilling of MSW, the Modern Landfill operation serves to manage waste generated in the local region, mainly in Erie County, Niagara County and nearby surrounding areas. This waste is generated regardless of whether Modern Landfill exists or not. Modern Landfill provides capacity for the local waste, and if Modern Landfill did not exist, even more GHGs would be generated in order to transport the waste farther away and manage it at other facilities (if those facilities existed and had capacity, which they do not, as demonstrated in Table 5). Should waste composition change, or if other waste management options that produce less GHG emissions become available in the future, GHG emissions from the site will be reduced accordingly (if the organics diversion goals of *Beyond Waste* and the 2023 New York State Solid Waste Management Plan are achieved, GHG emissions from Modern will be significantly less). In the meantime, Modern Landfill provides a means of managing the waste generated in the community and surrounding region that not only meets or surpasses all applicable air regulations, but also is the least impactful solid waste management available option for GHG emissions.

In 2010, NYSDEC adopted the latest version of the State Solid Waste Management Plan entitled "Sustainable Materials Management Strategy for New York State - Beyond Waste" (Beyond Waste). This Plan sets forth

[1] https://climate.ny.gov/Our Climate Act/Disadvantaged Communities Criteria

sustainable and comprehensive strategies through 2020 with resulting goals and targets at the State and local level through 2030. While “Beyond Waste” does not identify landfilling as the preferred waste management option, it does identify the need for landfills and states that New York landfills and municipal waste combustors “comply with regulations that are among the most protective in the nation.” Consistent with “Beyond Waste,” NYSDEC has either approved or is in the process of reviewing local Solid Waste Management plans for several communities in New York State. Modern Landfill is critical to the long-term management of waste in these communities and is identified in their respective Solid Waste Management Plans. Beyond Waste also highlights the benefits of utilizing landfill gas for off-site electricity generation, which is another benefit of this Facility. Landfill gas collected from the Modern Landfill will continue the generation of electricity at the adjacent off-site Landfill Gas-to-Energy (LFGTE) facility. The Facility also utilizes landfill gas as fuel for heating furnaces during the fall and winter months, providing an additional renewable benefit. Modern Landfill will continue to assess potential third-party partners that will beneficially utilize LFG in accordance with Beyond Waste. These uses include but are not limited to LFGTE facilities and Renewable Natural Gas (RNG) facilities.

The emissions calculated in this Memorandum (refer to Table 1 for a summary of total GHG emissions for the Modern Landfill) are associated with the amount of waste managed at the Modern Landfill which will be accepted from the nearby communities. The estimated emissions reflect the hauling of the waste and materials, construction and capping of landfill space, typical landfill operational activities, and the management of gas generated from the biological decomposition of the waste. Modern Landfill meets and surpasses the most stringent State and Federal regulations associated with the landfilling of municipal solid waste. There is currently no viable option or available capacity in the region for the waste managed by the Modern Landfill.

In the absence of Modern Landfill, the emissions will be generated at another disposal facility that may not be as effective at managing the waste and GHGs, and additional GHGs will be generated as the result of transporting the waste significantly longer distances. As discussed further in this Memorandum, there are other solid waste management facilities in the region, but they are at or near their annual waste acceptance capacity. If not for Modern Landfill, the waste will likely need to be shipped out of state and to facilities in OH and PA, unnecessarily increasing GHG emissions generated to manage the same amount of waste. These facilities may not be as protective of the environment as facilities meeting NYS’s stringent regulatory framework for landfills. The additional GHG emissions generated from transporting that in-state waste out of the state are still relevant to the CLCPA analysis and would reduce New York’s ability to meet its state-wide GHG emission goals. An action that would potentially result in the exporting of waste out of New York State would result in “leakage” and would be inconsistent with the CLCPA, which explicitly requires NYSDEC to promulgate implementing regulations that minimize “leakage.”

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 Modern Landfill. Attachment A and Attachment B provide the full supporting calculations for the estimated total facility emissions in 2030 and 2050, respectively. Attachment C and Attachment D provide the full supporting calculations for the estimated total facility emissions in 2023 (actuals) and 2035 (peak year), respectively. It should be noted that the estimated emissions presented in this document were calculated using the 20-year global warming potential (GWP) values stated in 6 NYCRR 496.5 in accordance with DAR-21.

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

- Potential-to-Emit (maximum) under the April 2020 Updated Title V Renewal Application (“PTE”).
- Estimated actual expected emissions based on the Landfill’s operational data and plans.

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 Modern Landfill

2.1.1 Landfill Gas Generation

Based on information provided by Modern Landfill, Inc., GHD calculated landfill gas (LFG) generation estimates for Modern Landfill. These estimates are based on historical actual and projected waste acceptance values utilizing the United States Environmental Protection Agency (USEPA) LandGEM Model Version 3.03.

The calculations to prepare these emission estimates take into account the amount of waste that would be managed at Modern Landfill, the type of waste that would be managed (putrescible or non-putrescible[2]), 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 putrescible waste is relevant to the assessment of the Facility's impacts on GHG emissions under the CLCPA.[3] Below are other key points about the information underlying the updated Title V renewal application, the calculations in this Memorandum, and the relevance of all this data to the CLCPA GHG assessment:

- In the modelled calculations, the April 2020 Updated Title V Renewal Application assumed 815,000 TPY of waste to be managed at the Facility would be putrescible. This value was used to apply the most conservative potential emission estimate, in accordance with the applicable regulatory requirements for Title V permitting. However, that assumption is substantially higher than what is actually occurring since a large fraction of the waste that the Facility accepts is non-putrescible waste containing inerts such as contaminated soils, ash, asbestos, brick, clean fill, concrete, etc.[4]
- Regarding LFG collection factors for these emission calculations:
  - An 85 percent collection efficiency was used to determine the amount of gas collected and the resulting fugitive emissions under the April 2020 Updated Title V Renewal Application. Actual collection efficiency is expected to be higher than 85 percent (see Section 2.2 for discussion).
  - Based on these conservative PTE assumptions associated with the Title V Permit standards, the peak rate of LFG generation for the Facility will be approximately 8,364 cubic feet per minute (cfm) of landfill gas generated (approximately 7,109 cfm of collected LFG assuming an 85 percent collection efficiency).

2.1.2 Landfill Gas Collection and Combustion

The collection system components for future landfill areas will consist of vertical gas wells (with an approximate spacing of 200 feet on center) and recently utilized horizontal collectors (with a horizontal spacing of approximately 100 feet and a vertical spacing of 20 feet in accordance with 6 NYCRR Part 363 requirements). Collected LFG will be routed through a gas header and directed to the off-site LFGTE Facility which consists of seven Caterpillar 3516 engines and three Caterpillar 3520 engines. The off-site LFGTE Facility contains a gas treatment system, which removes particulate > 10 microns, removes moisture with an air-to-air cooler, and compresses the gas. Any remaining excess LFG is combusted in the onsite flares. For the purposes of this evaluation, emission estimates were based on the assumption that all of the collected LFG is combusted in on-site landfill gas flares.

GHG emissions from the landfill gas flares were calculated by assuming that the LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. Information referenced from 40 CFR 98 Subpart HH was used in calculating GHG emissions from the landfill gas flares. Table A.2 of Attachment A and Table B.2 of Attachment B include the calculated GHG emissions for the landfill gas flares for the years 2030 and 2050, respectively.

Emissions of speciated HAP compounds in the fugitive LFG were calculated using historical LFG sampling results (sample collected on November 10, 2021). A destruction efficiency of 98 percent was assumed in the

[2] A portion of the material disposed includes C&D waste, impacted soils and other non-degradable inerts.
[3] Non-putrescible waste does not break down or generate GHG emissions.
[4] The Facility accepts a significant amount of industrial wastes and residuals from processing and recycling facilities.

calculations (except for mercury and HCl). Table A.3 of Attachment A and Table B.3 of Attachment B include the calculated fugitive HAP emissions for the landfill gas flares for the years 2030 and 2050, respectively.

The gas collection and control system for the Modern Landfill provides a significant level of reduction for greenhouse gas and HAP emissions. The LFG collection and control system ensures that approximately 1.5 million tons CO2eq of total GHGs and 1.2 tons of HAP will be avoided at the Modern Landfill in the peak year of emissions.

2.1.3 Fugitive Landfill Gas

Even with a properly maintained and operated gas collection and control system with soil cover, some small fraction of landfill gas will be released as fugitive emissions. Fugitive GHG emissions were calculated by assuming that LFG is approximately 50 percent methane and 50 percent carbon dioxide by volume. It should be noted that a portion of methane is oxidized to carbon dioxide as it passes through the soil cover (a 25 percent cover oxidation factor was used in accordance with the methodology provided in 40 CFR 98, Subpart HH). Table A.4 of Attachment A and Table B.4 of Attachment B include the calculated fugitive GHG emissions for the years 2030 and 2050, respectively.

Emissions of speciated HAP compounds in the fugitive LFG were calculated using historical LFG sampling data. Table A.5 of Attachment A and Table B.5 of Attachment B include the calculated fugitive HAP emissions for the years 2030 and 2050, respectively.

2.1.4 Leachate Storage and Recirculation

There is one 1.1 million gallon above ground leachate storage tank at the Facility. Emissions from the storage and recirculation of leachate were calculated using a mass balance approach. Based on a maximum annual leachate generation rate of 40 million gallons per year and laboratory analytical results of a leachate sample taken in May 1998, HAP emissions were calculated assuming all of the leachate evaporates at the Facility (very conservative estimate). Table A.6 of Attachment A and Table B.6 of Attachment B include the calculated emissions from the storage and recirculation of leachate at the Facility for the years 2030 and 2050, respectively.

2.1.5 Diesel Generators

The facility operates the following diesel generators at the Facility:

- Kolberg – Pioneer Impact Crusher FT4250
- TANA Shredder Cummins QSX15 C Engine Unit
- Komptech Shredder CAT C13 ACERT Engine

Emission factors for the diesel generators were referenced from USEPA AP 42, Section 3.3 (10/96) and also based on information provided by the manufacturer. Table A.7 of Attachment A and Table B.7 of Attachment B include the calculated diesel generator emissions at the Facility for the years 2030 and 2050, respectively.

2.1.6 Exempt Sources

The following embedded Table 1 summarizes the emission sources that are considered exempt and trivial from Title V Permitting:

Table 1 Summary of Exempt and Trivial Sources

Emission Source	Citation	Calculation Table
Natural Gas Furnaces	6 NYCRR 201 3.2(c)(1)(i)	Att. A, Table A.8 & Att. B, Table B.8
Landfill Gas Furnaces	6 NYCRR 201 3.2(c)(1)(i)	Att. A, Table A.9 & Att. B, Table B.9
Propane Furnaces	6 NYCRR 201 3.2(c)(1)(i)	Att. A, Table A.10 & Att. B, Table B.10
Portable Gasoline Generators	6 NYCRR 201 3.2(c)(3)(iii)	Att. A, Table A.11 & Att. B, Table B.11
Exempt Diesel Generators	6 NYCRR 201 3.2(c)(3)(ii)	Att. A, Table A.12 & Att. B, Table B.12
Composting Operations	6 NYCRR 201 3.3(c)(41)	Att. A, Table A.13 & Att. B, Table B.13

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 2A and 2B.

2.2 Estimated Actual Emissions

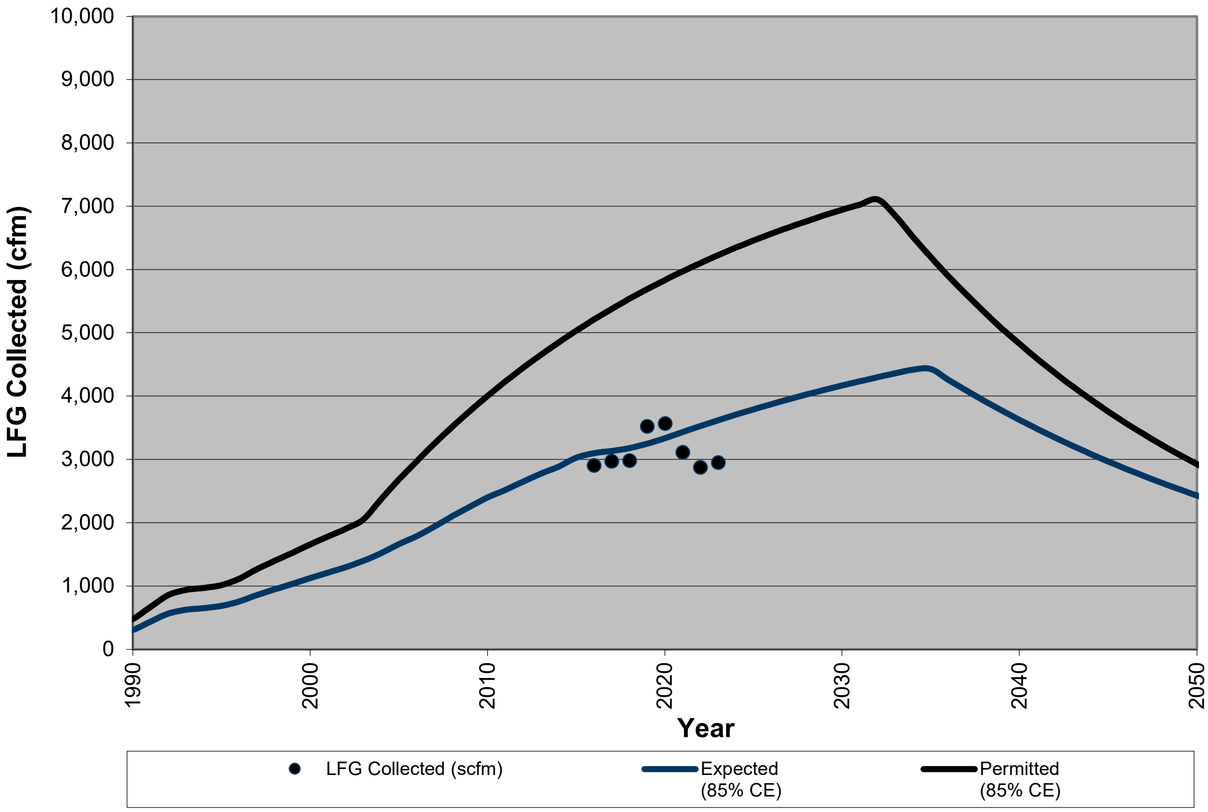
Below is a comparison of the assumptions used for calculating expected emissions for the years 2023 (actuals), 2030 (projected), 2035 (peak year) and 2050 (projected):

Parameter	***Actual 2023 Emissions (20-year GWP)***	***Expected 2030 Emissions (20-year GWP)***	***Peak 2035 Emissions (20-year GWP)***	***Expected 2050 Emissions* (20-year GWP)***
L_o (m^3/Mg)/k (yr^{-1})	100/0.04	100/0.04	100/0.04	100/0.04
Putrescible Fraction (percent)	69	69	69	69
Putrescible Waste Acceptance Rate (TPY)	Record Values	563,922	563,922	563,922
LFG Generation (scfm)	3,510	4,905	5,212	2,860
Collection Efficiency (percent)	76	84	95	95
LFG Collection (scfm)	2,668	4,120	4,951	2,717
Total Anthropogenic GHG Emissions (TPY CO_2eq)[5] [6]	345,067	347,029	174,262	98,251

The graph below shows the estimated LFG collected for both sets of parameters compared with historical actual collection rates:

[5] Global warming potential values over 100 years: CO_2 = 1, CH_4 = 25, N_2O = 298
Global warming potential values over 20 years = CO_2 = 1, CH_4 = 84, N_2O = 264
(Global warming potential values over 20 years are significantly higher than over 100 years)
[6] The totals presented here do not account for the emission reduction opportunities discussed in Section 5.3; actual totals may be significantly lower upon implementation of these opportunities. The totals also do not account for avoided electricity emissions due to the off-site LFGTE Facility or carbon sequestration. In addition, emissions would increase if waste were instead transported to a landfill facility located further away than Modern Landfill (see section 5.1 for further discussion of alternative facilities).

Figure 1
Modern Landfill
Expected Landfill Gas Collected



The curves show that the assumptions used for the expected emissions correlate much closer to historical data for the site's actual emissions and demonstrate that the PTE values are higher than what is actually expected to result from Modern Landfill.

2.2.1 Collection Efficiency

A collection efficiency of 85 percent is assumed for the purposes of Title V permitting but the actual collection efficiency is expected to be greater than 85 percent for the following reasons:

- The GCCS design will be improved from the previous system due to the reduced spacing of horizontal collectors (per 6 NYCRR Part 360 Revisions), resulting in the installation of more horizontal collectors across future landfill areas.
- Modern Landfill will be conducting monitoring according to the National Emission Standards for Hazardous Air Pollutants (NESHAP) that includes monthly wellfield monitoring for vacuum and temperature and quarterly surface emissions monitoring. Based on an evaluation of the monitoring done under the NSPS program and the information provided above, we can conclude that the collection efficiency is likely to be greater than 85 percent, but for the purposes of Title V permitting fugitive GHGs and HAPs from the Landfill, a value of 85 percent is assumed for the purposes of being conservative[7].

[7] This collection efficiency is based on an evaluation of a wide variety of data including gas collection system design, cover integrity and operational information as well as NESHAP, NYSDEC, and site-specific-requirements. This may be different than efficiencies calculated for other purposes, such as the EPA's Greenhouse Gas Reporting Rule which relies primarily on cover type.

2.2.2 Putrescible Waste Acceptance Rate

As discussed previously, Modern Landfill can accept up to 815,000 TPY on an annual basis (permitted waste). However, that assumption is substantially higher than what is actually occurring since a large fraction of the waste that the Facility accepts is non-putrescible waste containing inerts such as contaminated soils, ash, asbestos, brick, clean fill, concrete, etc. Therefore, a putrescible waste acceptance rate of 563,922 TPY is more appropriate as compared to what was assumed for April 2020 Updated Title V Renewal Application.

Table 2 2018 - 2022 Putrescible Acceptance Rates

Year	Putrescible Acceptance Rate (TPY)
2018	529,400.95
2019	570,072.38
2020	577,731.58
2021	568,979.60
2022	562,511.06

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 3 and 4. The assumptions used in the calculations and provided in the footnotes for attached Tables 3 and 4 and are also discussed in the following sections.

3.1 Off-Construction Season (Typically November 1 – April 30)

The off-construction season consists of typical operation activities of the site that are conducted year-round. The off-construction season is considered to last 26 weeks generally starting on November 1 and concluding on April 30. The typical operation activities of the site that generate GHG emissions from direct non-stationary sources include waste transportation and unloading, soil transportation, daily cover, operation and maintenance, and leachate hauling. Also included are non-stationary GHG and HAP emissions from the transportation of employees.

3.1.1 Waste Transportation and Unloading

Modern Landfill's permitted capacity is 815,000 TPY. Modern Landfill is not seeking a change to this existing annual permitted waste tonnage.

Most of this waste capacity serves the surrounding communities within Erie County and Niagara 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 10-wheel tractors with 120 cy transfer trailers, and the equipment used at the landfill to unload the waste at the working face. Calculations for the associated GHG and HAP emissions are provided in Table 3.

Transportation of waste from off-site to the active Landfill area assumes the average distance travelled by trucks is approximately 26.1 miles and that the average truck spends 45 minutes on-site from when they enter, weighs in at the scale house, travels to the active area for unloading, unloading, and travels back to the entrance as they leave. The distance from the entrance to the active area (at the furthest point) is around 1.1 miles. During waste unloading at the active area, two dozers spread and move the waste over the active area while two compactors compact the waste.

3.1.2 Soil Transportation

It is estimated that approximately 100,000 tons of soil (or 6,667 truckloads) will be used for Modern Landfill cell construction, final cover construction, and operations on an annual basis. The soil materials will be obtained from off-site NYSDEC permitted gravel/stone/soil sources. During off-construction season, less soil is imported as there is less demand, and is assumed to be 25-percent of yearly imported soil. Off-site soil sources are hauled to the site using tri-axle dump trucks. The average expected distance of travel for these soil trucks is 25 miles. The GHG and HAP emissions from the traveling to and from the landfill during the off-construction season are provided in Table 3.

3.1.3 Daily Cover

Daily cover using soil and alternative daily covers (ADCs) is completed during the last hour of each business day to control odor, prevent windblown litter, and scavenging of waste from wildlife. Equipment used for daily cover operations include an excavator, two haul trucks and one dozer. Calculations are provided in Table 3.

3.1.4 Operation and Maintenance

Typical operation and maintenance activities that result in GHG and HAP emissions (such as mowing, pipe installation and road maintenance) include use of a water truck, sweeper, and five light-duty vehicles. The water truck is essential to watering down access roads to control particulate emissions, sweeper trucks sweep down and maintain clear roads on the Modern Landfill, and light-duty vehicles are used to transport employees and equipment around the site for routine maintenance and operations. Calculations are provided in Table 3.

3.1.5 Leachate Transportation

Modern Landfill currently collects, stores, transports leachate to off-site wastewater treatment facility for treatment and disposal. The GHG and HAP emissions associated with the transportation of leachate to these WWTPs can be accounted for by distance travelled by 10-wheel tractors with 5,000-gallon transfer tankers. Calculations for the associated GHG and HAP emissions are provided in Table 3.

Transportation of leachate from the Modern Facility to the off-site wastewater treatment facility assumes a total of 23 million gallons of leachate is hauled per year and the average distance travelled by leachate tanker trucks is approximately 17.3 (average of distance to Lewiston and Buffalo Sewer Authority).

3.1.6 Emissions from Transportation of Employees

Emissions attributed to employee commutes to and from Modern Landfill have been considered and provided in Table 3. During off-construction season, there are typically 12 employees traveling to and from the site at an average travel distance of 10 miles.

3.2 Construction Season (Typically May 1 – October 31)

During construction season, typical operational activities of the Modern Landfill continue as additional activities such as cell construction and final cover construction. Additionally, construction season requires more contracted personnel on site for construction activities and longer shift hours to utilize longer days and ensure completion of construction projects. The construction season is considered to last 26 weeks starting on May 1 and concluding on October 31.

This section does not repeat discussion of any activities described in Section 3.1, but additional discussion is provided for the following activities that only occur during construction season.

3.2.1 Cell Construction

As current cells are filled to design capacity, cell construction in future landfill areas would begin during construction season. The majority of GHG and HAP emissions from cell construction is due to use of diesel-powered equipment to remove earth and haul gravel/stone/soil to lay the base of the cell. The equipment needed for this process includes three excavators, three haul trucks, two dozers, and a roller. Calculations for GHG and HAP emissions are provided in Table 4.

3.2.2 Final Cover Construction

As future landfill cells reach final approved design grades, final cover construction begins for these sections to minimize fugitive emissions of LFG and to increase landfill gas collection efficiency. The majority of GHG and HAP emissions from cover construction is due to use of diesel-powered equipment to haul gravel/stone/soil to lay soil sections of the cover system. The equipment needed for this process includes one excavator, two haul trucks, two dozers, and a roller. Calculations for GHG and HAP emission are provided in Table 4.

4. Insignificant Emissions

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

- Equipment used for maintenance/cleaning of the leachate collection system (e.g., jetting)
- Equipment used for installing components of the LFG collection system (e.g., drill rigs for installation of gas well collectors)
- Emissions from the production, delivery and installation of geomembranes/geotextiles and related products

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 Erie County, Niagara County and the surrounding area. Therefore, the alternative waste disposal options if Modern Landfill were not operating would need to consider the waste transportation and disposal at more distant locations. There are limited local alternatives (within 150 miles) for the waste streams that Modern Landfill handles on an annual basis. Ten alternatives considered were Covanta Niagara, Chaffee Landfill, Mill Seat Landfill, Chautauqua County Landfill, Hyland Landfill, High Acres Landfill, Ontario County Landfill, Bath Sanitary Landfill, Seneca Meadows Landfill and Chemung County Landfill. Based on available capacity at these facilities, none could accept Modern Landfill's current waste acceptance rate either individually or combined (see Table 5 attached to this Memorandum for additional details). Moreover, adequate facilities besides landfills (e.g., anaerobic or aerobic digestion, large scale composting, source separating organic) do not exist in this area to handle this waste volume. Currently, inadequate infrastructure exists to provide large-scale source separation of organics or other substantive modifications to the waste composition the landfill receives. Nevertheless, Modern routinely evaluates new and developing technologies for best managing waste and utilizing the landfill gas it generates. Modern will continue to do so throughout the life of the facility.

Without a viable local alternative, waste disposal options farther away would become necessary for some or all the waste that Modern Landfill would receive. These disposal options would lead to increased GHG and HAP emissions from hauling waste over longer distances. Such disposal would likely require the waste to be hauled out of New York State entirely; that waste would still generate GHG emissions in New York and elsewhere and those emissions would still be counted toward the CLCPA state-wide GHG emission limits. Accordingly, unless and until other infrastructure exists to manage this waste, Modern Landfill provides the least GHG-impact alternative for handling this waste that will be generated by this community.

Any other currently available option would result in the generation of the same GHG emissions as detailed herein, plus the additional emissions generated from the increased hauling distance.

5.2 Upstream Emissions

As noted in DAR-21, as part of the assessment of indirect emissions from stationary sources, we have analyzed emissions generated by off-site energy plants supplying energy used on the site of Modern Landfill. As the off-site fossil fuel-based energy consumption for Modern Landfill 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 upstream emissions. There are five sources of upstream emissions from stationary sources for off-site fossil fuel-based energy consumption: natural gas for heating, propane heating, gasoline, diesel and electrical power.

5.2.1 Natural Gas, Propane, Gasoline and Diesel Energy Consumption

Table 6 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 in the April 2020 Updated Title V Renewal Application. 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 Modern Landfill for lighting and powering of tools, equipment, and office appliances. The typical annual amount of electricity used by the Modern Landfill is estimated to be approximately 30,000 kWh (based on historical records at the Facility). To calculate the upstream 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, and hydro power generation accounts for over 91 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 30,000 kWh of electricity results in 4 tons of CO_2. A summary of upstream emissions from electricity is provided in Table 6.

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.

Activities that will be implemented to reduce emissions associated with the Modern Landfill include:

- Ensuring no more than 40 ft. of solid-walled pipe exists on new gas wells installed in future landfill areas as they are raised to accommodate filling activities
- Periodic monitoring of liquids in new wells installed in future landfill areas to ensure slotted section is available for gas extraction
- Install additional gas wells or horizontal collectors if surface emission scans demonstrate areas of elevated fugitive emissions that cannot be corrected with tuning of the existing collection system or required repairs identified
- Install additional or replace booster blowers to increase vacuum, if needed
- Early gas collection prior to NSPS regulation requirements
- Surface emissions monitoring program to include penetrations in NSPS areas and final cover
- Consideration of using equipment powered by non-diesel fuel sources as they become available and for this type of operation
- Installation of horizontal collectors (in addition to standard vertical gas wells) at a spacing of every 100 feet horizontally and 20 feet vertically within the waste mass)

In addition, the Facility already employs the following practices that result in reductions of GHG emissions:

- Modern maintains a fleet of approximately 130 trucks that are fuelled by compressed natural gas (CNG) in place of diesel trucks (and continues to add CNG trucks to its fleet on an annual basis)
- Modern utilizes a number of composting facilities in the nearby vicinity of the landfill (a portion of waste is diverted to these of-site local compost sites in lieu of landfilling).
- The Facility accepts a significant amount of industrial wastes and residuals from processing and recycling facilities.

Refer to Attachment F for a full assessment of mitigation measures under consideration at the Modern Landfill.

The NYSDEC requested additional information and clarifications on the "Response to Request for More Information (dated July 3, 2023)" (dated September 1, 2023). In this request, NYSDEC comment/response 11 stated "Of the potential mitigation measures proposed (i.e., Appendix B), only two will be considered viable options at this time: (1) early gas collection prior to NSHAP regulation required and (2) increased flare capacity". The comment/response has been received and acknowledged, and the full assessment of mitigation measures are provided for reference as Attachment F.

5.4 Landfill Carbon Sequestration

The EPA's Waste Reduction Model (WARM) incorporated carbon storage in landfills as a GHG emissions offset and sink. Likewise, the CLCPA recognizes the role that carbon sequestration could play in attaining the state-wide GHG emission limits (the scoping plan to be developed under ECL 75-0103(13)(d)&(i) must consider sequestration among the potential measures and actions to be implemented). The EPA's "Landfill Carbon Storage in WARM" (October 27, 2010) provides examples of materials that have high landfill carbon storage potential. Examples of these materials include newspapers, branches, and dimensional lumber. These materials have high landfill carbon storage potential due to presence of lignin, an organic polymer that provides strength in the cell walls of plants. While lignin can degrade in aerobic conditions, the anerobic conditions within landfills limits the degradation of lignin and the organic materials that contain lignin.

The breakdown of waste type reported in Modern Landfill's 2020 NYSDEC Annual Report was used as an example for the calculation of potential carbon offset. Using EPA's "Advancing Sustainable Materials Management: 2018 Fact Sheet (December 2020)" and published information on their Facts and Figures about Materials Waste and Recycling website, the MSW reported in Modern Landfill's 2020 NYSDEC Annual Report was further classified into paper/paperboard, branches, and dimensional lumber. Assuming a lignin content of 15 percent for these high potential carbon storage materials, an estimated 40,214 tons of CO_2 was sequestered in Modern Landfill during 2020. The same annual rate of sequestration is expected to occur for future landfill areas. Calculations are provided in Table 7[8].

5.5 Disproportionate Burden Analysis of GHG and HAPs

Modern Landfill is not within a disadvantaged community (DAC), but it does border a DAC to the north and there is a second nearby to the south according to the Disadvantaged Communities Criteria (Census Tract 36063024502, and 36063940001). To address Section 7(3) of CLCPA, the DEC is required to prioritize the reduction of GHG emissions and co pollutants in Disadvantaged Communities. Co-pollutants are defined as hazardous air pollutants ("HAPs") that are emitted by GHG sources. Therefore, HAPs emissions have been evaluated as part of this assessment.

As described previously in this assessment, the Modern Landfill operates a gas collection and control system that significantly reduces the amount of GHG and HAP emitted from the Facility. Modern provides mitigation measures and have proposed mitigation measures that may not be employed at other MSW landfills in New York State or elsewhere, as shown in Attachment F.

While approximately 80 percent of the waste hauling trucks pass through less than 1/2-mile portion of the DAC to the south, that represents less than approximately 2 percent of the distance waste hauling trucks travel, or

[8] The emissions shown in Table 8 have been provided for informational purposes but have not been included in the CLCPA Section 7(2) total shown in Table 1.

approximately 155 tons of GHGs and 0.004 tons of HAPs. Because less than 2 percent of this total route has the potential to result in emissions within the disadvantaged communities proximate to the Modern Landfill Facility, and only 155 tons per year of GHG emissions are associated with this one-mile portion of the trip, the GHG and HAP emissions do not result in increased impacts or burdens to the disadvantaged communities.

Modern's waste management practices reduce emissions beyond what is required by regulation. For example, Modern's CNG vehicle fleet operates on Compressed Natural Gas (CNG). To further mitigate GHG and HAP emissions, Modern is working with the Tuscarora Nation to improve recycling, manage used tires and eliminate open burning. Modern is also helping to identify grant opportunities to assist the Tuscarora Nation improve its waste management practices which will further reduce GHG emissions.

The latest New York State Ambient Air Quality Report for 2023 provides a summary of the ambient monitoring stations located throughout New York State. There are currently six active monitoring stations located within Region 9 (Brookside T, Amherst, Buffalo, Buffalo NR, Middleport, Dunkirk) five of which of located in close proximity to the Modern Facility (the Brookside T monitoring station is located 15 miles S of the Modern Facility, the Amherst monitoring station is located 18 miles SE of the Modern Facility, the Buffalo monitoring station is located 23 miles S of the Modern Facility, the Buffalo NR monitoring station is located 25 miles SE of the Modern Facility, and the Middleport monitoring station is located 25 miles E of the Modern Facility). A summary of 2023 ambient monitoring results for these stations with a comparison to the national ambient air quality standard is shown in the embedded Table 3 below:

Table 3 Summary of 2023 Air Monitoring Results – NYSDEC Region 9

Compound	Avg. Period	Station	2023 Result	Air Quality Standard	Percent of Standard
Sulfur Dioxide	1-hour	Brookside T	6.03 ppb	75 ppb	8.0 percent
Sulfur Dioxide	Annual	Brookside T	0.13 ppb	30 ppb	0.4 percent
Sulfur Dioxide	1-hour	Buffalo	6.23 ppb	75 ppb	8.3 percent
Sulfur Dioxide	Annual	Buffalo	0.10 ppb	30 ppb	0.3 percent
Carbon Monoxide	1-hour	Buffalo	0 days above standard	35 ppm	0 days above standard
Carbon Monoxide	8-hour	Buffalo	0 days above standard	9 ppm	0 days above standard
Carbon Monoxide	1-hour	Buffalo NR	0 days above standard	35 ppm	0 days above standard
Carbon Monoxide	8-hour	Buffalo NR	0 days above standard	9 ppm	0 days above standard
PM-2.5[9]	24-hour	Amherst	19.3 μg/m^3	35 μg/m^3	55.1 percent
PM-2.5[9]	Annual	Amherst	6.8 μg/m^3	9 ug/m^3	75.6 percent
PM-2.5[9]	24-hour	Brookside T	19.3 μg/m^3	35 μg/m^3	55.1 percent
PM-2.5[9]	Annual	Brookside T	7.5 μg/m^3	9 ug/m^3	83.3 percent
PM-2.5[9]	24-hour	Buffalo	31.1 μg/m^3	35 μg/m^3	88.9 percent
PM-2.5[9]	Annual	Buffalo	9.5 μg/m^3	9 ug/m^3	105.6 percent[10]
PM-2.5[9]	24-hour	Buffalo	19.6 μg/m^3	35 μg/m^3	56.0 percent
PM-2.5[9]	Annual	Buffalo	7.4 μg/m^3	9 ug/m^3	82.2 percent
PM-2.5[9]	24-hour	Buffalo NR	21.7 μg/m^3	35 μg/m^3	62.0 percent
PM-2.5[9]	Annual	Buffalo NR	8.1 μg/m^3	9 ug/m^3	90.0 percent

[9] Note that 2023 was an outlier year when it comes to PM-2.5 monitoring data likely due to the Canadian wildfires that year, which produced much higher background monitoring results for PM-2.5 versus other years. In addition, the PM-2.5 annual air quality standard has recently been lowered from 12 ug/m^3 to 9 ug/m^3.

[10] The combination of the two changes described in footnote No. 9 above resulted in one monitoring station (Buffalo) to be above the limit for PM-2.5 (105% of the limit).

Compound	Avg. Period	Station	2023 Result	Air Quality Standard	Percent of Standard
PM-2.5[9]	24-hour	Buffalo NR	20.5 µg/m^3	35 µg/m^3	58.6 percent
PM-2.5[9]	Annual	Buffalo NR	7.7 µg/m^3	9 ug/m^3	85.6 percent
Ozone	8-hour	Amherst	0.067 ppm	0.070 ppm	95.7 percent
Ozone	8-hour	Middleport	0.066 ppm	0.070 ppm	94.3 percent
Nitrogen Dioxide	1-hour	Buffalo	45.80 ppb	75 ppb	61.1 percent
Nitrogen Dioxide	Annual	Buffalo	7.91 ppb	53 ppb	14.9 percent
Nitrogen Dioxide	1-hour	Buffalo NR	42.33 ppb	75 ppb	56.4 percent
Nitrogen Dioxide	Annual	Buffalo NR	10.20 ppb	53 ppb	19.2 percent

Modern Landfill operates a gas collection and control system that significantly reduces the amount of GHG and HAP emitted from the Facility. Modern has agreed to mitigation measures that may not be employed at other MSW landfills in New York State or elsewhere. As shown in attached Attachment F, these mitigation measures provide GHG and HAPs emission reductions throughout the operational life of the landfill and will continue to reduce emissions through 2050.

The monitoring results for 2023 indicate good air quality in the vicinity of the Modern Facility (all of the monitoring results are in compliance with the ambient air quality standards, with the exception one instance as described in footnote No. 10). For these reasons, it is concluded that the Modern 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.

6. Conclusion

Table 1 provides an estimate of the overall GHG and HAP emissions associated with Modern Landfill. It is acknowledged that GHG and HAP emissions are generated from the landfilling of MSW as part of Modern Landfill. However, Modern Landfill manages waste generated in the local region--waste which is generated regardless of the Facility’s existence—and provides the avenue to manage this waste with the least amount of GHG and HAP emissions. If Modern Landfill did not exist, even more GHGs and HAPs would be generated to manage the same waste because additional GHG and HAP emissions would be generated to transport the waste farther away and manage it at other facilities (if those facilities existed and had capacity, which they do not, as demonstrated in Table 5). Should waste composition change, or if other waste management options become available in the future, GHG and HAP emissions from the site will be reduced accordingly. In the meantime, Modern Landfill provides a means of managing the waste generated in the community and surrounding region that not only meets or surpasses all air regulations, but also is the least impactful waste management option for GHG emissions. Finally, Modern has identified numerous reduction opportunities (see section 5.3) as a way to further mitigate any additional GHG and HAP emissions which may result at Modern Landfill.

Regards,

Steven D. Wilsey
Project Director

Bryan P. Szalda
Engineer

Table 1

Summary of Emissions Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

Emission Summary

	Year 2030 (Projected)		Year 2050 (Projected)		Year 2023 (Projected)		Year 2035 (Projected)	
Emissions Source	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)
Stationary Source Emissions	347,029	0.56	98,251	0.32	345,067	0.50	174,262	0.46
Non-Stationary (Off-Construction)	6,346	0.15	-	-	6,346	0.15	6,346	0.15
Non-Stationary (Construction)	8,463	0.20	-	-	8,463	0.20	8,463	0.20
Alternatives	Refer to Section 5.1 and Table 6							
Upstream GHG Emissions	1,995	-	1,995	-	1,995	-	1,995	-
Carbon Sequestration [2]	-40,214	-	-	-	-40,214	-	-	-
Uncontrolled Emissions	**1,758,842**	**1.76**	**1,020,230**	**0.88**	**1,265,100**	**1.40**	**1,867,386**	**1.84**
CLCPA Section 7(2) Total [3]	**363,834**		**100,246**		**361,872**		**191,067**	
CLCPA Section 7(3) Total [3]		**0.90**		**0.32**		**0.84**		**0.81**
% Reduction	**79**	**49**	**90**	**64**	**71**	**40**	**90**	**56**
CLPCA Target Reductions	**40**	**-**	**85**	**-**	**40**	**-**	**40**	**-**

	Year 2030 (PTE)		Year 2050 (PTE)		Year 2023 (PTE)		Year 2032 (PTE)	
Emissions Source	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)	Total Anthropogenic GHG (tons / year) [1]	Total HAPs (tons / year)
Stationary Source Emissions	574,287	0.84	117,128	0.35	714,059	0.89	276,157	0.66
Non-Stationary (Off-Construction)	6,346	0.15	-	-	6,346	0.15	6,346	0.15
Non-Stationary (Construction)	8,463	0.20	-	-	8,463	0.20	8,463	0.20
Alternatives	Refer to Section 5.1 and Table 6							
Upstream GHG Emissions	1,995	-	1,995	-	1,995	-	1,995	-
Carbon Sequestration [2]	-40,214	-	-	-	-40,214	-	-	-
Uncontrolled Emissions	**2,915,155**	**2.61**	**1,226,933**	**1.03**	**2,616,436**	**2.05**	**2,983,175**	**2.66**
CLCPA Section 7(2) Total [3]	**591,092**		**119,123**		**730,864**		**292,962**	
CLCPA Section 7(3) Total [3]		**1.18**		**0.35**		**1.23**		**1.01**
% Reduction	**80**	**55**	**90**	**66**	**72**	**40**	**90**	**62**
CLPCA Target Reductions	**40**	**-**	**85**	**-**	**40**	**-**	**40**	**-**

Notes:

[1] - Expressed as total anthropogenic GHG emissions (Refer to Table 2A, Table 2B, Table 2C and Table 2D for further breakdown).

[2] - Provided for informational purposes only (not included in Section 7(2) or Section 7(3) totals)

[3] - The totals presented here do not account for the emission reduction opportunities discussed in Section 5.3; actual totals may be significantly lower upon implementation of these opportunities. The totals do not account for carbon sequestration. In addition, emissions would increase if waste is instead transported to a landfill facility located further away than Modern Landfill (see Section 5.1 for further discussion of alternative facilities).

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table 2A

2030 Projected GHG Emissions from Stationary Sources
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

Summary of Total Expected Facility Emissions (2030)

	Projected Actual Emissions - 2030 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.20	2,990.52	3,271.53	---	277,799	11,962	289,761
LFG Flare Combustion Emissions	0.22	62,147.79	12.98	0.75	63,437	62,801	126,238
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.56**	**70,927**	**3,285**	**0.77**	**347,029**	**74,763**	**421,792**

Summary of Total Potential Emissions (2030)

	PTE - 2030 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.34	4,982.17	5,450.32	---	462,809	19,929	482,738
LFG Flare Combustion Emissions	0.36	103,537.34	21.62	1.25	105,684	104,626	210,310
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.84**	**114,308**	**5,472**	**1.27**	**574,287**	**124,554**	**698,841**

Notes:

[1] Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq).
20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table 2B

2050 Projected GHG Emissions from Stationary Sources
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

Summary of Total Expected Facility Emissions (2050)

	Projected Actual Emissions - 2050 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.04	544.95	596.16	---	50,622	2,180	52,802
LFG Flare Combustion Emissions	0.14	40,985.40	8.56	0.50	41,835	41,416	83,251
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.32**	**47,319**	**605**	**0.51**	**98,251**	**43,596**	**141,847**

Summary of Total Potential Emissions (2050)

	PTE - 2050 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.04	656.21	717.87	---	60,957	2,625	63,582
LFG Flare Combustion Emissions	0.17	49,353.12	10.31	0.60	50,377	49,872	100,248
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.35**	**55,798**	**728**	**0.61**	**117,128**	**52,497**	**169,624**

Notes:

[1] Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq).
20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table 2C

2023 Projected GHG Emissions from Stationary Sources
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

Summary of Total Expected Facility Emissions (2023)

	Projected Actual Emissions - 2023 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.22	3,210.14	3,511.79	---	298,200	12,841	311,041
LFG Flare Combustion Emissions	0.14	40,238.92	8.40	0.49	41,073	40,662	81,735
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.50**	**49,238**	**3,520**	**0.50**	**345,067**	**53,502**	**398,570**

Summary of Total Potential Emissions (2023)

	PTE - 2023 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.46	6,701.48	7,331.18	---	622,521	26,806	649,327
LFG Flare Combustion Emissions	0.29	84,002.51	17.54	1.02	85,745	84,885	170,630
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.89**	**96,493**	**7,349**	**1.03**	**714,059**	**111,691**	**825,750**

Notes:

1 Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq).
20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table 2D

2032/2035 Projected GHG Emissions from Stationary Sources
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

Summary of Total Expected Facility Emissions (2035)

	Projected Actual Emissions - 2035 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.07	992.96	1,086.27	---	92,239	3,972	96,211
LFG Flare Combustion Emissions	0.26	74,680.27	15.60	0.90	76,229	75,465	151,694
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.46**	**81,462**	**1,102**	**0.92**	**174,262**	**79,437**	**253,699**

Summary of Total Potential Emissions (2035)

	PTE - 2035 (TPY) [1]						
Emission Source	Total HAP	Anthropogenic CO_2	CH_4	N_2O	Anthropogenic GHG	Biogenic CO_2	Total GHG
Landfill Fugitive Emissions	0.11	1,593.54	1,743.28	---	148,029	6,374	154,403
LFG Flare Combustion Emissions	0.42	119,849.39	25.03	1.45	122,335	121,109	243,444
Leachate Storage / Recirculation Emissions	0.14	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	3,827.75	---	---	3,828	---	3,828
Exempt & Trivial Source Emissions	---	1,961	0	0	1,966	---	1,966
Totals	**0.66**	**127,232**	**1,768**	**1.46**	**276,157**	**127,483**	**403,641**

Notes:

[1] Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq).
20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table 3

Non-Stationary Sources (Off-Construction Season)
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

	CO_2	CH_4	N_2O	HAP	
Emissions (Diesel Fuel) [1] =	22.5	0.001	0.0002	0.0005	lb / gallon of diesel combusted
Emissions (Motor Gasoline) [1] =	19.4	0.001	0.0002	0.0005	lb / gallon of gasoline combusted

Off-Construction Season (6 months out of year November 1 - April 30)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Off-site to Active Area

Equipment Needed	Activity	Average Distance per Delivery [2] (miles)	Estimated Fuel Economy [4] (miles / gal)	Estimated Vehicle Trips [5] (trips)	Annual Fuel Consumption [All Units] (gal / year)	Idling Factor [6] (%)	Adjusted Fuel Consumption [All Units] (gal / year)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13] (tons / year)	Annual N_2O Emissions [13] (tons / year)	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Waste Dump Trucks	Transport Waste to Landfill Entrance	26.1	5.5	100,000	474,545	0	474,545	**5,338.9**	**0.22**	**0.04**	**5,368.5**	**0.12**
Waste Dump Trucks	Transport Waste from Entrance to Active Area	1.1	5.5	100,000	20,000	15	23,000	**258.8**	**0.01**	**0.00**	**260.2**	**0.01**
							Totals	**5,597.7**	**0.23**	**0.05**	**5,628.7**	**0.13**

Waste at Active Area

Equipment Needed	Activity	Daily Hours of Operation [7] (hours)	Weekly Hours of Operation [8] (hours)	Off-Construction Operating Weeks [9] (weeks)	Fuel Consumption Per Unit [10] (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13] (tons / year)	Annual N_2O Emissions [13] (tons / year)	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Compactor	Compact waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
Compactor	Compact waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
Dozer	Spread fresh waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
Dozer	Spread fresh waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
							Totals	**395.2**	**0.02**	**0.00**	**397.4**	**0.01**

Transport of Soil From Off-site to Construction Stockpile

Equipment Needed	Activity	Average Distance per Delivery [3] (miles)	Estimated Fuel Economy [4] (miles / gal)	Estimated Vehicle Trips (trips)	Annual Fuel Consumption [All Units] (gal / year)	Idling Factor [6] (%)	Adjusted Fuel Consumption [All Units] (gal / year)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13]	Annual N_2O Emissions [13]	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Tri-Axle Dump Trucks	Transport of Soil to Construction Stockpile	25.0	5.5	3,334	15,152	15	17,425	**196.0**	**0.01**	**0.00**	**197.1**	**0.00**
							Totals	**196.0**	**0.01**	**0.00**	**197.1**	**0.0**

Daily Cover of Soils at Active Area

Equipment Needed	Activity	Daily Hours of Operation [7] (hours)	Weekly Hours of Operation [8] (hours)	Off-Construction Operating Weeks [9] (weeks)	Fuel Consumption Per Unit [12] (gal / hr)	Daily Fuel Consumption on [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13]	Annual N_2O Emissions [13]	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Excavator	Strip daily cover	1	6	26	9.84	10	1,535	**17.3**	**0.00**	**0.00**	**17.4**	**0.00**
Haul Truck	Transport Soil to Landfill	1	6	26	5.52	6	860	**9.7**	**0.00**	**0.00**	**9.7**	**0.00**
Haul Truck	Transport Soil to Landfill	1	6	26	5.52	6	860	**9.7**	**0.00**	**0.00**	**9.7**	**0.00**
Dozer	Spread daily cover over fresh waste	1	6	26	6.20	6	967	**10.9**	**0.00**	**0.00**	**10.9**	**0.00**
							Totals	**47.5**	**0.00**	**0.00**	**47.8**	**0.00**

Operation and Maintenance

Equipment Needed	Activity	Daily Hours of Operation [7] (hours)	Weekly Hours of Operation [8] (hours)	Off-Construction Operating Weeks [9] (weeks)	Fuel Consumption Per Unit [10] (gal / hr)	Daily Fuel Consumption on [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13]	Annual N_2O Emissions [13]	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Sweeper	Sweep down roads	10.5	54.5	26	1.30	14	1,842	**20.7**	**0.00**	**0.00**	**20.8**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
							Totals	**58.5**	**0.00**	**0.00**	**60.6**	**0.00**

Emissions From Transportation of Employees

Equipment Needed	Quantity of workers (# employees)	Operating Days per Week (days)	Total Operating Days [11] (days)	Average Distance to Site (miles)	Estimated Fuel Economy [12] (miles / gal)	Consumption on [All Units] (gal / day)	Annual Fuel Consumption [All Units] (gal / year)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13]	Annual N_2O Emissions [13]	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Light Duty Vehicles	12	6	156	10	25.7	9.3	1,457	**14.1**	**0.00**	**0.00**	**14.8**	**0.00**
							Totals	**14.1**	**0.00**	**0.00**	**14.8**	**0.0**
							Grand Total	**6,309.0**	**0.3**	**0.1**	**6,346.4**	**0.1**

Notes:

1 CO_2, CH_4 and N_2O emission factors for diesel fuel and gasoline combustion referenced from 40 CFR 98, Subpart C; HAP emission factor referenced from AP-42, Section 3.3, Table 3.3-2.
2 Average distance from waste sources is calculated as 26.1 miles.
3 Distance from nearby permitted mine locations to Modern Landfill is estimated as 25 miles
4 Based on an engineering estimate and an analysis of past fuel usage by this equipment; average of loaded and unloaded conditions
5 Estimated Vehicle Trips = [100,000 trucks per year] x [0.5 (Half-year factor)] x [2 trips per delivery]
6 Idling factor added to account for wait time, where vehicle is immobile.
7 A workday consists of one 10.5-hour shift; however, daily cover operations only in the last hour of the workday
8 Operating schedule is 6 days per week (10.5 hours/day Monday through Friday, 8 hours on Saturday); Construction schedule is 6 days per week (11 hours/day Monday through Friday, 8 hours on Saturday)
9 Off-Construction season is 26 weeks out of the calendar year
10 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 light-duty trucks, an assumption of 1.0 gallons per hour of gasoline was utilized
11 Total Operating Days = (6 days per week) x (26 construction weeks per year)
12 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
13 Annual Emissions = (Annual Fuel Consumption [gal/yr]) x (Emission Factor from note 1 [lb per gallon of fuel combusted])
14 20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.
15 HAP emission factor referenced from AP-42, Section 3.3, Table 3.3-2 (10/96)

Note: The emissions in this table represent PTE totals. For simplicity, actual emissions are assumed to be equal to PTE totals but are expected to be less in any given year.

Table 4

Non-Stationary Sources (Construction Season)
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

	CO_2	CH_4	N_2O	HAP	
Emissions (Diesel Fuel) [1] =	22.5	0.001	0.0002	0.0005	lb / gallon of diesel combusted
Emissions (Motor Gasoline) [1] =	19.4	0.001	0.0002	0.0005	lb / gallon of gasoline combusted

Construction Season (6 months out of year May 1 - October 31)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Off-site to Active Area

Equipment Needed	Activity	Average Distance per Delivery [2] (miles)	Estimated Fuel Economy [4] (miles / gal)	Estimated Vehicle Trips [5] (trips)	Annual Fuel Consumption [All Units] (gal / year)	Idling Factor [6] (%)	Adjusted Fuel Consumption [All Units] (gal / year)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Waste Dump Trucks	Transport Waste to Landfill Entrance	26.1	5.5	100,000	474,545	0	474,545	**5,338.9**	**0.22**	**0.04**	**5,368.5**	**0.12**
Waste Dump Trucks	Transport Waste from Entrance to Active Area	1.1	5.5	100,000	20,000	15	23,000	**258.8**	**0.01**	**0.00**	**260.2**	**0.01**
							Totals	**5,597.7**	**0.23**	**0.05**	**5,628.7**	**0.13**

Waste at Active Area

Equipment Needed	Activity	Daily Hours of Operation [7] (hours)	Weekly Hours of Operation [8] (hours)	Construction Operating Weeks [10] (weeks)	Fuel Consumption Per Unit [11] (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Compactor	Compact waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
Compactor	Compact waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
Dozer	Spread fresh waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
Dozer	Spread fresh waste over Active Area	10.5	54.5	26	6.20	65	8,782	**98.8**	**0.00**	**0.00**	**99.3**	**0.00**
							Totals	**395.2**	**0.02**	**0.00**	**397.4**	**0.01**

Transport of Soil From Off-site to Construction Stockpile

Equipment Needed	Activity	Average Distance per Delivery [3] (miles)	Estimated Fuel Economy [4] (miles / gal)	Estimated Vehicle Trips (trips)	Annual Fuel Consumption [All Units] (gal / year)	Idling Factor [6] (%)	Adjusted Fuel Consumption [All Units] (gal / year)	Annual CO_2 Emissions [13] (tons / year)	Annual CH_4 Emissions [13]	Annual N_2O Emissions [13]	Total CO_2 Equivalents [14] (tons / year)	Total HAP Emissions [15] (tons / year)
Tri-Axle Dump Trucks	Transport of Soil to Construction Stockpile	25.0	5.5	10,001	45,457	15	52,275	**505.8**	**0.02**	**0.00**	**508.7**	**0.01**
							Totals	**505.8**	**0.02**	**0.00**	**508.7**	**0.0**

Table 4

Non-Stationary Sources (Construction Season)
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

	CO_2	CH_4	N_2O	HAP	
Emissions (Diesel Fuel) [1] =	22.5	0.001	0.0002	0.0005	lb / gallon of diesel combusted
Emissions (Motor Gasoline) [1] =	19.4	0.001	0.0002	0.0005	lb / gallon of gasoline combusted

Construction Season (6 months out of year May 1 - October 31)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Off-site to Active Area

Daily Cover of Soils at Active Area

Equipment Needed	Activity	Daily Hours of Operation [7] (hours)	Weekly Hours of Operation [9] (hours)	Construction Operating Weeks [10] (weeks)	Fuel Consumption Per Unit [11] (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Excavator	Strip daily cover	1	6	26	9.84	10	1,535	**17.3**	**0.00**	**0.00**	**17.4**	**0.00**
Haul Truck	Transport Soil to Landfill	1	6	26	5.52	6	860	**9.7**	**0.00**	**0.00**	**9.7**	**0.00**
Haul Truck	Transport Soil to Landfill	1	6	26	5.52	6	860	**9.7**	**0.00**	**0.00**	**9.7**	**0.00**
Dozer	Spread daily cover over fresh waste	1	6	26	6.20	6	967	**10.9**	**0.00**	**0.00**	**10.9**	**0.00**
							Totals	**47.5**	**0.00**	**0.00**	**47.8**	**0.00**

Operation and Maintenance

Equipment Needed	Activity	Daily Hours of Operation [7] (hours)	Weekly Hours of Operation [9] (hours)	Construction Operating Weeks [10] (weeks)	Fuel Consumption Per Unit [11] (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Water Truck	Water down roads	10.5	54.5	26	4.77	50	6,758	**76.0**	**0.00**	**0.00**	**76.5**	**0.00**
Sweeper	Sweep down roads	10.5	54.5	26	1.30	14	1,842	**20.7**	**0.00**	**0.00**	**20.8**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
Light-Duty Vehicle	Maintenance and operations	5	30	26	1.0	5	780	**7.5**	**0.00**	**0.00**	**7.9**	**0.00**
							Totals	**134.5**	**0.01**	**0.00**	**137.0**	**0.00**

Table 4

Non-Stationary Sources (Construction Season)
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

	CO_2	CH_4	N_2O	HAP	
Emissions (Diesel Fuel) [1] =	22.5	0.001	0.0002	0.0005	lb / gallon of diesel combusted
Emissions (Motor Gasoline) [1] =	19.4	0.001	0.0002	0.0005	lb / gallon of gasoline combusted

Construction Season (6 months out of year May 1 - October 31)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Off-site to Active Area

Cell Construction & Mining of Materials for Onsite Use

Equipment Needed	Activity	Daily Hours of Operation [8] (hours)	Weekly Hours of Operation [9] (hours)	Construction Operating Weeks [10] (weeks)	Fuel Consumption Per Unit [11] (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Excavator	Excavate areas for cell construction	10.5	67	26	9.84	103	17,142	**192.9**	**0.01**	**0.00**	**193.9**	**0.00**
Excavator	Excavate areas for cell construction	10.5	67	26	9.84	103	17,142	**192.9**	**0.01**	**0.00**	**193.9**	**0.00**
Excavator	Excavate areas for cell construction	10.5	67	26	9.84	103	17,142	**192.9**	**0.01**	**0.00**	**193.9**	**0.00**
Haul Truck	Transport Soil	5.0	33.5	26	5.52	28	4,804	**54.0**	**0.00**	**0.00**	**54.3**	**0.00**
Haul Truck	Transport Soil	5.0	33.5	26	5.52	28	4,804	**54.0**	**0.00**	**0.00**	**54.3**	**0.00**
Haul Truck	Transport Soil	5.0	33.5	26	5.52	28	4,804	**54.0**	**0.00**	**0.00**	**54.3**	**0.00**
Dozer	Spread soil over areas for cell construction	10.5	67	26	6.20	65	10,796	**121.5**	**0.00**	**0.00**	**122.1**	**0.00**
Dozer	Spread soil over areas for cell construction	10.5	67	26	6.20	65	10,796	**121.5**	**0.00**	**0.00**	**122.1**	**0.00**
Roller	Smooth and compact soil	10.5	67	26	4.77	50	8,308	**93.5**	**0.00**	**0.00**	**94.0**	**0.00**
							Totals	**1,077.1**	**0.04**	**0.01**	**1,083.1**	**0.03**

Final Cover Construction

Equipment Needed	Activity	Daily Hours of Operation [8] (hours)	Weekly Hours of Operation [9] (hours)	Construction Operating Weeks [10] (weeks)	Fuel Consumption Per Unit [11] (gal / hr)	Daily Fuel Consumption [All Units] (gal / day)	Total Fuel Consumption [All Units] (gallons)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Excavator	Excavate areas for cover construction	10.5	67	26	9.84	103	17,142	**192.9**	**0.01**	**0.00**	**193.9**	**0.00**
Haul Truck	Transport Soil	5.0	33.5	26	5.52	28	4,804	**54.0**	**0.00**	**0.00**	**54.3**	**0.00**
Haul Truck	Transport Soil	5.0	33.5	26	5.52	28	4,804	**54.0**	**0.00**	**0.00**	**54.3**	**0.00**
Dozer	Spread soil over areas as cover	10.5	67	26	6.20	65	10,796	**121.5**	**0.00**	**0.00**	**122.1**	**0.00**
Dozer	Spread soil over areas as cover	10.5	67	26	6.20	65	10,796	**121.5**	**0.00**	**0.00**	**122.1**	**0.00**
Roller	Smooth and compact soil	10.5	67	26	4.77	50	8,308	**93.5**	**0.00**	**0.00**	**94.0**	**0.00**
							Totals	**637.3**	**0.03**	**0.01**	**640.9**	**0.01**

Table 4

Non-Stationary Sources (Construction Season)
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

	CO_2	CH_4	N_2O	HAP	
Emissions (Diesel Fuel) [1] =	22.5	0.001	0.0002	0.0005	lb / gallon of diesel combusted
Emissions (Motor Gasoline) [1] =	19.4	0.001	0.0002	0.0005	lb / gallon of gasoline combusted

Construction Season (6 months out of year May 1 - October 31)

Direct Emissions From Non-Stationary Sources

Transport of Waste From Off-site to Active Area

Emissions From Transportation of Employees

Equipment Needed	Quantity of workers (# employees)	Operating Days per Week (days)	Total Operating Days [12] (days)	Average Distance to Site (miles)	Estimated Fuel Economy [13] (miles / gal)	Daily Fuel Consumption [All Units] (gal / day)	Annual Fuel Consumption [All Units] (gal / year)	Annual CO_2 Emissions [14] (tons / year)	Annual CH_4 Emissions [14] (tons / year)	Annual N_2O Emissions [14] (tons / year)	Total CO_2 Equivalents [15] (tons / year)	Total HAP Emissions [16] (tons / year)
Light Duty Vehicles	16	6	156	10	25.7	12.5	1,942	**18.8**	**0.00**	**0.00**	**19.8**	**0.00**
							Totals	**18.8**	**0.00**	**0.00**	**19.8**	**0.00**
							Grand Total	**8,413.9**	**0.3**	**0.1**	**8,463.4**	**0.2**

Notes:

1 CO_2, CH_4 and N_2O emission factors for diesel fuel and gasoline combustion referenced from 40 CFR 98, Subpart C; HAP emission factor referenced from AP-42, Section 3.3, Table 3.3-2.
2 Average distance from waste sources is calculated as 26.1 miles.
3 Distance from nearby permitted mine locations to Modern Landfill is estimated as 25 miles
4 Based on an engineering estimate and an analysis of past fuel usage by this equipment; average of loaded and unloaded conditions
5 Estimated Vehicle Trips = [100,000 trucks per year] x [0.5 (Half-year factor)] x [2 trips per delivery]
6 Idling factor added to account for wait time, where vehicle is immobile.
7 A workday consists of a 12-hour shift; however, daily cover operations only in the last hour of the workday
8 A workday consists of a 11-hour shift Mondays through Friday and an 8-hour shift on Saturdays; however, 1-hour is deducted each day for lunch hour break.
9 Operating schedule is 6 days per week (10.5 hours/day Monday through Friday, 8 hours on Saturday); Construction schedule is 6 days per week (11 hours/day Monday through Friday, 8 hours on Saturday)
10 Construction season is 26 weeks out of the calendar year
11 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 light-duty trucks, an assumption of 1.0 gallons per hour of gasoline was utilized
12 Total Operating Days = (6 days per week) x (26 construction weeks per year)
13 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
14 Annual Emissions = (Annual Fuel Consumption [gal/yr]) x (Emission Factor from note 1 [lb per gallon of fuel combusted])
15 20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.
16 HAP emission factor referenced from AP-42, Section 3.3, Table 3.3-2 (10/96)

Note: The emissions in this table represent PTE totals. For simplicity, actual emissions are assumed to be equal to PTE totals but are expected to be less in any given year.

Table 5

Site Capacity Evaluation of Alternatives
Greenhouse Gas and HAP Emission Calculations
Modern Landfill
Modern Landfill Inc.

Facility Name	Waste Landfilled in 2019	Permitted Waste Accepted	Difference
	tpy	tpy	tpy
Modern Landfill	812,951	815,000	2,049
Ontario County SLF	914,393	920,693	6,300
High Acres Landfill	938,719	1,074,500	135,781
Bath Sanitary Landfill	158,675	256,700	98,025
Mill Seat SLF	572,948	598,650	25,702
Hyland Landfill	464,991	465,000	9
Chaffee Landfill	498,336	600,000	101,664
Chemung County Sanitary Landfill	289,852	417,000	127,148
Chatauqua Landfill	262,657	408,000	145,343
Covanta Niagara	804,403	821,250	16,847
Seneca Meadows Landfill	2,163,293	2,190,000	26,707

Notes:

1 Data taken from 2019 Part 360 annual report

Table 6

Upstream Greenhouse Gas Emission Calculations
Modern Landfill
Modern Landfill Inc.

Energy	Yearly Elec Use [1]	NYUP (NPCC Upstate NY)		GHG Emissions (Off-Site Fossil Fuel Usage)		
	kWh	Source	%	Offsets	lb/year	tpy
Electricity Generated	30,000	Oil	0.6	CO2e	7,230	4
		Coal	0.8			
		Gas	25.9			

Energy	Amount Imported (MMBTU/yr)	Emission Factor (g / MMBTU)	GHG Emissions (Off-Site Fossil Fuel Usage)		
			GHG Emission Offsets	lb/year	tpy
Natural Gas	7,718	42,661	CO2e	725,901	363
Propane	262	27,173	CO2e	15,700	8
Gasoline	150	29,668	CO2e	9,811	5
Diesel	60,534	24,214	CO2e	3,231,409	1,616
			Total CO2 Equ.	3,990,050	1,995

Notes:

1 - The yearly electrical use for the facility is taken from historical records
https://www.epa.gov/egrid/power-profiler#/NYUP

2 Upstream emission factors from 2023 NYS Statewide GHG Emissions Report:

Fuel Type	CO_2	CH_4	N_2O	Total CO_2e
Natural Gas	12,272	361	0.14	42,661
Diesel/ Distillate Fuel	14,104	120	0.26	24,214
Coal	3,297	349	0.10	32,605
Kerosene/Jet Fuel	9,695	108	0.17	18,798
Gasoline (E85)	4,916	33	0.09	7,714
Gasoline	18,906	127	0.33	29,668
LPG	16,924	121	0.28	27,173
Petroleum Coke	11,299	112	0.20	20,737
Residual Fuel	10,791	109	0.18	20,017

Note: Total CO2e conversion uses GWP20 per 6 NYCRR Part 496

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table 7

Carbon Sequestration
Greenhouse Gas Emission Calculations
Modern Landfill
Modern Landfill Inc.

Types of Solid Waste	Year Totals Tons	Lignin Content %
Asbestos Waste	11,715.00	0
Construction & Demolition Debris	11,886.46	1%
Industrial Waste (including Industrial Process Sludge)	143,910.66	0
Mixed MSW (residential, institutional & commercial)	577,731.58	3%
Sewage Treatment Plant Sludge	61,557.88	0
Contaminated Soil	22.93	0
Glass	2844.39	0
Industrial Waste	93,748.08	0
Shredder Fluff	56,979.89	0
MSW Ash	39,695.04	0
Waste Tire-Derived Aggregate	17.43	0
Shingles	3,570.27	0
MSW Wood Ash	111,855.72	0

	EPA 2018 Waste Data [5]		Lignin Content		Carbon	CO2 equiv.	
Waste	MSW %	Lignin %	Tons	kg	Mol	kg	Tons
Paper/paperboard [2]	11.8	15	10,226	9,276,737	496,442,706	21,848,444	24,084
Branches	3.6	15	3,119	2,829,591	151,425,008	6,664,215	7,346
Dimensional Lumber	4.2	15	3,609	3,273,728	175,192,911	7,710,240	8,499
C&D Wood Products	6.8	15	121	109,989	5,886,030	259,044	286
					Grand Total	36,481,942	40,214

Notes:

[1] - CO_2 emission factor for diesel fuel and gasoline combustion referenced from Energy Information Administration published coefficients (Feb 2, 2016)
[2] - It is assumed that the paper/paperboard production process does not remove the lignin
[3] - Lignin chemical formula is C81H92O28. Molecular weight of Lignin is 1513.6 g/mol
[4] - It is assumed that no lignin decomposes anaerobically and all the carbon that would have decomposed into CO2 will be sequestered.
[5] - EPA's *'Advancing Sustainable Materials Management: 2018 Fact Sheet'* (December 2020)
20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2949025/
https://www.sciencedirect.com/topics/chemical-engineering/lignin
https://academic.oup.com/femsre/article/41/6/941/4569254
https://www.epa.gov/sites/production/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf
https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/paper-and-paperboard-material-specific-data
https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/yard-trimmings-material-specific-data
https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/wood-material-specific-data

Attachments

Attachment A

Emissions Inventory – Projected Actual 2030

Table A.1

Emissions Inventory
Modern Landfill, Inc.
Summary of Projected Actual 2030 Emissions

Emission Source	Projected Actual 2030 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.2	0.0	2,991	3,272	---	277,799	11,962
LFG Flare Combustion Emissions	0.2	0.2	62,148	13.0	0.8	63,437	62,801
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1,961	0.01	0.01	1,966	---
Totals	**0.6**	**0.2**	**70,927**	**3,285**	**0.8**	**347,029**	**74,763**

Notes:

1 - High HAP is Hydrogen Chloride

2 - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table A.2

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (Projected Actual 2030)

LFG to Flares = 4,120 cfm

	Operating Hours	Projected Actual 2030 Flare Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	62,147.8	3.8	0.8	9.2	62,801.0	62,801.0	63,436.6
	Total Emissions (TPY)	62,147.8	3.8	0.8	9.2	62,801.0	62,801.0	63,436.6
	Total Emissions (lb/yr)	1.24E+08	7.64E+03	1.50E+03	18,320.6	1.26E+08	1.26E+08	1.27E+08

Flare Combustion Factors

	Pounds per Hour of Operation		
	CO_2	CH_4	N_2O
Flares	14,189.0	0.9	0.17

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	123.6	MMBtu/hr
LFG combusted:	4,120	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table A.3

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (Projected Actual 2030)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	4,905	cfm
LFG Collection Efficiency =	84%	
Total LFG Collected =	4,120	cfm
Total LFG Collected to Flares =	4,120	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	Uncontrolled Emissions lb/yr	Uncontrolled Emissions TPY	mg/m3	Avg. Control [6]	Controlled Emissions lb/hr	Controlled Emissions lb/yr	Controlled Emissions TPY
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.001	11.94	0.01	0.09	98.0%	0.000	0.24	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.002	15.03	0.01	0.11	98.0%	0.000	0.30	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.001	8.86	0.00	0.07	98.0%	0.000	0.18	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.001	8.68	0.00	0.06	98.0%	0.000	0.17	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.005	41.89	0.02	0.31	98.0%	0.000	0.84	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.001	10.11	0.01	0.07	98.0%	0.000	0.20	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.002	19.06	0.01	0.14	98.0%	0.000	0.38	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.003	27.34	0.01	0.20	98.0%	0.000	0.55	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.002	13.77	0.01	0.10	98.0%	0.000	0.28	0.00
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.007	60.74	0.03	0.45	98.0%	0.000	1.21	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.001	10.08	0.01	0.07	98.0%	0.000	0.20	0.00
75-00-3	Chloroethane	64.52	0.04	0.002	15.72	0.01	0.12	98.0%	0.000	0.31	0.00
67-66-3	Chloroform	119.39	0.02	0.001	10.69	0.01	0.08	98.0%	0.000	0.21	0.00
74-87-3	Chloromethane [2]	50.49	0.02	0.001	4.52	0.00	0.03	98.0%	0.000	0.09	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.002	13.16	0.01	0.10	98.0%	0.000	0.26	0.00
75-09-2	Dichloromethane	84.94	0.03	0.002	15.23	0.01	0.11	98.0%	0.000	0.30	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.022	195.34	0.10	1.44	98.0%	0.000	3.91	0.00
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.002	16.82	0.01	0.12	98.0%	0.000	0.34	0.00
110-54-3	Hexane	86.18	0.38	0.021	182.86	0.09	1.35	98.0%	0.000	3.66	0.00
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.32	0.00	0.00	0.0%	0.000	0.32	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.006	53.85	0.03	0.40	98.0%	0.000	1.08	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.002	14.84	0.01	0.11	98.0%	0.000	0.30	0.00
79-01-6	Trichloroethene	131.40	0.02	0.001	11.76	0.01	0.09	98.0%	0.000	0.24	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.005	46.28	0.02	0.34	98.0%	0.000	0.93	0.00
1330-20-7	Xylene	106.16	0.85	0.057	499.79	0.25	3.70	98.0%	0.001	10.00	0.00
71-43-2	Benzene	78.11	0.36	0.018	154.09	0.08	1.14	98.0%	0.000	3.08	0.00
108-88-3	Toluene	92.13	1.33	0.077	677.08	0.34	5.01	98.0%	0.002	13.54	0.01
100-42-5	Styrene	104.15	0.02	0.001	9.32	0.00	0.07	98.0%	0.000	0.19	0.00
7647-01-0	Hydrogen Chloride [5]	36.46	1.94	0.045	390.85	0.20	2.89	0.0%	0.045	390.85	0.20
	Total HAPs					1.27					0.22

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)

6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table A.4

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Fugitive Emissions (Projected Actual 2030)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2030	4,905	84%	4,120	785	412,485,796	11,680,297	0.2	3,271.5	2,990.5	11,962.1	277,799

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from landfill gas modeling results
Utilized LandGEM Model using the following parameters (k = 0.04 yr^{-1}, Lo = 100 m^3/Mg) (referenced from AP-42, Section 2.4 (11/98))
Collection efficiency of 84% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)
LFG to Collection System = (Total LFG Generated) * (Collection Efficiency (%))
Fugitive LFG = (Total LFG Generated) * (100% - Collection Efficiency (%))
Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)
Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)
NMOC concentration of 595 ppm referenced from USEPA AP-42, Section 2.4 (11/98)

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 x10^{-6} pounds per mg]
Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)
Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))
Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)
Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]
Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]
Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }
Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table A.5

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (Projected Actual 2030)

Total LFG Generated =	4,905	cfm
LFG Collection Efficiency =	84%	
Average LFG Collected =	4,120	cfm
Fugitive Emission Estimates =	785	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	0.02	0.000	2.27	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.000	2.86	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	1.69	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	1.65	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.001	7.98	0.00	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	1.93	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.000	3.63	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.001	5.21	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	2.62	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.001	11.57	0.01	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	1.92	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.000	2.99	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	2.04	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	0.86	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	2.51	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.000	2.90	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.004	37.21	0.02	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.000	3.20	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.004	34.83	0.02	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.06	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.001	10.26	0.01	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.000	2.83	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	2.24	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.001	8.81	0.00	0.34
1330-20-7	Xylene	106.16	0.85	0.011	95.20	0.05	3.70
71-43-2	Benzene	78.11	0.36	0.003	29.35	0.01	1.14
108-88-3	Toluene	92.13	1.33	0.015	128.97	0.06	5.01
100-42-5	Styrene	104.15	0.02	0.000	1.78	0.00	0.07
	Total HAPs					0.20	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table A.6

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (Projected Actual 2030)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion =	40,000,000	gallons	x	3.7854	L/gal	x		1.36	mg/L VOC	x	2.21E-06	lbs/mg
VOC Portion =	**454**	pounds										
VOC Emissions =	454	pounds	x	100%	potentially emitted	=		**454.1**	**pounds of VOC**			
							=	**0.23**	**tons of VOC**			
HAP Portion =	40,000,000	gallons	x	3.7854	L/gal	x		0.81	mg/L VOC	x	2.21E-06	lbs/mg
HAP Portion =	**270**	pounds										
HAP Portion =	270	pounds	x	100%	potentially emitted	=		**270.4**	**pounds of VOC**			
							=	**0.14**	**tons of VOC**			

Table A.7

Calculated Diesel Engine Emissions (Projected Actual 2030)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table A.8

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (Projected Actual 2030)

Maximum Annual Natural Gas Combusted **7.72** MMscf

Emission Calculations:						
					Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	7.72	MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X / MMSCF	7.72	MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X / MMSCF	7.72	MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X / MMSCF	7.72	MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X / MMSCF	7.72	MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X / MMSCF	7.72	MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X / MMSCF	7.72	MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X / MMSCF	7.72	MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table A.9

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (Projected Actual 2030)

Maximum Annual Landfill Gas Combusted **3.93** MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	# Furnaces	Rated Capacity (BTU/hr)	Total Capacity (BTU/hr)
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table A.10

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (Projected Actual 2030)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table A.11

Emissions Inventory

Modern Landfill, Inc.

Exempt Gasoline Generators (Projected Actual 2030)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = 1,200 gallons

Power (HP)	Gallons Combusted	PM (lb/yr)	SO_2 (lb/yr)	NO_x (lb/yr)	VOC (lb/yr)	CO (lb/yr)	CO_2 (lb/yr)
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table A.12

Exempt Diesel Generators (Projected Actual 2030)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table A.13

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (Projected Actual 2030)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Table A.14

Emissions Inventory
Modern Landfill, Inc.
Summary of PTE 2030 Emissions

Emission Source	PTE 2030 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.3	0.0	4,982	5,450	---	462,809	19,929
LFG Flare Combustion Emissions	0.4	0.3	103,537	21.6	1.3	105,684	104,626
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1,961	0.01	0.01	1,966	---
Totals	**0.8**	**0.3**	**114,308**	**5,472**	**1.3**	**574,287**	**124,554**

Notes:

1 - High HAP is Hydrogen Chloride

2 - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table A.15

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (PTE 2030)

LFG to Flares = 6,864 cfm

	Operating Hours	PTE 2030 Flare Emissions (TPY) Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	103,537.3	6.4	1.3	15.3	104,625.5	104,625.5	105,684.5
	Total Emissions (TPY)	103,537.3	6.4	1.3	15.3	104,625.5	104,625.5	105,684.5
	Total Emissions (lb/yr)	2.07E+08	1.27E+04	2.51E+03	30,521.8	2.09E+08	2.09E+08	2.11E+08

Flare Combustion Factors

	Pounds per Hour of Operation CO_2	CH_4	N_2O
Flares	23,638.7	1.5	0.29

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	205.9	MMBtu/hr
LFG combusted:	6,864	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table A.16

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (PTE 2030)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	8,172	cfm
LFG Collection Efficiency =	84%	
Total LFG Collected =	6,864	cfm
Total LFG Collected to Flares =	6,864	cfm
Hours of Operation =	8,760	

				Uncontrolled Emissions					Controlled Emissions		
CAS #	**LFG Constituent**	**Molecular Weight**	**Median[1] ppmv**	**lb/hr**	**lb/yr**	**TPY**	**mg/m3**	**Avg. Control [6]**	**lb/hr**	**lb/yr**	**TPY**
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.002	19.90	0.01	0.09	98.0%	0.000	0.40	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.003	25.03	0.01	0.11	98.0%	0.000	0.50	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.002	14.76	0.01	0.07	98.0%	0.000	0.30	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.002	14.46	0.01	0.06	98.0%	0.000	0.29	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.008	69.78	0.03	0.31	98.0%	0.000	1.40	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.002	16.85	0.01	0.07	98.0%	0.000	0.34	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.004	31.75	0.02	0.14	98.0%	0.000	0.63	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.005	45.55	0.02	0.20	98.0%	0.000	0.91	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.003	22.94	0.01	0.10	98.0%	0.000	0.46	0.00
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.012	101.20	0.05	0.45	98.0%	0.000	2.02	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.002	16.79	0.01	0.07	98.0%	0.000	0.34	0.00
75-00-3	Chloroethane	64.52	0.04	0.003	26.19	0.01	0.12	98.0%	0.000	0.52	0.00
67-66-3	Chloroform	119.39	0.02	0.002	17.81	0.01	0.08	98.0%	0.000	0.36	0.00
74-87-3	Chloromethane [2]	50.49	0.02	0.001	7.53	0.00	0.03	98.0%	0.000	0.15	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.003	21.92	0.01	0.10	98.0%	0.000	0.44	0.00
75-09-2	Dichloromethane	84.94	0.03	0.003	25.37	0.01	0.11	98.0%	0.000	0.51	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.037	325.44	0.16	1.44	98.0%	0.001	6.51	0.00
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.003	28.02	0.01	0.12	98.0%	0.000	0.56	0.00
110-54-3	Hexane	86.18	0.38	0.035	304.65	0.15	1.35	98.0%	0.001	6.09	0.00
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.54	0.00	0.00	0.0%	0.000	0.54	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.010	89.72	0.04	0.40	98.0%	0.000	1.79	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.003	24.73	0.01	0.11	98.0%	0.000	0.49	0.00
79-01-6	Trichloroethene	131.40	0.02	0.002	19.60	0.01	0.09	98.0%	0.000	0.39	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.009	77.10	0.04	0.34	98.0%	0.000	1.54	0.00
1330-20-7	Xylene	106.16	0.85	0.095	832.65	0.42	3.70	98.0%	0.002	16.65	0.01
71-43-2	Benzene	78.11	0.36	0.029	256.71	0.13	1.14	98.0%	0.001	5.13	0.00
108-88-3	Toluene	92.13	1.33	0.129	1,128.01	0.56	5.01	98.0%	0.003	22.56	0.01
100-42-5	Styrene	104.15	0.02	0.002	15.53	0.01	0.07	98.0%	0.000	0.31	0.00
7647-01-0	Hydrogen Chloride [5]	36.46	1.94	0.074	651.15	0.33	2.89	0.0%	0.074	651.15	0.33
	Total HAPs					2.12					0.36

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)

6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table A.17

Emissions Inventory

Modern Landfill, Inc.

Summary of Landfill Gas Fugitive Emissions (PTE 2030)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2030	8,172	84%	6,864	1,307	687,195,510	19,459,210	0.3	5,450.3	4,982.2	19,928.7	462,809

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from landfill gas modeling results

Utilized LandGEM Model using the following parameters (k = 0.04 yr^{-1}, Lo = 100 m^3/Mg) (referenced from AP-42, Section 2.4 (11/98))

Collection efficiency of 84% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 $x10^{-6}$ pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table A.18

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (PTE 2030)

Total LFG Generated =	8,172	cfm
LFG Collection Efficiency =	84%	
Average LFG Collected =	6,864	cfm
Fugitive Emission Estimates =	1,307	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	0.02	0.000	3.79	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.001	4.77	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	2.81	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	2.75	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.002	13.29	0.01	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	3.21	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.001	6.05	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.001	8.68	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	4.37	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.002	19.28	0.01	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	3.20	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.001	4.99	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	3.39	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	1.43	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	4.18	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.001	4.83	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.007	61.99	0.03	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.001	5.34	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.007	58.03	0.03	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.10	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.002	17.09	0.01	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.001	4.71	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	3.73	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.002	14.69	0.01	0.34
1330-20-7	Xylene	106.16	0.85	0.018	158.60	0.08	3.70
71-43-2	Benzene	78.11	0.36	0.006	48.90	0.02	1.14
108-88-3	Toluene	92.13	1.33	0.025	214.86	0.11	5.01
100-42-5	Styrene	104.15	0.02	0.000	2.96	0.00	0.07
	Total HAPs					0.34	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table A.19

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (PTE 2030)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion = 40,000,000 gallons x 3.7854 L/gal x 1.36 mg/L VOC x 2.21E-06 lbs/mg

VOC Portion = **454** pounds

VOC Emissions = 454 pounds x 100% potentially emitted = **454.1 pounds of VOC**
= **0.23 tons of VOC**

HAP Portion = 40,000,000 gallons x 3.7854 L/gal x 0.81 mg/L VOC x 2.21E-06 lbs/mg

HAP Portion = **270** pounds

HAP Portion = 270 pounds x 100% potentially emitted = **270.4 pounds of VOC**
= **0.14 tons of VOC**

Table A.20

Calculated Diesel Engine Emissions (PTE 2030)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table A.21

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (PTE 2030)

Maximum Annual Natural Gas Combusted **7.72** MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	7.72 MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X / MMSCF	7.72 MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X / MMSCF	7.72 MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X / MMSCF	7.72 MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X / MMSCF	7.72 MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X / MMSCF	7.72 MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X / MMSCF	7.72 MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X / MMSCF	7.72 MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	# Furnaces	Rated Capacity (BTU/hr)	Total Capacity (BTU/hr)
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table A.22

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (PTE 2030)

Maximum Annual Landfill Gas Combusted **3.93** MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table A.23

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (PTE 2030)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:

					Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table A.24

Emissions Inventory

Modern Landfill, Inc.

Exempt Gasoline Generators (PTE 2030)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = **1,200** **gallons**

Power (HP)	**Gallons Combusted**	**PM (lb/yr)**	**SO_2 (lb/yr)**	**NO_x (lb/yr)**	**VOC (lb/yr)**	**CO (lb/yr)**	**CO_2 (lb/yr)**
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table A.25

Exempt Diesel Generators (PTE 2030)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table A.26

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (PTE 2030)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Attachment B

Emissions Inventory – Projected Actual 2050

Table B.1

Emissions Inventory
Modern Landfill, Inc.
Summary of Projected Actual 2050 Emissions

Emission Source	Projected Actual 2050 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.0	0.0	545	596	---	50,622	2,180
LFG Flare Combustion Emissions	0.1	0.1	40,985	8.6	0.5	41,835	41,416
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1961.1	0.01	0.01	1,966	---
Totals	**0.3**	**0.1**	**47,319**	**605**	**0.5**	**98,251**	**43,596**

Notes:

1 - High HAP is Hydrogen Chloride

2 - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table B.2

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (Projected Actual 2050)

LFG to Flares = 2,717 cfm

	Operating Hours	Projected Actual 2050 Flare Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	40,985.4	2.5	0.5	6.0	41,416.2	41,416.2	41,835.3
	Total Emissions (TPY)	40,985.4	2.5	0.5	6.0	41,416.2	41,416.2	41,835.3
	Total Emissions (lb/yr)	8.20E+07	5.04E+03	9.92E+02	12,082.1	8.28E+07	8.28E+07	8.37E+07

Flare Combustion Factors

	Pounds per Hour of Operation		
	CO_2	CH_4	N_2O
Flares	9,357.4	0.6	0.11

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	81.5	MMBtu/hr
LFG combusted:	2,717	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table B.3

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (Projected Actual 2050)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	2,860	cfm
LFG Collection Efficiency =	95%	
Total LFG Collected =	2,717	cfm
Total LFG Collected to Flares =	2,717	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	lb/yr	TPY	mg/m3	Avg. Control [6]	Controlled Emissions lb/hr	lb/yr	TPY
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.001	7.88	0.00	0.09	98.0%	0.000	0.16	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.001	9.91	0.00	0.11	98.0%	0.000	0.20	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.001	5.84	0.00	0.07	98.0%	0.000	0.12	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.001	5.72	0.00	0.06	98.0%	0.000	0.11	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.003	27.62	0.01	0.31	98.0%	0.000	0.55	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.001	6.67	0.00	0.07	98.0%	0.000	0.13	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.001	12.57	0.01	0.14	98.0%	0.000	0.25	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.002	18.03	0.01	0.20	98.0%	0.000	0.36	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.001	9.08	0.00	0.10	98.0%	0.000	0.18	0.00
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.005	40.06	0.02	0.45	98.0%	0.000	0.80	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.001	6.64	0.00	0.07	98.0%	0.000	0.13	0.00
75-00-3	Chloroethane	64.52	0.04	0.001	10.37	0.01	0.12	98.0%	0.000	0.21	0.00
67-66-3	Chloroform	119.39	0.02	0.001	7.05	0.00	0.08	98.0%	0.000	0.14	0.00
74-87-3	Chloromethane [2]	50.49	0.02	0.000	2.98	0.00	0.03	98.0%	0.000	0.06	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.001	8.68	0.00	0.10	98.0%	0.000	0.17	0.00
75-09-2	Dichloromethane	84.94	0.03	0.001	10.04	0.01	0.11	98.0%	0.000	0.20	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.015	128.82	0.06	1.44	98.0%	0.000	2.58	0.00
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.001	11.09	0.01	0.12	98.0%	0.000	0.22	0.00
110-54-3	Hexane	86.18	0.38	0.014	120.60	0.06	1.35	98.0%	0.000	2.41	0.00
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.21	0.00	0.00	0.0%	0.000	0.21	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.004	35.51	0.02	0.40	98.0%	0.000	0.71	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.001	9.79	0.00	0.11	98.0%	0.000	0.20	0.00
79-01-6	Trichloroethene	131.40	0.02	0.001	7.76	0.00	0.09	98.0%	0.000	0.16	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.003	30.52	0.02	0.34	98.0%	0.000	0.61	0.00
1330-20-7	Xylene	106.16	0.85	0.038	329.61	0.16	3.70	98.0%	0.001	6.59	0.00
71-43-2	Benzene	78.11	0.36	0.012	101.62	0.05	1.14	98.0%	0.000	2.03	0.00
108-88-3	Toluene	92.13	1.33	0.051	446.53	0.22	5.01	98.0%	0.001	8.93	0.00
100-42-5	Styrene	104.15	0.02	0.001	6.15	0.00	0.07	98.0%	0.000	0.12	0.00
7647-01-0	Hydrogen Chloride [5]	36.46	1.94	0.029	257.76	0.13	2.89	0.0%	0.029	257.76	0.13
	Total HAPs					0.84					0.14

Notes:
1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)
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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced
4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced
5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)
6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table B.4

Emissions Inventory

Modern Landfill, Inc.

Summary of Landfill Gas Fugitive Emissions (Projected Actual 2050)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2050	2,860	95%	2,717	143	75,165,441	2,128,448	0.0	596.2	544.9	2,179.8	50,622

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from landfill gas modeling results

Utilized LandGEM Model using the following parameters (k = 0.04 yr^{-1}, Lo = 100 m^3/Mg) (referenced from AP-42, Section 2.4 (11/98))

Collection efficiency of 95% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 x10^{-6} pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table B.5

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (Projected Actual 2050)

Total LFG Generated =	2,860	cfm
LFG Collection Efficiency =	95%	
Average LFG Collected =	2,717	cfm
Fugitive Emission Estimates =	143	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	0.02	0.000	0.41	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.000	0.52	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	0.31	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	0.30	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.000	1.45	0.00	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	0.35	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.000	0.66	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.000	0.95	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	0.48	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.000	2.11	0.00	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	0.35	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.000	0.55	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	0.37	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	0.16	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	0.46	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.000	0.53	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.001	6.78	0.00	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.000	0.58	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.001	6.35	0.00	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.01	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.000	1.87	0.00	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.000	0.52	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	0.41	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.000	1.61	0.00	0.34
1330-20-7	Xylene	106.16	0.85	0.002	17.35	0.01	3.70
71-43-2	Benzene	78.11	0.36	0.001	5.35	0.00	1.14
108-88-3	Toluene	92.13	1.33	0.003	23.50	0.01	5.01
100-42-5	Styrene	104.15	0.02	0.000	0.32	0.00	0.07
	Total HAPs					0.04	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table B.6

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (Projected Actual 2050)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion = 40,000,000 gallons x 3.7854 L/gal x 1.36 mg/L VOC x 2.21E-06 lbs/mg

VOC Portion = **454** pounds

VOC Emissions = 454 pounds x 100% potentially emitted = **454.1 pounds of VOC**
= **0.23 tons of VOC**

HAP Portion = 40,000,000 gallons x 3.7854 L/gal x 0.81 mg/L VOC x 2.21E-06 lbs/mg

HAP Portion = **270** pounds

HAP Portion = 270 pounds x 100% potentially emitted = **270.4 pounds of VOC**
= **0.14 tons of VOC**

Table B.7

Calculated Diesel Engine Emissions (Projected Actual 2050)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table B.8

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (Projected Actual 2050)

Maximum Annual Natural Gas Combusted **7.72** MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	7.72 MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X / MMSCF	7.72 MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X / MMSCF	7.72 MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X / MMSCF	7.72 MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X / MMSCF	7.72 MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X / MMSCF	7.72 MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X / MMSCF	7.72 MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X / MMSCF	7.72 MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table B.9

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (Projected Actual 2050)

Maximum Annual Landfill Gas Combusted 3.93 MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	7.60 lb. X MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	# Furnaces	Rated Capacity (BTU/hr)	Total Capacity (BTU/hr)
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table B.10

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (Projected Actual 2050)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	# Furnaces	Rated Capacity (BTU/hr)	Total Capacity (BTU/hr)
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table B.11

Emissions Inventory

Modern Landfill, Inc.

Exempt Gasoline Generators (Projected Actual 2050)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = **1,200** **gallons**

Power (HP)	**Gallons Combusted**	**PM (lb/yr)**	**SO_2 (lb/yr)**	**NO_x (lb/yr)**	**VOC (lb/yr)**	**CO (lb/yr)**	**CO_2 (lb/yr)**
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table B.12

Exempt Diesel Generators (Projected Actual 2050)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table B.13

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (Projected Actual 2050)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

[1] - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

[2] - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Table B.14

Emissions Inventory
Modern Landfill, Inc.
Summary of PTE 2050 Emissions

Emission Source	PTE 2050 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.0	0.0	656	718	---	60,957	2,625
LFG Flare Combustion Emissions	0.2	0.2	49,353	10.3	0.6	50,377	49,872
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1961.1	0.01	0.01	1,966	---
Totals	**0.4**	**0.2**	**55,798**	**728**	**0.6**	**117,128**	**52,497**

Notes:

1 - High HAP is Hydrogen Chloride

2 - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table B.15

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (PTE 2050)

LFG to Flares = 3,272 cfm

	Operating Hours	PTE 2050 Flare Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	49,353.1	3.0	0.6	7.3	49,871.8	49,871.8	50,376.6
	Total Emissions (TPY)	49,353.1	3.0	0.6	7.3	49,871.8	49,871.8	50,376.6
	Total Emissions (lb/yr)	9.87E+07	6.07E+03	1.19E+03	14,548.8	9.97E+07	9.97E+07	1.01E+08

Flare Combustion Factors

	Pounds per Hour of Operation		
	CO_2	CH_4	N_2O
Flares	11,267.8	0.7	0.14

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	98.2	MMBtu/hr
LFG combusted:	3,272	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table B.16

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (PTE 2050)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	3,444	cfm
LFG Collection Efficiency =	95%	
Total LFG Collected =	3,272	cfm
Total LFG Collected to Flares =	3,272	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	Uncontrolled Emissions lb/yr	Uncontrolled Emissions TPY	mg/m3	Avg. Control [6]	Controlled Emissions lb/hr	Controlled Emissions lb/yr	Controlled Emissions TPY
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.001	9.48	0.00	0.09	98.0%	0.000	0.19	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.001	11.93	0.01	0.11	98.0%	0.000	0.24	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.001	7.04	0.00	0.07	98.0%	0.000	0.14	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.001	6.89	0.00	0.06	98.0%	0.000	0.14	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.004	33.26	0.02	0.31	98.0%	0.000	0.67	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.001	8.03	0.00	0.07	98.0%	0.000	0.16	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.002	15.13	0.01	0.14	98.0%	0.000	0.30	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.002	21.71	0.01	0.20	98.0%	0.000	0.43	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.001	10.94	0.01	0.10	98.0%	0.000	0.22	0.00
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.006	48.24	0.02	0.45	98.0%	0.000	0.96	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.001	8.00	0.00	0.07	98.0%	0.000	0.16	0.00
75-00-3	Chloroethane	64.52	0.04	0.001	12.49	0.01	0.12	98.0%	0.000	0.25	0.00
67-66-3	Chloroform	119.39	0.02	0.001	8.49	0.00	0.08	98.0%	0.000	0.17	0.00
74-87-3	Chloromethane [2]	50.49	0.02	0.000	3.59	0.00	0.03	98.0%	0.000	0.07	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.001	10.45	0.01	0.10	98.0%	0.000	0.21	0.00
75-09-2	Dichloromethane	84.94	0.03	0.001	12.10	0.01	0.11	98.0%	0.000	0.24	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.018	155.13	0.08	1.44	98.0%	0.000	3.10	0.00
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.002	13.36	0.01	0.12	98.0%	0.000	0.27	0.00
110-54-3	Hexane	86.18	0.38	0.017	145.22	0.07	1.35	98.0%	0.000	2.90	0.00
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.26	0.00	0.00	0.0%	0.000	0.26	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.005	42.76	0.02	0.40	98.0%	0.000	0.86	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.001	11.79	0.01	0.11	98.0%	0.000	0.24	0.00
79-01-6	Trichloroethene	131.40	0.02	0.001	9.34	0.00	0.09	98.0%	0.000	0.19	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.004	36.75	0.02	0.34	98.0%	0.000	0.74	0.00
1330-20-7	Xylene	106.16	0.85	0.045	396.90	0.20	3.70	98.0%	0.001	7.94	0.00
71-43-2	Benzene	78.11	0.36	0.014	122.36	0.06	1.14	98.0%	0.000	2.45	0.00
108-88-3	Toluene	92.13	1.33	0.061	537.69	0.27	5.01	98.0%	0.001	10.75	0.01
100-42-5	Styrene	104.15	0.02	0.001	7.40	0.00	0.07	98.0%	0.000	0.15	0.00
7647-01-0	Hydrogen Chloride [5]	36.46	1.94	0.035	310.38	0.16	2.89	0.0%	0.035	310.38	0.16
	Total HAPs					1.01					0.17

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)

6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table B.17

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Fugitive Emissions (PTE 2050)

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 HAP Emissions** (TPY)	**Fugitive CH_4 Emissions** (TPY)	**Oxidized CO_2 Emissions** (TPY)	**Fugitive Biogenic CO_2 Emissions** (TPY)	**Antrhro GHG Emissions** (T CO_2eq/yr)
2050	3,444	95%	3,272	172	90,511,474	2,563,000	0.0	717.9	656.2	2,624.8	60,957

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from landfill gas modeling results

Utilized LandGEM Model using the following parameters (k = 0.04 yr^{-1}, Lo = 100 m^3/Mg) (referenced from AP-42, Section 2.4 (11/98))

Collection efficiency of 95% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

Conversion from NMOC in ppm to mg/m^3 = $\dfrac{595 \text{ ppm} \times 86.18}{24.47}$ mg/m^3

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 x10^{-6} pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table B.18

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (PTE 2050)

Total LFG Generated =	3,444	cfm
LFG Collection Efficiency =	95%	
Average LFG Collected =	3,272	cfm
Fugitive Emission Estimates =	172	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	0.02	0.000	0.50	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.000	0.63	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	0.37	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	0.36	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.000	1.75	0.00	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	0.42	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.000	0.80	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.000	1.14	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	0.58	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.000	2.54	0.00	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	0.42	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.000	0.66	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	0.45	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	0.19	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	0.55	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.000	0.64	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.001	8.16	0.00	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.000	0.70	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.001	7.64	0.00	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.01	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.000	2.25	0.00	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.000	0.62	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	0.49	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.000	1.93	0.00	0.34
1330-20-7	Xylene	106.16	0.85	0.002	20.89	0.01	3.70
71-43-2	Benzene	78.11	0.36	0.001	6.44	0.00	1.14
108-88-3	Toluene	92.13	1.33	0.003	28.30	0.01	5.01
100-42-5	Styrene	104.15	0.02	0.000	0.39	0.00	0.07
	Total HAPs					0.04	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table B.19

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (PTE 2050)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion =	40,000,000	gallons	x	3.7854	L/gal	x	1.36	mg/L VOC	x	2.21E-06 lbs/mg
VOC Portion =	**454**	pounds								
VOC Emissions =	454	pounds	x	100%	potentially emitted	=		**454.1**	**pounds of VOC**	
						=		**0.23**	**tons of VOC**	
HAP Portion =	40,000,000	gallons	x	3.7854	L/gal	x	0.81	mg/L VOC	x	2.21E-06 lbs/mg
HAP Portion =	**270**	pounds								
HAP Portion =	270	pounds	x	100%	potentially emitted	=		**270.4**	**pounds of VOC**	
						=		**0.14**	**tons of VOC**	

Table B.20

Calculated Diesel Engine Emissions (PTE 2050)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table B.21

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (PTE 2050)

Maximum Annual Natural Gas Combusted 7.72 MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	7.60 lb. X MMSCF	7.72 MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X MMSCF	7.72 MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X MMSCF	7.72 MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X MMSCF	7.72 MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X MMSCF	7.72 MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X MMSCF	7.72 MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X MMSCF	7.72 MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X MMSCF	7.72 MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	# Furnaces	Rated Capacity (BTU/hr)	Total Capacity (BTU/hr)
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table B.22

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (PTE 2050)

Maximum Annual Landfill Gas Combusted **3.93** MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table B.23

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (PTE 2050)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table B.24

Emissions Inventory

Modern Landfill, Inc.

Exempt Gasoline Generators (PTE 2050)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = **1,200** **gallons**

Power (HP)	Gallons Combusted	PM (lb/yr)	SO_2 (lb/yr)	NO_x (lb/yr)	VOC (lb/yr)	CO (lb/yr)	CO_2 (lb/yr)
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table B.25

Exempt Diesel Generators (PTE 2050)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table B.26

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (PTE 2050)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Attachment C

Emissions Inventory – Projected Actual 2023

Table C.1

Emissions Inventory
Modern Landfill, Inc.
Summary of Projected Actual 2023 Emissions

Emission Source	Projected Actual 2023 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.2	0.0	3,210	3,512	---	298,200	12,841
LFG Flare Combustion Emissions	0.1	0.1	40,239	8.4	0.5	41,073	40,662
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1,961	0.01	0.01	1,966	---
Totals	**0.5**	**0.1**	**49,238**	**3,520**	**0.5**	**345,067**	**53,502**

Notes:

1 - High HAP is Hydrogen Chloride

2 - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table C.2

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (Projected Actual 2023)

LFG to Flares = 2,668 cfm

	Operating Hours	Projected Actual 2023 Flare Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	40,238.9	2.5	0.5	5.9	40,661.8	40,661.8	41,073.4
	Total Emissions (TPY)	40,238.9	2.5	0.5	5.9	40,661.8	40,661.8	41,073.4
	Total Emissions (lb/yr)	8.05E+07	4.95E+03	9.74E+02	11,862.0	8.13E+07	8.13E+07	8.21E+07

Flare Combustion Factors

	Pounds per Hour of Operation		
	CO_2	CH_4	N_2O
Flares	9,187.0	0.6	0.11

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	80.0	MMBtu/hr
LFG combusted:	2,668	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table C.3

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (Projected Actual 2023)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	3,510	cfm
LFG Collection Efficiency =	76%	
Total LFG Collected =	2,668	cfm
Total LFG Collected to Flares =	2,668	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	Uncontrolled Emissions lb/yr	Uncontrolled Emissions TPY	mg/m3	Avg. Control [6]	Controlled Emissions lb/hr	Controlled Emissions lb/yr	Controlled Emissions TPY
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.001	7.73	0.00	0.09	98.0%	0.000	0.15	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.001	9.73	0.00	0.11	98.0%	0.000	0.19	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.001	5.74	0.00	0.07	98.0%	0.000	0.11	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.001	5.62	0.00	0.06	98.0%	0.000	0.11	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.003	27.12	0.01	0.31	98.0%	0.000	0.54	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.001	6.55	0.00	0.07	98.0%	0.000	0.13	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.001	12.34	0.01	0.14	98.0%	0.000	0.25	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.002	17.70	0.01	0.20	98.0%	0.000	0.35	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.001	8.92	0.00	0.10	98.0%	0.000	0.18	0.00
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.004	39.33	0.02	0.45	98.0%	0.000	0.79	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.001	6.52	0.00	0.07	98.0%	0.000	0.13	0.00
75-00-3	Chloroethane	64.52	0.04	0.001	10.18	0.01	0.12	98.0%	0.000	0.20	0.00
67-66-3	Chloroform	119.39	0.02	0.001	6.92	0.00	0.08	98.0%	0.000	0.14	0.00
74-87-3	Chloromethane [2]	50.49	0.02	0.000	2.93	0.00	0.03	98.0%	0.000	0.06	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.001	8.52	0.00	0.10	98.0%	0.000	0.17	0.00
75-09-2	Dichloromethane	84.94	0.03	0.001	9.86	0.00	0.11	98.0%	0.000	0.20	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.014	126.48	0.06	1.44	98.0%	0.000	2.53	0.00
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.001	10.89	0.01	0.12	98.0%	0.000	0.22	0.00
110-54-3	Hexane	86.18	0.38	0.014	118.40	0.06	1.35	98.0%	0.000	2.37	0.00
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.21	0.00	0.00	0.0%	0.000	0.21	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.004	34.87	0.02	0.40	98.0%	0.000	0.70	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.001	9.61	0.00	0.11	98.0%	0.000	0.19	0.00
79-01-6	Trichloroethene	131.40	0.02	0.001	7.62	0.00	0.09	98.0%	0.000	0.15	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.003	29.96	0.01	0.34	98.0%	0.000	0.60	0.00
1330-20-7	Xylene	106.16	0.85	0.037	323.60	0.16	3.70	98.0%	0.001	6.47	0.00
71-43-2	Benzene	78.11	0.36	0.011	99.77	0.05	1.14	98.0%	0.000	2.00	0.00
108-88-3	Toluene	92.13	1.33	0.050	438.39	0.22	5.01	98.0%	0.001	8.77	0.00
100-42-5	Styrene	104.15	0.02	0.001	6.04	0.00	0.07	98.0%	0.000	0.12	0.00
7647-01-0	Hydrogen Chloride [5]	36.46	1.94	0.029	253.06	0.13	2.89	0.0%	0.029	253.06	0.13
	Total HAPs					0.82					0.14

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)

6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table C.4

Emissions Inventory

Modern Landfill, Inc.

Summary of Landfill Gas Fugitive Emissions (Projected Actual 2023)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2023	3,510	76%	2,668	842	442,778,584	12,538,093	0.2	3,511.8	3,210.1	12,840.6	298,200

Notes:

Landfill gas (LFG) to Collection System in average cubic feet per minute (cfm) from flow data collected in 2022 and 2023.

Collection efficiency of 76% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

Conversion from NMOC in ppm to mg/m^3 = $\dfrac{595 \text{ ppm} \times 86.18}{24.47}$ mg/m^3

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 $\times 10^{-6}$ pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table C.5

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (Projected Actual 2023)

Total LFG Generated =	3,510	cfm
LFG Collection Efficiency =	76%	
Average LFG Collected =	2,668	cfm
Fugitive Emission Estimates =	842	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	0.02	0.000	2.44	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.000	3.07	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	1.81	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	1.77	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.001	8.56	0.00	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	2.07	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.000	3.90	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.001	5.59	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	2.82	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.001	12.42	0.01	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	2.06	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.000	3.21	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	2.19	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	0.92	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	2.69	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.000	3.11	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.005	39.94	0.02	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.000	3.44	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.004	37.39	0.02	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.07	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.001	11.01	0.01	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.000	3.04	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	2.41	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.001	9.46	0.00	0.34
1330-20-7	Xylene	106.16	0.85	0.012	102.19	0.05	3.70
71-43-2	Benzene	78.11	0.36	0.004	31.51	0.02	1.14
108-88-3	Toluene	92.13	1.33	0.016	138.44	0.07	5.01
100-42-5	Styrene	104.15	0.02	0.000	1.91	0.00	0.07
	Total HAPs					0.22	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table C.6

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (Projected Actual 2023)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion =	40,000,000	gallons	x	3.7854	L/gal	x		1.36	mg/L VOC	x	2.21E-06	lbs/mg
VOC Portion =	**454**	pounds										
VOC Emissions =	454	pounds	x	100%	potentially emitted	=		**454.1**	**pounds of VOC**			
							=	**0.23**	**tons of VOC**			
HAP Portion =	40,000,000	gallons	x	3.7854	L/gal	x		0.81	mg/L VOC	x	2.21E-06	lbs/mg
HAP Portion =	**270**	pounds										
HAP Portion =	270	pounds	x	100%	potentially emitted	=		**270.4**	**pounds of VOC**			
							=	**0.14**	**tons of VOC**			

Table C.7

Calculated Diesel Engine Emissions (Projected Actual 2023)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table C.8

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (Projected Actual 2023)

Maximum Annual Natural Gas Combusted 7.72 MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X MMSCF	7.72 MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X MMSCF	7.72 MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X MMSCF	7.72 MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X MMSCF	7.72 MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X MMSCF	7.72 MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X MMSCF	7.72 MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X MMSCF	7.72 MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X MMSCF	7.72 MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table C.9

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (Projected Actual 2023)

Maximum Annual Landfill Gas Combusted 3.93 MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table C.10

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (Projected Actual 2023)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table C.11

Emissions Inventory
Modern Landfill, Inc.
Exempt Gasoline Generators (Projected Actual 2023)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = **1,200** **gallons**

Power (HP)	Gallons Combusted	PM (lb/yr)	SO_2 (lb/yr)	NO_x (lb/yr)	VOC (lb/yr)	CO (lb/yr)	CO_2 (lb/yr)
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table C.12

Exempt Diesel Generators (Projected Actual 2023)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table C.13

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (Projected Actual 2023)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Table C.14

Emissions Inventory
Modern Landfill, Inc.
Summary of PTE 2023 Emissions

Emission Source	PTE 2023 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.5	0.0	6,701	7,331	---	622,521	26,806
LFG Flare Combustion Emissions	0.3	0.3	84,003	17.5	1.0	85,745	84,885
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1,961	0.01	0.01	1,966	---
Totals	**0.9**	**0.3**	**96,493**	**7,349**	**1.0**	**714,059**	**111,691**

Notes:

1 - High HAP is Hydrogen Chloride

2 - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table C.15

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (PTE 2023)

LFG to Flares = 5,569 cfm

	Operating Hours	PTE 2023 Flare Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	84,002.5	5.2	1.0	12.4	84,885.4	84,885.4	85,744.5
Total Emissions (TPY)		84,002.5	5.2	1.0	12.4	84,885.4	84,885.4	85,744.5
Total Emissions (lb/yr)		1.68E+08	1.03E+04	2.03E+03	24,763.1	1.70E+08	1.70E+08	1.71E+08

Flare Combustion Factors

	Pounds per Hour of Operation		
	CO_2	CH_4	N_2O
Flares	19,178.7	1.2	0.23

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	167.1	MMBtu/hr
LFG combusted:	5,569	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table C.16

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (PTE 2023)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	7,328	cfm
LFG Collection Efficiency =	76%	
Total LFG Collected =	5,569	cfm
Total LFG Collected to Flares =	5,569	cfm
Hours of Operation =	8,760	

				Uncontrolled Emissions					Controlled Emissions		
CAS #	LFG Constituent	Molecular Weight	Median[1] ppmv	lb/hr	lb/yr	TPY	mg/m3	Avg. Control[6]	lb/hr	lb/yr	TPY
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.002	16.14	0.01	0.09	98.0%	0.000	0.32	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.002	20.31	0.01	0.11	98.0%	0.000	0.41	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.001	11.97	0.01	0.07	98.0%	0.000	0.24	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.001	11.73	0.01	0.06	98.0%	0.000	0.23	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.006	56.62	0.03	0.31	98.0%	0.000	1.13	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.002	13.67	0.01	0.07	98.0%	0.000	0.27	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.003	25.76	0.01	0.14	98.0%	0.000	0.52	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.004	36.96	0.02	0.20	98.0%	0.000	0.74	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.002	18.61	0.01	0.10	98.0%	0.000	0.37	0.00
463-58-1	Carbonyl sulfide[4]	60.07	0.18	0.009	82.10	0.04	0.45	98.0%	0.000	1.64	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.002	13.62	0.01	0.07	98.0%	0.000	0.27	0.00
75-00-3	Chloroethane	64.52	0.04	0.002	21.25	0.01	0.12	98.0%	0.000	0.43	0.00
67-66-3	Chloroform	119.39	0.02	0.002	14.45	0.01	0.08	98.0%	0.000	0.29	0.00
74-87-3	Chloromethane[2]	50.49	0.02	0.001	6.11	0.00	0.03	98.0%	0.000	0.12	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.002	17.79	0.01	0.10	98.0%	0.000	0.36	0.00
75-09-2	Dichloromethane	84.94	0.03	0.002	20.59	0.01	0.11	98.0%	0.000	0.41	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.030	264.04	0.13	1.44	98.0%	0.001	5.28	0.00
106-93-4	Ethylene dibromide[2]	187.88	0.02	0.003	22.73	0.01	0.12	98.0%	0.000	0.45	0.00
110-54-3	Hexane	86.18	0.38	0.028	247.17	0.12	1.35	98.0%	0.001	4.94	0.00
7439-97-6	Mercury[3]	200.61	0.000292	0.000	0.44	0.00	0.00	0.0%	0.000	0.44	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.008	72.79	0.04	0.40	98.0%	0.000	1.46	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.002	20.06	0.01	0.11	98.0%	0.000	0.40	0.00
79-01-6	Trichloroethene	131.40	0.02	0.002	15.90	0.01	0.09	98.0%	0.000	0.32	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.007	62.55	0.03	0.34	98.0%	0.000	1.25	0.00
1330-20-7	Xylene	106.16	0.85	0.077	675.55	0.34	3.70	98.0%	0.002	13.51	0.01
71-43-2	Benzene	78.11	0.36	0.024	208.27	0.10	1.14	98.0%	0.000	4.17	0.00
108-88-3	Toluene	92.13	1.33	0.104	915.19	0.46	5.01	98.0%	0.002	18.30	0.01
100-42-5	Styrene	104.15	0.02	0.001	12.60	0.01	0.07	98.0%	0.000	0.25	0.00
7647-01-0	Hydrogen Chloride[5]	36.46	1.94	0.060	528.29	0.26	2.89	0.0%	0.060	528.29	0.26
	Total HAPs					1.72					0.29

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)

6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table C.17

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Fugitive Emissions (PTE 2023)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2023	7,328	76%	5,569	1,759	924,341,604	26,174,439	0.5	7,331.2	6,701.5	26,805.9	622,521

Notes:

Landfill gas (LFG) to Collection System in average cubic feet per minute (cfm) from flow data collected in 2022 and 2023.

Collection efficiency of 76% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 $\times 10^{-6}$ pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table C.18

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (PTE 2023)

Total LFG Generated =	7,328	cfm
LFG Collection Efficiency =	76%	
Average LFG Collected =	5,569	cfm
Fugitive Emission Estimates =	1,759	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	0.02	0.001	5.10	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.001	6.41	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	3.78	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	3.70	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.002	17.88	0.01	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	4.32	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.001	8.13	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.001	11.67	0.01	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.001	5.88	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.003	25.93	0.01	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	4.30	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.001	6.71	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.001	4.56	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	1.93	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.001	5.62	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.001	6.50	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.010	83.38	0.04	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.001	7.18	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.009	78.05	0.04	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.14	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.003	22.99	0.01	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.001	6.34	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.001	5.02	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.002	19.75	0.01	0.34
1330-20-7	Xylene	106.16	0.85	0.024	213.33	0.11	3.70
71-43-2	Benzene	78.11	0.36	0.008	65.77	0.03	1.14
108-88-3	Toluene	92.13	1.33	0.033	289.01	0.14	5.01
100-42-5	Styrene	104.15	0.02	0.000	3.98	0.00	0.07
	Total HAPs					0.46	

Notes:

[1] Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

[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) datal

[3] Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

[4] Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table C.19

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (PTE 2023)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion =	40,000,000	gallons	x	3.7854	L/gal	x	1.36	mg/L VOC	x	2.21E-06	lbs/mg
VOC Portion =	**454**	pounds									
VOC Emissions =	454	pounds	x	100%	potentially emitted	=				**454.1**	**pounds of VOC**
						=				**0.23**	**tons of VOC**
HAP Portion =	40,000,000	gallons	x	3.7854	L/gal	x	0.81	mg/L VOC	x	2.21E-06	lbs/mg
HAP Portion =	**270**	pounds									
HAP Portion =	270	pounds	x	100%	potentially emitted	=				**270.4**	**pounds of VOC**
						=				**0.14**	**tons of VOC**

Table C.20

Calculated Diesel Engine Emissions (PTE 2023)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table C.21

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (PTE 2023)

Maximum Annual Natural Gas Combusted **7.72** MMscf

Emission Calculations:						
					Lbs/yr	Tons/yr
PM=	7.60 lb. X MMSCF	7.72	MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X MMSCF	7.72	MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X MMSCF	7.72	MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X MMSCF	7.72	MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X MMSCF	7.72	MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X MMSCF	7.72	MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X MMSCF	7.72	MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X MMSCF	7.72	MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table C.22

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (PTE 2023)

Maximum Annual Landfill Gas Combusted **3.93** MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table C.23

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (PTE 2023)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table C.24

Emissions Inventory
Modern Landfill, Inc.
Exempt Gasoline Generators (PTE 2023)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = **1,200** **gallons**

Power (HP)	**Gallons Combusted**	**PM (lb/yr)**	**SO_2 (lb/yr)**	**NO_x (lb/yr)**	**VOC (lb/yr)**	**CO (lb/yr)**	**CO_2 (lb/yr)**
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table C.25

Exempt Diesel Generators (PTE 2023)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table C.26

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (Projected Actual 2023)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Attachment D

Emissions Inventory – Projected Actual 2035

Table D.1

Emissions Inventory

Modern Landfill, Inc.

Summary of Projected Actual 2035 Emissions

Emission Source	Projected Actual 2035 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.1	0.0	993	1,086	---	92,239	3,972
LFG Flare Combustion Emissions	0.3	0.2	74,680	15.6	0.9	76,229	75,465
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1,961	0.01	0.01	1,966	---
Totals	**0.5**	**0.2**	**81,462**	**1,102**	**0.9**	**174,262**	**79,437**

Notes:

[1] - High HAP is Hydrogen Chloride

[2] - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table D.2

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (Projected Actual 2035)

LFG to Flares = 4,951 cfm

	Operating Hours	Projected Actual 2035 Flare Emissions (TPY) Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	74,680.3	4.6	0.9	11.0	75,465.2	75,465.2	76,229.0
	Total Emissions (TPY)	74,680.3	4.6	0.9	11.0	75,465.2	75,465.2	76,229.0
	Total Emissions (lb/yr)	1.49E+08	9.18E+03	1.81E+03	22,015.0	1.51E+08	1.51E+08	1.52E+08

Flare Combustion Factors

	Pounds per Hour of Operation CO_2	CH_4	N_2O
Flares	17,050.3	1.0	0.21

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	148.5	MMBtu/hr
LFG combusted:	4,951	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table D.3

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (Projected Actual 2035)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	5,212	cfm
LFG Collection Efficiency =	95%	
Total LFG Collected =	4,951	cfm
Total LFG Collected to Flares =	4,951	cfm
Hours of Operation =	8,760	

				Uncontrolled Emissions					Controlled Emissions		
CAS #	**LFG Constituent**	**Molecular Weight**	**Median[1] ppmv**	**lb/hr**	**lb/yr**	**TPY**	**mg/m3**	**Avg. Control [6]**	**lb/hr**	**lb/yr**	**TPY**
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.002	14.35	0.01	0.09	98.0%	0.000	0.29	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.002	18.06	0.01	0.11	98.0%	0.000	0.36	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.001	10.65	0.01	0.07	98.0%	0.000	0.21	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.001	10.43	0.01	0.06	98.0%	0.000	0.21	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.006	50.33	0.03	0.31	98.0%	0.000	1.01	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.001	12.15	0.01	0.07	98.0%	0.000	0.24	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.003	22.90	0.01	0.14	98.0%	0.000	0.46	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.004	32.86	0.02	0.20	98.0%	0.000	0.66	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.002	16.55	0.01	0.10	98.0%	0.000	0.33	0.00
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.008	72.99	0.04	0.45	98.0%	0.000	1.46	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.001	12.11	0.01	0.07	98.0%	0.000	0.24	0.00
75-00-3	Chloroethane	64.52	0.04	0.002	18.89	0.01	0.12	98.0%	0.000	0.38	0.00
67-66-3	Chloroform	119.39	0.02	0.001	12.84	0.01	0.08	98.0%	0.000	0.26	0.00
74-87-3	Chloromethane [2]	50.49	0.02	0.001	5.43	0.00	0.03	98.0%	0.000	0.11	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.002	15.81	0.01	0.10	98.0%	0.000	0.32	0.00
75-09-2	Dichloromethane	84.94	0.03	0.002	18.30	0.01	0.11	98.0%	0.000	0.37	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.027	234.73	0.12	1.44	98.0%	0.001	4.69	0.00
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.002	20.21	0.01	0.12	98.0%	0.000	0.40	0.00
110-54-3	Hexane	86.18	0.38	0.025	219.74	0.11	1.35	98.0%	0.001	4.39	0.00
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.39	0.00	0.00	0.0%	0.000	0.39	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.007	64.71	0.03	0.40	98.0%	0.000	1.29	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.002	17.84	0.01	0.11	98.0%	0.000	0.36	0.00
79-01-6	Trichloroethene	131.40	0.02	0.002	14.13	0.01	0.09	98.0%	0.000	0.28	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.006	55.61	0.03	0.34	98.0%	0.000	1.11	0.00
1330-20-7	Xylene	106.16	0.85	0.069	600.58	0.30	3.70	98.0%	0.001	12.01	0.01
71-43-2	Benzene	78.11	0.36	0.021	185.16	0.09	1.14	98.0%	0.000	3.70	0.00
108-88-3	Toluene	92.13	1.33	0.093	813.62	0.41	5.01	98.0%	0.002	16.27	0.01
100-42-5	Styrene	104.15	0.02	0.001	11.20	0.01	0.07	98.0%	0.000	0.22	0.00
7647-01-0	Hydrogen Chloride [5]	36.46	1.94	0.054	469.67	0.23	2.89	0.0%	0.054	469.67	0.23
	Total HAPs					1.53					0.26

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

5 Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)

6 Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table D.4

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Fugitive Emissions (Projected Actual 2035)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2035	5,212	95%	4,951	261	136,960,363	3,878,286	0.1	1,086.3	993.0	3,971.9	92,239

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from landfill gas modeling results

Utilized LandGEM Model using the following parameters (k = 0.04 yr^{-1}, Lo = 100 m^3/Mg) (referenced from AP-42, Section 2.4 (11/98))

Collection efficiency of 95% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 $x10^{-6}$ pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table D.5

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (Projected Actual 2035)

Total LFG Generated =	5,212	cfm
LFG Collection Efficiency =	95%	
Average LFG Collected =	4,951	cfm
Fugitive Emission Estimates =	261	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	0.02	0.000	0.76	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.000	0.95	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	0.56	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	0.55	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.000	2.65	0.00	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	0.64	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.000	1.21	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.000	1.73	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	0.87	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.000	3.84	0.00	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	0.64	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.000	0.99	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	0.68	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	0.29	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	0.83	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.000	0.96	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.001	12.35	0.01	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.000	1.06	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.001	11.57	0.01	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.02	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.000	3.41	0.00	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.000	0.94	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	0.74	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.000	2.93	0.00	0.34
1330-20-7	Xylene	106.16	0.85	0.004	31.61	0.02	3.70
71-43-2	Benzene	78.11	0.36	0.001	9.75	0.00	1.14
108-88-3	Toluene	92.13	1.33	0.005	42.82	0.02	5.01
100-42-5	Styrene	104.15	0.02	0.000	0.59	0.00	0.07
	Total HAPs					0.07	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table D.6

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (Projected Actual 2035)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion = 40,000,000 gallons x 3.7854 L/gal x 1.36 mg/L VOC x 2.21E-06 lbs/mg

VOC Portion = **454** pounds

VOC Emissions = 454 pounds x 100% potentially emitted = **454.1 pounds of VOC**
= **0.23 tons of VOC**

HAP Portion = 40,000,000 gallons x 3.7854 L/gal x 0.81 mg/L VOC x 2.21E-06 lbs/mg

HAP Portion = **270** pounds

HAP Portion = 270 pounds x 100% potentially emitted = **270.4 pounds of VOC**
= **0.14 tons of VOC**

Table D.7

Calculated Diesel Engine Emissions (Projected Actual 2035)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year

[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

[3] - Based on information provided by the manufacturer

[4] - Engine meets Tier IV standards for nonroad diesel engines

Table D.8

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (Projected Actual 2035)

Maximum Annual Natural Gas Combusted **7.72** MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	7.72 MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X / MMSCF	7.72 MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X / MMSCF	7.72 MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X / MMSCF	7.72 MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X / MMSCF	7.72 MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X / MMSCF	7.72 MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X / MMSCF	7.72 MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X / MMSCF	7.72 MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table D.9

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (Projected Actual 2035)

Maximum Annual Landfill Gas Combusted **3.93** MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table D.10

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (Projected Actual 2035)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86 10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table D.11

Emissions Inventory

Modern Landfill, Inc.

Exempt Gasoline Generators (Projected Actual 2035)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = **1,200** **gallons**

Power (HP)	**Gallons Combusted**	**PM (lb/yr)**	**SO_2 (lb/yr)**	**NO_x (lb/yr)**	**VOC (lb/yr)**	**CO (lb/yr)**	**CO_2 (lb/yr)**
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table D.12

Exempt Diesel Generators (Projected Actual 2035)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	[redacted]	[redacted]	[redacted]	0.002	[redacted]	[redacted]	1.150
lb/yr	[redacted]	[redacted]	[redacted]	2,469	[redacted]	[redacted]	1,385,175
TPY	[redacted]	[redacted]	[redacted]	1.23	[redacted]	[redacted]	692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16	[redacted]	1.46	0.17	[redacted]
lb/yr	7,307	307	307	[redacted]	2,891	337	[redacted]
TPY	3.65	0.15	0.15	[redacted]	1.45	0.17	[redacted]

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	[redacted]	[redacted]	[redacted]	0.002	[redacted]	[redacted]	1.150
lb/yr	[redacted]	[redacted]	[redacted]	893	[redacted]	[redacted]	501,206
TPY	[redacted]	[redacted]	[redacted]	0.45	[redacted]	[redacted]	250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09	[redacted]	0.64	0.06	[redacted]
lb/yr	8,263	83	83	[redacted]	615	58	[redacted]
TPY	4.13	0.04	0.04	[redacted]	0.31	0.03	[redacted]

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table D.13

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (Projected Actual 2035)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Table D.14

Emissions Inventory
Modern Landfill, Inc.
Summary of PTE 2032 Emissions

Emission Source	PTE 2032 Emissions (tons/year)						
	HAPs	Hi-HAP[1]	Anthro CO_2	CH_4	N_2O	Anthro GHG[2]	Biogenic CO_2
Landfill Fugitive Emissions	0.1	0.0	1,594	1,743	---	148,029	6,374
LFG Flare Combustion Emissions	0.4	0.4	119,849	25.0	1.5	122,335	121,109
Leachate Storage / Recirculation Emissions	0.1	---	---	---	---	---	---
Non-Exempt Diesel Generators	---	---	3,828	---	---	3,828	---
Exempt & Trivial Source Emissions	---	---	1,961	0.01	0.01	1,966	---
Totals	**0.7**	**0.4**	**127,232**	**1,768**	**1.5**	**276,157**	**127,483**

Notes:

[1] - High HAP is Hydrogen Chloride

[2] - Total greenhouse gas emissions are expressed as tons of carbon dioxide equivalents (tons CO_2 eq)

Table D.15

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare Greenhouse Gas Emissions (PTE 2032)

LFG to Flares = 7,946 cfm

	Operating Hours	PTE 2032 Flare Emissions (TPY)						
		Combustion CO_2	Combustion CH_4	Combustion N_2O	Escape CH_4	Collected CO_2	Biogenic CO_2	Anthro GHG
Flares	8,760	119,849.4	7.4	1.5	17.7	121,109.0	121,109.0	122,334.8
	Total Emissions (TPY)	119,849.4	7.4	1.5	17.7	121,109.0	121,109.0	122,334.8
	Total Emissions (lb/yr)	2.40E+08	1.47E+04	2.90E+03	35,330.4	2.42E+08	2.42E+08	2.45E+08

Flare Combustion Factors

	Pounds per Hour of Operation		
	CO_2	CH_4	N_2O
Flares	27,362.9	1.7	0.33

Notes:

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

Emission Factor Development

Enclosed Flares

	EF (kg/MMBtu)	GWP (20 year)
CO_2	52.07	1
CH_4	3.20E-03	84
N_2O	6.30E-04	264

Heating value	500	Btu/scf
LFG CH_4 Concentration	50	%
CH_4 Destruction Efficiency	99.96	% (Typical CH_4 DE for Flares)
CH_4 Density	0.0423	pounds per cubic foot (referenced from 40 CFR Part 98, Subpart HH)
CO_2 concentration	50	%
CO_2 density	0.116	pounds per cubic foot

LFG Data:

Heat Input:	238.4	MMBtu/hr
LFG combusted:	7,946	cfm

20-yr GWP values assumed to calculate CO2 equivalents: CO_2 = 1, CH_4 = 84, N_2O = 264.

Table D.16

Emissions Inventory
Modern Landfill, Inc.
Summary of Flare HAP Emissions (PTE 2032)

Landfill Gas Flares - HAP Emission Estimates

Total LFG Generated =	8,364	cfm
LFG Collection Efficiency =	95%	
Total LFG Collected =	7,946	cfm
Total LFG Collected to Flares =	7,946	cfm
Hours of Operation =	8,760	

CAS #	LFG Constituent	Molecular Weight	Median[1] ppmv	Uncontrolled Emissions lb/hr	lb/yr	TPY	mg/m3	Avg. Control[6]	Controlled Emissions lb/hr	lb/yr	TPY
71-55-6	1,1,1-Trichloroethane	133.41	0.02	0.003	23.03	0.01	0.09	98.0%	0.000	0.46	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.003	28.98	0.01	0.11	98.0%	0.000	0.58	0.00
75-34-3	1,1-Dichloroethane	98.97	0.02	0.002	17.09	0.01	0.07	98.0%	0.000	0.34	0.00
75-35-4	1,1-Dichloroethene	96.94	0.02	0.002	16.73	0.01	0.06	98.0%	0.000	0.33	0.00
107-06-2	1,2-Dichloroethane	98.96	0.08	0.009	80.78	0.04	0.31	98.0%	0.000	1.62	0.00
78-87-5	1,2-Dichloropropane	112.99	0.02	0.002	19.51	0.01	0.07	98.0%	0.000	0.39	0.00
107-13-1	Acrylonitrile	53.06	0.07	0.004	36.75	0.02	0.14	98.0%	0.000	0.74	0.00
75-15-0	Carbon disulfide	76.13	0.07	0.006	52.73	0.03	0.20	98.0%	0.000	1.05	0.00
56-23-5	Carbon tetrachloride	153.84	0.02	0.003	26.56	0.01	0.10	98.0%	0.000	0.53	0.00
463-58-1	Carbonyl sulfide[4]	60.07	0.18	0.013	117.14	0.06	0.45	98.0%	0.000	2.34	0.00
108-90-7	Chlorobenzene	112.56	0.02	0.002	19.43	0.01	0.07	98.0%	0.000	0.39	0.00
75-00-3	Chloroethane	64.52	0.04	0.003	30.32	0.02	0.12	98.0%	0.000	0.61	0.00
67-66-3	Chloroform	119.39	0.02	0.002	20.61	0.01	0.08	98.0%	0.000	0.41	0.00
74-87-3	Chloromethane[2]	50.49	0.02	0.001	8.72	0.00	0.03	98.0%	0.000	0.17	0.00
106-46-7	Dichlorobenzene	147.00	0.02	0.003	25.38	0.01	0.10	98.0%	0.000	0.51	0.00
75-09-2	Dichloromethane	84.94	0.03	0.003	29.37	0.01	0.11	98.0%	0.000	0.59	0.00
100-41-4	Ethylbenzene	106.16	0.33	0.043	376.71	0.19	1.44	98.0%	0.001	7.53	0.00
106-93-4	Ethylene dibromide[2]	187.88	0.02	0.004	32.43	0.02	0.12	98.0%	0.000	0.65	0.00
110-54-3	Hexane	86.18	0.38	0.040	352.65	0.18	1.35	98.0%	0.001	7.05	0.00
7439-97-6	Mercury[3]	200.61	0.000292	0.000	0.62	0.00	0.00	0.0%	0.000	0.62	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.012	103.85	0.05	0.40	98.0%	0.000	2.08	0.00
127-18-4	Perchloroethylene	165.83	0.02	0.003	28.63	0.01	0.11	98.0%	0.000	0.57	0.00
79-01-6	Trichloroethene	131.40	0.02	0.003	22.68	0.01	0.09	98.0%	0.000	0.45	0.00
75-01-4	Vinyl chloride	62.50	0.13	0.010	89.25	0.04	0.34	98.0%	0.000	1.78	0.00
1330-20-7	Xylene	106.16	0.85	0.110	963.83	0.48	3.70	98.0%	0.002	19.28	0.01
71-43-2	Benzene	78.11	0.36	0.034	297.15	0.15	1.14	98.0%	0.001	5.94	0.00
108-88-3	Toluene	92.13	1.33	0.149	1,305.73	0.65	5.01	98.0%	0.003	26.11	0.01
100-42-5	Styrene	104.15	0.02	0.002	17.98	0.01	0.07	98.0%	0.000	0.36	0.00
7647-01-0	Hydrogen Chloride[5]	36.46	1.94	0.086	753.73	0.38	2.89	0.0%	0.086	753.73	0.38
	Total HAPs					2.45					0.42

Notes:

1. Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)
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. Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced
4. Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced
5. Lab-derived HCl concentration was calculated by summing the concentration all of chloride compounds from the laboratory report (multiplied by respective # of chloride atoms for each compound)
6. Control efficiency of 98% assumed for all speciated HAPs (except mercury and HCl)

Equations:

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

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

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

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

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

Table D.17

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Fugitive Emissions (PTE 2032)

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 HAP Emissions (TPY)	Fugitive CH_4 Emissions (TPY)	Oxidized CO_2 Emissions (TPY)	Fugitive Biogenic CO_2 Emissions (TPY)	Antrhro GHG Emissions (T CO_2eq/yr)
2032	8,364	95%	7,946	418	219,798,562	6,224,002	0.1	1,743.3	1,593.5	6,374.2	148,029

Notes:

Total landfill gas (LFG) Generated in average cubic feet per minute (cfm) from landfill gas modeling results

Utilized LandGEM Model using the following parameters ($k = 0.04\ yr^{-1}$, $Lo = 100\ m^3/Mg$) (referenced from AP-42, Section 2.4 (11/98))

Collection efficiency of 95% based on cover type analysis using methodology in 40 CFR 98 Subpart HH (refer to Attachment E)

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

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

Fugitive LFG (ft^3/yr) = (Fugitive LFG (cfm)) * (60 minutes per hour) * (8,760 hours per year)

Fugitive LFG (m^3/yr) = (Fugitive LFG (ft^3/yr)) / (35.3147 cubic feet per cubic meter)

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

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

Fugitive NMOC Emissions (lb/yr) = [Fugitive LFG (m^3/yr)] * [2,095.9 mg of NMOC per m^3 of LFG] * [2.2046 $x10^{-6}$ pounds per mg]

Fugitive NMOC Emissions (TPY) = (Fugitive NMOC Emissions (lb/yr)) / (2000 pounds per ton)

Fugitive VOC Emissions = Fugitive NMOC Emissions (tons/yr) * 39% (VOCs are 39% of total NMOC according to USEPA AP-42, Chapter 2.4 (11/98))

Total Fugitive HAP Emissions determined from sum of individual speciated HAPs (see Table A.5)

Fugitive CH_4 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.0423 lb CH4 / ft^3 CH_4] * [75% oxidation factor] / [2,000 lb/ton]

Oxidized CO_2 emissions (TPY) = [Fugitive LFG (ft^3/yr)] * [50% CH_4] * [0.116 lb CO_2 / ft^3 CH_4] * [25% oxidized] / [2,000 lb/ton]

Fugitive Biogenic emissions (TPY) = { [Fugitive LFG (ft^3/yr)] * [50% CO_2] * [0.116 lb CO_2 / ft^3 CO_2] / [2,000 lb/ton] }

Total GHG Emissions (tons CO_2 equivalents / year) = {[Fugitive CH_4 Emissions (TPY)] * 84} + {[Fugitive Biogenic Emissions (TPY)] * 1} + {Oxidized CO2 Emissions}

Equations:

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

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

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

Table D.18

Emissions Inventory
Modern Landfill, Inc.
Summary of Fugitive HAP Emissions (PTE 2032)

Total LFG Generated =	8,364	cfm
LFG Collection Efficiency =	95%	
Average LFG Collected =	7,946	cfm
Fugitive Emission Estimates =	418	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	0.02	0.000	1.21	0.00	0.09
79-34-5	1,1,2,2-Tetrachloroethane	167.85	0.02	0.000	1.53	0.00	0.11
75-34-3	1,1-Dichloroethane	98.97	0.02	0.000	0.90	0.00	0.07
75-35-4	1,1-Dichloroethene	96.94	0.02	0.000	0.88	0.00	0.06
107-06-2	1,2-Dichloroethane	98.96	0.08	0.000	4.25	0.00	0.31
78-87-5	1,2-Dichloropropane	112.99	0.02	0.000	1.03	0.00	0.07
107-13-1	Acrylonitrile	53.06	0.07	0.000	1.93	0.00	0.14
75-15-0	Carbon disulfide	76.13	0.07	0.000	2.78	0.00	0.20
56-23-5	Carbon tetrachloride	153.84	0.02	0.000	1.40	0.00	0.10
463-58-1	Carbonyl sulfide [4]	60.07	0.18	0.001	6.17	0.00	0.45
108-90-7	Chlorobenzene	112.56	0.02	0.000	1.02	0.00	0.07
75-00-3	Chloroethane	64.52	0.04	0.000	1.60	0.00	0.12
67-66-3	Chloroform	119.39	0.02	0.000	1.08	0.00	0.08
74-87-3	Chloromethane [2]	50.49	0.02	0.000	0.46	0.00	0.03
106-46-7	Dichlorobenzene	147.00	0.02	0.000	1.34	0.00	0.10
75-09-2	Dichloromethane	84.94	0.03	0.000	1.55	0.00	0.11
100-41-4	Ethylbenzene	106.16	0.33	0.002	19.83	0.01	1.44
106-93-4	Ethylene dibromide [2]	187.88	0.02	0.000	1.71	0.00	0.12
110-54-3	Hexane	86.18	0.38	0.002	18.56	0.01	1.35
7439-97-6	Mercury [3]	200.61	0.000292	0.000	0.03	0.00	0.00
108-10-1	Methyl isobutyl ketone	100.16	0.10	0.001	5.47	0.00	0.40
127-18-4	Perchloroethylene	165.83	0.02	0.000	1.51	0.00	0.11
79-01-6	Trichloroethene	131.40	0.02	0.000	1.19	0.00	0.09
75-01-4	Vinyl chloride	62.50	0.13	0.001	4.70	0.00	0.34
1330-20-7	Xylene	106.16	0.85	0.006	50.73	0.03	3.70
71-43-2	Benzene	78.11	0.36	0.002	15.64	0.01	1.14
108-88-3	Toluene	92.13	1.33	0.008	68.72	0.03	5.01
100-42-5	Styrene	104.15	0.02	0.000	0.95	0.00	0.07
	Total HAPs					0.11	

Notes:

1 Maximum concentration of four landfill gas samples collected on November 10, 2021 (used half of the reporting limit for non-detected compounds)

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) datal

3 Mercury was not tested for in sampling analysis; USEPA AP-42 value referenced

4 Carbonyl sulfide was not tested for in sampling analysis; WIAC value referenced

Equations:

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

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

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

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

Table D.19

Emissions Inventory
Modern Landfill, Inc.
Summary of Leachate Storage/Recirculation Emissions (PTE 2032)

According to analysis of May 20, 1998 leachate sample, the following compounds were detected:

Compound	Conc. (µg/L)	VOC (µg/L)	HAP (µg/L)
M+P - Cresol	540	540	540
Methyl Ethyl Ketone	550	550	---
Acetone	510	---	---
Phenol	270	270	270
Total VOC/HAP in Leachate (µg/L)		**1360**	**810**
Total VOC/HAP in Leachate (mg/L)		**1.36**	**0.81**

Maximum Amount of Leachate Stored / Recirculated at the Facility **Total = 40,000,000 gallons / year**

VOC Portion =	40,000,000	gallons	x	3.7854	L/gal	x	1.36	mg/L VOC	x	2.21E-06	lbs/mg
VOC Portion =	**454**	pounds									
VOC Emissions =	454	pounds	x	100%	potentially emitted	=				**454.1**	**pounds of VOC**
						=				**0.23**	**tons of VOC**
HAP Portion =	40,000,000	gallons	x	3.7854	L/gal	x	0.81	mg/L VOC	x	2.21E-06	lbs/mg
HAP Portion =	**270**	pounds									
HAP Portion =	270	pounds	x	100%	potentially emitted	=				**270.4**	**pounds of VOC**
						=				**0.14**	**tons of VOC**

Table D.20

Calculated Diesel Engine Emissions (PTE 2032)
Modern Landfill

1. Kolberg – Pioneer Impact Crusher FT4250

Hours [1]	Power Rating		Conversions:	
4380	440	hp	0.0022046	lb/g
	1,926,563	hp-hr/yr		
	328	kw		
	1,436,640	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				3,949			2,215,547
TPY				1.97			1107.77

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,267	63	63		11,085	602	
TPY	0.63	0.03	0.03		5.54	0.30	

2. TANA Shredder - Cummins QSX15-C Engine

Hours [1]	Power Rating		Conversions:	
4380	560	hp	0.0022046	lb/g
	2,452,800	hp-hr/yr		
	418	kw		
	1,829,055	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				5,028			2,820,720
TPY				2.51			1410.36

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.73	0.11	0.11		0.65	0.13	
lb/yr	15,041	460	460		2,621	524	
TPY	7.52	0.23	0.23		1.31	0.26	

3. Komptech Shredder - CAT C13 ACERT Engine

Hours [1]	Power Rating		Conversions:	
4380	520	hp	0.0022046	lb/g
	2,277,600	hp-hr/yr		
	388	kw		
	1,698,409	kw-hr/yr		

AP-42

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/HP-HR				0.002			1.150
lb/yr				4669			2,619,240
TPY				2.33			1309.62

ENGINE TIER 4 LIMITS [4]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	0.40	0.02	0.02		3.50	0.19	
lb/yr	1,498	75	75		13,105	711	
TPY	0.75	0.04	0.04		6.55	0.36	

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	17,805	598	598	13,647	26,811	1,837	7,655,507
TPY	8.90	0.30	0.30	6.82	13.41	0.92	3827.75

Notes:

[1] - Based on maximum operating time of 6 months per year
[2] - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)
[3] - Based on information provided by the manufacturer
[4] - Engine meets Tier IV standards for nonroad diesel engines

Table D.21

Emissions Inventory
Modern Landfill, Inc.
Summary of Natural Gas Furnace Heating Emissions (PTE 2032)

Maximum Annual Natural Gas Combusted 7.72 MMscf

Emission Calculations:

				Lbs/yr	Tons/yr
PM=	7.60 lb. X MMSCF	7.72 MMSCF NG	=	**58.66**	**0.03**
SO_X =	0.6 lb. X MMSCF	7.72 MMSCF NG	=	**4.63**	**0.002**
NO_X =	100 lb. X MMSCF	7.72 MMSCF NG	=	**771.83**	**0.39**
VOC =	5.5 lb. X MMSCF	7.72 MMSCF NG	=	**42.45**	**0.02**
CO =	84 lb. X MMSCF	7.72 MMSCF NG	=	**648.33**	**0.32**
CO_2 =	120,000 lb. X MMSCF	7.72 MMSCF NG	=	**926190.72**	**463.10**
CH_4 =	2.3 lb. X MMSCF	7.72 MMSCF NG	=	**17.75**	**0.009**
N_2O =	2.2 lb. X MMSCF	7.72 MMSCF NG	=	**16.98**	**0.008**

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

Summary of Natural Gas Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Guardhouse	1	57,000	57,000
Maintenance Shop	10	90,000	900,000
Landfill Training Center	2	135,000	270,000
Leachate Loading	1	40,000	40,000
Scalehouse [A]	1	500,000	500,000
		TOTALS	**1,767,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Natural Gas Consumption = 7.7 MMscf [B]

Notes:

A BTU rating of scalehouse furnace is unknown; assumed to be less than 500,000 BTU / hour
B Natural gas has a heating value of 1,000 BTU/scf

Table D.22

Emissions Inventory
Modern Landfill, Inc.
Summary of Landfill Gas Heating Emissions (PTE 2032)

Maximum Annual Landfill Gas Combusted **3.93** MMscf

Emission Calculations:					
				Lbs/yr	Tons/yr
PM=	7.60 lb. X / MMSCF	3.93 MMSCF LFG	=	**29.88**	**0.01**
SO_X =	0.6 lb. X / MMSCF	3.93 MMSCF LFG	=	**2.36**	**0.001**
NO_X =	100 lb. X / MMSCF	3.93 MMSCF LFG	=	**393.12**	**0.20**
VOC =	5.5 lb. X / MMSCF	3.93 MMSCF LFG	=	**21.62**	**0.01**
CO =	84 lb. X / MMSCF	3.93 MMSCF LFG	=	**330.22**	**0.17**
CO_2 =	120,000 lb. X / MMSCF	3.93 MMSCF LFG	=	**471744.00**	**235.87**
CH_4 =	2.3 lb. X / MMSCF	3.93 MMSCF LFG	=	**9.04**	**0.005**
N_2O =	2.2 lb. X / MMSCF	3.93 MMSCF LFG	=	**8.65**	**0.004**

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

Summary of Landfill Gas Furnaces at Facility

Location	# Furnaces	Rated Capacity (BTU/hr)	Total Capacity (BTU/hr)
Maintenance Shop	3	150,000	450,000
		TOTALS	**450,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)

Maximum Landfill Gas Consumption = 3.9 MMscf [A]

Notes:

A Landfill gas has a heating value of 500 BTU/scf

Table D.23

Emissions Inventory
Modern Landfill, Inc.
Summary of Propane Furnace Heating Emissions (PTE 2032)

Maximum Annual Propane Combusted **2.86** 10^3 gallons

Emission Calculations:

					Lbs/yr	Tons/yr
PM=	0.70 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**2.00**	**0.00**
SO_X =	0.1 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**0.29**	**0.000**
NO_X =	13 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**37.24**	**0.02**
VOC =	1 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**2.86**	**0.00**
CO =	7.5 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**21.48**	**0.01**
CO_2 =	12,500 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**35803.28**	**17.90**
CH_4 =	0.2 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**0.57**	**0.000**
N_2O =	0.9 lb. X / 10^3 gal	2.86	10^3 gal propane	=	**2.58**	**0.001**

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

Summary of Propane Furnaces at Facility

Location	**# Furnaces**	**Rated Capacity (BTU/hr)**	**Total Capacity (BTU/hr)**
Tire Facility Garage	1	60,000	60,000
		TOTALS	**60,000**

Annual Heating Hours = 4368 (24 hours per day, 7 days per week, 26 weeks per year)
Maximum Propane Consumption = 2,864 gallons [A]

Notes:

A Propane has a heating value of 91,500 BTU / gallon

Table D.24

Emissions Inventory
Modern Landfill, Inc.
Exempt Gasoline Generators (PTE 2032)

Emission Factors *

PM=	0.10 Lb PM / MMBtu
SO_X =	0.084 Lb SO_X / MMBtu
NO_X =	1.63 Lb NO_X / MMBtu
VOC =	2.10 Lb VOC / MMBtu
CO =	0.99 Lb CO / MMBtu
CO_2 =	154 Lb CO_2 / MMBtu

Maximum Annual Gasoline Throughput = 1,200 gallons

Power (HP)	Gallons Combusted	PM (lb/yr)	SO_2 (lb/yr)	NO_x (lb/yr)	VOC (lb/yr)	CO (lb/yr)	CO_2 (lb/yr)
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
13	400	5.00	4.20	81.50	105.00	49.50	7,700
	Total (lb/yr)	**15.00**	**12.60**	**244.50**	**315.00**	**148.50**	**23,100**
	Total (TPY)	**0.01**	**0.01**	**0.12**	**0.16**	**0.07**	**11.55**

(Assume 1 gallon of gasoline = 125,000 Btu or 0.125 MMBtu)

* Emissions factors from AP-42 10/96, section 3.3; no emission factor given for CH_4 or N_2O

Table D.25

Exempt Diesel Generators (PTE 2032)
Modern Landfill, Inc.

1. Kolberg – Pioneer Jaw Crusher 2650

Hours [1]	Power Rating		Conversions:	
4380	275	hp	0.0022046	lb/g
	1,204,500	hp-hr/yr		
	205	kw		
	898,197	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				2,469			1,385,175
TPY				1.23			692.59

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/kw-HR	3.69	0.16	0.16		1.46	0.17	
lb/yr	7,307	307	307		2,891	337	
TPY	3.65	0.15	0.15		1.45	0.17	

2. Caterpillar 3412 Engine (Unit 657, Power Backup Trailer)

Hours [1]	Power Rating		Conversions:	
500	872	hp	0.0022046	lb/g
	435,832	hp-hr/yr		
	650	kw		
	325,000	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR				0.002			1.150
lb/yr				893			501,206
TPY				0.45			250.60

ENGINE TEST DATA [3]

	NO_X	$PM_{2.5}$	PM_{10}	SO_X	CO	HC	CO_2
g/HP-HR	8.60	0.09	0.09		0.64	0.06	
lb/yr	8,263	83	83		615	58	
TPY	4.13	0.04	0.04		0.31	0.03	

3. Caterpillar 2101 Engine (Stormwater Pump)

Hours [1]	Power Rating		Conversions:	
4380	80	hp	0.0022046	lb/g
	350,400	hp-hr/yr		
	60	kw		
	261,294	kw-hr/yr		

AP-42 [2]

	NO_X	$PM_{2.5}$	PM_{10}	SOx	CO	HC	CO_2
lb/HP-HR	0.031	0.002	0.002	0.002	0.007	0.002	1.150
lb/yr	10862.40	770.88	770.88	718.32	2340.67	865.49	402,960
TPY	5.43	0.39	0.39	0.36	1.17	0.43	201.48

TOTALS

	NO_X	$PM_{2.5}$	PM_{10}	SO_x [2]	CO	HC	CO_2 [2]
lb/yr	26,432	1,160	1,160	4,081	5,847	1,260	2,289,341
TPY	13.22	0.58	0.58	2.04	2.92	0.63	1144.67

Notes:

1 - Based on maximum operating time of 6 months per year (except for backup power unit which is based on maximum of 500 hours per year

2 - Emission factor referenced from Section 3.3 of USEPA AP-42 (10/96)

3 - Based on information provided by the manufacturer

Table D.26

Emissions Inventory
Modern Landfill, Inc.
Estimated VOC, NH3 and GHG Emissions for Composting (PTE 2032)

Material	Amount Composted (tons/year)	VOC (TPY)	NH_3 (TPY)	GHG (TCO_2eq/yr)
Yard Waste & Food Waste	1,700	4.9	---	74.8
Animal Manure	300	0.3	0.4	13.2
TOTALS	**2,000**	**5.1**	**0.4**	**88.0**

EMISSION FACTORS

Material	VOC [1] (lb/ton)	NH_3 [1] (lb/ton)	GHG [2] (lb/ton)
Yard Waste & Food Waste	5.71	---	88.0
Animal Manure	1.78	2.93	88.0

Notes:

1 - VOC and NH_3 emission factors referenced from the document "VOC Compost Emission Factors," prepared by the San Joaquin Valley Air Pollution Control District (September 15, 2010).

2 - GHG emission factors referenced from USEPA Waste Reduction Model (WARM) for yard trimmings and food scraps; only emission factors associated with the transporting and turning of compost were assumed (offsets associated with soil carbon storage were not credited since this activity occurs after the sale of compost to the consumer).

Attachment E

Calculation of Collection Efficiency

Table 1

Calculation of Collection Efficiency-2023
40 CFR 98 Subpart HH
Modern Landfill
Model City, New York

Average collection efficiency calculated according to Table HH-3 of 40 CFR Part 98, Subpart HH

$$CE = \frac{\left[(A_2 * CE_2) + (A_3 * CE_3) + (A_4 * CE_4) + (A_5 * CE_5)\right]}{A_2 + A_3 + A_4 + A_5}$$

A_2 = Total area of landfill that does not have active gas collection
CE_2 = 0%
A_3 = Total area of landfill that has daily soil cover and active gas collection
CE_3 = 60%
A_4 = Total area of landfill that has intermediate soil cover and active gas collection
CE_4 = 75%
A_5 = Total area of landfill that has final soil cover and geomembrane cover system and active gas collection
CE_5 = 95%

The following is based on information provided by Modern Landfill for the projected construction/capping sequence:

A_2 =	0.0	acres (all four landfill areas have active gas collection) =	0	m^2
A_3 =	6.00	acres (total area with daily soil cover and active gas collection) =	24,281.160	m^2
A_4 =	112.00	acres (total area with intermediate soil cover and active gas collection) =	453,248.320	m^2
A_5 =	12.00	acres (total area with final soil cover and active gas collection) =	48,562.320	m^2
CE =	0.76	Total A =	526,091.800	m^2

Table 2

Calculation of Collection Efficiency-2030
40 CFR 98 Subpart HH
Modern Landfill
Model City, New York

Average collection efficiency calculated according to Table HH-3 of 40 CFR Part 98, Subpart HH

$$CE = \frac{\left[(A_2 * CE_2) + (A_3 * CE_3) + (A_4 * CE_4) + (A_5 * CE_5)\right]}{A_2 + A_3 + A_4 + A_5}$$

A_2 = Total area of landfill that does not have active gas collection
CE_2 = 0%
A_3 = Total area of landfill that has daily soil cover and active gas collection
CE_3 = 60%
A_4 = Total area of landfill that has intermediate soil cover and active gas collection
CE_4 = 75%
A_5 = Total area of landfill that has final soil cover and geomembrane cover system and active gas collection
CE_5 = 95%

The following is based on information provided by Modern Landfill for the projected construction/capping sequence:

A_2 =	0.0	acres (all four landfill areas have active gas collection) =	0	m^2
A_3 =	4.00	acres (total area with daily soil cover and active gas collection) =	16,187.440	m^2
A_4 =	84.00	acres (total area with intermediate soil cover and active gas collection) =	339,936.240	m^2
A_5 =	74.00	acres (total area with final soil cover and active gas collection) =	299,467.640	m^2
CE =	0.84	Total A =	655,591.320	m^2

Table 3

Calculation of Collection Efficiency-2050
40 CFR 98 Subpart HH
Modern Landfill
Model City, New York

Average collection efficiency calculated according to Table HH-3 of 40 CFR Part 98, Subpart HH

$$CE = \frac{[(A_2 * CE_2) + (A_3 * CE_3) + (A_4 * CE_4) + (A_5 * CE_5)]}{A_2 + A_3 + A_4 + A_5}$$

A_2 = Total area of landfill that does not have active gas collection
CE_2 = 0%
A_3 = Total area of landfill that has daily soil cover and active gas collection
CE_3 = 60%
A_4 = Total area of landfill that has intermediate soil cover and active gas collection
CE_4 = 75%
A_5 = Total area of landfill that has final soil cover and geomembrane cover system and active gas collection
CE_5 = 95%

The following is based on information provided by Modern Landfill for the projected construction/capping sequence:

A_2 =	0.0	acres (all four landfill areas have active gas collection) =	0	m^2
A_3 =	0.00	acres (total area with daily soil cover and active gas collection) =	0.000	m^2
A_4 =	0.00	acres (total area with intermediate soil cover and active gas collection) =	0.000	m^2
A_5 =	232.00	acres (total area with final soil cover and active gas collection) =	938,871.520	m^2
CE =	0.95	Total A =	938,871.520	m^2

Attachment F

Summary of Mitigation Measures for Consideration

Attachment F

Summary of Mitigation Measures for Consideration
Modern Landfill
Modern Landfill, Inc.

Current Measures

Mitigation Measure Considered	*Description / Synopsis of Measure*	*Description of How Mitigation Measure Reduces GHG Emissions*	*Estimated Additional Cost*	*Estimated Reduction in GHG Emissions*	*Technically Feasible?*	*Economically Feasible?*	*Conclusion / Determination*
Limit length of solid pipe on gas collection wells	Ensuring no more than 40 ft. of solid pipe exists on new gas wells installed in future landfill areas as they are raised to accommodate filling activities. In some cases horizontal collectors may be added adjacent to solid pipe to reduce emissions	The reduction of solid pipe and the maximization of perforated pipe in the gas collector allows for better gas collection and less fugitive emissions	Negligible	Difficult to quantify	Yes	Yes	---
Periodic liquid level monitoring in gas wells	Periodic monitoring of liquids in new wells installed in future landfill areas to ensure slotted section is available for gas extraction	Monitoring of liquid levels within gas wells will determine which wells need a dewatering program implemented. A greater length of slotted section that is free of liquids may result in more gas capture within the collection system thereby reducing fugitive emissions.	TBD	Difficult to quantify	Yes	Yes	---
Install additional gas collection wells as needed (beyond those identified in GCCS Plan)	Install additional gas wells or horizontal collectors if surface emission scans demonstrate areas of elevated fugitive emissions that cannot be corrected with tuning of the existing collection system or required repairs identified	If standard corrective actions are not successful in remedying areas of elevated fugitive emissions, then additional gas collectors may be required, thereby reducing fugitive emissions	TBD	~5-20 SCFM in additional capture per gas collector installed	Yes	Yes	---
Early gas collection prior to regulation	Early gas collection prior to NSPS regulation requirement	NSPS regulations require gas collection in areas with waste place for 5 years or more (or within 2 years of reaching final grade, whichever is sooner). Early gas collection prior to the required timeframe results in additional gas collection and destruction, thereby reducing fugitive emissions	TBD	~200 - 400 SCFM in additional capture due to early collection over 5-year period	Yes	Yes	Modern agrees to implement this mitigation measure
Enhanced waste management practices at local DAC	Modern is working with the Tuscarora Nation to improve recycling, manage used tires and reduce open burning	Reduction in open dumping and burning will reduce GHGs	TBD	Can quantify better once changes have been implemented	Yes	Yes	---
Enhanced waste management practices at local DAC	Modern will help identify grant opportunities, if any, to assist the Tuscarora Nation with their waste management practices	Reduction in open dumping and burning will reduce GHGs	TBD	Dependent upon what grants are available	Yes	Dependent upon what grants are available	---
Alternative power generation	When all currently permitted landfill areas are at final grade and receive final cap, Modern will evaluate the feasibility of installing solar panels to generate electricity	Offset of fossil fuel emissions	Depends on alternative's evaluated and selected	Can better quantify once feasibility has been completed	Yes	TBD as part of feasibility evaluation	---
Alternative power generation	Modern will evaluate the feasibility of installing solar panels to generate electricity on the closed 15 acre landfill	Offset of fossil fuel emissions	Depends on alternative's evaluated and selected	Can better quantify once feasibility has been completed	Yes	TBD as part of feasibility evaluation	---

Attachment F

Summary of Mitigation Measures for Consideration
Modern Landfill
Modern Landfill, Inc.

Current Measures

Mitigation Measure Considered	*Description / Synopsis of Measure*	*Description of How Mitigation Measure Reduces GHG Emissions*	*Estimated Additional Cost*	*Estimated Reduction in GHG Emissions*	*Technically Feasible?*	*Economically Feasible?*	*Conclusion / Determination*
Enhanced SEM	For Quarterly SEM scans, Modern agrees to a 200 ppm methane action level for follow-up and repair.	Reduces surface emissions/GHGs	TBD	Difficult to quantify	Yes	Yes	Modern agrees to implement this measure
Enhanced SEM	Within one year of permit issuance Modern will evaluate alternative surface emissions monitoring technologies and submit a schedule and implementation plan to DEC	Reduce fugitive GHG emissions, increase collection efficiency	TBD	Difficult to quantify	Yes	TBD as part of feasibility evaluation	---
Leachate treatment improvements	Modern agrees to evaluate leachate pre-treatment options to allow for direct discharge of leachate and reduce GHG emissions from truck hauling.	Offset of fossil fuel emissions	TBD	Reduced truck trips account for approximately 202.5 TPY avoided CO2 emissions	Yes	TBD as part of feasibility evaluation	---
Organics Diversion	Modern agrees to work with the Town of Lewiston to evaluate the feasibility of an organics diversion program	Offset of landfill emissions	TBD	Dependent on the volume of organics that can successfully be diverted	Yes	TBD as part of feasibility evaluation	---
Organics Diversion Options	Modern will train their salesforce to offer available organics diversion options to their customers following the organics diversion hierarchy including food donations and animal feed options	Reduce organics landfilled	TBD once design is completed	Dependent on the options available and customer willingness to participate	Yes	Yes	---
Alternate Fuel Equipment	For new heavy equipment purchases, Modern will evaluate alternatives to fossil fuels. Modern is currently evaluating electric and RNG options that can provide the size, range and capacity needed	Offset of fossil fuel emissions	Depends on alternative's evaluated and selected	Dependent upon equipment available and selected	TBD as part of feasibility evaluation	TBD as part of feasibility evaluation	---
Alternate Fuel Vehicles	For fleet replacement, Modern will evaluate options for low emission vehicles	Offset of fossil fuel emissions	Depends on alternative's evaluated and selected	Dependent on vehicles available and selected	TBD as part of feasibility evaluation	TBD as part of feasibility evaluation	---
Increased GCCS Efficiency and reliability	Modern agrees to design and install a new blower station to provide redundant blower capacity and allow for the delivery of LFG to multiple flares	Reduce downtime, increase reliability. Will provide consistent vacuum on the wellfield and allow quicker response to changing weather conditions and barometric pressure changes	TBD once design is completed	Difficult to quantify	Yes	Yes	Modern agrees to implement this measure
Increased Flare Capacity	Modern has included a 3,000 CFM open flare in the latest Title V renewal.	Increase back-up, redundancy and reliability	TBD once design is completed	Difficult to quantify	Yes	Yes	Modern agrees to implement this measure

Attachment G

AFLEET Tool Output

On-Road, Off-Road, Rail, and Marine Fleet Footprint Calculator Output (Off-Construction Season, November 1 - April 30)

On-Road Fleet Footprint Calculator Output

On-Road Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year On-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type

Vehicle Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Passenger Car	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passenger Truck	110.9	62.6	186.7	6.5	2.9	1.2	11.0	0.6
Light Commercial Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
School Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refuse Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Short-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Long-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combination Short-Haul Truck	419.5	230.6	343.8	569.3	33.2	11.1	18.1	2.6
Combination Long-Haul Truck	12,296.4	6,758.7	10,572.0	15,998.9	935.5	311.8	527.7	76.9
Total	12,826.8	7,051.9	11,102.5	16,574.6	971.7	324.1	556.9	80.1

Remaining Lifetime Year On-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type

Vehicle Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Passenger Car	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passenger Truck	1,219.6	688.7	2,838.4	89.1	33.3	12.9	163.1	6.6
Light Commercial Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
School Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refuse Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Short-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Long-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combination Short-Haul Truck	4,614.6	2,536.4	3,787.3	6,278.8	365.7	122.6	200.1	28.9
Combination Long-Haul Truck	135,260.4	74,345.6	116,291.6	175,987.4	10,290.1	3,430.0	5,804.7	845.9
Total	141,094.7	77,570.8	122,917.3	182,355.4	10,689.1	3,565.6	6,167.9	881.4

On-Road Fleet Footprint Calculator Output - Externality Costs

Current Year On-Road - Energy Use and Emission Externality Costs by Vehicle Type								
Vehicle Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Passenger Car	$0	$0	$0	$0	$0	$0	$0	$0
Passenger Truck	$2,278	$3,855	$0	$51	$9	$73	$31	$17
Light Commercial Truck	$0	$0	$0	$0	$0	$0	$0	$0
School Bus	$0	$0	$0	$0	$0	$0	$0	$0
Transit Bus	$0	$0	$0	$0	$0	$0	$0	$0
Refuse Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Short-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Long-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Combination Short-Haul Truck	$8,618	$14,198	$0	$4,466	$107	$696	$51	$74
Combination Long-Haul Truck	$252,602	$416,163	$0	$125,500	$3,022	$19,463	$1,497	$2,175
Total	$263,498	$434,216	$0	$130,016	$3,138	$20,232	$1,580	$2,266

Remaining Lifetime On-Road - Energy Use and Emission Externality Costs by Vehicle Type								
Vehicle Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Passenger Car	$0	$0	$0	$0	$0	$0	$0	$0
Passenger Truck	$25,054	$42,409	$0	$699	$99	$808	$463	$188
Light Commercial Truck	$0	$0	$0	$0	$0	$0	$0	$0
School Bus	$0	$0	$0	$0	$0	$0	$0	$0
Transit Bus	$0	$0	$0	$0	$0	$0	$0	$0
Refuse Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Short-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Long-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Combination Short-Haul Truck	$94,798	$156,179	$0	$49,253	$1,178	$7,652	$568	$816
Combination Long-Haul Truck	$2,778,626	$4,577,788	$0	$1,380,498	$33,247	$214,097	$16,469	$23,925
Total	$2,898,478	$4,776,376	$0	$1,430,450	$34,524	$222,556	$17,499	$24,930

Off-Road Fleet Footprint Calculator Output

Off-Road Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year Off-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Equipment Type

Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Aerial Lifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Airport Support Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All Terrain Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chain Saws	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Turf Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cranes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crawler Tractor/Dozers	897.5	493.3	48.3	165.4	10.8	9.8	7.9	5.6
Excavators	38.2	21.0	1.5	12.9	0.1	0.1	0.5	0.2
Forklifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Golf Carts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn & Garden Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn Mowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafblowers/Vacuums	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rollers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubber Tire Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skid Steer Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Snowblowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweepers/Scrubbers	45.8	25.2	26.0	225.0	2.0	2.0	8.3	0.3
Terminal Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tractors/Loaders/Backhoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trimmers/Edgers/Brush Cutter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	981.4	539.4	75.7	403.3	13.0	11.9	16.6	6.1

Remaining Lifetime Year Off-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type

Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Aerial Lifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Airport Support Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All Terrain Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chain Saws	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Turf Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cranes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crawler Tractor/Dozers	5,551.8	3,051.6	298.5	1,023.4	67.0	60.9	48.7	34.7
Excavators	2,750.0	1,511.5	107.1	927.0	8.4	8.0	34.0	17.2
Forklifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Golf Carts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn & Garden Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn Mowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafblowers/Vacuums	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rollers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubber Tire Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skid Steer Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Snowblowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweepers/Scrubbers	29.3	16.1	16.6	143.7	1.3	1.2	5.3	0.2
Terminal Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tractors/Loaders/Backhoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trimmers/Edgers/Brush Cutter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	8,331.1	4,579.2	422.2	2,094.1	76.7	70.2	88.0	52.1

Off-Road Fleet Footprint Calculator Output - Externality Costs

Current Year Off-Road - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	GHGs	CO	NOx	PM10	PM2.5	VOC	SOx
Equipment Type	($)	($)	($)	($)	($)	($)	($)	($)
Aerial Lifts	$0	$0	$0	$0	$0	$0	$0	$0
Agricultural Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Airport Support Equipment	$0	$0	$0	$0	$0	$0	$0	$0
All Terrain Vehicles	$0	$0	$0	$0	$0	$0	$0	$0
Chain Saws	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Turf Equipment	$0	$0	$0	$0	$0	$0	$0	$0
Cranes	$0	$0	$0	$0	$0	$0	$0	$0
Crawler Tractor/Dozers	$18,436	$30,374	$0	$1,298	$5	$615	$22	$159
Excavators	$784	$1,292	$0	$101	$0	$7	$1	$7
Forklifts	$0	$0	$0	$0	$0	$0	$0	$0
Golf Carts	$0	$0	$0	$0	$0	$0	$0	$0
Lawn & Garden Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Lawn Mowers	$0	$0	$0	$0	$0	$0	$0	$0
Leafblowers/Vacuums	$0	$0	$0	$0	$0	$0	$0	$0
Rollers	$0	$0	$0	$0	$0	$0	$0	$0
Rubber Tire Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Skid Steer Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Snowblowers	$0	$0	$0	$0	$0	$0	$0	$0
Sweepers/Scrubbers	$941	$1,550	$0	$1,765	$0	$122	$23	$8
Terminal Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Tractors/Loaders/Backhoes	$0	$0	$0	$0	$0	$0	$0	$0
Trimmers/Edgers/Brush Cutter	$0	$0	$0	$0	$0	$0	$0	$0
Total	$20,161	$33,216	$0	$3,164	$5	$743	$47	$174

Remaining Lifetime Off-Road - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	GHGs	CO	NOx	PM10	PM2.5	VOC	SOx
Equipment Type	($)	($)	($)	($)	($)	($)	($)	($)
Aerial Lifts	$0	$0	$0	$0	$0	$0	$0	$0
Agricultural Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Airport Support Equipment	$0	$0	$0	$0	$0	$0	$0	$0
All Terrain Vehicles	$0	$0	$0	$0	$0	$0	$0	$0
Chain Saws	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Turf Equipment	$0	$0	$0	$0	$0	$0	$0	$0
Cranes	$0	$0	$0	$0	$0	$0	$0	$0
Crawler Tractor/Dozers	$114,050	$187,898	$0	$8,028	$30	$3,802	$138	$982
Excavators	$56,493	$93,073	$0	$7,271	$2	$502	$96	$486
Forklifts	$0	$0	$0	$0	$0	$0	$0	$0
Golf Carts	$0	$0	$0	$0	$0	$0	$0	$0
Lawn & Garden Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Lawn Mowers	$0	$0	$0	$0	$0	$0	$0	$0
Leafblowers/Vacuums	$0	$0	$0	$0	$0	$0	$0	$0
Rollers	$0	$0	$0	$0	$0	$0	$0	$0
Rubber Tire Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Skid Steer Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Snowblowers	$0	$0	$0	$0	$0	$0	$0	$0
Sweepers/Scrubbers	$601	$990	$0	$1,128	$0	$78	$15	$5
Terminal Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Tractors/Loaders/Backhoes	$0	$0	$0	$0	$0	$0	$0	$0
Trimmers/Edgers/Brush Cutter	$0	$0	$0	$0	$0	$0	$0	$0
Total	$171,144	$281,961	$0	$16,427	$32	$4,382	$250	$1,474

Rail Fleet Footprint Calculator Output

Rail Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year Rail - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Equipment Type								
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Class I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Class II / III	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Switcher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intercity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commuter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Light Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Year Rail - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type								
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Class I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Class II / III	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Switcher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intercity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commuter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Light Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Rail Fleet Footprint Calculator Output - Externality Costs

Current Year Rail - Energy Use and Emission Externality Costs by Vehicle Type								
Equipment Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Class I	$0	$0	$0	$0	$0	$0	$0	$0
Class II / III	$0	$0	$0	$0	$0	$0	$0	$0
Switcher	$0	$0	$0	$0	$0	$0	$0	$0
Intercity	$0	$0	$0	$0	$0	$0	$0	$0
Commuter	$0	$0	$0	$0	$0	$0	$0	$0
Heavy Transit	$0	$0	$0	$0	$0	$0	$0	$0
Light Transit	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Rail - Energy Use and Emission Externality Costs by Vehicle Type								
Equipment Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Class I	$0	$0	$0	$0	$0	$0	$0	$0
Class II / III	$0	$0	$0	$0	$0	$0	$0	$0
Switcher	$0	$0	$0	$0	$0	$0	$0	$0
Intercity	$0	$0	$0	$0	$0	$0	$0	$0
Commuter	$0	$0	$0	$0	$0	$0	$0	$0
Heavy Transit	$0	$0	$0	$0	$0	$0	$0	$0
Light Transit	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Marine Fleet Footprint Calculator Output

Marine Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year Marine - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Equipment Type								
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Bulk Carrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Container Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cruise Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
General Cargo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RORO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other OGV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Excursion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Harbor Ferry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offshore Crew and Supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towboat / Pushboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tugboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Boat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Harbor Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inboard/Sterndrive	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outboard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Personal Water Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

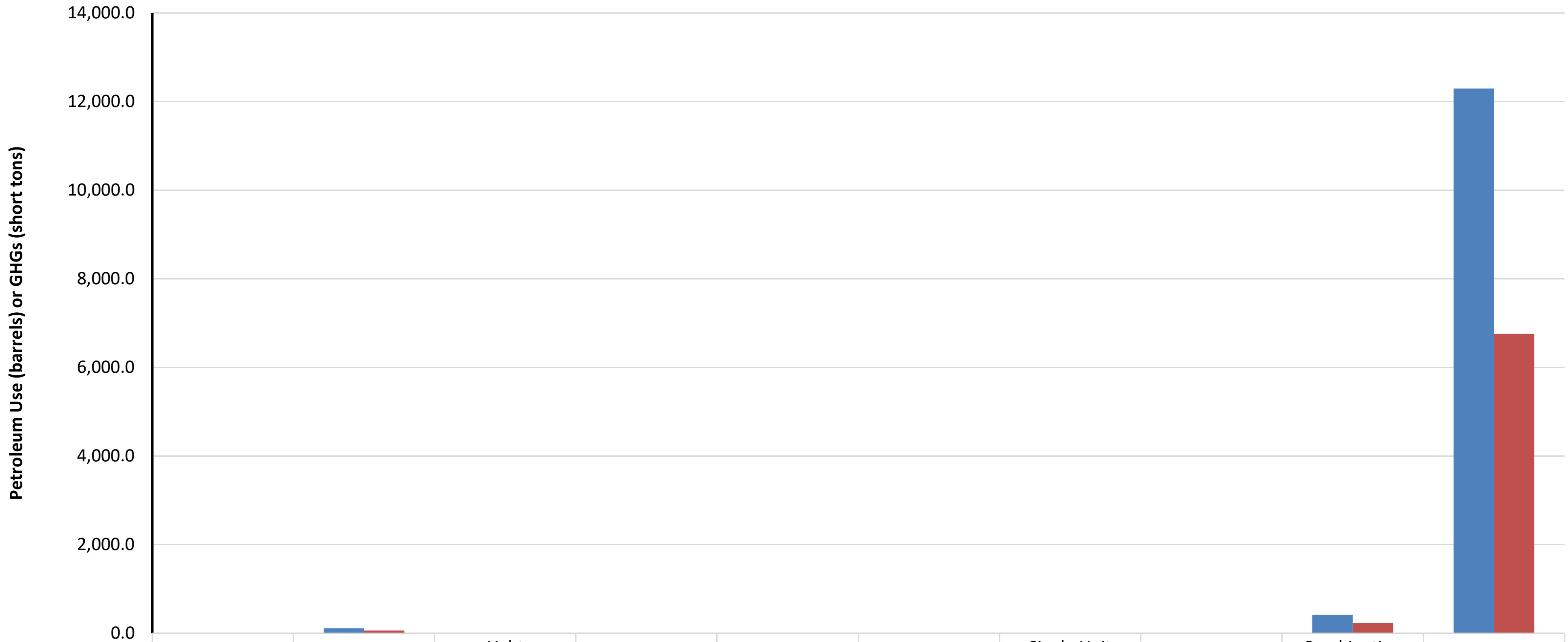
Remaining Lifetime Year Marine - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type								
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Bulk Carrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Container Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cruise Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
General Cargo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RORO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other OGV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Excursion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Harbor Ferry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offshore Crew and Supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towboat / Pushboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tugboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Boat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Harbor Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inboard/Sterndrive	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outboard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Personal Water Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Marine Fleet Footprint Calculator Output - Externality Costs

Current Year Marine - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	GHGs	CO	NOx	PM10	PM2.5	VOC	SOx
Equipment Type	($)	($)	($)	($)	($)	($)	($)	($)
Bulk Carrier	$0	$0	$0	$0	$0	$0	$0	$0
Container Ship	$0	$0	$0	$0	$0	$0	$0	$0
Cruise Ship	$0	$0	$0	$0	$0	$0	$0	$0
General Cargo	$0	$0	$0	$0	$0	$0	$0	$0
RORO	$0	$0	$0	$0	$0	$0	$0	$0
Tanker	$0	$0	$0	$0	$0	$0	$0	$0
Other OGV	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Fishing	$0	$0	$0	$0	$0	$0	$0	$0
Excursion	$0	$0	$0	$0	$0	$0	$0	$0
Government	$0	$0	$0	$0	$0	$0	$0	$0
Harbor Ferry	$0	$0	$0	$0	$0	$0	$0	$0
Offshore Crew and Supply	$0	$0	$0	$0	$0	$0	$0	$0
Towboat / Pushboat	$0	$0	$0	$0	$0	$0	$0	$0
Tugboat	$0	$0	$0	$0	$0	$0	$0	$0
Work Boat	$0	$0	$0	$0	$0	$0	$0	$0
Other Harbor Craft	$0	$0	$0	$0	$0	$0	$0	$0
Inboard/Sterndrive	$0	$0	$0	$0	$0	$0	$0	$0
Outboard	$0	$0	$0	$0	$0	$0	$0	$0
Personal Water Craft	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

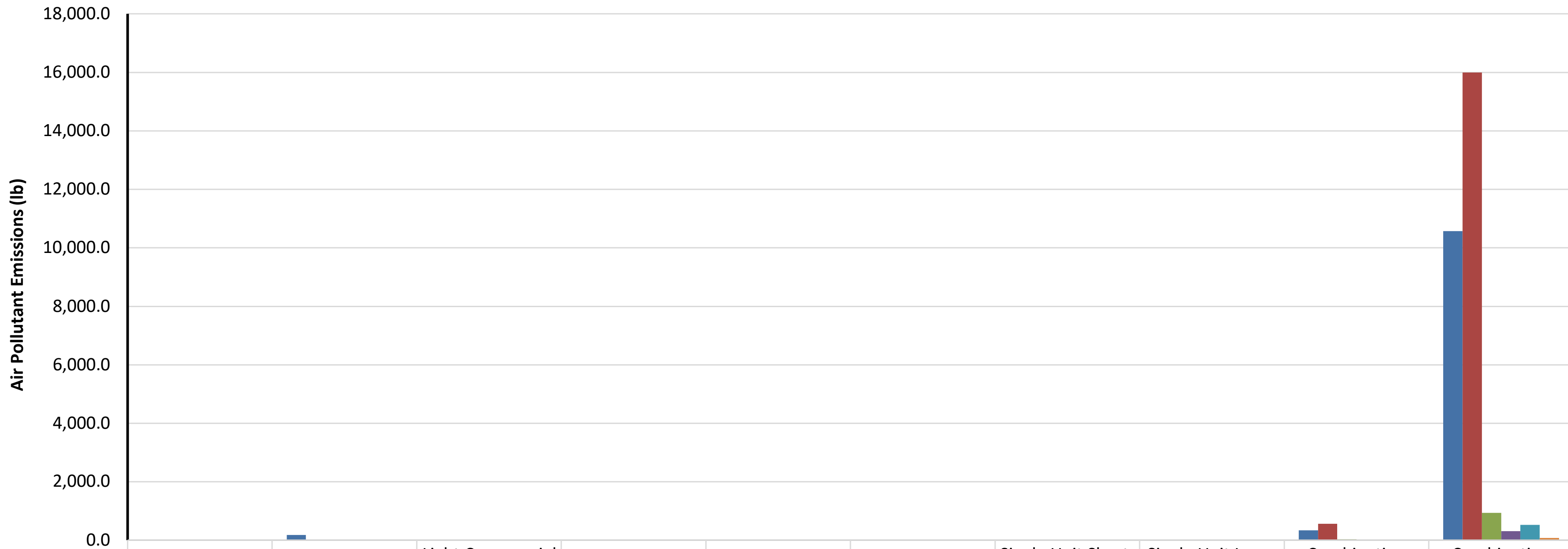
Remaining Lifetime Marine - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	GHGs	CO	NOx	PM10	PM2.5	VOC	SOx
Equipment Type	($)	($)	($)	($)	($)	($)	($)	($)
Bulk Carrier	$0	$0	$0	$0	$0	$0	$0	$0
Container Ship	$0	$0	$0	$0	$0	$0	$0	$0
Cruise Ship	$0	$0	$0	$0	$0	$0	$0	$0
General Cargo	$0	$0	$0	$0	$0	$0	$0	$0
RORO	$0	$0	$0	$0	$0	$0	$0	$0
Tanker	$0	$0	$0	$0	$0	$0	$0	$0
Other OGV	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Fishing	$0	$0	$0	$0	$0	$0	$0	$0
Excursion	$0	$0	$0	$0	$0	$0	$0	$0
Government	$0	$0	$0	$0	$0	$0	$0	$0
Harbor Ferry	$0	$0	$0	$0	$0	$0	$0	$0
Offshore Crew and Supply	$0	$0	$0	$0	$0	$0	$0	$0
Towboat / Pushboat	$0	$0	$0	$0	$0	$0	$0	$0
Tugboat	$0	$0	$0	$0	$0	$0	$0	$0
Work Boat	$0	$0	$0	$0	$0	$0	$0	$0
Other Harbor Craft	$0	$0	$0	$0	$0	$0	$0	$0
Inboard/Sterndrive	$0	$0	$0	$0	$0	$0	$0	$0
Outboard	$0	$0	$0	$0	$0	$0	$0	$0
Personal Water Craft	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Current Year Well-to-Wheels Petroleum Use and GHGs - On-Road Fleet



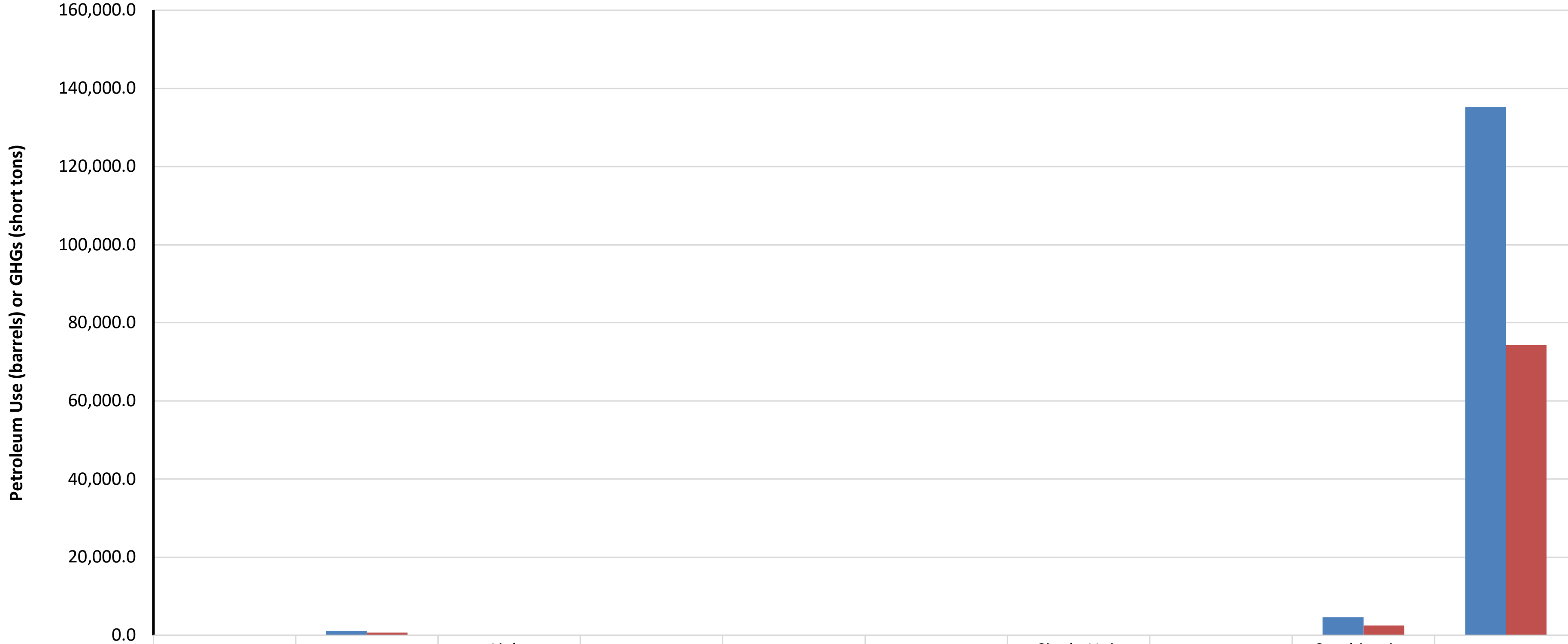
	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
Petroleum Use	0.0	110.9	0.0	0.0	0.0	0.0	0.0	0.0	419.5	12,296.4
GHGs	0.0	62.6	0.0	0.0	0.0	0.0	0.0	0.0	230.6	6,758.7

Current Year Vehicle Operation Air Pollutants - On-Road Fleet



	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
CO	0.0	186.7	0.0	0.0	0.0	0.0	0.0	0.0	343.8	10,572.0
NOx	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	569.3	15,998.9
PM10	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	33.2	935.5
PM2.5	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	11.1	311.8
VOC	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	18.1	527.7
SOx	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	2.6	76.9

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - On-Road Fleet



	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
Petroleum Use	0.0	1,219.6	0.0	0.0	0.0	0.0	0.0	0.0	4,614.6	135,260.4
GHGs	0.0	688.7	0.0	0.0	0.0	0.0	0.0	0.0	2,536.4	74,345.6

Remaining Lifetime Vehicle Operation Air Pollutants - On-Road Fleet

	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
CO	0.0	2,838.4	0.0	0.0	0.0	0.0	0.0	0.0	3,787.3	116,291.6
NOx	0.0	89.1	0.0	0.0	0.0	0.0	0.0	0.0	6,278.8	175,987.4
PM10	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	365.7	10,290.1
PM2.5	0.0	12.9	0.0	0.0	0.0	0.0	0.0	0.0	122.6	3,430.0
VOC	0.0	163.1	0.0	0.0	0.0	0.0	0.0	0.0	200.1	5,804.7
SOx	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	28.9	845.9

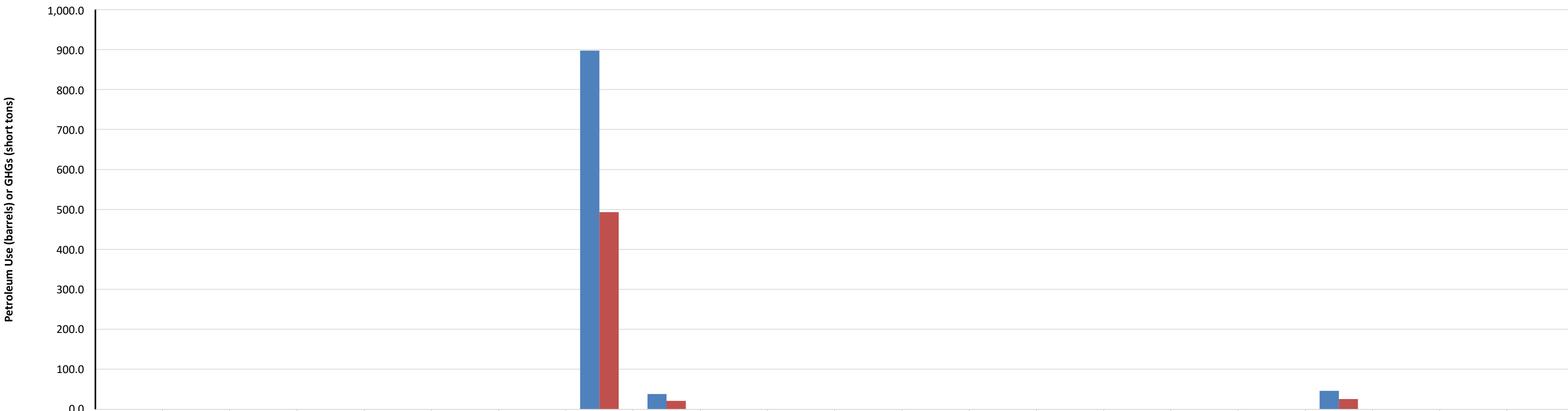
Current Year Externality Costs - On-Road Fleet

	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
SOx	$0	$17	$0	$0	$0	$0	$0	$0	$74	$2,175
VOC	$0	$31	$0	$0	$0	$0	$0	$0	$51	$1,497
PM2.5	$0	$73	$0	$0	$0	$0	$0	$0	$696	$19,463
PM10	$0	$9	$0	$0	$0	$0	$0	$0	$107	$3,022
NOx	$0	$51	$0	$0	$0	$0	$0	$0	$4,466	$125,500
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$3,855	$0	$0	$0	$0	$0	$0	$14,198	$416,163
Petroleum Use	$0	$2,278	$0	$0	$0	$0	$0	$0	$8,618	$252,602

Remaining Lifetime Externality Costs - On-Road Fleet

	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
SOx	$0	$188	$0	$0	$0	$0	$0	$0	$816	$23,925
VOC	$0	$463	$0	$0	$0	$0	$0	$0	$568	$16,469
PM2.5	$0	$808	$0	$0	$0	$0	$0	$0	$7,652	$214,097
PM10	$0	$99	$0	$0	$0	$0	$0	$0	$1,178	$33,247
NOx	$0	$699	$0	$0	$0	$0	$0	$0	$49,253	$1,380,498
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$42,409	$0	$0	$0	$0	$0	$0	$156,179	$4,577,788
Petroleum Use	$0	$25,054	$0	$0	$0	$0	$0	$0	$94,798	$2,778,626

Current Year Well-to-Wheels Petroleum Use and GHGs - Off-Road Fleet

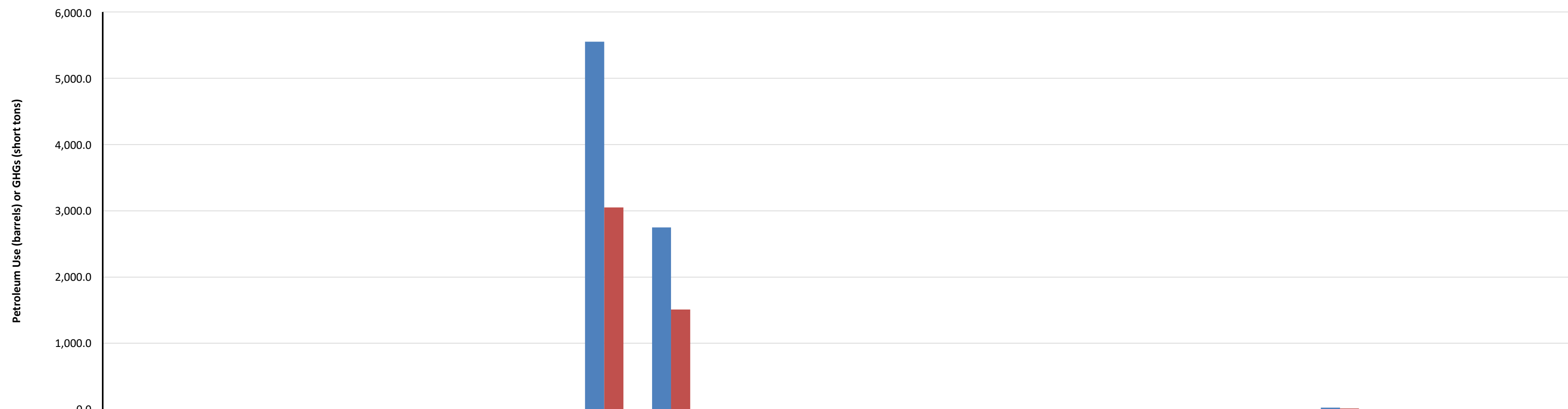


	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	897.5	38.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.8	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	493.3	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.2	0.0	0.0	0.0

Current Year Vehicle Operation Air Pollutants - Off-Road Fleet

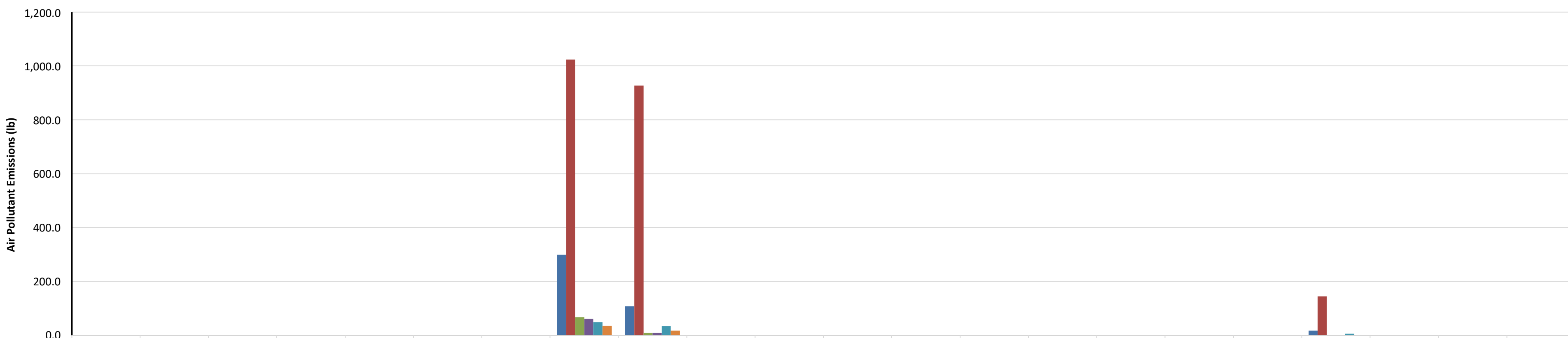
	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.3	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	165.4	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	225.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - Off-Road Fleet



	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5,551.8	2,750.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.3	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,051.6	1,511.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.1	0.0	0.0	0.0

Remaining Lifetime Vehicle Operation Air Pollutants - Off-Road Fleet

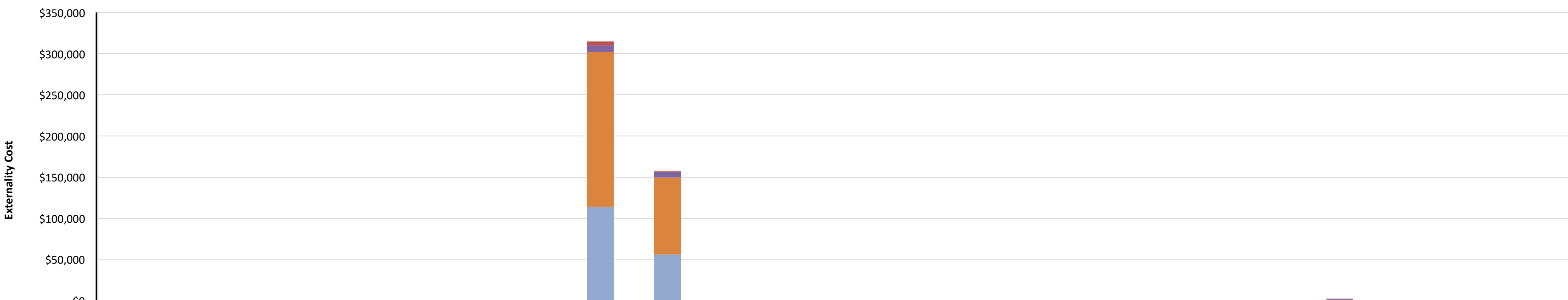


	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	298.5	107.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.6	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,023.4	927.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	143.7	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.0	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.9	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.7	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.7	17.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0

Current Year Externality Costs - Off-Road Fleet

	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
SOx	$0	$0	$0	$0	$0	$0	$0	$159	$7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$22	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$615	$7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$122	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$1,298	$101	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,765	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$30,374	$1,292	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,550	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$18,436	$784	$0	$0	$0	$0	$0	$0	$0	$0	$0	$941	$0	$0	$0

Remaining Lifetime Externality Costs - Off-Road Fleet



	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers /Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
SOx	$0	$0	$0	$0	$0	$0	$0	$982	$486	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$138	$96	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$3,802	$502	$0	$0	$0	$0	$0	$0	$0	$0	$0	$78	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$30	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$8,028	$7,271	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,128	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$187,898	$93,073	$0	$0	$0	$0	$0	$0	$0	$0	$0	$990	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$114,050	$56,493	$0	$0	$0	$0	$0	$0	$0	$0	$0	$601	$0	$0	$0

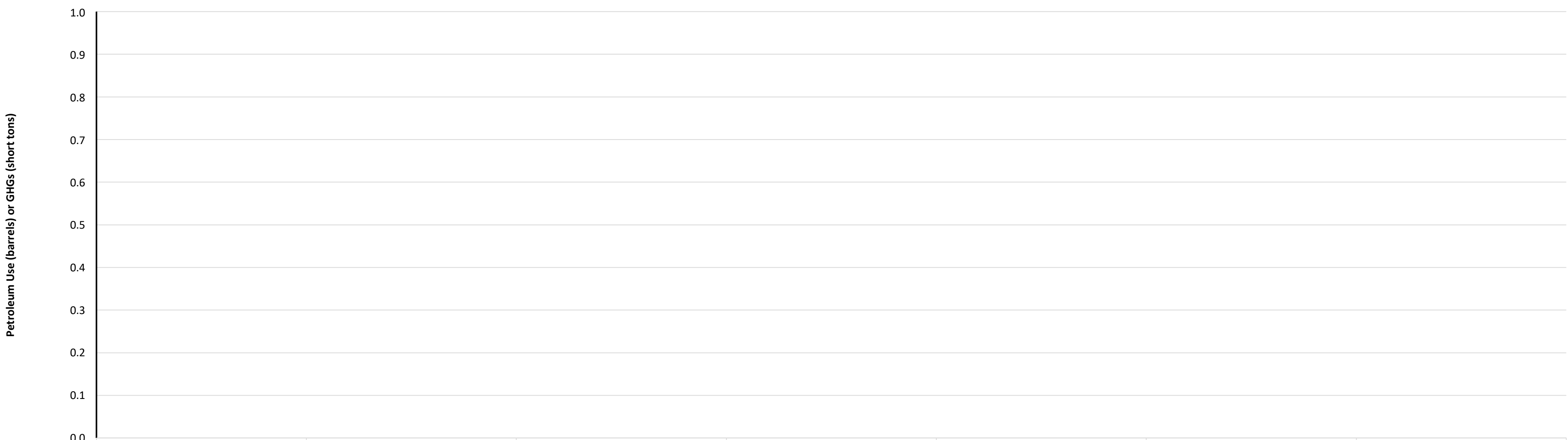
Current Year Well-to-Wheels Petroleum Use and GHGs - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Vehicle Operation Air Pollutants - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - Rail Fleet



	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0

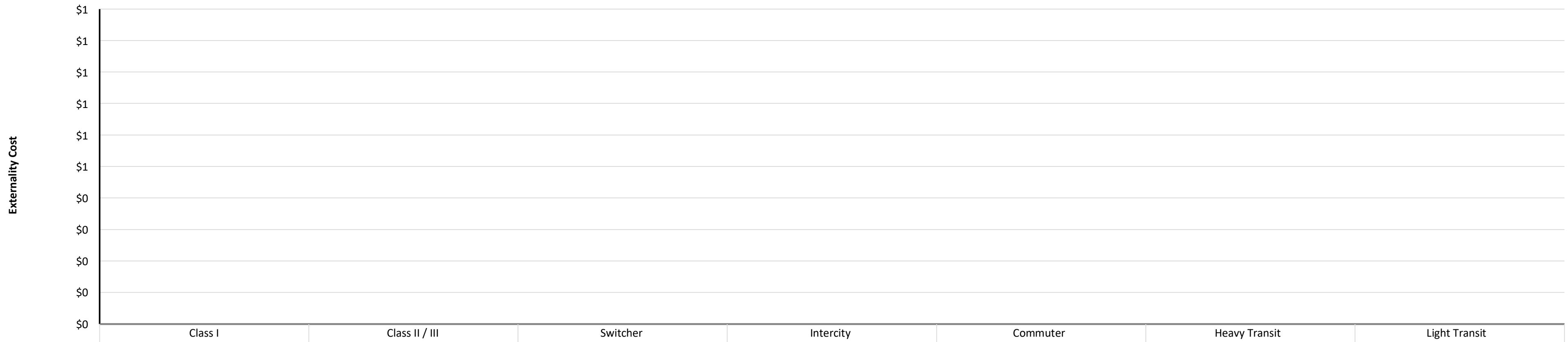
Remaining Lifetime Vehicle Operation Air Pollutants - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Externality Costs - Rail Fleet

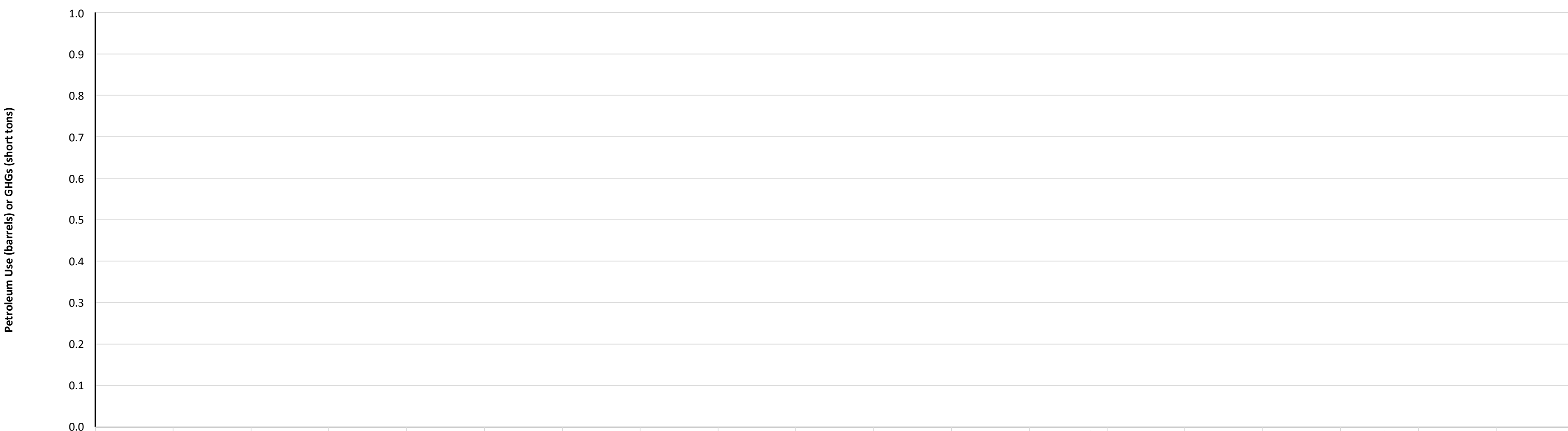
	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
SOx	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Externality Costs - Rail Fleet



	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
SOx	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0

Current Year Well-to-Wheels Petroleum Use and GHGs - Marine Fleet

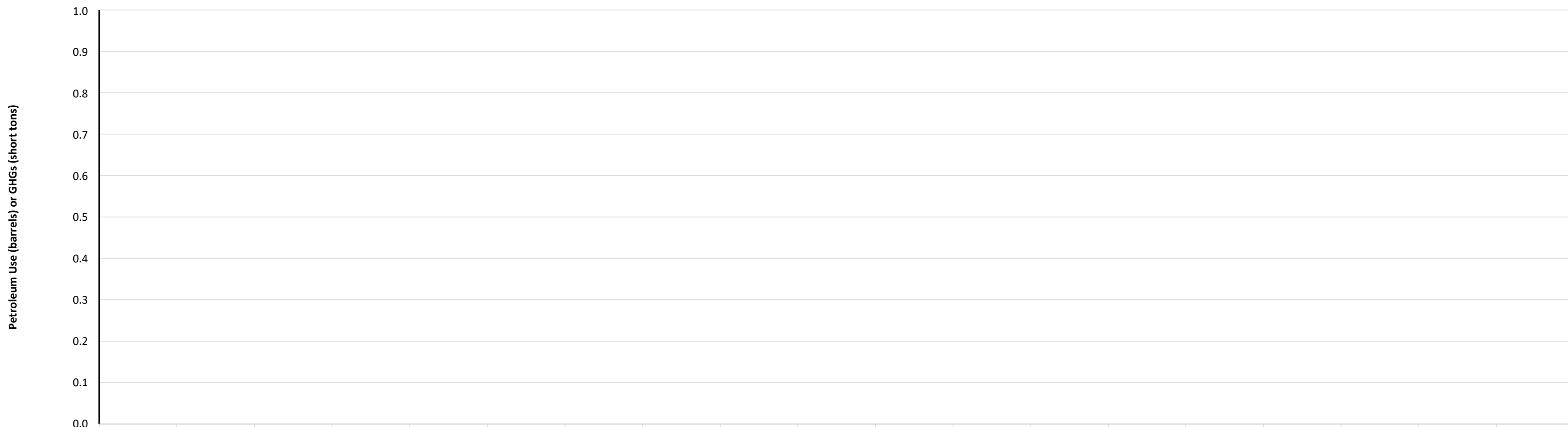


	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Stern drive	Outboard	Personal Water Craft
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Vehicle Operation Air Pollutants - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Sterndrive	Outboard	Personal Water Craft
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - Marine Fleet



	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Stern drive	Outboard	Personal Water Craft
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Vehicle Operation Air Pollutants - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Sterndrive	Outboard	Personal Water Craft
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Externality Costs - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Stern drive	Outboard	Personal Water Craft
SOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Externality Costs - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Stern drive	Outboard	Personal Water Craft
SOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

On-Road, Off-Road, Rail, and Marine Fleet Footprint Calculator Output (Construction Season, May 1 - October 30)

On-Road Fleet Footprint Calculator Output

On-Road Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year On-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type								
Vehicle Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Passenger Car	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passenger Truck	120.9	68.3	221.7	7.7	3.5	1.4	13.1	0.7
Light Commercial Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
School Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refuse Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Short-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Long-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combination Short-Haul Truck	1,770.2	973.0	1,143.6	1,893.8	110.6	37.1	60.3	11.1
Combination Long-Haul Truck	12,296.4	6,758.7	10,572.0	15,998.9	935.5	311.8	527.7	76.9
Total	14,187.5	7,800.0	11,937.2	17,900.4	1,049.5	350.3	601.1	88.6

Remaining Lifetime Year On-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type								
Vehicle Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Passenger Car	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passenger Truck	1,330.0	751.1	3,369.6	105.8	39.6	15.4	193.6	7.2
Light Commercial Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
School Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refuse Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Short-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single Unit Long-Haul Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combination Short-Haul Truck	19,472.7	10,703.1	12,598.9	20,887.2	1,216.5	407.8	665.7	121.8
Combination Long-Haul Truck	135,260.3	74,345.5	116,291.6	175,987.4	10,290.1	3,430.0	5,804.7	845.9
Total	156,063.0	85,799.8	132,260.0	196,980.4	11,546.2	3,853.2	6,664.0	974.9

On-Road Fleet Footprint Calculator Output - Externality Costs

Current Year On-Road - Energy Use and Emission Externality Costs by Vehicle Type

Vehicle Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Passenger Car	$0	$0	$0	$0	$0	$0	$0	$0
Passenger Truck	$2,484	$4,204	$0	$60	$10	$87	$37	$19
Light Commercial Truck	$0	$0	$0	$0	$0	$0	$0	$0
School Bus	$0	$0	$0	$0	$0	$0	$0	$0
Transit Bus	$0	$0	$0	$0	$0	$0	$0	$0
Refuse Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Short-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Long-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Combination Short-Haul Truck	$36,366	$59,913	$0	$14,856	$356	$2,314	$171	$313
Combination Long-Haul Truck	$252,602	$416,162	$0	$125,500	$3,022	$19,463	$1,497	$2,175
Total	$291,452	$480,279	$0	$140,416	$3,389	$21,865	$1,705	$2,507

Remaining Lifetime On-Road - Energy Use and Emission Externality Costs by Vehicle Type

Vehicle Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Passenger Car	$0	$0	$0	$0	$0	$0	$0	$0
Passenger Truck	$27,323	$46,248	$0	$830	$117	$959	$549	$205
Light Commercial Truck	$0	$0	$0	$0	$0	$0	$0	$0
School Bus	$0	$0	$0	$0	$0	$0	$0	$0
Transit Bus	$0	$0	$0	$0	$0	$0	$0	$0
Refuse Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Short-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Single Unit Long-Haul Truck	$0	$0	$0	$0	$0	$0	$0	$0
Combination Short-Haul Truck	$400,024	$659,039	$0	$163,845	$3,919	$25,454	$1,889	$3,444
Combination Long-Haul Truck	$2,778,624	$4,577,784	$0	$1,380,498	$33,247	$214,097	$16,469	$23,925
Total	$3,205,970	$5,283,071	$0	$1,545,173	$37,284	$240,510	$18,907	$27,575

Off-Road Fleet Footprint Calculator Output

Off-Road Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year Off-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Equipment Type

Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Aerial Lifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Airport Support Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All Terrain Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chain Saws	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Turf Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cranes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crawler Tractor/Dozers	1,971.2	1,083.5	106.0	363.4	23.8	21.6	17.3	12.3
Excavators	1,743.0	958.1	67.9	587.5	5.3	5.1	21.5	10.9
Forklifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Golf Carts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn & Garden Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn Mowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafblowers/Vacuums	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rollers	413.1	227.1	21.1	367.7	4.7	4.7	3.0	2.6
Rubber Tire Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skid Steer Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Snowblowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweepers/Scrubbers	213.8	117.5	52.0	450.0	4.1	3.9	16.5	1.3
Terminal Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tractors/Loaders/Backhoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trimmers/Edgers/Brush Cutter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	4,341.2	2,386.1	247.0	1,768.5	37.9	35.4	58.4	27.1

Remaining Lifetime Year Off-Road - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type

Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Aerial Lifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Airport Support Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All Terrain Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chain Saws	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Turf Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cranes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crawler Tractor/Dozers	8,569.9	4,710.4	460.8	1,579.8	103.4	94.0	75.2	53.6
Excavators	7,542.1	4,145.5	293.7	2,542.1	23.1	22.1	93.2	47.2
Forklifts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Golf Carts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn & Garden Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn Mowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafblowers/Vacuums	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rollers	223.4	122.8	11.4	198.9	2.6	2.6	1.6	1.4
Rubber Tire Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skid Steer Loaders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Snowblowers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweepers/Scrubbers	136.6	75.1	33.2	287.5	2.6	2.5	10.5	0.9
Terminal Tractors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tractors/Loaders/Backhoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trimmers/Edgers/Brush Cutter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	16,472.0	9,053.8	799.1	4,608.2	131.7	121.1	180.6	103.0

Off-Road Fleet Footprint Calculator Output - Externality Costs

Current Year Off-Road - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	**GHGs**	**CO**	**NOx**	**PM10**	**PM2.5**	**VOC**	**SOx**
Equipment Type	**($)**	**($)**	**($)**	**($)**	**($)**	**($)**	**($)**	**($)**
Aerial Lifts	$0	$0	$0	$0	$0	$0	$0	$0
Agricultural Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Airport Support Equipment	$0	$0	$0	$0	$0	$0	$0	$0
All Terrain Vehicles	$0	$0	$0	$0	$0	$0	$0	$0
Chain Saws	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Turf Equipment	$0	$0	$0	$0	$0	$0	$0	$0
Cranes	$0	$0	$0	$0	$0	$0	$0	$0
Crawler Tractor/Dozers	$40,494	$66,714	$0	$2,851	$10	$1,350	$49	$349
Excavators	$35,807	$58,992	$0	$4,608	$1	$318	$61	$308
Forklifts	$0	$0	$0	$0	$0	$0	$0	$0
Golf Carts	$0	$0	$0	$0	$0	$0	$0	$0
Lawn & Garden Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Lawn Mowers	$0	$0	$0	$0	$0	$0	$0	$0
Leafblowers/Vacuums	$0	$0	$0	$0	$0	$0	$0	$0
Rollers	$8,487	$13,982	$0	$2,884	$0	$296	$9	$73
Rubber Tire Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Skid Steer Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Snowblowers	$0	$0	$0	$0	$0	$0	$0	$0
Sweepers/Scrubbers	$4,393	$7,237	$0	$3,530	$1	$244	$47	$38
Terminal Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Tractors/Loaders/Backhoes	$0	$0	$0	$0	$0	$0	$0	$0
Trimmers/Edgers/Brush Cutter	$0	$0	$0	$0	$0	$0	$0	$0
Total	$89,181	$146,925	$0	$13,873	$12	$2,208	$166	$768

Remaining Lifetime Off-Road - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	**GHGs**	**CO**	**NOx**	**PM10**	**PM2.5**	**VOC**	**SOx**
Equipment Type	**($)**	**($)**	**($)**	**($)**	**($)**	**($)**	**($)**	**($)**
Aerial Lifts	$0	$0	$0	$0	$0	$0	$0	$0
Agricultural Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Airport Support Equipment	$0	$0	$0	$0	$0	$0	$0	$0
All Terrain Vehicles	$0	$0	$0	$0	$0	$0	$0	$0
Chain Saws	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Turf Equipment	$0	$0	$0	$0	$0	$0	$0	$0
Cranes	$0	$0	$0	$0	$0	$0	$0	$0
Crawler Tractor/Dozers	$176,049	$290,041	$0	$12,392	$46	$5,870	$213	$1,516
Excavators	$154,936	$255,257	$0	$19,941	$5	$1,377	$264	$1,334
Forklifts	$0	$0	$0	$0	$0	$0	$0	$0
Golf Carts	$0	$0	$0	$0	$0	$0	$0	$0
Lawn & Garden Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Lawn Mowers	$0	$0	$0	$0	$0	$0	$0	$0
Leafblowers/Vacuums	$0	$0	$0	$0	$0	$0	$0	$0
Rollers	$4,590	$7,562	$0	$1,560	$0	$160	$5	$40
Rubber Tire Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Skid Steer Loaders	$0	$0	$0	$0	$0	$0	$0	$0
Snowblowers	$0	$0	$0	$0	$0	$0	$0	$0
Sweepers/Scrubbers	$2,806	$4,623	$0	$2,255	$1	$156	$30	$24
Terminal Tractors	$0	$0	$0	$0	$0	$0	$0	$0
Tractors/Loaders/Backhoes	$0	$0	$0	$0	$0	$0	$0	$0
Trimmers/Edgers/Brush Cutter	$0	$0	$0	$0	$0	$0	$0	$0
Total	$338,381	$557,483	$0	$36,148	$51	$7,562	$512	$2,914

Rail Fleet Footprint Calculator Output

Rail Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year Rail - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Equipment Type								
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Class I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Class II / III	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Switcher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intercity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commuter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Light Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Year Rail - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type								
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Class I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Class II / III	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Switcher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intercity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commuter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Light Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Rail Fleet Footprint Calculator Output - Externality Costs

Current Year Rail - Energy Use and Emission Externality Costs by Vehicle Type								
Equipment Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Class I	$0	$0	$0	$0	$0	$0	$0	$0
Class II / III	$0	$0	$0	$0	$0	$0	$0	$0
Switcher	$0	$0	$0	$0	$0	$0	$0	$0
Intercity	$0	$0	$0	$0	$0	$0	$0	$0
Commuter	$0	$0	$0	$0	$0	$0	$0	$0
Heavy Transit	$0	$0	$0	$0	$0	$0	$0	$0
Light Transit	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Rail - Energy Use and Emission Externality Costs by Vehicle Type								
Equipment Type	Petroleum Use ($)	GHGs ($)	CO ($)	NOx ($)	PM10 ($)	PM2.5 ($)	VOC ($)	SOx ($)
Class I	$0	$0	$0	$0	$0	$0	$0	$0
Class II / III	$0	$0	$0	$0	$0	$0	$0	$0
Switcher	$0	$0	$0	$0	$0	$0	$0	$0
Intercity	$0	$0	$0	$0	$0	$0	$0	$0
Commuter	$0	$0	$0	$0	$0	$0	$0	$0
Heavy Transit	$0	$0	$0	$0	$0	$0	$0	$0
Light Transit	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Marine Fleet Footprint Calculator Output

Marine Fleet Footprint Calculator Output - Energy Use and Emissions

Current Year Marine - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Equipment Type

Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Bulk Carrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Container Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cruise Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
General Cargo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RORO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other OGV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Excursion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Harbor Ferry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offshore Crew and Supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towboat / Pushboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tugboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Boat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Harbor Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inboard/Sterndrive	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outboard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Personal Water Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Year Marine - Well-to-Wheels Petroleum Use and GHGs & Vehicle Operation Air Pollutants by Vehicle Type

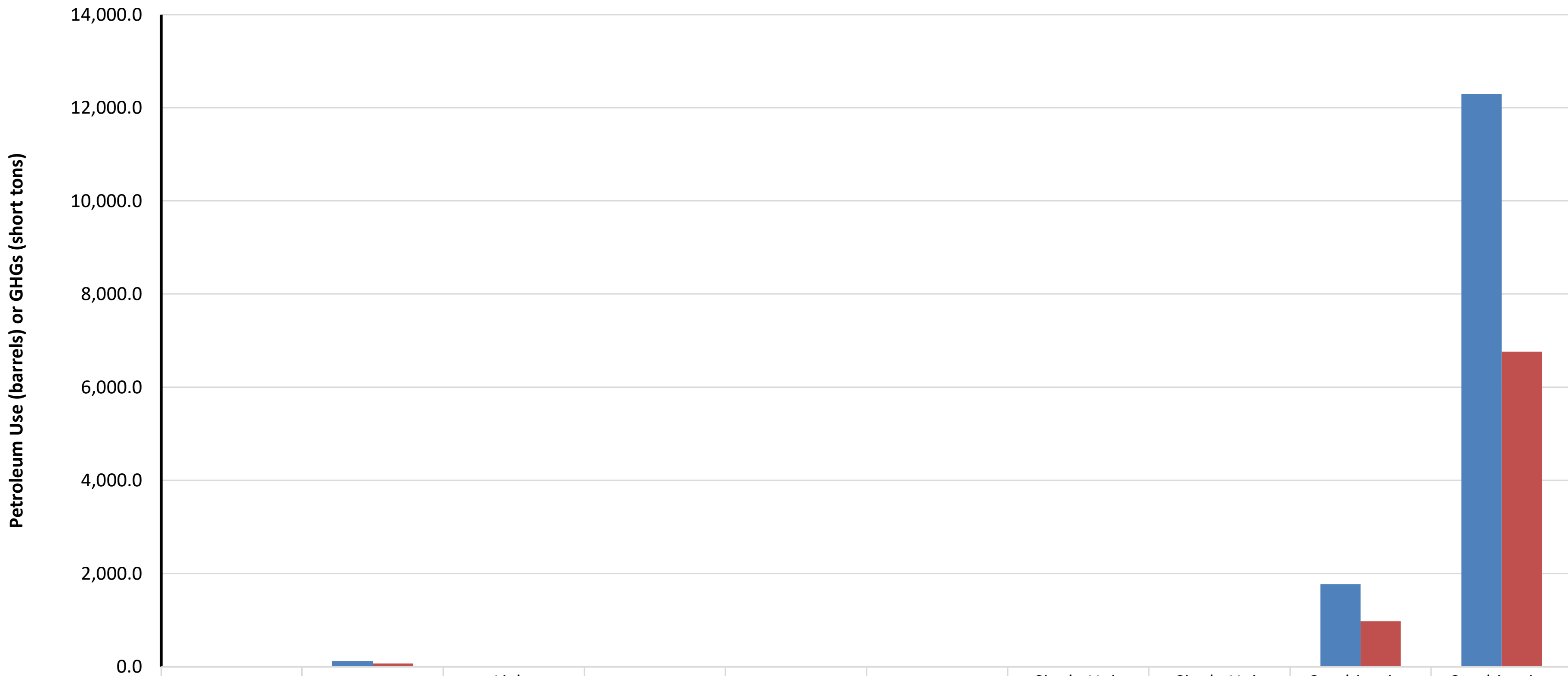
Equipment Type	Petroleum Use (barrels)	GHGs (short tons)	CO (lb)	NOx (lb)	PM10 (lb)	PM2.5 (lb)	VOC (lb)	SOx (lb)
Bulk Carrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Container Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cruise Ship	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
General Cargo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RORO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other OGV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Excursion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Harbor Ferry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offshore Crew and Supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towboat / Pushboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tugboat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Boat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Harbor Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inboard/Sterndrive	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outboard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Personal Water Craft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Marine Fleet Footprint Calculator Output - Externality Costs

Current Year Marine - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	GHGs	CO	NOx	PM10	PM2.5	VOC	SOx
Equipment Type	($)	($)	($)	($)	($)	($)	($)	($)
Bulk Carrier	$0	$0	$0	$0	$0	$0	$0	$0
Container Ship	$0	$0	$0	$0	$0	$0	$0	$0
Cruise Ship	$0	$0	$0	$0	$0	$0	$0	$0
General Cargo	$0	$0	$0	$0	$0	$0	$0	$0
RORO	$0	$0	$0	$0	$0	$0	$0	$0
Tanker	$0	$0	$0	$0	$0	$0	$0	$0
Other OGV	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Fishing	$0	$0	$0	$0	$0	$0	$0	$0
Excursion	$0	$0	$0	$0	$0	$0	$0	$0
Government	$0	$0	$0	$0	$0	$0	$0	$0
Harbor Ferry	$0	$0	$0	$0	$0	$0	$0	$0
Offshore Crew and Supply	$0	$0	$0	$0	$0	$0	$0	$0
Towboat / Pushboat	$0	$0	$0	$0	$0	$0	$0	$0
Tugboat	$0	$0	$0	$0	$0	$0	$0	$0
Work Boat	$0	$0	$0	$0	$0	$0	$0	$0
Other Harbor Craft	$0	$0	$0	$0	$0	$0	$0	$0
Inboard/Sterndrive	$0	$0	$0	$0	$0	$0	$0	$0
Outboard	$0	$0	$0	$0	$0	$0	$0	$0
Personal Water Craft	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Marine - Energy Use and Emission Externality Costs by Vehicle Type								
	Petroleum Use	GHGs	CO	NOx	PM10	PM2.5	VOC	SOx
Equipment Type	($)	($)	($)	($)	($)	($)	($)	($)
Bulk Carrier	$0	$0	$0	$0	$0	$0	$0	$0
Container Ship	$0	$0	$0	$0	$0	$0	$0	$0
Cruise Ship	$0	$0	$0	$0	$0	$0	$0	$0
General Cargo	$0	$0	$0	$0	$0	$0	$0	$0
RORO	$0	$0	$0	$0	$0	$0	$0	$0
Tanker	$0	$0	$0	$0	$0	$0	$0	$0
Other OGV	$0	$0	$0	$0	$0	$0	$0	$0
Commercial Fishing	$0	$0	$0	$0	$0	$0	$0	$0
Excursion	$0	$0	$0	$0	$0	$0	$0	$0
Government	$0	$0	$0	$0	$0	$0	$0	$0
Harbor Ferry	$0	$0	$0	$0	$0	$0	$0	$0
Offshore Crew and Supply	$0	$0	$0	$0	$0	$0	$0	$0
Towboat / Pushboat	$0	$0	$0	$0	$0	$0	$0	$0
Tugboat	$0	$0	$0	$0	$0	$0	$0	$0
Work Boat	$0	$0	$0	$0	$0	$0	$0	$0
Other Harbor Craft	$0	$0	$0	$0	$0	$0	$0	$0
Inboard/Sterndrive	$0	$0	$0	$0	$0	$0	$0	$0
Outboard	$0	$0	$0	$0	$0	$0	$0	$0
Personal Water Craft	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

Current Year Well-to-Wheels Petroleum Use and GHGs - On-Road Fleet

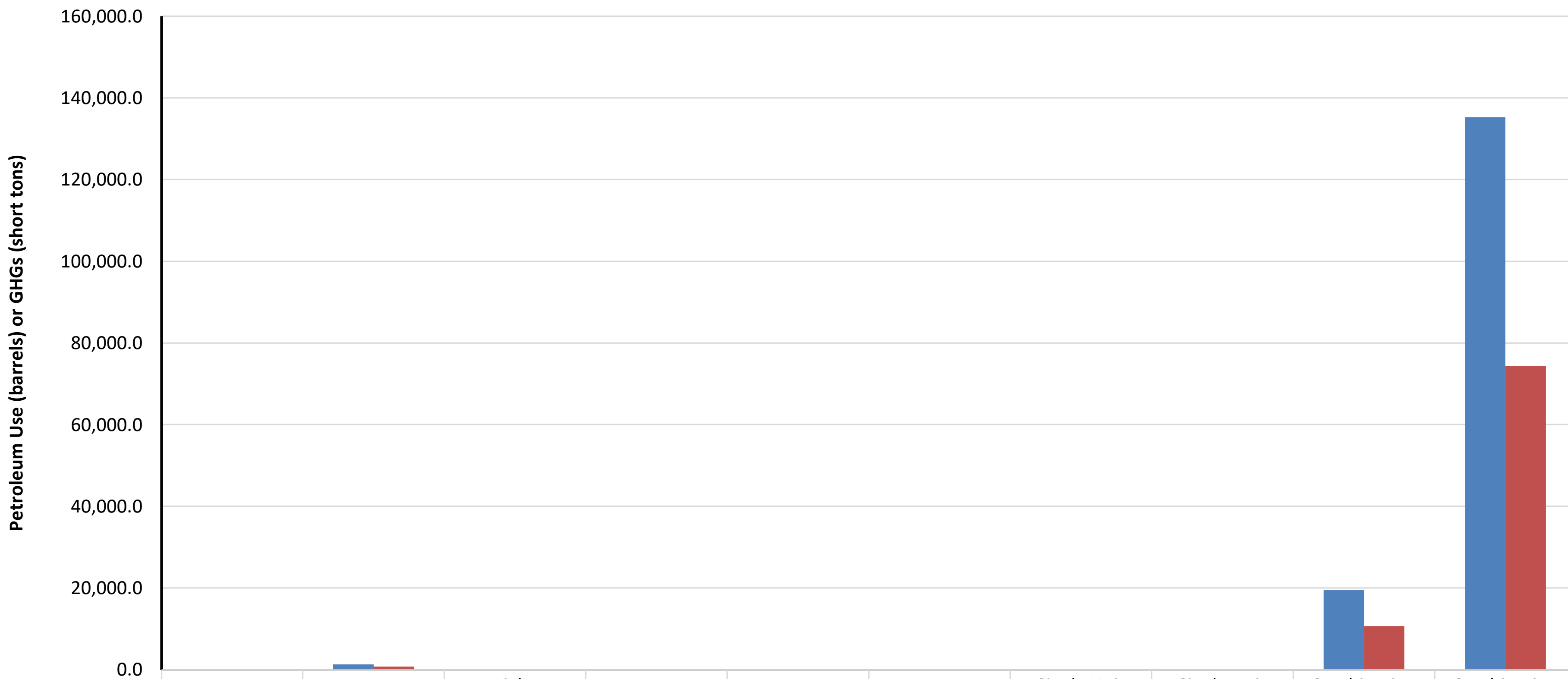


	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
Petroleum Use	0.0	120.9	0.0	0.0	0.0	0.0	0.0	0.0	1,770.2	12,296.4
GHGs	0.0	68.3	0.0	0.0	0.0	0.0	0.0	0.0	973.0	6,758.7

Current Year Vehicle Operation Air Pollutants - On-Road Fleet

	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
CO	0.0	221.7	0.0	0.0	0.0	0.0	0.0	0.0	1,143.6	10,572.0
NOx	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	1,893.8	15,998.9
PM10	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	110.6	935.5
PM2.5	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	37.1	311.8
VOC	0.0	13.1	0.0	0.0	0.0	0.0	0.0	0.0	60.3	527.7
SOx	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	11.1	76.9

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - On-Road Fleet



	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
Petroleum Use	0.0	1,330.0	0.0	0.0	0.0	0.0	0.0	0.0	19,472.7	135,260.3
GHGs	0.0	751.1	0.0	0.0	0.0	0.0	0.0	0.0	10,703.1	74,345.5

Remaining Lifetime Vehicle Operation Air Pollutants - On-Road Fleet

	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
CO	0.0	3,369.6	0.0	0.0	0.0	0.0	0.0	0.0	12,598.9	116,291.6
NOx	0.0	105.8	0.0	0.0	0.0	0.0	0.0	0.0	20,887.2	175,987.4
PM10	0.0	39.6	0.0	0.0	0.0	0.0	0.0	0.0	1,216.5	10,290.1
PM2.5	0.0	15.4	0.0	0.0	0.0	0.0	0.0	0.0	407.8	3,430.0
VOC	0.0	193.6	0.0	0.0	0.0	0.0	0.0	0.0	665.7	5,804.7
SOx	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	121.8	845.9

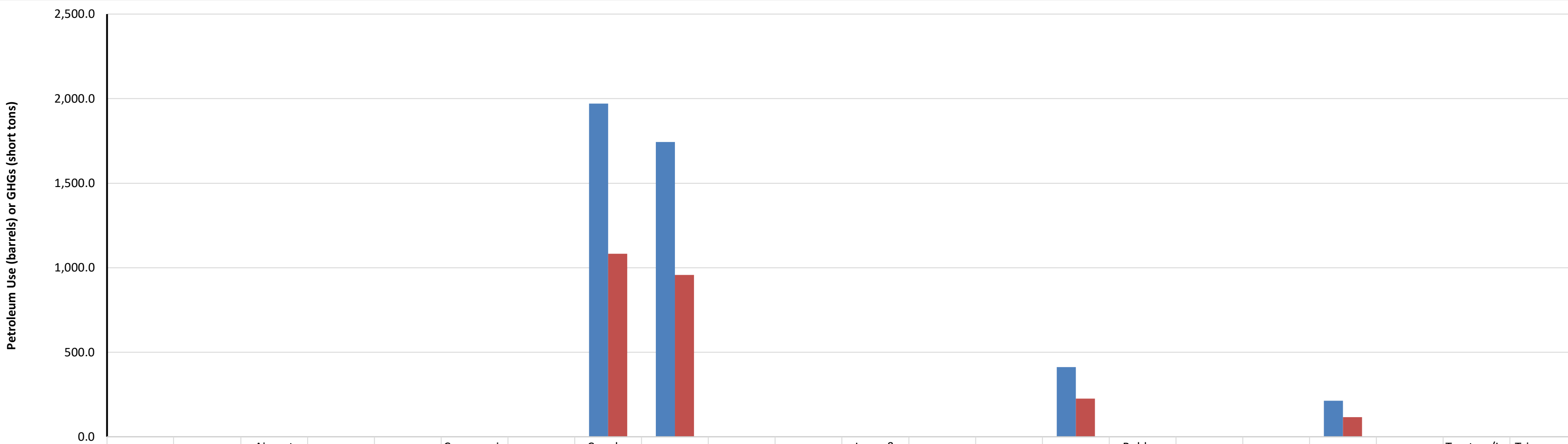
Current Year Externality Costs - On-Road Fleet

	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
SOx	$0	$19	$0	$0	$0	$0	$0	$0	$313	$2,175
VOC	$0	$37	$0	$0	$0	$0	$0	$0	$171	$1,497
PM2.5	$0	$87	$0	$0	$0	$0	$0	$0	$2,314	$19,463
PM10	$0	$10	$0	$0	$0	$0	$0	$0	$356	$3,022
NOx	$0	$60	$0	$0	$0	$0	$0	$0	$14,856	$125,500
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$4,204	$0	$0	$0	$0	$0	$0	$59,913	$416,162
Petroleum Use	$0	$2,484	$0	$0	$0	$0	$0	$0	$36,366	$252,602

Remaining Lifetime Externality Costs - On-Road Fleet

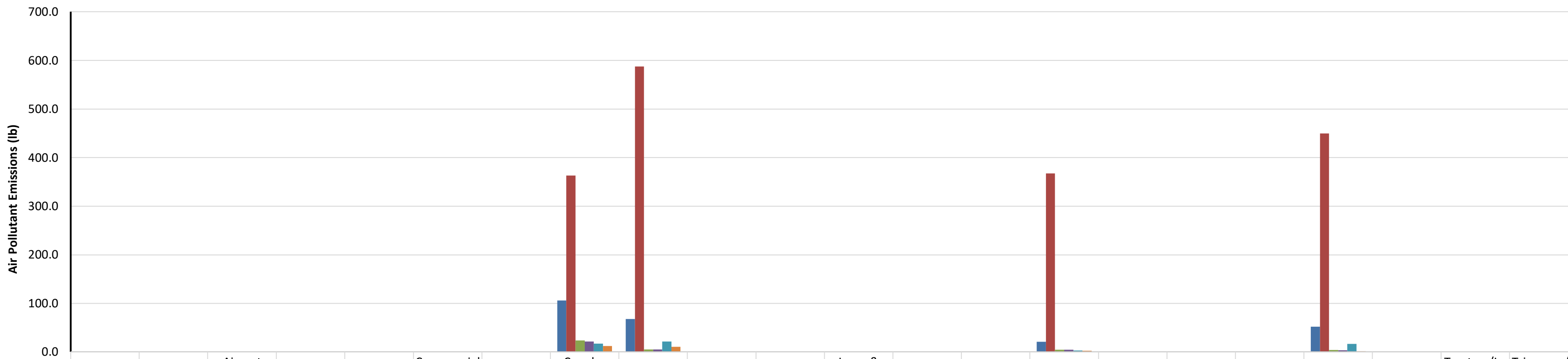
	Passenger Car	Passenger Truck	Light Commercial Truck	School Bus	Transit Bus	Refuse Truck	Single Unit Short-Haul Truck	Single Unit Long-Haul Truck	Combination Short-Haul Truck	Combination Long-Haul Truck
SOx	$0	$205	$0	$0	$0	$0	$0	$0	$3,444	$23,925
VOC	$0	$549	$0	$0	$0	$0	$0	$0	$1,889	$16,469
PM2.5	$0	$959	$0	$0	$0	$0	$0	$0	$25,454	$214,097
PM10	$0	$117	$0	$0	$0	$0	$0	$0	$3,919	$33,247
NOx	$0	$830	$0	$0	$0	$0	$0	$0	$163,845	$1,380,498
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$46,248	$0	$0	$0	$0	$0	$0	$659,039	$4,577,784
Petroleum Use	$0	$27,323	$0	$0	$0	$0	$0	$0	$400,024	$2,778,624

Current Year Well-to-Wheels Petroleum Use and GHGs - Off-Road Fleet



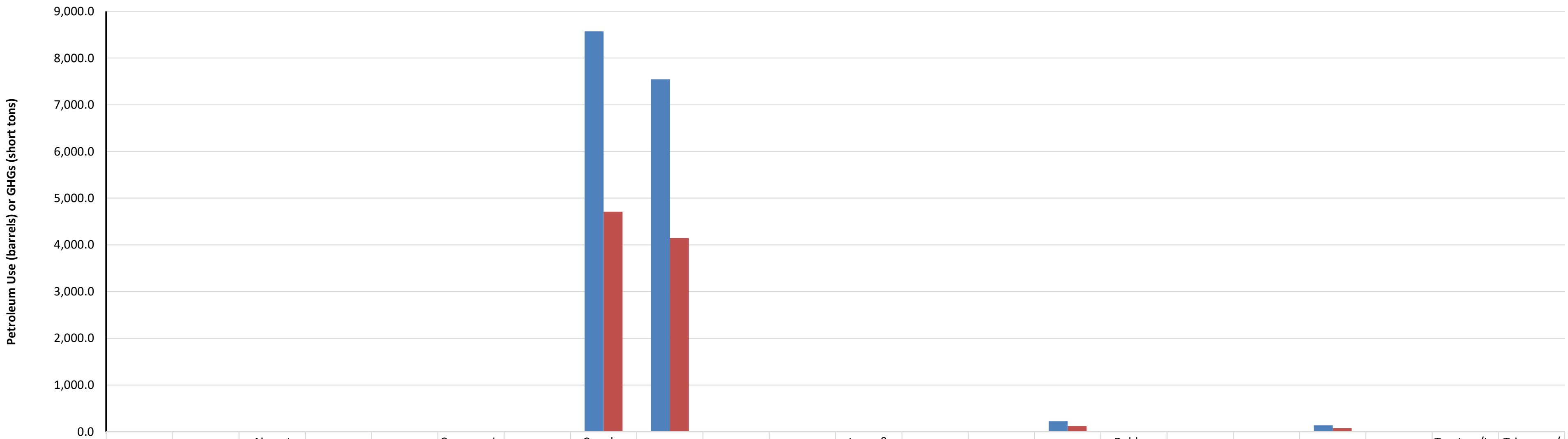
	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,971.2	1,743.0	0.0	0.0	0.0	0.0	0.0	413.1	0.0	0.0	0.0	213.8	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,083.5	958.1	0.0	0.0	0.0	0.0	0.0	227.1	0.0	0.0	0.0	117.5	0.0	0.0	0.0

Current Year Vehicle Operation Air Pollutants - Off-Road Fleet



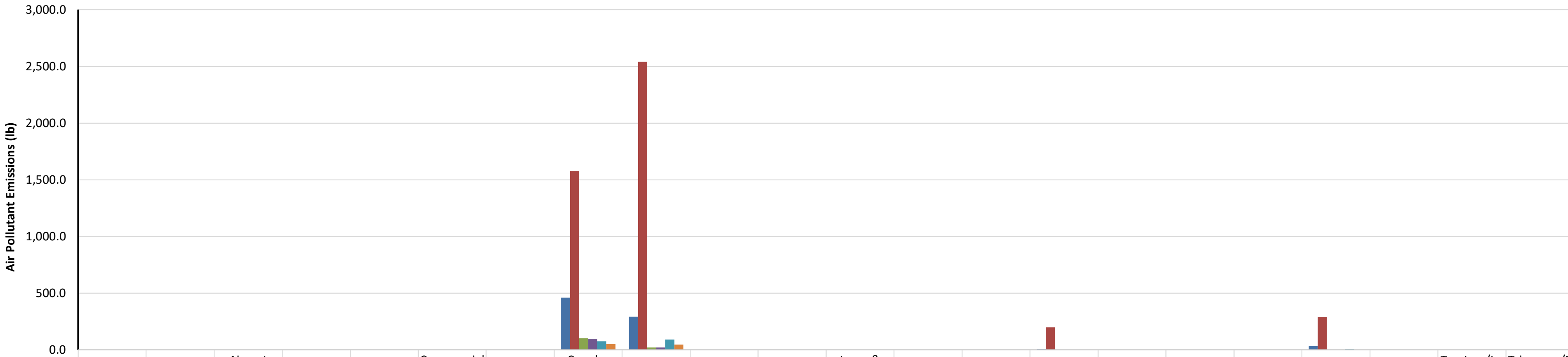
	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	106.0	67.9	0.0	0.0	0.0	0.0	0.0	21.1	0.0	0.0	0.0	52.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.4	587.5	0.0	0.0	0.0	0.0	0.0	367.7	0.0	0.0	0.0	450.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8	5.3	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	4.1	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.6	5.1	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	3.9	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3	21.5	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.3	10.9	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	1.3	0.0	0.0	0.0

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - Off-Road Fleet



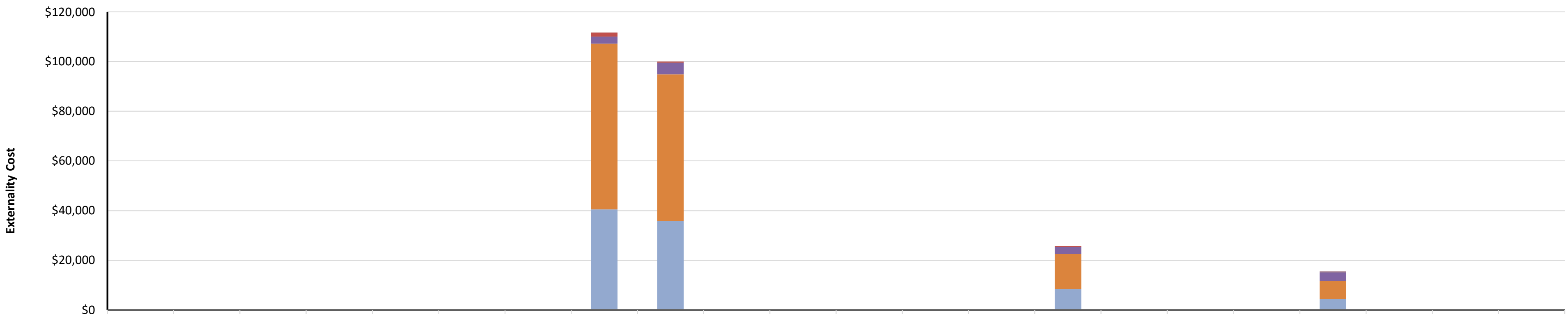
	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8,569.9	7,542.1	0.0	0.0	0.0	0.0	0.0	223.4	0.0	0.0	0.0	136.6	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,710.4	4,145.5	0.0	0.0	0.0	0.0	0.0	122.8	0.0	0.0	0.0	75.1	0.0	0.0	0.0

Remaining Lifetime Vehicle Operation Air Pollutants - Off-Road Fleet



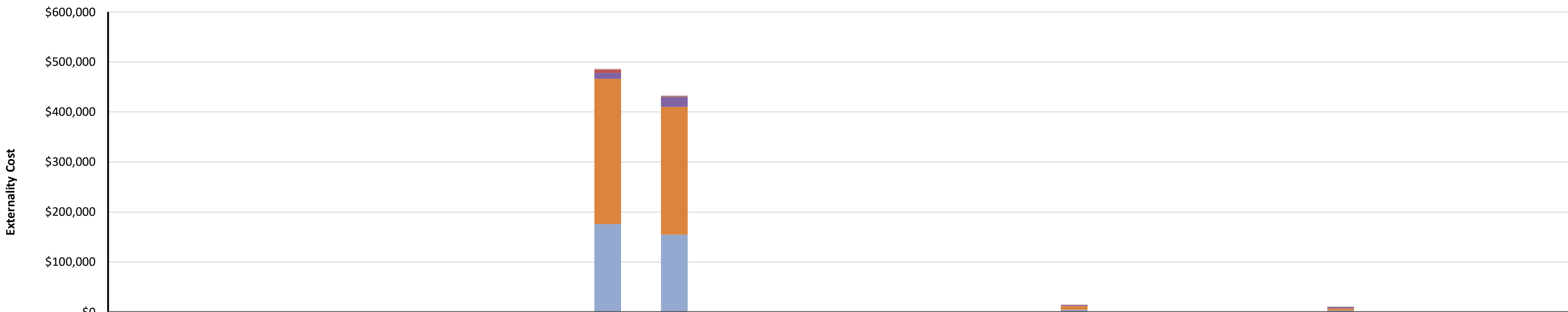
	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	460.8	293.7	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.0	0.0	33.2	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,579.8	2,542.1	0.0	0.0	0.0	0.0	0.0	198.9	0.0	0.0	0.0	287.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	103.4	23.1	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	2.6	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.0	22.1	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	2.5	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.2	93.2	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	10.5	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.6	47.2	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.9	0.0	0.0	0.0

Current Year Externality Costs - Off-Road Fleet



	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
SOx	$0	$0	$0	$0	$0	$0	$0	$349	$308	$0	$0	$0	$0	$0	$73	$0	$0	$0	$38	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$49	$61	$0	$0	$0	$0	$0	$9	$0	$0	$0	$47	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$1,350	$318	$0	$0	$0	$0	$0	$296	$0	$0	$0	$244	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$10	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$2,851	$4,608	$0	$0	$0	$0	$0	$2,884	$0	$0	$0	$3,530	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$66,714	$58,992	$0	$0	$0	$0	$0	$13,982	$0	$0	$0	$7,237	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$40,494	$35,807	$0	$0	$0	$0	$0	$8,487	$0	$0	$0	$4,393	$0	$0	$0

Remaining Lifetime Externality Costs - Off-Road Fleet



	Aerial Lifts	Agricultural Tractors	Airport Support Equipment	All Terrain Vehicles	Chain Saws	Commercial Turf Equipment	Cranes	Crawler Tractor/Dozers	Excavators	Forklifts	Golf Carts	Lawn & Garden Tractors	Lawn Mowers	Leafblowers/Vacuums	Rollers	Rubber Tire Loaders	Skid Steer Loaders	Snowblowers	Sweepers/Scrubbers	Terminal Tractors	Tractors/Loaders/Backhoes	Trimmers/Edgers/Brush Cutter
SOx	$0	$0	$0	$0	$0	$0	$0	$1,516	$1,334	$0	$0	$0	$0	$0	$40	$0	$0	$0	$24	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$213	$264	$0	$0	$0	$0	$0	$5	$0	$0	$0	$30	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$5,870	$1,377	$0	$0	$0	$0	$0	$160	$0	$0	$0	$156	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$46	$5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$12,392	$19,941	$0	$0	$0	$0	$0	$1,560	$0	$0	$0	$2,255	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$290,041	$255,257	$0	$0	$0	$0	$0	$7,562	$0	$0	$0	$4,623	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$176,049	$154,936	$0	$0	$0	$0	$0	$4,590	$0	$0	$0	$2,806	$0	$0	$0

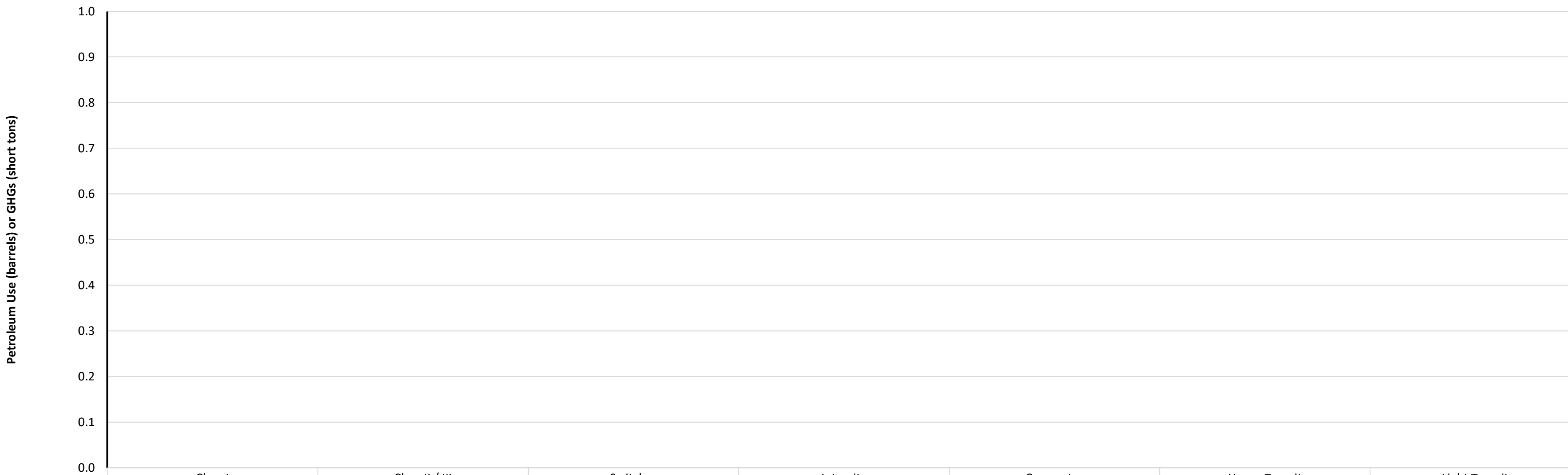
Current Year Well-to-Wheels Petroleum Use and GHGs - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Vehicle Operation Air Pollutants - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - Rail Fleet



	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Vehicle Operation Air Pollutants - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Externality Costs - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
SOx	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Externality Costs - Rail Fleet

	Class I	Class II / III	Switcher	Intercity	Commuter	Heavy Transit	Light Transit
SOx	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0

Current Year Well-to-Wheels Petroleum Use and GHGs - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Sterndrive	Outboard	Personal Water Craft
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Vehicle Operation Air Pollutants - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Stern drive	Outboard	Personal Water Craft
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Well-to-Wheels Petroleum Use and GHGs - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Sterndrive	Outboard	Personal Water Craft
Petroleum Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GHGs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Remaining Lifetime Vehicle Operation Air Pollutants - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Stern drive	Outboard	Personal Water Craft
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Current Year Externality Costs - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Sterndrive	Outboard	Personal Water Craft
SOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Remaining Lifetime Externality Costs - Marine Fleet

	Bulk Carrier	Container Ship	Cruise Ship	General Cargo	RORO	Tanker	Other OGV	Commercial Fishing	Excursion	Government	Harbor Ferry	Offshore Crew and Supply	Towboat / Pushboat	Tugboat	Work Boat	Other Harbor Craft	Inboard/Ster ndrive	Outboard	Personal Water Craft
SOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VOC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM2.5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PM10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NOx	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GHGs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Petroleum Use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0