

July 28, 2019
File No. 07206022.18 Task 3

Davis Zhu
Permit Services Division
Bay Area Air Quality Management District
375 Beale Street
San Francisco, CA 94105

Subject: Application to Request Exemption from NSPS Subpart WWW and Cancellation of the Title V Permit, City of Palo Alto Landfill, Palo Alto, California (Facility #A2721)

Dear Mr. Zhu:

On behalf of the City of Palo Alto (City), SCS Engineers (SCS) has prepared this application for submittal to the Bay Area Air Quality Management District (BAAQMD or District) requesting exemption from the New Source Performance Standards (NSPS) Subpart WWW requirements and the cancellation of the Title V permit for the City of Palo Alto Landfill (Landfill or Site).

BACKGROUND

The Landfill is a closed municipal solid waste (MSW) disposal site owned and operated by the City. The Landfill facility occupies 137.03 acres of the approximately 1,500-acre, City-owned Byxbee Park and Baylands parcel and is located at 2380 Embarcadero Road, Palo Alto, California 94303. The Landfill maintains a BAAQMD Title V permit (Facility #A2721). A copy of the Title V permit is provided as **Attachment A**.

The Landfill stopped receiving MSW in July 2011, and final closure activities were completed in November 2015. Approval of the final closure of the Landfill was received from CalRecycle on March 24, 2016. A landfill gas (LFG) collection and control system (GCCS) was initially installed in 1989. The GCCS has been in operation for 30 years, and the LFG generation has been steadily declining since the Landfill stopped receiving waste 8 years ago.

REASON FOR PERMITTING

The Landfill is currently subject to the New Source Performance Standards for Municipal Solid Waste Landfills (NSPS; 40 Code of Federal Regulations [CFR], Part 60, Subpart WWW), because the site has over 2.5 million megagrams (Mg) of waste-in-place and commenced construction, reconstruction, or modification on or after May 30, 1991. The Landfill also previously triggered the NSPS requirements to install and operate a GCCS because the non-methane organic compound (NMOC) emissions were previously calculated to be over 50 Mg. As previously noted, a GCCS was installed, and has been operating since 1989. However, the Landfill ceased accepting MSW in 2011, and the generated LFG as well as the associated NMOC emissions have been declining since that time.

NSPS Obligations

According to 40 CFR 60.752(b)(2)(v), the GCCS at older, closed landfills may be capped or removed provided all of the conditions of paragraphs 60.752(b)(2)(v) (A), (B), and (C) are met. 40 CFR 60.752(b)(2)(v) states the following:

The collection and control system may be capped or removed provided that all the conditions of paragraphs (b)(2)(v)(A), (B), and (C) of this section are met:

40 CFR 60.752(b)(2)(v)(A) The landfill shall be a closed landfill as defined in §60.751 of this subpart. A closure report shall be submitted to the Administrator as provided in §60.757(d);

40 CFR 60.752(b)(2)(v)(B) The collection and control system shall have been in operation a minimum of 15 years; and

40 CFR 60.752(b)(2)(v)(C) Following the procedures specified in §60.754(b) of this subpart, the calculated NMOC gas produced by the landfill shall be less than 50 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart and no more than 180 days apart.

The Landfill currently meets all of the above conditions stated in 60.752(b)(2)(c) (A), (B), and (C) including successfully completing three successive NMOC sampling tests, the results of which demonstrate that the NMOC concentration is below 50 Mg per year. However, the City is not requesting to cap or remove the Landfill's GCCS at this time. Instead, the City is requesting exemption from the requirements of the NSPS rule, as the Site has demonstrated from the three successive NMOC test results that the Site is well below the NSPS threshold of 50 Mg and should therefore no longer be subject to the NSPS requirements. The following subsections demonstrate how the Landfill meets all the criteria outlined in 40 CFR 60.752(b)(2)(v).

40 CFR 60.752(b)(2)(v)(A)

The Landfill is a closed landfill as defined in 40 CFR 60.751. The Landfill officially ceased waste acceptance and disposal operations in July 2011 and achieved final closure status in November 2015. The March 24, 2016 letter from CalRecycle approving the final closure activities is provided as **Attachment B**.

40 CFR 60.752(b)(2)(v)(B)

The Landfill's GCCS was initially installed in 1989, or 30 years ago, greater than the 15-year requirement. For documentation that the GCCS has been in operation for at least 15 years, the City has provided a copy of the annual flare source test results for 2002, 17 years ago. This document, dated December 23, 2002 is provided as **Attachment C**.

40 CFR 60.752(b)(2)(v)(C)

Tier 2 NMOC sampling was conducted on October 23, 2018, January 29, 2019, and May 17, 2019. As required by the Regulation, the test dates were no less than 90 days apart and no more than 180 days apart. Tier 2 testing consisted of collecting three LFG samples from the main header for each of the three sampling events.

The three NMOC sampling events were conducted by SCS Field Services (SCSFS). Three LFG samples, the minimum number of samples required under NSPS Subpart WWW, were taken during each sampling event. The samples obtained during each of these sampling events were contained in SUMMA canisters and shipped to either Atmospheric Assessment Associates, Inc. (AtmAA) or Atmospheric Analysis & Consulting Inc. (AAC) for LFG analysis of NMOC content. The LFG samples were analyzed for NMOC content by U.S. Environmental Protection Agency (EPA) Method 25C, as required. The NMOC results were reported as methane and converted to NMOC as hexane to be consistent with NSPS reporting protocols. The weighted NMOC concentration as hexane was calculated by dividing the NMOC concentration as methane, as reported by the laboratories, by six, in accordance with the NSPS procedures as described in 40 CFR 60.754(a)(3). Copies of the laboratory analytical results and the chain-of-custody forms are provided in **Attachment D**.

A Tier 2 NMOC emissions rate was determined by SCS for each of the three sampling events, using the average of the results for each event (in NMOC concentrations as hexane) and actual disposal rates from 1955 through 2011. For each calculation, SCS used the default methane generation rate constant, “k”, of 0.02, which is acceptable for arid areas (receiving less than 25 inches of annual rainfall), and the NSPS-specified L_0 value of 170 cubic meters of methane produced per Mg of waste. Emissions were estimated for 2019 using the EPA Landfill Gas Emissions Model (LandGEM). Average estimated NMOC emissions for 2019 are shown in **Table 1**. As the values below document, annual NMOC emissions at the site have been below 10 MG, based on each Tier 2 result. Copies of the model output summary reports are provided in **Attachment E**.

Table 1. NMOC Concentrations and Emissions

Date of Sampling	Average NMOC Concentration results (ppmv, as Hexane)	2019 NMOC Emissions (Mg/yr)
October 23, 2018	82.50	3.91
January 29, 2019	82.37	3.89
May 17, 2019	153.7	7.28

The City is requesting a response from the District confirming that the Site is no longer subject to NSPS Subpart WWW. In addition, the Site also triggered federal (Title V) permitting requirements, pursuant to Part 70 of the Clean Air Act and BAAQMD Regulation 2, Rule 6, as a consequence of being subject to an NSPS regulation. Because the Site will no longer be subject to NSPS Subpart WWW, it is the City’s and SCS’ understanding that it will also no longer be considered a Title V site, and the City’s Title V permit will be canceled..

Please also respond indicating the District’s concurrence with the changes in permitting status described. In addition, please specify what actions, if any, will be required by the City in order for the City’s permit to operate to be revised to reflect the Site’s new status with regards to the federal (NSPS and Title V) regulations. If the City is required to submit an application to revise the permit to operate by removing all conditions related to CAA Part 70 and BAAQMD Rule 2-6, please confirm, and an application will be prepared and submitted.

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We look forward to hearing from the District regarding this matter, and confirming the Site's federal permitting status as soon as possible. Please contact Michael O'Connor at 707-236-3791 or at moconnor@scsengineers.com if you have any questions or require any additional information at this time.

Sincerely,



Haley DeLong
Project Professional
SCS Engineers



Michael O'Connor
Project Manager, CAPP
SCS Engineers

Initial of Author/Initials of Reviewer (or typist)

HD/MRO

cc: Elise Sbarbori, City of Palo Alto

Attachments: Attachment A – Current BAAQMD Title V Permit
Attachment B – CalRecycle final closure letter (March 24, 2016)
Attachment C – Flare Source Test Results (December 23, 2002)
Attachment D - Laboratory Results
Attachment E - LandGEM Summary Reports

ATTACHMENT A
Current BAAQMD Title V Permit

Bay Area Air Quality Management District

939 Ellis Street
San Francisco, CA 94109
(415) 771-6000

Final

MAJOR FACILITY REVIEW PERMIT

Issued To:
City of Palo Alto Landfill
Facility #A2721

Facility Address:
2380 Embarcadero Road
Palo Alto, CA 94303

Mailing Address:
PO Box 10250
Palo Alto, CA 94303

Responsible Official
J. Michael Sartor, Director of Public Works
(650) 496-5930

Facility Contact
Chuck Muir, Manager
(650) 496-6979

Type of Facility: Landfill
Primary SIC: 4953
Product: Landfill Gas

BAAQMD Engineering
Division Contact: Stanley Tom

ISSUED BY THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Signed by Jaime A. Williams _____
Jaime A. Williams, Director of Engineering

January 13, 2016
Date

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I. STANDARD CONDITIONS

A. Administrative Requirements

The permit holder shall comply with all applicable requirements in the following regulations:

- BAAQMD Regulation 1 - General Provisions and Definitions
(as amended by the District Board on 5/4/11);
- SIP Regulation 1 - General Provisions and Definitions
(as approved by EPA through 6/28/99);
- BAAQMD Regulation 2, Rule 1 - Permits, General Requirements
(as amended by the District Board on 3/4/09);
- SIP Regulation 2, Rule 1 - Permits, General Requirements
(as approved by EPA through 1/26/99);
- BAAQMD Regulation 2, Rule 2 - Permits, New Source Review
(as amended by the District Board on 6/15/05);
- SIP Regulation 2, Rule 2 - Permits, New Source Review and Prevention of Significant Deterioration
(as approved by EPA through 1/26/99);
- BAAQMD Regulation 2, Rule 4 - Permits, Emissions Banking
(as amended by the District Board on 12/21/04);
- SIP Regulation 2, Rule 4 - Permits, Emissions Banking
(as approved by EPA through 1/26/99);
- BAAQMD Regulation 2, Rule 5 – New Source Review of Toxic Air Contaminants
(as amended by the District Board on 01/06/10);
- BAAQMD Regulation 2, Rule 6 - Permits, Major Facility Review
(as amended by the District Board on 4/16/03); and
- SIP Regulation 2 Rule 6 – Permits, Major Facility Review
(as approved by EPA through 6/23/95)

B. Conditions to Implement Regulation 2, Rule 6, Major Facility Review

1. This Major Facility Review Permit was issued on June 4, 2012, and expires on June 3, 2017. The permit holder shall submit a complete application for renewal of this Major Facility Review Permit no later than December 3, 2016 and no earlier than June 3, 2016. **If a complete application for renewal has not been submitted in accordance with this deadline, the facility may not operate after June 3, 2017.** If the permit renewal has not been issued by June 3, 2017, but a complete application for renewal has been submitted in accordance with the above deadlines, the existing permit will continue in force until the District takes final action on the renewal application. (Regulation 2-6-307, 404.2, 407, & 409.6; MOP Volume II, Part 3, §4.2)

I. Standard Conditions

2. The permit holder shall comply with all conditions of this permit. The permit consists of this document and all appendices. Any non-compliance with the terms and conditions of this permit will constitute a violation of the law and will be grounds for enforcement action; permit termination, revocation and re-issuance, or modification; or denial of a permit renewal application. (Regulation 2-6-307; MOP Volume II, Part 3, §4.11)
3. In the event any enforcement action is brought as a result of a violation of any term or condition of this permit, the fact that it would have been necessary for the permittee to halt or reduce the permitted activity in order to maintain compliance with such term or condition shall not be a defense to such enforcement action. (MOP Volume II, Part 3, §4.11)
4. This permit may be modified, revoked, reopened and reissued, or terminated for cause. (Regulation 2-6-307, 409.8, 415; MOP Volume II, Part 3, §4.11)
5. The filing of a request by the facility for a permit modification, revocation and re-issuance, or termination, or the filing of a notification of planned changes or anticipated non-compliance does not stay the applicability of any permit condition. (Regulation 2-6-409.7; MOP Volume II, Part 3, §4.11)
6. This permit does not convey any property rights of any sort, or any exclusive privilege. (Regulation 2-6-409.7; MOP Volume II, Part 3, §4.11)
7. The permit holder shall supply within 30 days any information that the District requests in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. (Regulation 1-441, Regulation 2-6-409.4 & 501; MOP Volume II, Part 3, §4.11)
8. Any records required to be maintained pursuant to this permit that the permittee considers to contain proprietary or trade secret information shall be prominently designated as such. Copies of any such proprietary or trade secret information which are provided to the District shall be maintained by the District in a locked confidential file, provided, however, that requests from the public for the review of any such information shall be handled in accordance with the District's procedures set forth in Section 11 of the District's Administrative Code. (Regulation 2-6-419; MOP Volume II, Part 3, §4.11)
9. Proprietary or trade secret information provided to EPA will be subject to the requirements of 40 CFR Part 2, Subpart B - Public Information, Confidentiality of Business Information. (40 CFR Part 2)

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10. The emissions inventory submitted with the application for this Major Facility Review Permit is an estimate of actual emissions or the potential to emit for the time period stated and is included only as one means of determining applicable requirements for emission sources. It does not establish, or constitute a basis for establishing, any new emission limitations. (MOP Volume II, Part 3, §4.11)
11. The responsible official shall certify all documents submitted by the facility pursuant to the major facility review permit. The certification shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. The certifications shall be signed by a responsible official for the facility. (Regulation 2-6-409.20, MOP Volume II, Part 3, §4.11)
12. The permit holder is responsible for compliance, and certification of compliance, with all conditions of the permit, regardless whether it acts through employees, agents, contractors, or subcontractors. (Regulation 2-6-307)

C. Requirement to Pay Fees

The permit holder shall pay annual fees in accordance with District Regulation 3, including Schedule P. (Regulation 2-6-402 & 409.13, Regulation 3; MOP Volume II, Part 3, §4.12)

D. Inspection and Entry

Access to Facility: The permit holder shall provide reasonable access to the facility and equipment that is subject to this permit to the APCO and/or to his or her designee. (Regulation 1-440, Regulation 2-6-409.3; MOP Volume II, Part 3, §4.14)

E. Records

1. The permit holder must provide any information, records, and reports requested or specified by the APCO. (Regulation 1-441, Regulation 2-6-409.4)
2. Notwithstanding the specific wording in any requirement, all records for federally enforceable requirements shall be maintained for at least five years from the date of creation of the record. (Regulation 2-6-501, MOP Volume II, Part 3, §4.7)

F. Monitoring Reports

Reports of all required monitoring must be submitted to the District at least once every six months, except where an applicable requirement specifies more frequent reporting. Reports shall be for the following periods: June 1st through November 30th and December 1st through May 31st, and are due on the last day of the month after the end of the reporting period. All instances of non-compliance shall be clearly identified in these reports. The reports shall be certified by the responsible official as true, accurate, and complete. In addition, all instances of non-compliance with the

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permit shall be reported in writing to the District's Compliance and Enforcement Division within 10 calendar days of the discovery of the incident. Within 30 calendar days of the discovery of any incident of non-compliance, the facility shall submit a written report including the probable cause of non-compliance and any corrective or preventative actions. The reports shall be sent to the following address:

Director of Compliance and Enforcement
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
Attn: Title V Reports

(Regulation 2-6-502, MOP Volume II, Part 3, §4.7)

G. Compliance Certification

Compliance certifications shall be submitted annually by the responsible official of this facility to the Bay Area Air Quality Management District and to the Environmental Protection Agency. The certification period will be December 1st through November 30th. The certification shall be submitted by December 31st of each year. The certification must list each applicable requirement, the compliance status, whether compliance was continuous or intermittent, the method used to determine compliance, and any other specific information required by the permit. The certification should be directed to the District's Compliance and Enforcement Division at the address above, and a copy of the certification shall be sent to the Environmental Protection Agency at the following address:

Director
Enforcement Division, TRI & Air Section (ENF-2-1)
USEPA Region 9
75 Hawthorne Street
San Francisco, California 94105

(MOP Volume II, Part 3, §4.5 and 4.15)

H. Emergency Provisions

1. The permit holder may seek relief from enforcement action in the event of a breakdown, as defined by Regulation 1-208 of the District's Rules and Regulations, by following the procedures contained in Regulations 1-431 and 1-432. The District will thereafter determine whether breakdown relief will be

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granted in accordance with Regulation 1-433. (MOP Volume II, Part 3, §4.8)

2. The permit holder may seek relief from enforcement action for a violation of any of the terms and conditions of this permit by applying to the District's Hearing Board for a variance pursuant to Health and Safety Code Section 42350. The Hearing Board will determine after notice and hearing whether variance relief should be granted in accordance with the procedures and standards set forth in Health and Safety Code Section 42350 et seq. (MOP Volume II, Part 3, §4.8)
3. The granting by the District of breakdown relief or the issuance by the Hearing Board of a variance will not provide relief from federal enforcement. (MOP Volume II, Part 3, §4.8)

I. Severability

In the event that any provision of this permit is invalidated by a court or tribunal of competent jurisdiction, or by the Administrator of the EPA, all remaining portions of the permit shall remain in full force and effect. (Regulation 2-6-409.5; MOP Volume II, Part 3, §4.10)

J. Miscellaneous Conditions

1. The maximum capacity for each source as shown in Table II-A is the maximum allowable capacity. Exceedance of the maximum allowable capacity for any source is a violation of Regulation 2, Rule 1, Section 301. (Regulation 2-1-301)

II. EQUIPMENT

A. Permitted Source List

Each of the following sources has been issued a permit to operate pursuant to the requirements of BAAQMD Regulation 2, Permits. The capacities in this table are the maximum allowable capacities for each source, pursuant to Standard Condition I.J and Regulation 2-1-301.

**Table II – A
 Permitted Sources**

S-#	Description	Make or Type	Model	Capacity
S-1	Palo Alto Landfill with Gas Collection System	Inactive solid waste disposal site that accepted municipal, commercial, industrial, and construction wastes. active		Max. Design Capacity = 7,759,000 yd ³ (5,932,000 m ³) Max. Cumulative Decomposable Materials In Place = 5,830,000 tons (5,289,000 Mg) 105 vertical wells 24 leachate collection wells

B. Abatement Device List

**Table II – B
 Abatement Devices**

A-#	Description	Source(s) Controlled	Applicable Requirement	Operating Parameters	Limit or Efficiency
A-10	Landfill Gas Flare, Perennial Energy, 9 MM BTU/hour, fired on landfill gas	S-1	BAAQMD 8-34-301.3, see also Table IV-A	Minimum combustion zone temperature of 1457 °F, see also Table VII-A	Either ≥ 98% by weight destruction of NMOC, or Outlet Concentration < 30 ppmv of NMOC, as CH ₄ , at 3% O ₂ , dry

III. GENERALLY APPLICABLE REQUIREMENTS

The permit holder shall comply with all applicable requirements, including those specified in the BAAQMD and SIP Rules and Regulations and other federal requirements cited below. These requirements apply in a general manner to the facility and/or to sources exempt from the requirement to obtain a District Permit to Operate. The District has determined that these requirements will not be violated under normal, routine operations, and that no additional periodic monitoring or reporting to demonstrate compliance is warranted. In cases where a requirement, in addition to being generally applicable, is also specifically applicable to one or more sources, the requirement and the source are also included in Section IV, Source-Specific Applicable Requirements, of this permit. This section also contains provisions that may apply to temporary sources.

The dates in parentheses in the Title column identify the versions of the regulations being cited and are, as applicable:

1. BAAQMD regulation(s): The date(s) of adoption or most recent amendment of the regulation by the District Board of Directors
2. Any federal requirement, including a version of a District regulation that has been approved into the SIP: The most recent date of EPA approval of any portion of the rule, encompassing all actions on the rule through that date

The full language of the SIP requirements are posted on the EPA Region 9 website. The address is:

<http://yosemite.epa.gov/r9/r9sips.nsf/Agency?ReadForm&count=500&state=California&cat=Bay+Area+Air+Quality+Management+District-Agency-Wide+Provisions>.

NOTE:

There are differences between the current BAAQMD rules and the versions of the rules in the SIP. All sources must comply with both versions of the rule until US EPA has reviewed and approved the District's revision of the regulation.

**Table III
 Generally Applicable Requirements**

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)
BAAQMD Regulation 1	General Provisions and Definitions (5/4/11)	N
SIP Regulation 1	General Provisions and Definitions (6/28/99)	Y
BAAQMD Regulation 2, Rule 1	Permits – General Requirements (3/04/09)	N
BAAQMD 2-1-429	Permits – Federal Emissions Statement (12/21/04)	N

III. Generally Applicable Requirements

Table III
Generally Applicable Requirements

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)
SIP Regulation 2, Rule 1	Permits – General Requirements (1/26/99)	Y
SIP Regulation 2-1-429	Permits – Federal Emissions Statement (4/3/95)	Y
BAAQMD Regulation 2, Rule 5	Permits – New Source Review of Toxic Air Contaminants (1/06/10)	N
BAAQMD Regulation 4	Air Pollution Episode Plan (3/20/91)	N
SIP Regulation 4	Air Pollution Episode Plan (8/6/90)	Y
BAAQMD Regulation 5	Open Burning (7/9/08)	N
SIP Regulation 5	Open Burning (9/4/98)	Y
BAAQMD Regulation 6, Rule 1	Particulate Matter – General Requirements (12/5/07)	N
SIP Regulation 6	Particulate Matter and Visible Emissions (9/4/98)	Y
BAAQMD Regulation 7	Odorous Substances (3/17/82)	N
BAAQMD Regulation 8, Rule 1	Organic Compounds – General Provisions (6/15/94)	Y
BAAQMD Regulation 8, Rule 2	Organic Compounds – Miscellaneous Operations (7/20/05)	N
SIP Regulation 8, Rule 2	Organic Compounds – Miscellaneous Operations (3/22/95)	Y
BAAQMD Regulation 8, Rule 3	Organic Compounds – Architectural Coatings (7/01/09)	N
SIP Regulation 8, Rule 3	Organic Compounds – Architectural Coatings (1/2/04)	Y
BAAQMD Regulation 8, Rule 4	Organic Compounds – General Solvent and Surface Coating Operations (10/16/02)	Y
BAAQMD Regulation 8, Rule 15	Organic Compounds – Emulsified and Liquid Asphalts (6/1/94)	Y
BAAQMD Regulation 8, Rule 16	Organic Compounds – Solvent Cleaning Operations (10/16/02)	Y
BAAQMD Regulation 8, Rule 40	Organic Compounds – Aeration of Contaminated Soil and Removal of Underground Storage Tanks (6/15/05)	N
BAAQMD 8-40-116	Exemption, Small Volume (12/15/99)	Y
BAAQMD 8-40-117	Exemption, Accidental Spills (12/15/99)	Y
SIP Regulation 8, Rule 40	Organic Compounds – Aeration of Contaminated Soil and Removal of Underground Storage Tanks (4/19/01)	Y
BAAQMD Regulation 8, Rule 47	Organic Compounds – Air Stripping and Soil Vapor Extraction Operations (6/15/05)	N
SIP Regulation 8, Rule 47	Organic Compounds – Air Stripping and Soil Vapor Extraction Operations (4/26/95)	Y
BAAQMD Regulation 8, Rule 49	Organic Compounds – Aerosol Paint Products (12/20/95)	N
SIP Regulation 8, Rule 49	Organic Compounds – Aerosol Paint Products (3/22/95)	Y
BAAQMD Regulation 8, Rule 51	Organic Compounds – Adhesive and Sealant Products (7/17/02)	N
SIP Regulation 8, Rule 51	Organic Compounds – Adhesive and Sealant Products (2/26/02)	Y
BAAQMD Regulation 9, Rule 1	Inorganic Gaseous Pollutants – Sulfur Dioxide (3/15/95)	N

III. Generally Applicable Requirements

Table III
Generally Applicable Requirements

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)
SIP Regulation 9, Rule 1	Inorganic Gaseous Pollutants – Sulfur Dioxide (6/8/99)	Y
BAAQMD Regulation 9, Rule 2	Inorganic Gaseous Pollutants – Hydrogen Sulfide (10/06/99)	N
BAAQMD Regulation 11, Rule 1	Hazardous Pollutants – Lead (3/17/82)	N
SIP Regulation 11, Rule 1	Hazardous Pollutants – Lead (9/2/81)	Y
BAAQMD Regulation 11, Rule 2	Hazardous Pollutants – Asbestos Demolition, Renovation and Manufacturing (10/7/98)	N
BAAQMD Regulation 11, Rule 14	Hazardous Pollutants – Asbestos Containing Serpentine (7/17/91)	N
BAAQMD Regulation 12, Rule 4	Miscellaneous Standards of Performance – Sandblasting (7/11/90)	N
SIP Regulation 12, Rule 4	Miscellaneous Standards of Performance – Sandblasting (9/2/81)	Y
California Health and Safety Code Section 41750 et seq.	Portable Equipment	N
California Health and Safety Code Section 44300 et seq.	Air Toxics “Hot Spots” Information and Assessment Act of 1987	N
California Health and Safety Code, Title 17, Section 93105	Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying and Surface Mining Operations (7/26/01)	N
California Health and Safety Code, Title 17, Section 93106	Asbestos Airborne Toxic Control Measure for Asbestos Containing Serpentine (7/20/00)	N
California Health and Safety Code Title 17, Section 93116	Airborne Toxic Control Measure for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater (2/19/11)	N
40 CFR Part 61, Subpart A	National Emission Standards for Hazardous Air Pollutants – General Provisions (9/13/10)	Y
40 CFR Part 61, Subpart M	National Emission Standards for Hazardous Air Pollutants – National Emission Standard for Asbestos (7/20/04)	Y
EPA Regulation 40 CFR 82	Protection of Stratospheric Ozone (4/13/05)	
Subpart F, 40 CFR 82.154	Recycling and Emissions Reductions – Prohibitions	Y
Subpart F, 40 CFR 82.156	Recycling and Emissions Reductions – Required Practices	Y
Subpart F, 40 CFR 82.158	Recycling and Emissions Reductions – Standards for recycling and recovery equipment	Y
Subpart F, 40 CFR 82.161	Recycling and Emissions Reductions – Technician Certification	Y
Subpart F, 40 CFR 82.162	Recycling and Emissions Reductions – Certification by Owners of Recovery and Recycling Equipment (3/12/04)	Y
Subpart F, 40 CFR 82.166	Recycling and Emissions Reductions – Reporting and Recordkeeping Requirements	Y

IV. SOURCE-SPECIFIC APPLICABLE REQUIREMENTS

The permit holder shall comply with all applicable requirements, including those specified in the BAAQMD and SIP Rules and Regulations and other federal requirements cited below. The requirements cited in the following tables apply in a specific manner to the indicated source(s).

The dates in parenthesis in the Title column identify the versions of the regulations being cited and are, as applicable:

1. BAAQMD regulation(s): The date(s) of adoption or most recent amendment of the regulation by the District Board of Directors
2. Any federal requirement, including a version of a District regulation that has been approved into the SIP: The most recent date of EPA approval of any portion of the rule, encompassing all actions on the rule through that date

The full text of each permit condition cited is included in Section VI, Permit Conditions, of this permit. The full language of the SIP requirements are posted on the EPA Region 9 website. The address is:

<http://yosemite.epa.gov/r9/r9sips.nsf/Agency?ReadForm&count=500&state=California&cat=Bay+Area+Air+Quality+Management+District-Agency-Wide+Provisions>.

All other text may be found in the regulations themselves.

Table IV – A
Source-Specific Applicable Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
BAAQMD Regulation 1	General Provisions and Definitions (5/4/11)		
1-523	Parametric Monitoring and Recordkeeping Procedures	N	
1-523.1	Reporting requirement for periods of inoperation > 24 hours	Y	
1-523.2	Limit on duration of inoperation	Y	
1-523.3	Reporting requirement for violations of any applicable limits	N	
1-523.4	Records of inoperation, tests, calibrations, adjustments, & maintenance	Y	
1-523.5	Maintenance and calibration	N	
SIP Regulation 1	General Provisions and Definitions (6/28/99)		

IV. Source-Specific Applicable Requirements

Table IV – A
Source-Specific Applicable Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
1-523	Parametric Monitoring and Recordkeeping Procedures	Y	
1-523.3	Reports of Violations	Y	
BAAQMD Regulation 6, Rule 1	Particulate Matter – General Requirements (12/5/07)		
6-1-301	Ringelmann No. 1 Limitation	N	
6-1-305	Visible Particles	N	
6-1-310	Particle Weight Limitation (applies to flares only)	N	
6-1-401	Appearance of Emissions	N	
SIP Regulation 6	Particulate Matter and Visible Emissions (9/4/98)		
6-301	Ringelmann No. 1 Limitation	Y	
6-305	Visible Particles	Y	
6-310	Particle Weight Limitation (applies to flares only)	Y	
6-401	Appearance of Emissions	Y	
BAAQMD Regulation 8, Rule 34	Organic Compounds – Solid Waste Disposal Sites (6/15/05)		
8-34-113	Limited Exemption, Inspection and Maintenance	Y	
8-34-113.1	Emission Minimization Requirement	Y	
8-34-113.2	Shutdown Time Limitation	Y	
8-34-113.3	Recordkeeping Requirement	Y	
8-34-117	Limited Exemption, Gas Collection System Components	Y	
8-34-117.1	Necessity of Existing Component Repairs/Adjustments	Y	
8-34-117.2	New Components are Described in Collection and Control System Design Plan	Y	
8-34-117.3	Meets Section 8-34-118 Requirements	Y	
8-34-117.4	Limits on Number of Wells Shutdown	Y	
8-34-117.5	Shutdown Duration Limit	Y	
8-34-117.6	Well Disconnection Records	Y	
8-34-118	Limited Exemption, Construction Activities	Y	
8-34-118.1	Construction Plan	Y	
8-34-118.2	Activity is Required to Maintain Compliance with this Rule	Y	

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Source-Specific Applicable Requirements
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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
8-34-118.3	Required or Approved by Other Enforcement Agencies	Y	
8-34-118.4	Emission Minimization Requirement	Y	
8-34-118.5	Excavated Refuse Requirements	Y	
8-34-118.6	Covering Requirements for Exposed Refuse	Y	
8-34-118.7	Installation Time Limit	Y	
8-34-118.8	Capping Required for New Components	Y	
8-34-118.9	Construction Activity Records	Y	
8-34-301	Landfill Gas Collection and Emission Control System Requirements	Y	
8-34-301.1	Continuous Operation	Y	
8-34-301.2	Collection and Control Systems Leak Limitations	Y	
8-34-301.3	Limits for Enclosed Flares	Y	
8-34-301.4	Limits for Other Emission Control Systems (Permit Holder shall ensure that Facility # A0617 will comply with this requirement whenever landfill gas is vented to the sludge incinerators: S-1 or S-2 at Facility # A0617)	Y	
8-34-303	Landfill Surface Requirements	Y	
8-34-304	Gas Collection System Installation Requirements	Y	
8-34-304.1	Based on Waste Age For Inactive or Closed Areas	Y	
8-34-304.2	Based on Waste Age For Active Areas	Y	
8-34-304.3	Based on Amount of Decomposable Waste Accepted	Y	
8-34-304.4	Based on NMOC Emission Rate	Y	
8-34-305	Wellhead Requirements	Y	
8-34-305.1	Wellhead Vacuum Requirements	Y	
8-34-305.2	Wellhead Temperature Limit	Y	
8-34-305.3	Nitrogen Concentration Limit for Wellhead Gas, or	Y	
8-34-305.4	Oxygen Concentration Limit for Wellhead Gas	Y	
8-34-404	Less Than Continuous Operation Petition	Y	
8-34-404.1	Monitoring requirements for individual gas collection system components that are subject to less than continuous operation provisions	Y	
8-34-404.2	Map showing components that are operating less than continuously	Y	
8-34-404.3	Operating, inspection, and maintenance schedules for components that are operating less than continuously	Y	

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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
8-34-404.4	Operating conditions for components that are operating less than continuously	Y	
8-34-404.5	Renewal requirements apply whenever information submitted pursuant to 8-34-404.1 changes	Y	
8-34-405	Design Capacity Reports	Y	
8-34-408	Collection and Control System Design Plans	Y	
8-34-408.2	Sites With Existing Collection and Control Systems	Y	
8-34-411	Annual Report	Y	
8-34-412	Compliance Demonstration Tests	Y	
8-34-413	Performance Test Report	Y	
8-34-414	Repair Schedule for Wellhead Excesses	Y	
8-34-414.1	Records of Excesses	Y	
8-34-414.2	Corrective Action	Y	
8-34-414.3	Collection System Expansion	Y	
8-34-414.4	Operational Due Date for Expansion	Y	
8-34-415	Repair Schedule for Surface Leak Excesses	Y	
8-34-415.1	Records of Excesses	Y	
8-34-415.2	Corrective Action	Y	
8-34-415.3	Re-monitor Excess Location Within 10 Days	Y	
8-34-415.4	Re-monitor Excess Location Within 1 Month	Y	
8-34-415.5	If No More Excesses, No Further Re-Monitoring	Y	
8-34-415.6	Additional Corrective Action	Y	
8-34-415.7	Re-monitor Second Excess Within 10 days	Y	
8-34-415.8	Re-monitor Second Excess Within 1 Month	Y	
8-34-415.9	If No More Excesses, No Further Re-monitoring	Y	
8-34-415.10	Collection System Expansion for Third Excess in a Quarter	Y	
8-34-415.11	Operational Due Date for Expansion	Y	
8-34-416	Cover Repairs	Y	
8-34-501	Operating Records	Y	
8-34-501.1	Collection System Downtime	Y	
8-34-501.2	Emission Control System Downtime	Y	
8-34-501.3	Continuous Temperature Records for Enclosed Combustors (applies to flares only)	Y	

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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
8-34-501.4	Testing	Y	
8-34-501.5	Record keeping requirements for components subject to Section 404 less than continuous operating provisions	Y	
8-34-501.6	Leak Discovery and Repair Records	Y	
8-34-501.7	Waste Acceptance Records	Y	
8-34-501.8	Non-decomposable Waste Records	Y	
8-34-501.9	Wellhead Excesses and Repair Records	Y	
8-34-501.10	Gas Flow Rate Records for All Emission Control Systems	Y	
8-34-501.11	Records of Key Emission Control System Operating Parameters (Permit Holder shall ensure that Facility # A0617 will comply with this requirement whenever landfill gas is vented to the sludge incinerators: S-1 or S-2 at Facility # A0617)	Y	
8-34-501.12	Records Retention for 5 Years	Y	
8-34-503	Landfill Gas Collection and Emission Control System Leak Testing	Y	
8-34-504	Portable Hydrocarbon Detector	Y	
8-34-505	Well Head Monitoring	Y	
8-34-506	Landfill Surface Monitoring	Y	
8-34-506.1	Criteria for Annual Monitoring: Closed Landfill	Y	
8-34-506.2	Criteria for Annual Monitoring: No Excess in 3 Quarters	Y	
8-34-506.3	Criteria for Annual Monitoring: Revert to Quarterly Monitoring if an Excess is Detected	Y	
8-34-507	Continuous Temperature Monitor and Recorder (applies to flares only)	Y	
8-34-508	Gas Flow Meter	Y	
8-34-509	Key Emission Control System Operating Parameter(s) (Permit Holder shall ensure that Facility # A0617 will comply with this requirement whenever landfill gas is vented to the sludge incinerators: S-1 or S-2 at Facility # A0617)	Y	
8-34-510	Cover Integrity Monitoring	Y	
BAAQMD Regulation 9, Rule 1	Inorganic Gaseous Pollutants – Sulfur Dioxide (3/15/95)		
9-1-301	Limitations on Ground Level Concentrations (applies to flares only)	Y	
9-1-302	General Emission Limitations (applies to flares only)	Y	

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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
BAAQMD Regulation 9, Rule 2	Inorganic Gaseous Pollutants – Hydrogen Sulfide (10/6/99)		
9-2-301	Limitations on Hydrogen Sulfide	N	
40 CFR Part 60, Subpart A	Standards of Performance for New Stationary Sources – General Provisions (9/13/10)		
60.4	Address	Y	
60.4(b)	Requires Submission of Requests, Reports, Applications, and Other Correspondence to the Administrator	Y	
60.7	Notification and Record Keeping	Y	
60.8	Performance Tests	Y	
60.11	Compliance with Standards and Maintenance Requirements	Y	
60.11(a)	Compliance determined by performance tests	Y	
60.11(d)	Control devices operated using good air pollution control practice	Y	
60.12	Circumvention	Y	
60.13	Monitoring Requirements	Y	
60.13(a)	Applies to all continuous monitoring systems	Y	
60.13(b)	Monitors shall be installed and operational before performing performance tests	Y	
60.13(e)	Continuous monitors shall operate continuously	Y	
60.13(f)	Monitors shall be installed in proper locations	Y	
60.13(g)	Requires multiple monitors for multiple stacks	Y	
60.14	Modification	Y	
60.15	Reconstruction	Y	
60.19	General Notification and Reporting Requirements	Y	
40 CFR Part 60, Subpart Cc	Standards of Performance for New Stationary Sources – Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills (2/24/99)		
60.33c	Emission guidelines for municipal solid waste landfill emissions	Y	
60.34c	Test methods and procedures	Y	
60.35c	Reporting and recordkeeping guidelines	Y	

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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
60.36c	Compliance Times	Y	
60.36c(a)	Collection and Control Systems in Compliance by 30 months after Initial NMOC Emission Rate Report Shows NMOC Emissions \geq 50 MG/year	Y	
40 CFR Part 62, Subpart F	Approval and Promulgation of State Plans for Designated Facilities and Pollutants – California (4/20/06)		
62.1100	Identification of Plan	Y	
62.1115	Identification of Sources – Existing Municipal Solid Waste Landfills	Y	
40 CFR Part 63, Subpart A	National Emission Standards for Hazardous Air Pollutants – General Provisions (9/13/10)		
63.4	Prohibited activities and circumvention	Y	
63.5	Preconstruction review and notification requirements	Y	
63.5(b)	Requirements for existing, newly constructed, and reconstructed sources	Y	
63.6	Compliance with standards and maintenance requirements	Y	
63.6(e)	Operation and maintenance requirements and SSM Plan	Y	
63.6(f)	Compliance with non-opacity emission standards	Y	
63.10	Record keeping and reporting requirements	Y	
63.10(b)	General record keeping requirements	Y	
63.10(b)(2)	For affected sources, maintain relevant records of:	Y	
63.10(b)(2)(i-v)	Records for startup, shutdown, malfunction, and maintenance	Y	
63.10(d)	General reporting requirements	Y	
63.10(d)(5)	Startup, Shutdown, and Malfunction (SSM) Reports	Y	
40 CFR Part 63, Subpart AAAAA	National Emission Standards for Hazardous Air Pollutants – Municipal Solid Waste Landfills (4/20/06)		
63.1945	When do I have to comply with this subpart?	Y	
63.1945(b)	Compliance date for existing affected landfills	Y	
63.1955	What requirements must I meet?	Y	
63.1955(a)	Comply with either 63.1955(a)(1) or (a)(2)	Y	

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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
63.1955(a)(2)	Comply with State Plan that implements 40 CFR Part 60, Subpart Cc	Y	
63.1955(b)	Comply with 63.1960-63.1985, if a collection and control system is required by 40 CFR Part 60, Subpart WWW or a State Plan implementing 40 CFR Part 60, Subpart Cc	Y	
63.1955(c)	Comply with all approved alternatives to standards for collection and control systems plus all SSM requirements and 6 month compliance reporting requirements	Y	
63.1960	How is compliance determined?	Y	
63.1965	What is a deviation?	Y	
63.1975	How do I calculate the 3-hour block average used to demonstrate compliance?	Y	
63.1980	What records and reports must I keep and submit?	Y	
63.1980(a)	Comply with all record keeping and reporting requirements in 40 CFR Part 60, Subpart WWW or the State Plan implementing 40 CFR Part 60, Subpart Cc, except that the annual report required by 40 CFR 60.757(f) must be submitted every 6 months	Y	
63.1980(b)	Comply with all record keeping and reporting requirements in 40 CFR Part 60, Subpart A and 40 CFR Part 63, Subpart A, including SSM Plans and Reports	Y	
BAAQMD Condition # 1028			
Part 1	Design capacity and waste acceptance rate limits (Regulations 2-1-301 and 2-1-234.3)	Y	
Part 2	Deleted		
Part 3	Deleted		
Part 4	Particulate emission control measures (Regulations 2-1-403, 6-1-301, and 6-1-305)	Y	
Part 5	Control requirements for collected landfill gas (Regulation 8-34-301)	Y	
Part 6	Landfill gas collection system operating requirements (Regulations 8-34-301.1 and 8-34-305, CA H&S Code, Title 17, Division 3, Chapter 10, Article 4, Subarticle 6, 40 CFR Part 60.753)	Y	

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Source-Specific Applicable Requirements
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Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
Part 7	Landfill gas collection system description and Authority to Construct requirement for collection system modifications (Regulations 2-1-301, 8-34-301.1, 8-34-304, and 8-34-305)	Y	
Part 8	Flare heat input limits (Regulation 2-1-301)	Y	
Part 9	Flare temperature limit (Regulations 2-5-301 and 8-34-301.3)	Y	
Part 10	Flare alarm requirements (Regulation 8-34-301)	Y	
Part 11	NO _x limit in flare exhaust (Basis: Cumulative Increase)	Y	
Part 12	CO limit in flare exhaust (Basis: Cumulative Increase)	Y	
Part 13	Deleted		
Part 14	Landfill gas sulfur content limit and monitoring requirements (Regulation 9-1-302)	Y	
Part 15	Annual source test (Cumulative Increase and Regulations 2-5-302, 8-34-301.3, and 8-34-412)	Y	
Part 16	Annual landfill gas characterization test (Regulations 2-5-302 and 8-34-412)	Y	
Part 17	Record keeping requirements (Cumulative Increase and Regulations 2-1-301, 2-5-501, 2-6-501, 6-1-301, 6-1-305, 8-2-301, 8-34-301, 8-34-304, and 8-34-501)	Y	
Part 18	Reporting periods and report submittal due dates for the Regulation 8, Rule 34 report (Regulation 8-34-411 and 40 CFR 63.1980(a))	Y	
Part 19	Operating and monitoring requirements for leachate wells (Regulations 8-34-305, 8-34-404, 8-34-414, 8-34-501.4, 8-34-501.9, Regulation 2-6-501, 40 CFR Part 60.755(a) and 60.759, CCR, Title 17, Section 95468(a)(1))	Y	

V. SCHEDULE OF COMPLIANCE

The permit holder shall comply with all applicable requirements cited in this permit. The permit holder shall also comply with applicable requirements that become effective during the term of this permit on a timely basis.

VI. PERMIT CONDITIONS

Any condition that is preceded by an asterisk is not federally enforceable.

Condition # 1028

For: S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM AND A-10 LANDFILL GAS FLARE

1. The cumulative amount of all decomposable materials placed in the landfill shall not exceed 5,830,000 tons. Effective August 1, 2011, no waste shall be disposed of in the landfill. Modified October 21, 2014. (Basis: Regulation 2-1-301, Cumulative Increase)
2. Deleted October 21, 2014
3. Deleted October 21, 2014
4. Water and/or dust suppressants shall be applied to all unpaved roadways and active soil removal and fill areas associated with this landfill as necessary to prevent visible particulate emissions that persist for longer than 3 minutes in any hour. Paved roadways at the facility shall be kept sufficiently clear of dirt and debris as necessary to prevent visible particulate emissions (that persist for longer than 3 minutes in any hour) from vehicle traffic.
(Basis: Regulations 2-1-403, 6-1-301, and 6-1-305)
5. All collected landfill gas shall be vented to the properly operating Landfill Gas Flare (A-10) or the sludge incinerators (S-1 and S-2) as supplemental fuel at Site # A0617 Palo Alto Regional Water Quality Control Plant. If the sludge incinerators at site # A0617 are not operating, all collected landfill gas shall be vented to the A-10 Landfill Gas Flare. Any amount of collected landfill gas that exceeds the capacity of the operating sludge incinerators at Site #A0617 shall be vented to the flare. Raw landfill shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during collection system installation, maintenance, or repair (which is performed in compliance with Regulation 8, Rule 34, Sections 113, 117, or 118) and for inadvertent component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303. (Basis: Regulation 8-34-301)

VI. Permit Conditions

Condition # 1028

For: S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM AND A-10 LANDFILL GAS FLARE

6. The landfill gas collection system described in Part 7a shall be operated continuously, as defined in Regulation 8-34-219. Wells and adjustment valves shall not be shut off, disconnected, or removed from operation without written authorization from the District, unless the Permit Holder complies with all applicable requirements of Regulation 8, Rule 34, Sections 113, 117, and 118. The landfill gas collection system described in Part 7b.(iii) is not required to be operated continuously and is subject to the alternative wellhead standards described in Part 19, as allowed under Regulation 8-34-305. The CCR, Title 17, Section 95464(c) Wellhead Gauge Pressure Requirement continues to apply to these components. (Basis: Regulation 8-34-301.1 and 8-34-305, CA H&S Code, Title 17, Division 3, Chapter 10, Article 4, Subarticle 6, 40 CFR Part 60.753)

7. The Permit Holder shall apply for and receive a Change of Conditions before altering the landfill gas collection system described in Part 7a below. Increasing or decreasing the number of wells or collectors, changing the length of collectors, or changing locations of wells or collectors are all considered to be alterations that are subject to this requirement.

a. The Permit Holder has been issued a Change of Condition for the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are described in detail in Permit Application # 22543 as of June 7, 2011 and Application # 26538 for the LCRS.

Required Components

Total Number of Vertical Wells:	105
Total Number of Leachate Collection Wells	24
Total Number of Decommission Wells	4

b. The Permit is authorized to make the landfill gas collection system and leachate collection recovery system component alterations described below:

- i. install up to 17 vertical wells in the Phase IIC area
- ii. install up to 10 additional vertical wells in the landfill as needed
- iii. connect up to 24 leachate cleanout risers/collection wells to the landfill gas collection system
- iv. allow the decommissioning of 20 vertical wells in the landfill gas collection system if wells are unproductive, and provided compliance with surface emission standards is maintained.

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Wells installed pursuant to this subpart shall be added to or removed from subpart a in accordance with the procedures identified in Regulation 2-6-414 or 2-6-415. (Basis: Regulations 2-1-301, 8-34-301.1, 8-34-304, 8-34-305)

8. The Heat Input to the A-10 Landfill Gas Flare shall not exceed 216 million BTU per day and shall not exceed 78,840 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record, on a monthly basis, the maximum daily and total monthly heat input to the flare based on: (a) the landfill gas flow rate recorded pursuant to Regulation 8-34-508 and 8-34-501.10, (b) the average methane concentration in the landfill gas measured in most recent source test, and (c) a high heating value for methane of 1013 BTU per cubic foot at 60 degrees F. (Basis: Regulation 2-1-301)
9. The combustion zone temperature of the A-10 Landfill Gas Flare shall be maintained at a minimum of 1457 degrees Fahrenheit, averaged over any 3-hour period. If a source test demonstrates compliance with all applicable requirements at a different temperature, the APCO may revise the minimum combustion zone temperature limit, in accordance with the procedures identified in Regulation 2-6-414 or 2-6-415, based on the following criteria. The minimum combustion zone temperature for the flare shall be equal to the average combustion zone temperature measured during the most recent complying source test minus 50 degrees F, provided that the minimum combustion zone temperature shall not be less than 1400 degrees F. (Basis: Regulations 2-5-301 and 8-34-301.3)
10. The A-10 Landfill Gas Flare shall be equipped with both local and remote alarm systems. (Basis: Regulation 8-34-301)
11. Nitrogen oxide (NO_x) emissions from the A-10 Landfill Gas Flare shall not exceed 0.06 lbs/MM BTU (calculated as NO₂). (Basis: Cumulative Increase)
12. Carbon monoxide (CO) emissions from the A-10 Landfill Gas Flare shall not exceed 0.20 lbs/MM BTU. (Basis: Cumulative Increase)

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- *13. Deleted March 5, 2014
14. Total reduced sulfur compounds in the collected landfill gas shall be monitored as a surrogate for monitoring sulfur dioxide in control system's exhaust. The concentration of total reduced sulfur compounds in the collected landfill gas shall not exceed 860 ppmv (dry) expressed as hydrogen sulfide. In order to demonstrate compliance with this part, the Permit Holder shall test collected landfill gas on an annual basis. The landfill gas sample shall be taken from the main landfill gas header. The Permit Holder shall either test the gas for total reduced sulfur compounds (carbon disulfide, carbonyl sulfide, dimethyl sulfide, hydrogen sulfide, ethyl mercaptan, and methyl mercaptan) using District approved methods (MOP, Volume III, Methods 5, 25, or 44) or test the gas for hydrogen sulfide using a draeger tube and following the manufacturer's recommended procedures for using the draeger tube and interpreting the results. If the draeger tube method is used, the measured hydrogen sulfide concentration shall be multiplied by 1.2 to obtain the total reduced sulfur concentration. (Basis: Regulation 9-1-302)
15. To demonstrate compliance with Parts 8-12 above and Regulation 8, Rule 34, Sections 301.3 and 412, the Permit Holder shall ensure that a District approved source test is conducted annually on the Landfill Gas Flare (A-10). As a minimum, the annual source test shall determine the following:
- landfill gas flow rate to the flare (dry basis);
 - concentrations (dry basis) of carbon dioxide (CO₂), nitrogen (N₂), oxygen (O₂), methane (CH₄), and total non-methane organic compounds (NMOC) in the landfill gas;
 - stack gas flow rate from the flare (dry basis);
 - concentrations (dry basis) of NO_x, CO, CH₄, NMOC, and O₂ in the flare stack gas;
 - the NMOC and methane destruction efficiencies achieved by the flare; and
 - the average combustion zone temperature in the flare during the test period.

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Each annual source test shall be conducted no later than 12 months after the previous annual source test. The Source Test Section of the District shall be contacted to obtain approval of the source test procedures at least 14 days in advance of each source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of each source test. The source test report shall be submitted to the Compliance and Enforcement Division and the Source Test Section within 45 days of the test date.

(Basis: Cumulative Increase and Regulations 2-5-302, 8-34-301.3, and 8-34-412)

16. To demonstrate compliance with Regulation 8-34-412, the Permit Holder shall conduct a characterization of the landfill gas concurrent with the annual source test required by Part 15 above. The landfill gas sample shall be drawn from the main landfill gas header. In addition to the compounds listed in part 15b, the landfill gas shall be analyzed for the organic compounds listed below. All concentrations shall be reported on a dry basis. The test report shall be submitted to the Compliance and Enforcement Division and the Source Test Section within 45 days of the test date. (Basis: Regulations 2-5-302 and 8-34-412)

Organic Compounds

acrylonitrile
benzene
carbon tetrachloride
chlorobenzene
chloroethane
chloroform
1,1 dichloroethane
1,1 dichlorethene
1,2 dichloroethane
1,4 dichlorobenzene
ethyl benzene
ethylene dibromide

Organic Compounds

hexane
isopropyl alcohol
methyl ethyl ketone
methylene chloride
perchloroethylene
toluene
1,1,1 trichloroethane
1,1,2,2 tetrachloroethane
trichloroethylene
vinyl chloride
xylenes

17. To demonstrate compliance with the above conditions, the Permit Holder shall maintain the following records in a District approved logbook.
- a. Deleted October 21, 2014

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- b. Deleted September 24, 2014
- c. Deleted October 21, 2014
- d. Record of the dates, locations, and frequency per day of all watering activities on unpaved roads or active soil or fill areas. Record the dates, locations, and type of any dust suppressant applications. Record the dates and description of all paved road-cleaning activities. The Permit Holder may use District approved checklists that describe the standard dust mitigation measures employed at this site in lieu of these daily records, provided that the checklists are completed on a daily basis and any deviations from standard procedures are described. All records shall be summarized on monthly basis.
- e. Record the initial operation date for each new landfill gas well and collector.
- f. Maintain an accurate map of the landfill that indicates the locations of all refuse boundaries and the locations of all wells and collectors (using unique identifiers) that are required to be operating continuously pursuant to part 7a. Any areas containing only non-decomposable waste shall be clearly identified. This map shall be updated at least once a year to indicate changes in refuse boundaries and to include any newly installed wells and collectors.
- g. Calculate and record the heat input to A-10, pursuant to Part 8.
- h. Maintain records of all test dates and test results performed to maintain compliance Parts 14-16 above or to maintain compliance with any applicable rule or regulation
- i. Maintain records of the cumulative amount of all waste and cover materials placed in the landfill (in units of cubic yards and tons) and records of the cumulative amount of all decomposable materials placed in the landfill (in tons) including all decomposable wastes and all decomposable cover materials.

VI. Permit Conditions

Condition # 1028

For: S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM AND A-10 LANDFILL GAS FLARE

All records shall be maintained on site or shall be made readily available to District staff upon request for a period of at least 5 years from the date of entry. These record keeping requirements do not replace the record keeping requirements contained in any applicable rules or regulations.

(Basis: Cumulative Increase and Regulations 2-1-301, 2-5-501, 2-6-501, 6-1-301, 6-1-305, 8-2-301, 8-34-301, 8-34-304, and 8-34-501)

18. The annual report required by BAAQMD Regulation 8-34-411 shall be submitted in two semi-annual increments. The reporting periods and report submittal due dates for all increments of the Regulation 8-34-411 report shall be synchronized with the reporting periods and report submittal due dates for the semi-annual MFR Permit monitoring reports that are required by Section I.F of the MFR Permit for this site. A single report may be submitted to satisfy the requirements of Section I.F, Regulation 8-34-411, and 40 CFR Part 63.1980(a), provided that all items required by each applicable reporting requirement are included in the single report. (Basis: Regulation 8-34-411 and 40 CFR Part 63.1980(a))
19. The leachate collection system shall be connected to the vacuum system as needed to prevent violation of applicable surface and component leak limits, and the operating requirements listed below shall replace the operating requirements identified in Regulation 8-34-301.1, 8-34-305.3, and 8-34-305.4 for the leachate collection risers (LCRs). All LCRs remain subject to the landfill gas temperature limit in Regulation 8-34-305.2.
 - a. The Regulation 8-34-305.3 and 8-34-305.4, the nitrogen and oxygen content limits, shall not apply, provided that each LCRS is operated at an oxygen concentration not to exceed 15% by volume. Regulation 8-34-414 and subpart 19(b) below may be used in conjunction with this alternative wellhead limit.
 - b. The component may be disconnected from the vacuum system if compliance with Part 19(a) requires turning off the vacuum to a LCR or if the temperature > 131 degreesF. The component shall be connected to vacuum if any pressure is detected.
 - c. The owner/operator shall monitor and record the gauge pressure, oxygen content, methane content, and temperature at each LCR on a monthly basis regardless of whether the component is connected to vacuum or not.

VI. Permit Conditions

Condition # 1028

For: S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM AND A-10 LANDFILL GAS FLARE

All records to demonstrate compliance with Part 19 and all applicable sections of BAAQMD Regulation 8, Rule 34 shall be recorded in a District-approved log and made available to District staff upon request for at least 5 years from date of entry. (basis: Regulations 8-34-305, 8-34-404, 8-34-414, 8-34-501.4, 8-34-501.9, Regulation 2-6-501, 40 CFR Part 60.755(a) and 60.759, CCR, Title 17, Section 95468(a)(1))

VII. APPLICABLE LIMITS & COMPLIANCE MONITORING REQUIREMENTS

This section has been included to summarize the applicable emission limits contained in Section IV, Source-Specific Applicable Requirements, of this permit. The following tables show the relationship between each emission limit and the associated compliance monitoring provisions, if any. The monitoring frequency column indicates whether periodic (P) or continuous (C) monitoring is required. For periodic monitoring, the frequency of the monitoring has also been shown using the following codes: annual (A), quarterly (Q), monthly (M), weekly (W), daily (D), or on an event basis (E). No monitoring (N) has been required if the current applicable rule or regulation does not require monitoring, and the operation is unlikely to deviate from the applicable emission limit based upon the nature of the operation.

This section is only a summary of the limits and monitoring requirements. In the case of a conflict with any requirement in Sections I-VI, the preceding sections take precedence over Section VII.

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
Periods of Inoperation for Parametric Monitors	BAAQMD 1-523.2	Y		≤ 15 consecutive days per incident and ≤ 30 calendar days per 12 month period	BAAQMD 1-523.4	P/D	Operating Records for All Parametric Monitors (gas flow meters and temperature monitors)
Opacity	BAAQMD 6-1-301 and SIP 6-301	Y		Ringelmann No. 1 for < 3 minutes in any hour (applies to S-1)	BAAQMD Condition # 1028, Part 17d	P/E, M	Records of all site watering and road cleaning events

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
Opacity	BAAQMD 6-1-301 and SIP 6-301	Y		Ringelmann No. 1 for < 3 minutes in any hour (applies to flares)	None	N	NA
FP	BAAQMD 6-1-310 and SIP 6-310	Y		≤ 0.15 grains/dscf (applies to flares only)	None	N	NA
Collection and Control Systems Shutdown Time	BAAQMD 8-34-113.2	Y		≤ 240 hours per year and ≤ 5 consecutive days	BAAQMD 8-34-501.1	P/D	Operating Records
Well Shutdown Limits	BAAQMD 8-34-117.4	Y		No more than 5 wells at a time or < 10% of total collection system, whichever is less	BAAQMD 8-34-117.6 and 501.1	P/D	Records
Well Shutdown Limits	BAAQMD 8-34-117.5	Y		≤ 24 hours per well	BAAQMD 8-34-117.6 and 501.1	P/D	Records
Gas Flow	BAAQMD 8-34-301 and 301.1 and 404 and BAAQMD Condition # 1028 Parts 6 and 19	Y		Landfill gas collection system shall operate continuously, except as described in Condition # 1028, Parts 6 and 19, and all collected gases shall be vented to a properly operating control system	BAAQMD 8-34-501.5, 501.10 and 508 and BAAQMD Condition # 1028 Part 19	C	Gas Flow Meter and Recorder (every 15 minutes) and Records

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
TOC (Total Organic Compounds Plus Methane)	BAAQMD 8-34-301.2	Y		≤ 1000 ppmv as methane (component leak limit)	BAAQMD 8-34-501.6 and 503 and BAAQMD Condition # 1028, Part 17h	P/Q	Quarterly Inspection of collection and control system components with portable analyzer and Records
Non-Methane Organic Compounds (NMOC)	BAAQMD 8-34-301.3	Y		≥ 98% removal by weight OR < 30 ppmv, dry basis @ 3% O ₂ , expressed as methane (applies to A-10 only)	BAAQMD 8-34-412 and 8-34-501.3 and 8-34- 501.4 and 507 BAAQMD Condition # 1028, Parts 15 and 17h	P/A	Annual Source Tests and Records

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
TOC	BAAQMD 8-34-303	Y		≤ 500 ppmv as methane at 2 inches above surface	BAAQMD 8-34-415, 416, 501.6, 506 and 510 and BAAQMD Condition # 1028, Part 17h	P/M, Q, and E	Monthly Visual Inspection of Cover, Quarterly Inspection of Surface with portable analyzer, Various Reinspection Times for Leaking Areas, and Records
Collection System Installation Dates	BAAQMD 8-34-304.2	Y		For Active Areas: Collection system components must be installed and operating by 5 years + 60 days after initial waste placement	BAAQMD 8-34-501.7 and 501.8 and BAAQMD Condition # 1028, Parts 12a-c, 12e-f	P/E	Records
Collection System Installation Dates	BAAQMD 8-34-304.3	Y		For Any Uncontrolled Areas or Cells: collection system components must be installed and operating within 60 days after the uncontrolled area or cell accumulates 1,000,000 tons of decomposable waste	BAAQMD 8-34-501.7 and 501.8 and BAAQMD Condition # 1028, Parts 12a-c, 12e-f	P/E	Records

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
Wellhead Pressure	BAAQMD 8-34-305.1	Y		< 0 psig	BAAQMD 8-34-414, 501.9 and 505.1 and BAAQMD Condition # 1028, Part 17h	P/M	Monthly Inspection and Records
Temperature of Gas at Wellhead	BAAQMD 8-34-305.2	Y		< 55 °C (< 131 °F)	BAAQMD 8-34-414, 501.9 and 505.2 and BAAQMD Condition # 1028, Part 17h	P/M	Monthly Inspection and Records
Gas Concentrations at Wellhead	BAAQMD 8-34-305.3 or 305.4 and BAAQMD Condition # 1028, Part 19	Y		Applies to Gas Collection System Components Other than Leachate Wells: N ₂ < 20% by volume OR O ₂ < 5% by volume Applies to Leachate Wells When Connected to the LFG Collection System: O ₂ < 15% by volume	BAAQMD 8-34-414, 501.9 and 505.3 or 505.4 and BAAQMD Condition # 1028, Parts 17h and 19	P/M	Monthly Inspection and Records

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
Gas Flow	BAAQMD Condition # 1028, Parts 5, 6, 7 and 19	Y		Landfill gas collection system, except designated leachate collection system components, shall operate continuously and all collected gases shall be vented to a properly operating control system	BAAQMD 8-34-501.1, 501.2, 501.10 and 508 and BAAQMD Condition # 1028, Parts 17f and 19	C, P/E	Records of Landfill Gas Flow Rates, Collection and Control Systems Downtime, and Collection System Components
Continuous Monitors	40 CFR 60.13(e)	Y		Requires Continuous Operation except for breakdowns, repairs, calibration, and required span adjustments	40 CFR 60.7(b)	P/D	Operating Records for All Continuous Monitors (gas flow meters and temperature monitors)
Startup Shutdown or Malfunction Procedures	40 CFR 63.6(e)	Y		Minimize Emissions by Implementing SSM Plan	40 CFR 63.1980(a-b)	P/E	Records (all occurrences, duration of each, and corrective actions)
Temperature of Combustion Zone (CT)	BAAQMD Condition # 1028, Part 9	Y		CT \geq 1457 °F, averaged over any 3-hour period (applies to A-10 only)	BAAQMD 8-34-501.3 and 507	C	Temperature Sensor and Recorder (continuous)

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
NOx	BAAQMD Condition # 1028, Part 11	Y		From A-10 Only: ≤ 0.06 lbs/MM BTU (calculated as NO ₂)	BAAQMD Condition # 1028, Parts 15 and 17h	P/A	Annual Source Test and Records
CO	BAAQMD Condition # 1028, Part 12	Y		From A-10 Only: < 0.20 lbs/MM BTU	BAAQMD Condition # 1028, Parts 15 and 17h	P/A	Annual Source Test and Records
SO ₂	BAAQMD 9-1-301	Y		Property Line Ground Level Limits: ≤ 0.5 ppm for 3 minutes and ≤ 0.25 ppm for 60 min. and ≤ 0.05 ppm for 24 hours (applies to flares only)	None	N	NA
SO ₂	BAAQMD Regulation 9-1-302	Y		From Flares: ≤ 300 ppm (dry basis)	BAAQMD Condition # 1028, Parts 14 and 17h	P/Q	Sulfur analysis of landfill gas
Total Sulfur Content in Landfill Gas	BAAQMD Condition # 1028, Part 14	Y		In Collected Landfill Gas: ≤ 860 ppmv of TRS (expressed as H ₂ S)	BAAQMD Condition # 1028, Parts 14 and 17h	P/A	Sulfur analysis of landfill gas
H ₂ S	BAAQMD 9-2-301	N		Property Line Ground Level Limits: ≤ 0.06 ppm, averaged over 3 minutes and ≤ 0.03 ppm, averaged over 60 minutes	None	N	NA

VII. Applicable Limits and Compliance Monitoring Requirements

Table VII – A
Applicable Limits and Compliance Monitoring Requirements
S-1 PALO ALTO LANDFILL WITH GAS COLLECTION SYSTEM;
AND A-10 LANDFILL GAS FLARE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
Amount of Waste Accepted	BAAQMD Condition # 1028, Part 1	Y		≤ 5,830,000 tons (cumulative amount of all decomposable materials)	BAAQMD Condition # 1028, Part 17i	P/D	Records
Heat Input	BAAQMD Condition # 1028, Part 8	Y		≤ 216 MM BTU per day and ≤ 78,840 MM BTU per year	BAAQMD Condition # 1028, Parts 8 and 17g	P/D	Records

VIII. TEST METHODS

The test methods associated with the emission limit of a District regulation are generally found in Section 600 of the regulation. The following table indicates only the test methods associated with the emission limits included in Section VII, Applicable Emission Limits & Compliance Monitoring Requirements, of this permit.

**Table VIII
 Test Methods**

Applicable Requirement	Description of Requirement	Acceptable Test Methods
BAAQMD 6-1-301 and SIP 6-301	Ringelmann No. 1 Limitation	Manual of Procedures, Volume I, Evaluation of Visible Emissions; or US EPA Method 9 Visual Determination of the Opacity of Emissions from Stationary Sources
BAAQMD 6-1-303.1 and SIP 6-303.1	Ringelmann No. 2 Limitation	Manual of Procedures, Volume I, Evaluation of Visible Emissions; or US EPA Method 9 Visual Determination of the Opacity of Emissions from Stationary Sources
BAAQMD 6-1-310 and SIP 6-310	Particulate Weight Limitation	Manual of Procedures, Volume IV, ST-15, Particulates Sampling or For combustion equipment: US EPA Method 5, Determination of Particulate Matter Emissions from Stationary Sources
BAAQMD 6-1-311 and SIP 6-311	Process Weight Rate Based Emissions Limits	Manual of Procedures, Volume IV, ST-15, Particulates Sampling, or US EPA Method 5, Determination of Particulate Matter Emissions from Stationary Sources
BAAQMD 8-34-301.2	Collection and Control System Component Leak Limitations	US EPA Reference Method 21, Determination of Volatile Organic Compound Leaks
BAAQMD 8-34-301.3	NMOC Emission Limits for Flares	Manual of Procedures, Volume IV, ST-14, Oxygen, Continuous Sampling; and Manual of Procedures, Volume IV, ST-7, Non-Methane Organic Carbon Sampling; or US EPA Reference Methods 18, 25, 25A, or 25C
BAAQMD 8-34-303	Landfill Surface Requirements	US EPA Reference Method 21, Determination of Volatile Organic Compound Leaks
BAAQMD 8-34-305.1	Wellhead Gauge Pressure	APCO Approved Device
BAAQMD 8-34-305.2	Temperature Limit for Gas at Wellheads	APCO Approved Device
BAAQMD 8-34-305.3	Nitrogen Concentration in Gas at Wellheads	US EPA Reference Method 3C, Determination of Carbon Dioxide, Methane, Nitrogen, and Oxygen from Stationary Sources
BAAQMD 8-34-305.4	Oxygen Concentration in Gas at Wellheads	US EPA Reference Method 3C, Determination of Carbon Dioxide, Methane, Nitrogen, and Oxygen from Stationary Sources

VIII. Test Methods

**Table VIII
 Test Methods**

Applicable Requirement	Description of Requirement	Acceptable Test Methods
BAAQMD 8-34-412	Compliance Demonstration Test	US EPA Reference Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography, Method 25, Determination of Total Gaseous Nonmethane Organic Emissions as Carbon, Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer, or Method 25C, Determination of Nonmethane Organic Compounds (NMOC) in MSW Landfill Gases
BAAQMD 9-1-301	Limitations on Ground Level Concentrations (SO ₂)	Manual of Procedures, Volume VI, Part 1, Ground Level Monitoring for Hydrogen Sulfide and Sulfur Dioxide
BAAQMD 9-1-302	General Emission Limitation (SO ₂)	Manual of Procedures, Volume IV, ST-19A, Sulfur Dioxide, Continuous Sampling, or
BAAQMD 9-1-304	Liquid Fuel Sulfur Content	Manual of Procedures, Volume III, Method 10A, Determination of Sulfur in Petroleum and Petroleum Products or ASTM D2622-94 or CARB Approved Equivalent
BAAQMD 9-2-301	Limitations on Hydrogen Sulfide	Manual of Procedures, Volume VI, Part 1, Ground Level Monitoring for Hydrogen Sulfide and Sulfur Dioxide
40 CFR 60.8	Performance Tests	EPA Reference Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography, Method 25, Determination of Total Gaseous Non-methane Organic Emissions as Carbon, Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer, or Method 25C, Determination of Non-methane Organic Compounds (NMOC) in MSW Landfill Gases
BAAQMD Condition # 1028, Part 8	Heat Input Limits	APCO approved gas flow meter and APCO approved calculation procedure described in BAAQMD Condition # 1028, Part 8
BAAQMD Condition # 1028, Part 9	Flare Combustion Zone Temperature Limit	APCO Approved Device
BAAQMD Condition # 1028, Part 11	NO _x Limit for Flare	Manual of Procedures, Volume IV, ST-13A, Oxides of Nitrogen, Continuous Sampling and ST-14, Oxygen, Continuous Sampling or US EPA Reference Method 20, Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines

VIII. Test Methods

**Table VIII
 Test Methods**

Applicable Requirement	Description of Requirement	Acceptable Test Methods
BAAQMD Condition # 1028, Part 12	CO Limit for Flare	Manual of Procedures, Volume IV, ST-6, Carbon Monoxide, Continuous Sampling and ST-14, Oxygen, Continuous Sampling or US EPA Reference Method 10, Determination of Carbon Monoxide Emissions from Stationary Sources
BAAQMD Condition # 1028, Part 14	Landfill Gas Sulfur Content Limit	Manual of Procedures, Volume III, Method 5 Determination of Total Mercaptans in Effluents and Method 25 Determination of Hydrogen Sulfide in Effluents, or Method 44 Determination of Reduced Sulfur Gases and Sulfur Dioxide in Effluent Samples by Gas Chromatographic Methods;
BAAQMD Condition # 1028, Part 15	Compliance Demonstration Test	Manual of Procedures, Volume IV, ST-17, Stack Gas Velocity and Volumetric Flow Rate; ST-23 Water Vapor; ST-14, Oxygen, Continuous Sampling; ST-13A, Oxides of Nitrogen, Continuous Sampling; ST-6, Carbon Monoxide, Continuous Sampling; and Manual of Procedures, Volume IV, ST-7, Organic Compounds or US EPA Reference Methods 10 and 20; and Methods 18, 25, 25A, or 25C; and Method 44
BAAQMD Condition # 1028, Part 16	Gas Characterization Analyses	US EPA Reference Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography; and Method 44 Determination of Reduced Sulfur Gases and Sulfur Dioxide in Effluent Samples by Gas Chromatographic Methods
BAAQMD Condition # 1028, Part 19	Methane and Oxygen Concentrations in Gas at Wellheads	US EPA Reference Method 3C, Determination of Carbon Dioxide, Methane, Nitrogen, and Oxygen from Stationary Sources

IX. PERMIT SHIELD

Not Applicable

X. REVISION HISTORY

Title V Permit Issuance (Application 3047):

December 4, 2003

Minor Revision (Application 2230):

April 9, 2004

- Corrected a date in Section I.B.1.
- Revised the minimum flare temperature in Condition # 1028, Part 9 and Tables II-B and VII-A based on new source test data.
- Corrected the peak waste disposal limit in Condition # 1028, Part 1a and Tables II-A and VII-A based on the Solid Waste Facility Permit for the landfill.
- Added text to Condition # 1028, Part 7 that describes the proposed vertical wells that the District is planning to issue an Authority to Construct for.
- Corrected typographical errors in Condition # 1028, Part 12 and Table VII-A.
- Deleted future effective dates that have passed in Tables IV-A and VII-A.
- Added Section X Revision History and revised subsequent section numbers.

Minor Revision (Application 9783):

October 13, 2004

- Revised Condition #20477 and Table VII-C for S-6, Diesel Engine, to reflect BACT2 emission factors for POC, NO_x and CO. POC from 0.042 g/bhp-hr to 1.5 g/bhp-hr, NO_x 6.2 g/bhp-hr to 6.9 g/bhp-hr and CO from 0.48 g/bhp-hr to 2.75 g/bhp-hr.
- Revised Condition #20479 and the Table VII-E for S-8, Diesel Engine, to reflect BACT2 emission factors for POC, NO_x and CO. POC from 0.3 g/bhp-hr to 1.5 g/bhp-hr, NO_x 6.5 g/bhp-hr to 6.9 g/bhp-hr and CO from 1.3 g/bhp-hr to 2.75 g/bhp-hr.

Administrative Amendment (Application 14875):

August 2, 2006

- Change of responsible official for the facility

X. Revision History

Administrative Amendment (Application 15698):

August 28, 2007

- Permit condition 1028, part 5, was modified to show that landfill gas from plant A2721 can be combusted at A-1 and Sludge Incinerators (S-1 and S-2) at plant A0617 instead of S-1 and S-2 IC Engines at plant A9794 since plant A9794 has closed.
- The “Description of Requirement” for regulations 8-34-301.4, 8-34-501.11, and 8-34-509 in “Table IV-A Source Specific Applicable Requirements” was modified to reflect the option of venting landfill gas to facility A0617 instead of A9794
- Permit condition 1028, part 7b was deleted because authority to construct 2230 has expired.

Permit Renewal (Application 18263):

June 4, 2012

- Change responsible official name
- Change facility contact name and phone number.
- Correct BAAQMD contact information.
- Delete line for Section XII in Table of Contents.
- Add and revise text in Section I, III, IV, VII, and VIII to conform to current standard text.
- Remove source that had been shut down from Table II-A (S-8); delete the associated condition (20479) in Section VI Permit Conditions; Delete source S-6 from Table II-A as facility states that this is a portable engine and not stationary engine; delete associated condition (20477) in Section VI Permit Conditions; Delete Tables IV-C and E and VII-C and E and associated test methods in Table VIII.
- Create Section II-C Exempt Equipment List for sources S-6 and S-9
- Correct and update regulatory references and amendment dates throughout the permit.
- Add several missing BAAQMD and federal regulations to Table III, and add several new California regulations to Table III.
- Renumber Table IV-D as Table IV-C and Table VII-D as Table VII-C.
- Incorporate changes to SIP Regulation 6 and BAAQMD Regulation 6, Rule 1 in Tables IV- A-C, VII- A-C, and VIII and in Conditions #1028, 20476, and 20478.

X. Revision History

- Throughout the permit, replace condition bases citing the Toxic Risk Management Policy (TRMP) with the appropriate regulatory citation from BAAQMD Regulation 2, Rule 5, which was adopted in 2005 and amended in 2010.
- In Table IV-A, Condition #1028 Part 1, Table VII-A, and Section IX, clarify the applicability of Regulation 8, Rule 2, the daily waste acceptance limits, and the permit shield for VOC-laden soil handling and re-use due to the discontinuation of waste acceptance at the S-1 landfill as of 7/28/11.
- Correct the descriptions of several requirements in Tables IV-A, VII-A, and VIII.
- Add missing sections of 40 CFR Part 60 Subparts A and Cc, Part 62 Subpart F, and Part 63 Subparts A and AAAA to Table IV-A.
- In Part VI for S-1, correct Condition #1028, Part 7, which previously omitted the total number of vertical wells (92) allowed under A/N 15698.
- For S-1 and A-3, correct the landfill gas sulfur content limit and monitoring frequency in Condition #1028, Part 14 and Table VII-A based on a worst case landfill gas methane content of 25%.
- Remove obsolete testing requirements from Condition # 1028, Parts 15, 16, and 18.
- Add symbols and text to Tables VII – A-C to clarify limits and applicability of monitoring requirements.
- In Tables VII-B and VII-C, clarify the Regulation 6-1-311 limit.
- For Table VIII, add missing test methods and remove obsolete or unnecessary test methods.
- Clarify the applicability of the permit shield in Section IX.
- Correct Header from IX Permit Shield to X Revision History.
- Add this permit renewal to the Section X Revision History.
- Add terms to the Section XI Glossary.
- Remove Section XII State Implementation Plan.

X. Revision History

Minor Revision (Application 26066):

January 13, 2016

- Replace flare, A-3, with smaller flare, A-10 in Tables II-A, II-B, IV-A, VII-A, and VIII. Revise Condition # 1028, Parts 5, 8, 9, 10, 11, 12, 15, and 17 to reflect this change.
- Revise the daily and annual heat input limits, the combustion zone temperature, and the NO_x and CO emission limits for the new smaller flare A-10 in Condition # 1028, Parts 8, 9, 11, and 12, respectively. Reflect these changes in Tables IV-A and VII-A.
- Remove an unnecessary limit, Condition # 1028 Part 13, from Section VI and from Tables IV-A, VII-A, and VIII.
- Revise Condition # 1028, Part 7 to authorize installation of additional landfill gas collection system wells.
- Revise Condition # 1028, Parts 6 and 7 and add Part 19 to authorize connection of leachate collection system components to the gas collection system and to identify new operating limits and alternative wellhead requirements for these components. Add related requirements to Tables IV-A and VII-A.
- Remove the S-5 Wood Grinder, S-7 Trommel Screen, A-5 Water Sprays, S-6 Portable Diesel Engine for S-5 and S-9 Portable Diesel Engine for S-10 from Tables II-A, II-B, and II-C.
- Remove associated requirements for S-5, S-7, and A-5 by deleting Tables IV-B, IV-C, VII-B, VII-D, Condition # 20476, Condition # 20478, and related test methods in Table VIII.
- Remove obsolete requirements for this landfill, which has ceased accepting waste and cover materials, from Condition # 1028, Parts 1, 2, 3, 17a-c; from Tables IV-A, VII-A, and VIII; and Section IX. Add a record keeping requirement to Condition # 1028, Part 17i for the revised cumulative limit in Part 1 and reflect this change in Table VII-A.

XI. GLOSSARY

ACT

Federal Clean Air Act

AP-42

An EPA Document “Compilation of Air Pollution Emission Factors” that is used to estimate emissions from numerous source types. It is available electronically from EPA’s web site at: <http://www.epa.gov/ttn/chief/ap42/index.html>

APCO

Air Pollution Control Officer: Head of Bay Area Air Quality Management District

ARB

Air Resources Board

ASTM

American Society for Testing and Materials

ATCM

Airborne Toxic Control Measure

BAAQMD

Bay Area Air Quality Management District

BACT

Best Available Control Technology

BARCT

Best Available Retrofit Control Technology

Basis

The underlying authority that allows the District to impose requirements.

C1

An organic chemical compound with one carbon atom, for example: methane

C3

An organic chemical compound with three carbon atoms, for example: propane

XI. Glossary

C5

An organic chemical compound with five carbon atoms, for example: pentane

C6

An organic chemical compound with six carbon atoms, for example: hexane

C₆H₆

Benzene

CAA

The federal Clean Air Act

CAAQS

California Ambient Air Quality Standards

CAM

Compliance Assurance Monitoring per 40 CFR Part 64

CAPCOA

California Air Pollution Control Officers Association

CARB

California Air Resources Board (same as ARB)

CCR

The California Code of Regulations

CEC

California Energy Commission

CEM

A “continuous emission monitor” is a monitoring device that provides a continuous direct measurement of some pollutant (e.g. NO_x concentration) in an exhaust stream.

CEQA

California Environmental Quality Act

CFR

The Code of Federal Regulations. 40 CFR contains the implementing regulations for federal environmental statutes such as the Clean Air Act. Parts 50-99 of 40 CFR contain the requirements for air pollution programs.

XI. Glossary

CH₄ or CH₄

Methane

CI

Compression Ignition

CIWMB

California Integrated Waste Management Board

CO

Carbon Monoxide

CO₂ or CO₂

Carbon Dioxide **CO₂e**

Carbon Dioxide Equivalent. A carbon dioxide equivalent emission rate is the emission rate of a greenhouse gas compound that has been adjusted by multiplying the mass emission rate by the global warming potential of the greenhouse gas compound. These adjusted emission rates for individual compounds are typically summed together, and the total is also referred to as the carbon dioxide equivalent (CO₂e) emission rate.

CT

Combustion Zone Temperature

Cumulative Increase

The sum of permitted emissions from each new or modified source since a specified date pursuant to BAAQMD Rule 2-1-403, Permit Conditions (as amended by the District Board on 7/17/91) and SIP Rule 2-1-403, Permit Conditions (as approved by EPA on 6/23/95). Used to determine whether threshold-based requirements are triggered.

District

The Bay Area Air Quality Management District

E6, E9, E12

Very large or very small number values are commonly expressed in a form called scientific notation, which consists of a decimal part multiplied by 10 raised to some power. For example, 4.53E6 equals $(4.53) \times (10^6) = (4.53) \times (10 \times 10 \times 10 \times 10 \times 10 \times 10) = 4,530,000$. Scientific notation is used to express large or small numbers without writing out long strings of zeros.

EG

Emission Guidelines

XI. Glossary

EO

Executive Order

EPA

The federal Environmental Protection Agency.

Excluded

Not subject to any District regulations.

Federally Enforceable, FE

All limitations and conditions which are enforceable by the Administrator of the EPA including those requirements developed pursuant to 40 CFR Part 51, subpart I (NSR), Part 52.21 (PSD), Part 60 (NSPS), Part 61 (NESHAPs), Part 63 (MACT), and Part 72 (Permits Regulation, Acid Rain), including limitations and conditions contained in operating permits issued under an EPA-approved program that has been incorporated into the SIP.

FP

Filterable Particulate as measured by BAAQMD Method ST-15, Particulate.

FR

Federal Register

GDF

Gasoline Dispensing Facility

GHG

Greenhouse Gas

GLM

Ground Level Monitor

Grains

1/7000 of a pound

GRS

Gas Recovery Systems, Inc.

XI. Glossary

GWP

Global Warming Potential. A comparison of the ability of each greenhouse gas to trap heat in the atmosphere relative to that of carbon dioxide over a specific time period.

H₂S or H₂S

Hydrogen Sulfide

H₂SO₄ or H₂SO₄

Sulfuric Acid

H&SC

Health and Safety Code

HAP

Hazardous Air Pollutant. Any pollutant listed pursuant to Section 112(b) of the Act. Also refers to the program mandated by Title I, Section 112, of the Act and implemented by 40 CFR Part 63.

Hg

Mercury

HHV

Higher Heating Value. The quantity of heat evolved as determined by a calorimeter where the combustion products are cooled to 60 °F and all water vapor is condensed to liquid.

HRSA

Health Risk Screening Assessment.

ISCST

Industrial Source Complex Short Term.

LEA

Local Enforcement Agency

LFG

Landfill gas

LHV

Lower Heating Value. Similar to the higher heating value (see HHV) except that the water produced by the combustion is not condensed but retained as vapor at 60°F.

XI. Glossary

Long ton

2200 pounds

Major Facility

A facility with potential emissions of: (1) at least 100 tons per year of regulated air pollutants, (2) at least 10 tons per year of any single hazardous air pollutant, and/or (3) at least 25 tons per year of any combination of hazardous air pollutants, or such lesser quantity of hazardous air pollutants as determined by the EPA administrator.

MAX or Max.

Maximum

MFR

Major Facility Review. The District's term for the federal operating permit program mandated by Title V of the Federal Clean Air Act and implemented by District Regulation 2, Rule 6.

MIN or Min.

Minimum

MOP

The District's Manual of Procedures.

MSDS

Material Safety Data Sheet

MSW

Municipal solid waste

MW

Molecular weight

N2 or N₂

Nitrogen

NA

Not Applicable

NAAQS

National Ambient Air Quality Standards

XI. Glossary

NESHAPS

National Emission Standards for Hazardous Air Pollutants. See in 40 CFR Parts 61 and 63.

NMHC

Non-methane Hydrocarbons (Same as NMOC)

NMOC

Non-methane Organic Compounds (Same as NMHC)

NO₂

Nitrogen Dioxide

NO_x or NO_x

Oxides of nitrogen.

NSPS

Standards of Performance for New Stationary Sources. Federal standards for emissions from new stationary sources. Mandated by Title I, Section 111 of the Federal Clean Air Act, and implemented by 40 CFR Part 60 and District Regulation 10.

NSR

New Source Review. A federal program for pre-construction review and permitting of new and modified sources of pollutants for which criteria have been established in accordance with Section 108 of the Federal Clean Air Act. Mandated by Title I of the Federal Clean Air Act and implemented by 40 CFR Parts 51 and 52 and District Regulation 2, Rule 2. (Note: There are additional NSR requirements mandated by the California Clean Air Act.)

O₂ or O₂

Oxygen

Offset Requirement

A New Source Review requirement to provide federally enforceable emission offsets for the emissions from a new or modified source. Applies to emissions of POC, NO_x, PM₁₀, and SO₂.

PERP

Portable Equipment Registration Program

Phase II Acid Rain Facility

A facility that generates electricity for sale through fossil-fuel combustion and is not exempted by 40 CFR 72 from Titles IV and V of the Clean Air Act.

XI. Glossary

POC

Precursor Organic Compounds

PM

Particulate Matter

PM10 or PM₁₀

Particulate matter with aerodynamic equivalent diameter of less than or equal to 10 microns

PSD

Prevention of Significant Deterioration. A federal program for permitting new and modified sources of those air pollutants for which the District is classified "attainment" of the National Air Ambient Quality Standards. Mandated by Title I of the Act and implemented by both 40 CFR Part 52 and District Regulation 2, Rule 2.

PTE

Potential to Emit as defined by BAAQMD Regulation 2-6-218

PV or P/V Valve or PRV

Pressure / Vacuum Relief Valve

RACT

Reasonably Available Control Technology.

RICE

Reciprocating Internal Combustion Engine

RMP

Risk Management Plan

RWQCB

Regional Water Quality Control Board

S

Sulfur

SCR

A "selective catalytic reduction" unit is an abatement device that reduces NOx concentrations in the exhaust stream of a combustion device. SCRs utilize a catalyst, which operates within a specific temperature range, and injected ammonia to promote the conversion of NOx compounds to nitrogen gas.

XI. Glossary

Short ton

2000 pounds

SIP

State Implementation Plan. State and District programs and regulations approved by EPA and developed in order to attain the National Air Ambient Quality Standards. Mandated by Title I of the Act.

SO₂ or SO₂

Sulfur dioxide

SO₃ or SO₃

Sulfur trioxide

SSM

Startup, Shutdown, or Malfunction

SSM Plan

A plan, which states the procedures that will be followed during a startup, shutdown, or malfunction, that is prepared in accordance with the general NESHAP provisions (40 CFR Part 63, Subpart A) and maintained on site at the facility.

TAC

Toxic Air Contaminant

TBACT

Best Available Control Technology for Toxics

THC

Total Hydrocarbons (NMHC + Methane)

therm

100,000 British Thermal Units

Title V

Title V of the federal Clean Air Act. Requires a federally enforceable operating permit program for major and certain other facilities.

TOC

Total Organic Compounds (NMOC + Methane, Same as THC)

XI. Glossary

TPH

Total Petroleum Hydrocarbons

TRMP

Toxic Risk Management Policy

TRS

Total Reduced Sulfur, which is a measure of the amount of sulfur-containing compounds in a gas stream, typically a fuel gas stream, including, but not limited to, hydrogen sulfide. The TRS content of a fuel gas determines the concentration of SO₂ that will be present in the combusted fuel gas, since sulfur compounds are converted to SO₂ by the combustion process.

TSP

Total Suspended Particulate

TVP

True Vapor Pressure

VOC

Volatile Organic Compounds

VMT

Vehicle Miles Traveled

Symbols:

<	=	less than
>	=	greater than
≤	=	less than or equal to
≥	=	greater than or equal to

Units of Measure:

atm	=	atmospheres
bbl	=	barrel of liquid (42 gallons)
bhp	=	brake-horsepower
btu	=	British Thermal Unit
BTU	=	British Thermal Unit
°C	=	degrees Centigrade
cfm	=	cubic feet per minute
dscf	=	dry standard cubic feet
°F	=	degrees Fahrenheit
ft ³	=	cubic feet

XI. Glossary

g	=	grams
gal	=	gallon
gpm	=	gallons per minute
gr	=	grains
hp	=	horsepower
hr	=	hour
in	=	inches
kW	=	kilowatt
lb	=	pound
lbmol	=	pound-mole
max	=	maximum
m ²	=	square meter
m ³	=	cubic meters
min	=	minute
mm	=	million
MM	=	million
MM BTU	=	million BTU
MMcf	=	million cubic feet
Mg	=	mega grams
M scf	=	one thousand standard cubic feet
MW	=	megawatts
ppb	=	parts per billion
ppbv	=	parts per billion, by volume
ppm	=	parts per million
ppmv	=	parts per million, by volume
ppmw	=	parts per million, by weight
psia	=	pounds per square inch, absolute
psig	=	pounds per square inch, gauge
scf	=	standard cubic feet
scfm	=	standard cubic feet per minute
sdcf	=	standard dry cubic feet
sdcfm	=	standard dry cubic feet per minute
tpy	=	tons per year
yd	=	yard
yd ³	=	cubic yards
yr	=	year

ATTACHMENT B

CalRecycle Final Closure Letter (March 24, 2016)

**DEPARTMENT OF RESOURCES RECYCLING AND RECOVERY**

1001 I STREET, SACRAMENTO, CALIFORNIA 95814 • WWW.CALRECYCLE.CA.GOV • (916) 322-4027
P.O. BOX 4025, SACRAMENTO, CALIFORNIA 95812

March 24, 2016

Ron Arp
City of Palo Alto
Public Works Department
P.O. Box 10250
Palo Alto, California 94303

**PALO ALTO LANDFILL, SANTA CLARA COUNTY (43-AM-0001)
CLOSURE CERTIFICATION
ACCEPTANCE**

Dear Mr. Arp:

Department of Resources Recycling and Recovery (CalRecycle) Engineering Support Branch (ESB) Closure and Technical Support Unit (Closure) staff has reviewed the final Construction Quality Assurance Report (Report) and other closure certification documents for the Palo Alto Landfill. The documents reviewed were:

- *Construction Quality Assurance Report, Final Closure Phase IIC – Part II, City of Palo Alto Landfill, Palo Alto, California*; dated November 2015; prepared by Golder Associates (received November 12 2015).
- *Closure Cost Comparison*; dated November 19, 2015; prepared by Golder Associates (received January 21, 2016).
- *Closed Site Recordation*; dated February 26, 2016 (received March 23, 2016).

The Report addresses the quality assurance for construction of the closure activities for the final closure area. In a January 11, 2016, letter CalRecycle Staff previously determined the submitted Report was technically adequate in meeting the Requirements of Title 27, California Code of Regulations. However, before CalRecycle could formally accept the closure certification, the following two items had to be submitted.

1. The as-built costs of closure in the same arrangement and sequence as the estimated costs of closure included in the final closure plan [27 CCR 21880(a)(1)].
2. Evidence that the recording requirements of 27 CCR 21170 have been met.

The above two items have been submitted, and CalRecycle staff has determined that the submittals comply with the requirements

The San Francisco Bay Regional Water Quality Control Board (RWQCB) accepted the report in a letter dated February 10, 2016. The Santa Clara County Department of Environmental Health, acting as the Solid Waste Local Enforcement Agency (LEA), accepted the Report in a letter dated December 3, 2015.



Therefore, the Palo Alto Landfill is considered formally closed, and the minimum 30-year postclosure maintenance period has commenced.

Please note that it is the operator's obligation to submit documents that are in compliance with the aforementioned requirements. CalRecycle staff's determination that the documents meet these requirements is not intended nor should be construed to preclude CalRecycle from seeking revisions to the documents to the extent it is subsequently determined that any part thereof is not in compliance.

The acceptance of this document is an acknowledgement that a California Professional Engineer, contracted by City of Palo Alto, has monitored the construction and certified that the closure actions have been constructed to the original specifications.

Should you have any questions or comments concerning the above matter, please contact Alfred Worcester of Michael Wochnick of my staff at (916) 341-6353 or (916) 341-6289, respectively. Alternatively, Closure staff may be reached by email at Alfred.worcester@calrecycle.ca.gov or michael.wochnick@calrecycle.ca.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Wes Mindermann', is written over a horizontal line.

Wes Mindermann, P.E., Chief
Engineering Support Branch
Waste Permitting, Compliance, & Mitigation Division

cc: Jaji Murage, Santa Clara County Environmental Health Department
Keith Roberson, San Francisco Bay Regional Water Quality Control Board

ATTACHMENT C

Flare Source Test Results (December 23, 2002)

City of Palo Alto

Public Works Department

December 23, 2002

Ms. Christine Schaulfelberger
Bay Area Air Quality Management District
Compliance and Enforcement Division
939 Ellis Street
San Francisco, CA 94109

Subject: 2002 Annual Report (Section 8-34-411) for City of Palo Alto Landfill Gas Collection System and Flare, Plant #2721

Divisions

Administration
650.329.2373
650.329.2299 fax

Engineering
650.329.2151
650.329.2299 fax

Environmental
Compliance
650.329.2598
650.494.3531 fax

Equipment
Management
650.496.6922
650.496.6958 fax

Facilities
Management
650.496.6900
650.496.6958 fax

Operations
650.496.6974
650.852.9289 fax

Regional Water
Quality Control
650.329.2598
650.494.3531 fax

Dear Ms. Schaulfelberger,

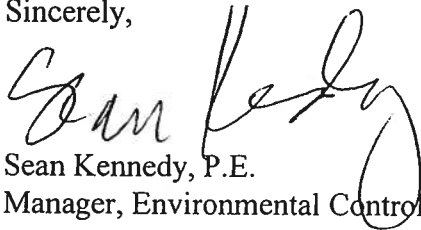
Please find enclosed the City of Palo Alto's 2002 Annual Report for the Landfill Gas Collection System and Flare in accordance with Section 8-34-411. This Annual Report includes:

- System/Emission Control Downtimes and Continuous Temperature/Flow Monitoring (exceptions) (501, 507, 508)
- Annual Waste Acceptance Rates and Tonnages in Place (501)
- Quarterly Leak Testing (503)
- Monthly Wellhead Monitoring (505)
- Quarterly Landfill Surface Monitoring (506)
- Compliance Source Test Results (413)
- Contractor Operation and Monitoring Reports (501, 503, 505, 506, 507, 508)

Not included in this report are results for December Monthly Wellhead Monitoring and 4th Quarter Landfill Surface Monitoring. Because of the January 1 report deadline and conflicts with holiday schedules, we were unable to incorporate these December monitoring activities. We will forward them on to you as soon as they become available.

If you have any additional questions, please call me at (650) 496-5937.

Sincerely,



Sean Kennedy, P.E.
Manager, Environmental Control Programs

cc: Carol Allen
Project File

File: baaqmd2002annualreport.ltr.doc

P.O.Box 10250
Palo Alto, CA 94303



COMPLIANCE SOURCE TEST RESULTS

Distribution: <input checked="" type="checkbox"/> Firm Permit Services Requester	BAY AREA AIR QUALITY MANAGEMENT DISTRICT 939 Ellis Street San Francisco, California 94109 (415) 771-6000	Report No. <u>03064</u> Test Date: <u>10/29/02</u>
	SUMMARY OF SOURCE TEST RESULTS	Test Times: Run A: <u>1129 - 1224</u> Run B: <u>1239 - 1330</u> Run C: _____

Source Information		BAAQMD Representatives
Firm Name and Address: City Of Palo Alto Landfill Byxbee Park Palo Alto, California 94301	Firm Representative and Title: Sean Kennedy Manager Phone No. (650) 496 - 5937 Source(s): Flare 1 ; (A - 3)	Source Test Team: B. Bartley G. Bradbury
Permit Conditions: Flare Temperature > 1,400 °F CO < 550 Lbs / Day Landfill Gas Total Chlorinated HC < 104 ppm	Plant No. A2721 Permit Con. 1028 Operates: 24 Per Day 365 Per Days Yr	Permit Services / Enforcement: Test Requested by: H. Doss

Operating Parameters: The average flare exhaust temperature during the test period was 1,520 ° F.

Applicable Regulations: Reg. 8, Rule 34, Section 301.3 AND 2 - 1 - 307	VN Recommended: NO
--	---------------------------

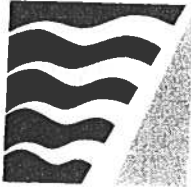
Source Test Results and Comments:

METHOD	PARAMETER	INLET RESULTS	OUTLET RESULTS	LIMITS
	Volumetric Flowrate; SDCFM	460	3,100 *	
ST-13	Nitric Oxide, ppm		5	
	Oxides of Nitrogen, ppm		5	
	Oxides of Nitrogen, Lbs / Hr		0.11	
	Oxides of Nitrogen, Estimated Lbs / Day		2.7	
ST-6	Carbon Monoxide, ppm		<2	
	Carbon Monoxide, Lbs / Hr		<0.02	
	Carbon Monoxide, Estimated Lbs / Day		<0.5	550
ST-5	Carbon Dioxide, %	29.0	8.8	
ST-14	Oxygen, %	2.2	11.9	
ST-7	Methane, ppm	295,200	2	
	Non - Methane Organic Compounds, ppm	1,000	<2	
	Non - Methane Organic Compounds, ppm Corrected To 3% Oxygen		<4	30
	Non - Methane Organic Compounds, Lbs / Hr	1.1	<0.02	
	Non - Methane Organic Compounds, Estimated Lbs / Day	27.3	<0.4	
	Total Hydrocarbon Removal Efficiency, %		>99.9	
	Methane Removal Efficiency, %		>99.9	
	Non - Methane Organic Compound Removal Efficiency, %		>98.6	98
	Estimated Heat Rate, mmBTU / Day		200	
	Total Chlorinated Hydrocarbons; ppm (In Landfill Gas)		<2	104

* Calculated value using fuel data and an EPA "F" factor.

NO COMMERCIAL USE OF THESE RESULTS IS AUTHORIZED

Air Quality Engineer	Date	Supervising Air Quality Engineer	Date	Approved by Air Quality Engineering Manager	Date
<i>Bob Bartley</i>	<i>11/13/02</i>	<i>G. Fend</i>	<i>11/14/02</i>	<i>K. Kuraniec</i>	<i>11/15/02</i>
B. Bartley				K. Kuraniec	



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

October 7, 2002

Sean Kennedy, Manager of Environmental Control
City of Palo Alto
Byxbee Park
Palo Alto, CA 94301

Dear Mr. Kennedy:

This letter confirms the acceptance of the September 14, 2000 District source test as demonstrating compliance with the initial test requirement of Regulation 8-34-412. This test indicated that on that test date, the Flare (S-3) demonstrated compliance with the July 1, 2002 provisions of Section 301. Because the City of Palo Alto Landfill is subject to a Major Facility Review permit, you must also comply with the requirement to conduct an Annual Compliance Demonstration Test. The first such test should be completed prior to July 1, 2003.

The landfill flare is required to meet the requirements of Regulation 8-34 at all times and the District has the authority to conduct any testing necessary to determine compliance with Federal, State, or District regulations.

If you have any questions regarding this matter, please contact Kelly Wee, Air Quality Program Manager at (415) 749-4760.

Sincerely,

A handwritten signature in black ink, appearing to read "C. Schaufelberger".

Christine Schaufelberger
Acting Director of Enforcement

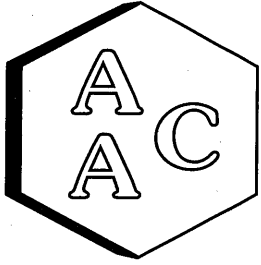
CS:KW:

cc: Carol Allen, Permits
Ed Boehmer, Supervising Air Quality Inspector
Bernard Salalila, Air Quality Inspector
Kenneth Kunaniec, Air Quality Engineering Manager

ATTACHMENT D

Laboratory Results

- **October 26, 2018**
- **February 7, 2019**
- **June 3, 2019**



Atmospheric Analysis & Consulting, Inc.

CLIENT : Best Environmental
PROJECT NAME : Palo Alto Flare
AAC PROJECT NO. : 181657
REPORT DATE : 10/26/2018

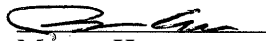
On October 24, 2018, Atmospheric Analysis & Consulting, Inc. received three (3) Tedlar Bags for TNMOC analysis by EPA 25C and Fixed Gases analysis by EPA 3C and one (1) Six-Liter Summa Canister for BTU analysis by ASTM D-3588. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHgA)
Flare In R1	181657-114180	N/A
Flare In R2	181657-114181	N/A
Flare In R3	181657-114182	N/A
LFG	181657-114183	748.4

All of the analyses mentioned above were performed in accordance with AAC's ISO/IEC 17025:2005 and NELAP approved Quality Assurance Plan. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

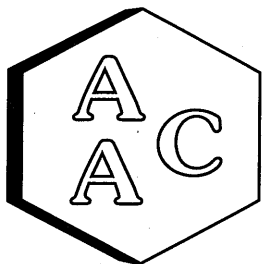
I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. Bag "Flare In R2" (114181) was received with low sample volume. The results confirm a leak due to the high O₂/N₂. No other problems were encountered during receiving, preparation, and/or analysis of these samples. The Laboratory Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.


Marcus Hueppe
Laboratory Director

This report consists of 10 pages.





Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO. : 181657
MATRIX : AIR


SAMPLING DATE : 10/23/2018
RECEIVING DATE : 10/24/2018
ANALYSIS DATE : 10/24/2018
REPORT DATE : 10/26/2018

EPA 3C & EPA 25C

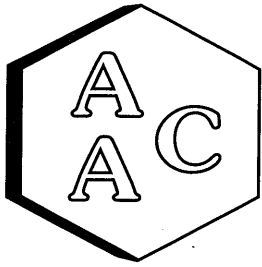
Client ID	Flare In R1	Flare In R2	Flare In R3
AAC ID	181657-114180	181657-114181	181657-114182
Analyte	Result	Result	Result
H ₂	< 1.0 %	< 1.0 %	< 1.0 %
O ₂	1.9 %	13.4 %	1.2 %
N ₂	35.0 %	61.6 %	33.1 %
CO	< 0.1 %	< 0.1 %	< 0.1 %
CO ₂	28.5 %	12.2 %	29.6 %
CH ₄	34.5 %	12.8 %	36.1 %
TNMOC (as Carbon)	581 ppmC	355 ppmC	549 ppmC

All fixed gases have been normalized to 100% on a dry basis

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac


Marcus Hueppe
Laboratory Director





Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report ASTM-D3588 (BTU and F-Factor)

CLIENT
PROJECT NO.

Best Environmental
181657

SAMPLING DATE
ANALYSIS DATE

10/23/2018
10/24-25/2018

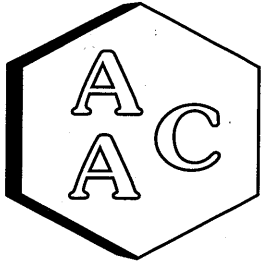
Client ID: AAC ID:		LFG 181657-114183	
Component		Mole %	Weight %
FIXED GASES	H ₂	0.00	0.00
	O ₂	0.67	0.74
	N ₂	32.57	31.49
	CO	0.00	0.00
	CO ₂	31.57	47.95
	CH ₄	34.81	19.28
	He	NM	NM
	Ar	NM	NM
HYDROCARBONS	C ₂ (as Ethane)	0.0004	0.0004
	C ₃ (as Propane)	0.0008	0.0012
	C ₄ (as Butane)	0.0004	0.0008
	C ₅ (as Pentane)	0.0003	0.0007
	C ₆ (as Hexane)	0.0003	0.0008
	C ₆₊ (as Hexane)	0.0086	0.0255
TRS	TRS as H ₂ S	0.0018	0.0021
H ₂ O	Moisture content	NM	NM

All results have been normalized to 100% on a dry basis.

<i>Fuel Gas Specifications</i>			
Atomic Breakdown - (scf/lb) / %		HHV Btu/lb	4612
<i>Carbon (C)</i>	27.5	LHV Btu/lb	4152
<i>Hydrogen (H)</i>	4.8	HHV Btu/dscf	352
<i>Oxygen (O)</i>	35.6	LHV Btu/dscf	317
<i>Nitrogen (N)</i>	31.5	F-Factor	10369
<i>Helium (He)</i>	0.00	Relative Density	1.0004
<i>Argon (Ar)</i>	0.51	C2-C6+ Weight %	0.0294
<i>Sulfur (S)</i>	0.00	MW lb/lb-mole	28.973
Motor Octane Number	82.09	Methane Number	14.21

Marcus Haeppel
Laboratory Director





Atmospheric Analysis & Consulting, Inc.

LABORATORY ANALYSIS REPORT


CLIENT Best Environmental
PROJECT NO. 181657
MATRIX AIR
UNITS ppmV

SAMPLING DATE 10/23/18
ANALYSIS DATE 10/24/18

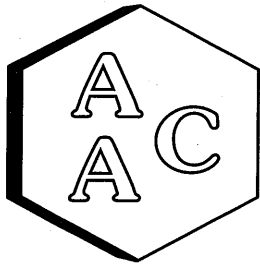
Total Reduced Sulfur Compounds Analysis by ASTM D-5504

Client ID	LFG
AAC ID	181657-114183
Canister Dil. Fac.	1.4
Analyte	Result
Hydrogen Sulfide	16.9
Carbonyl Sulfide	0.095
Sulfur Dioxide	< 0.068
Methyl Mercaptan	0.090
Ethyl Mercaptan	< 0.068
Dimethyl Sulfide	0.172
Carbon Disulfide	< 0.068
Isopropyl Mercaptan	< 0.068
tert-Butyl Mercaptan	< 0.068
n-Propyl Mercaptan	< 0.068
Methylethylsulfide	< 0.068
sec-Butyl Mercaptan / Thiophene	< 0.068
iso-Butyl Mercaptan	< 0.068
Diethyl Sulfide	< 0.068
n-Butyl Mercaptan	< 0.068
Dimethyl Disulfide	< 0.068
2-Methylthiophene	< 0.068
3-Methylthiophene	< 0.068
Tetrahydrothiophene	< 0.068
Bromothiophene	< 0.068
Thiophenol	< 0.068
Diethyl Disulfide	< 0.068
Total Unidentified Sulfur	< 0.068
Total Reduced Sulfurs	17.1

All unidentified compound's concentrations expressed in terms of H₂S (TRS does not include COS and SO₂)
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.


Marcus Hueppe
Laboratory Director





Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : 10/24/2018
 Analyst : DL
 Units : %

Instrument ID : TCD #1
 Calb Date : 08/28/18
 Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
CCV	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	Result	10.2	10.2	20.3	10.3	10.1	9.9
	% Rec *	106.9	98.2	102.3	100.7	98.9	97.1

II - Method Blank - EPA 3C

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
MB	Concentration:	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 3C

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	LCS Result	10.0	10.4	20.1	10.3	10.0	9.8
	LCSD Result	10.2	10.5	20.4	10.5	10.2	10.0
	LCS % Rec *	105.1	99.7	100.9	100.4	98.1	96.3
	LCSD % Rec *	106.7	101.1	102.4	102.0	99.8	97.9
	% RPD ***	1.5	1.4	1.5	1.6	1.7	1.7

IV - Sample & Sample Duplicate - EPA 3C

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
181657-114180	Sample	0.0	1.9	34.5	33.8	0.0	28.0
	Sample Dup	0.0	1.9	34.2	33.7	0.0	27.9
	Mean	0.0	1.9	34.3	33.7	0.0	28.0
	% RPD ***	0.0	1.5	0.8	0.1	0.0	0.1

V - Matrix Spike & Duplicate- EPA 3C

AAC ID	Analyte	H ₂	N ₂	CH ₄	CO	CO ₂
181657-114180	Sample Conc	0.0	17.2	16.9	0.0	14.0
	Spike Conc	9.5	9.8	10.3	10.2	10.2
	MS Result	9.4	27.2	25.7	10.1	24.2
	MSD Result	9.7	27.2	25.7	10.3	24.2
	MS % Rec **	99.2	101.9	86.4	99.6	99.8
	MSD % Rec **	102.1	102.2	85.8	100.9	99.7
	% RPD ***	2.9	0.4	0.7	1.3	0.1

VI - Closing Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
CCV	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	Result	9.2	10.5	20.3	10.4	10.1	10.0
	% Rec *	96.9	101.0	102.0	101.6	99.4	97.9

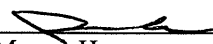
* Must be 85-115%

** Must be 75-125%

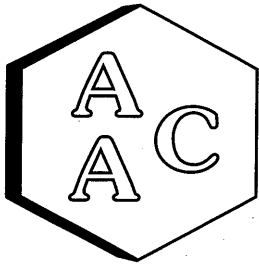
*** Must be < 25%

ND = Not Detected

<RL = less than Reporting Limit


 Marcus Hueppe
 Laboratory Director





Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Analysis Date : 10/24/2018
 Analyst : DL
 Units : ppmv

Instrument ID: FID#4
 Calibration Date: 1/9/2018

I - Opening Calibration Verification Standard - Method 25C

Analyte	xRF	DRF	%RPD*
Propane	35106	34074	3.0

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	35106	34074	33900	35628	34534	1.6

III - Method Blank - Method 25C

AAC ID	Analyte	Sample Result
MB	TNMOC	ND

IV - Laboratory Control Spike & Duplicate - Method 25C

AAC ID	Analyte	Spike Added	LCS Result	LCSD Result	LCS % Rec **	LCSD % Rec **	% RPD***
LCS/LCSD	Propane	50.9	53.6	54.8	105.4	107.8	2.2

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	35106	30614	13.7


xCF - Average Calibration Factor from Initial Calibration Curve

dCF - Daily Calibration Factor

* Must be <15%

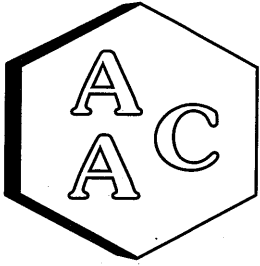
** Must be 90-110 %

*** Must be <20%



 Marcus Hueppe
 Laboratory Director





Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : 10/24/2018
 Analyst : DL
 Units : %

Instrument ID : TCD #1
 Calb Date : 08/28/18
 Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
CCV	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	Result	10.2	10.2	20.3	10.3	10.1	9.9
	% Rec *	106.9	98.2	102.3	100.7	98.9	97.1

II - Method Blank - BTU/ASTM D-1945

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	LCS Result	10.0	10.4	20.1	10.3	10.0	9.8
	LCSD Result	10.2	10.5	20.4	10.5	10.2	10.0
	LCS % Rec *	105.1	99.7	100.9	100.4	98.1	96.3
	LCSD % Rec **	106.7	101.1	102.4	102.0	99.8	97.9
	% RPD ***	1.5	1.4	1.5	1.6	1.7	1.7

IV - Sample & Sample Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
181657-114180	Sample	0.0	1.9	34.5	33.8	0.0	28.0
	Sample Dup	0.0	1.9	34.2	33.7	0.0	27.9
	Mean	0.0	1.9	34.3	33.7	0.0	28.0
	% RPD ***	0.0	1.5	0.8	0.1	0.0	0.1

V - Matrix Spike & Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	H ₂	N ₂	CH ₄	CO	CO ₂
181657-114180	Sample Conc	0.0	17.2	16.9	0.0	14.0
	Spike Conc	9.5	9.8	10.3	10.2	10.2
	MS Result	9.4	27.2	25.7	10.1	24.2
	MSD Result	9.7	27.2	25.7	10.3	24.2
	MS % Rec **	99.2	101.9	86.4	99.6	99.8
	MSD % Rec **	102.1	102.2	85.8	100.9	99.7
	% RPD ***	2.9	0.4	0.7	1.3	0.1

VI - Closing Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	H ₂	O ₂	N ₂	CH ₄	CO	CO ₂
CCV	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	Result	9.2	10.5	20.3	10.4	10.1	10.0
	% Rec *	96.9	101.0	102.0	101.6	99.4	97.9


* Must be 85-115%

** Must be 75-125%

*** Must be < 25%

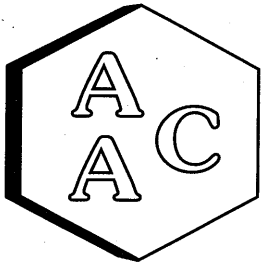
ND = Not Detected

<RL = less than Reporting Limit



 Marcus Hueppe
 Laboratory Director





Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : 10/25/2018
 Analyst : DL
 Units : ppmv

Instrument ID : FID #3
 Calb Date : 02/27/18
 Reporting Limit : 0.5 ppmv

I - Opening Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	Result	96.3	97.3	96.1	95.6	95.7	93.3
	% Rec *	96.6	97.2	96.2	95.7	95.7	93.3

II - Method Blank - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	LCS Result	95.9	96.5	96.8	95.5	94.6	93.1
	LCSD Result	96.3	97.0	97.0	96.3	95.0	93.5
	LCS % Rec *	96.2	96.4	96.8	95.7	94.6	93.2
	LCSD % Rec *	96.7	96.9	97.1	96.4	95.0	93.5
	% RPD ***	0.4	0.5	0.3	0.8	0.4	0.4

IV - Sample & Sample Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
181547-113794	Sample	17.1	0.6	0.0	0.0	0.0	0.0
	Sample Dup	16.7	0.6	0.0	0.0	0.0	0.0
	Mean	16.9	0.6	0.0	0.0	0.0	0.0
	% RPD ***	2.2	0.8	0.0	0.0	0.0	0.0

V - Matrix Spike & Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
181547-113794	Sample Conc	8.4	0.3	0.0	0.0	0.0	0.0
	Spike Conc	49.8	50.1	50.0	49.9	50.0	50.0
	MS Result	58.7	51.1	51.3	50.6	50.5	50.4
	MSD Result	59.1	52.0	51.9	51.2	51.0	51.2
	MS % Rec **	100.8	101.5	102.8	101.5	101.0	100.9
	MSD % Rec **	101.7	103.2	103.8	102.5	102.0	102.5
% RPD ***	0.8	1.7	1.0	1.0	1.0	1.6	

VI - Closing Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	Result	99.2	100.0	100.1	98.6	97.6	95.8
	% Rec *	99.6	99.8	100.1	98.8	97.6	95.8


* Must be 85-115%

** Must be 75-125%

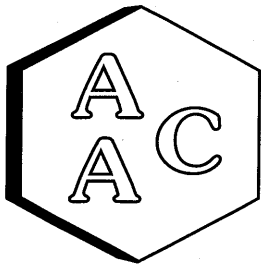
*** Must be < 25%

ND = Not Detected

<RL = less than Reporting Limit


 Marcus Hueppe
 Laboratory Director





Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report ASTM D-5504

Date Analyzed: 10/24/2018
Analyst: ZB
Units: ppbV

Instrument ID: SCD#10
Calb. Date: 7/31/2018

Opening Calibration Verification Standard

465.3 ppbV H₂S (SSI099)

H ₂ S	Resp. (area)	Result	% Rec *	% RPD ****
Initial	3113	445	95.6	2.2
Duplicate	3212	459	98.7	0.9
Triplicate	3225	461	99.1	1.3

452.0 ppbV MeSH (SSI099)

MeSH	Resp. (area)	Result	% Rec *	% RPD ****
Initial	3769	435	96.3	1.4
Duplicate	3860	446	98.7	1.0
Triplicate	3841	444	98.2	0.5

476.3 ppbV DMS (SSI099)

DMS	Resp. (area)	Result	% Rec *	% RPD ****
Initial	4907	479	100.5	0.8
Duplicate	4947	482	101.3	0.0
Triplicate	4983	486	102.0	0.8

Method Blank

Analyte	Result
H ₂ S	<PQL
MeSH	<PQL
DMS	<PQL

Duplicate Analysis

Sample ID 181657-114183

Analyte	Sample Result	Duplicate Result	Mean	% RPD ***
H ₂ S	12727.9	12191.8	12459.9	4.3
MeSH	66.6	65.5	66.1	1.6
DMS	127.3	127.2	127.2	0.1

Matrix Spike & Duplicate

Sample ID 181657-114183 x20

Analyte	Sample Conc.	Spike Added	MS Result	MSD Result	MS % Rec **	MSD % Rec **	% RPD ***
H ₂ S	623.0	232.6	872.4	868.8	102.0	101.5	0.4
MeSH	3.3	226.0	221.7	222.1	96.7	96.9	0.2
DMS	6.4	238.1	255.4	252.7	104.5	103.4	1.1

Closing Calibration Verification Standard


Analyte	Std. Conc.	Result	% Rec **
H ₂ S	465.3	482.6	103.7
MeSH	452.0	464.5	102.8
DMS	476.3	508.7	106.8

* Must be 95-105%, ** Must be 90-110%, *** Must be < 10%, **** Must be < 5% RPD from Mean result.

H₂S: PQL = 10.0 ppbV, MDL = 1.09 ppbV

MeSH: PQL = 10.0 ppbV, MDL = 1.13 ppbV

DMS: PQL = 10.0 ppbV, MDL = 1.39 ppbV


 Marcus Hueppe
 Laboratory Director



Project ID: Palo Alto Fern

SAMPLE CHAIN OF CUSTODY

BE PROJECT MANAGER:

Analytical Lab:

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	SAMPLE DESCRIPTION	ANALYSIS	TAT
1	10/23/18	921	Flare Area In R1 114180	Bag	1 L	Amb	LFG	M25C & 3C	
2		1005	R2 114181	↓	↓				
3		1116	R3 114182	↓	↓				
4									
5		1051	LFG # 815 114183	9.1L Can	6 L		LFG	TO15 & Sulfurs D5504	
6								ASTM 194573582	
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									

SPECIAL INSTRUCTIONS: Record & Report all liquid sample volumes.

Can 1-30, F-102

- TO15 AP42 list

Submit Results to: Attn:

BEST ENVIRONMENTAL 339 STEALTH COURT, LIVERMORE CA. 94551

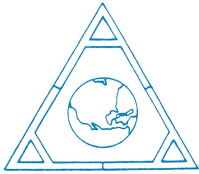
Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by:  Received by:  Date: 10/24/18 Time: 0950

SAMPLE CONDITION AS RECEIVED: OK or not OK

1/4 CAN, NO FLOW F050



LABORATORY ANALYSIS REPORT

environmental consultants
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Total Gaseous Non-Methane Organics (TGNMO), Nitrogen, and Oxygen
Analysis in SUMMA Canister Samples

Report Date: February 7, 2019
Client: SCS Field Services
Site: Palo Alto Landfill
Project No.: 07 - SO03008
Date Received: February 1, 2019
Date Analyzed: February 1, 2019

ANALYSIS DESCRIPTION

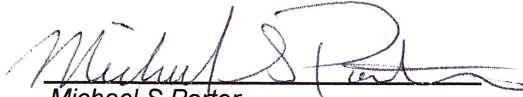
Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25C. Nitrogen and oxygen were measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3C. The Total gaseous non- methane organics concentration is reported with the oxygen correction per method 25C guidelines.

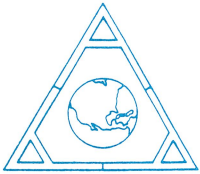
AtmAA Lab No.	Sample ID	Oxygen (%,v)	Nitrogen (%,v)	TGNMO(*) (ppmvC)	TGNMO(*) (ppmvC6)
10329-5	Palo Alto Flare 2	1.18	33.7	483	80.5
10329-6	Palo Alto Flare 1	1.47	34.9	487	81.2
10329-7	Palo Alto Flare 3	1.21	34.4	509	84.8

TGNMO is total gaseous non-methane organics measured as ppmvC and ppmvC6.
The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.

TGNMO(*) - oxygen correction

Note: Site barometric pressures and site temperatures which were recorded on the submitted chain of custody, were used in the concentration calculations.


Michael S Porter
Senior Analyst



LABORATORY ANALYSIS REPORT

Permanent Gases Analysis in SUMMA Canister Samples
Report Date: February 7, 2019
Client: SCS Field Services
Project Name: Palo Alto
Project No.: 07 - SO03008

Date Received: February 1, 2019
Date Analyzed: February 1, 2019


ANALYSIS DESCRIPTION

Permanent gases are measured by thermal conductivity detection/gas chromatography (TCD/GC), EPA 3C.

AtmAA Lab No.:	10329-5	10329-6	10329-7
Sample ID:	Flare 2	Flare 1	Flare 3
Canister:	145	361	112

<u>Components</u>	<u>(Concentration in %v)</u>		
Methane	34.2	33.6	33.9
Carbon Dioxide	31.0	30.5	30.9
Nitrogen	33.2	34.4	33.9
Oxygen	1.16	1.45	1.19

Actual analysis results are reported on a "wet" basis.

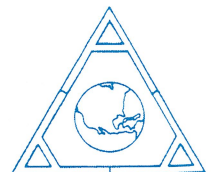

Michael S Porter
Senior Analyst

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Name: Palo Alto
Date Received: February 1, 2019
Date Analyzed: February 1, 2019

Components	Sample ID	Repeat Analysis		Mean Conc.	% Diff. From Mean
		Run #1	Run #2		
<i>(Concentration in %v)</i>					
Methane	Flare 2	34.3	34.2	34.2	0.13
	Flare 1	33.7	33.5	33.6	0.30
	Flare 3	34.0	33.9	33.9	0.16
Carbon Dioxide	Flare 2	31.0	30.9	31.0	0.19
	Flare 1	30.5	30.5	30.5	0.05
	Flare 3	30.9	31.0	30.9	0.08
Nitrogen	Flare 2	33.2	33.3	33.2	0.17
	Flare 1	34.2	34.6	34.4	0.58
	Flare 3	33.9	34.0	33.9	0.12
Oxygen	Flare 2	1.20	1.12	1.2	3.4
	Flare 1	1.47	1.42	1.45	1.7
	Flare 3	1.18	1.20	1.19	0.84

Three SUMMA canister samples, laboratory numbers 10329-(5 - 7), were analyzed for permanent gases. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % difference from mean for 12 repeat measurements from 3 SUMMA canister samples is 0.64%.





LABORATORY ANALYSIS REPORT

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Total Gaseous Non-Methane Organics (TGNMO), Nitrogen, and Oxygen
Analysis in SUMMA Canister Samples

Report Date: June 3, 2019
Client: SCS Field Services
Site: Palo Alto Landfill
Project No.: 07 - SO03008
Date Received: May 23, 2019
Date Analyzed: May 24, 2019

ANALYSIS DESCRIPTION

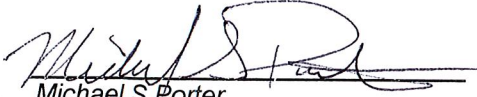
Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25C. Nitrogen and oxygen were measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3C. The Total gaseous non- methane organics concentration is reported with the oxygen correction per method 25C guidelines.

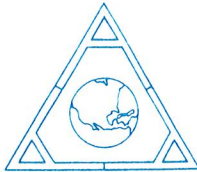
AtmAA Lab No.	Sample ID	Oxygen (%,v)	Nitrogen (%,v)	TGNMO(*) (ppmvC)	TGNMO(*) (ppmvC6)
11439-6	00178 / Flare	1.15	27.8	897	150
11439-7	00177 - Flare	1.07	29.4	922	154
11439-8	00174 / Flare	1.18	28.6	940	157

TGNMO is total gaseous non-methane organics measured as ppmvC and ppmvC6. The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.

TGNMO(*) - oxygen correction

Note: Site barometric pressures and site temperatures which were recorded on the submitted chain of custody, were used in the concentration calculations.


Michael S Porter
Senior Analyst



LABORATORY ANALYSIS REPORT

Permanent Gases Analysis in SUMMA Canister Samples
Report Date: June 3, 2019
Client: SCS Field Services
Project Name: Palo Alto
Project No.: 07 - SO03008

Date Received: May 24, 2019
Date Analyzed: May 24, 2019

ANALYSIS DESCRIPTION


Permanent gases are measured by thermal conductivity detection/gas chromatography (TCD/GC), EPA 3C.

AtmAA Lab No.:	11439-6	11439-7	11439-8
Sample ID:	Flare 2	Flare 1	Flare 3
Canister:	178	177	174

<u>Components</u>	<u>(Concentration in %v)</u>		
Methane	38.3	38.4	38.3
Carbon Dioxide	31.6	31.8	31.4
Nitrogen	27.8	28.7	28.4
Oxygen	1.13	1.06	1.16

The reported oxygen concentration includes any argon present in the sample. Calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon. The accuracy of permanent gas analysis by TCD/GC is +/- 2%, actual results are reported. Actual analysis results are reported on a "wet" basis.

Actual analysis results are reported on a "wet" basis.

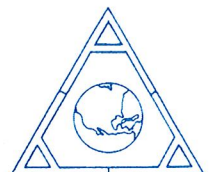

Michael S Porter
Senior Analyst

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

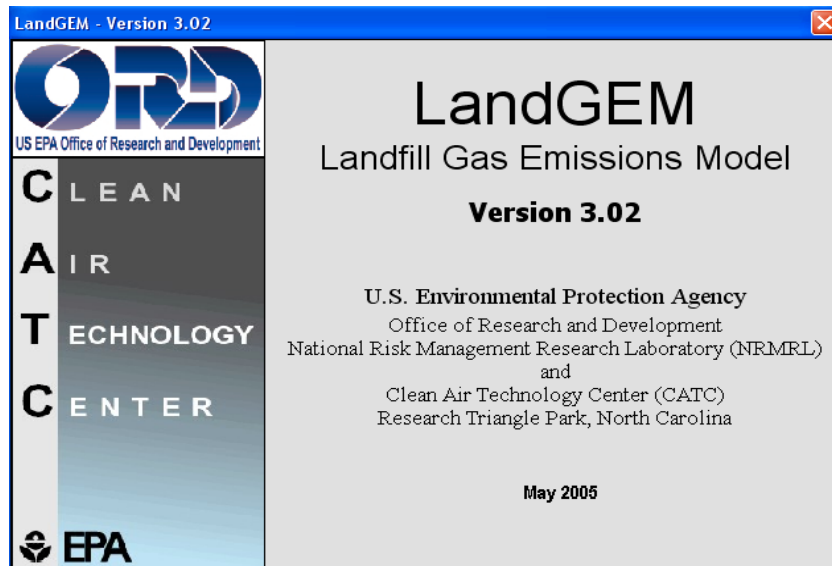
Project Name: Palo Alto
Date Received: May 24, 2019
Date Analyzed: May 24, 2019

Components	Sample ID	Repeat Analysis		Mean Conc.	% Diff. From Mean
		Run #1	Run #2		
<i>(Concentration in %v)</i>					
Methane	Flare 2	38.3	38.4	38.3	0.18
	Flare 1	38.4	38.5	38.4	0.08
	Flare 3	38.3	38.3	38.3	0.01
Carbon Dioxide	Flare 2	31.6	31.6	31.6	0.11
	Flare 1	31.6	31.9	31.8	0.47
	Flare 3	31.4	31.4	31.4	0.03
Nitrogen	Flare 2	28.0	27.7	27.8	0.50
	Flare 1	28.9	28.5	28.7	0.70
	Flare 3	28.6	28.2	28.4	0.83
Oxygen	Flare 2	1.14	1.12	1.13	0.88
	Flare 1	1.04	1.08	1.06	1.9
	Flare 3	1.14	1.17	1.16	1.3

Three SUMMA canister samples, laboratory numbers 11439-(6 - 8), were analyzed for permanent gases. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % difference from mean for 12 repeat measurements from 3 SUMMA canister samples is 0.57%.



ATTACHMENT E
LandGEM Summary Reports



Summary Report

Landfill Name or Identifier: Palo Alto Landfill - October 2018 NMOC Data

Date: Monday, July 29, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

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

Where,

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

i = 1-year time increment

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

j = 0.1-year time increment

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

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

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

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

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

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

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	1955	
Landfill Closure Year (with 80-year limit)	2011	
Actual Closure Year (without limit)	2011	
Have Model Calculate Closure Year?	No	
Waste Design Capacity		<i>megagrams</i>

MODEL PARAMETERS

Methane Generation Rate, k	0.020	<i>year⁻¹</i>
Potential Methane Generation Capacity, L ₀	170	<i>m³/Mg</i>
NMOC Concentration	83	<i>ppmv as hexane</i>
Methane Content	50	<i>% by volume</i>

GASES / POLLUTANTS SELECTED

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

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1955	110,408	121,449	0	0
1956	110,408	121,449	110,408	121,449
1957	110,408	121,449	220,816	242,898
1958	110,408	121,449	331,225	364,347
1959	110,408	121,449	441,633	485,796
1960	110,408	121,449	552,041	607,245
1961	110,408	121,449	662,449	728,694
1962	110,408	121,449	772,857	850,143
1963	110,408	121,449	883,265	971,592
1964	110,408	121,449	993,674	1,093,041
1965	110,408	121,449	1,104,082	1,214,490
1966	110,408	121,449	1,214,490	1,335,939
1967	110,408	121,449	1,324,898	1,457,388
1968	110,408	121,449	1,435,306	1,578,837
1969	110,408	121,449	1,545,715	1,700,286
1970	110,408	121,449	1,656,123	1,821,735
1971	110,408	121,449	1,766,531	1,943,184
1972	110,408	121,449	1,876,939	2,064,633
1973	110,408	121,449	1,987,347	2,186,082
1974	110,408	121,449	2,097,755	2,307,531
1975	110,408	121,449	2,208,164	2,428,980
1976	110,408	121,449	2,318,572	2,550,429
1977	110,408	121,449	2,428,980	2,671,878
1978	110,408	121,449	2,539,388	2,793,327
1979	80,784	88,862	2,649,796	2,914,776
1980	84,809	93,290	2,730,580	3,003,638
1981	86,155	94,771	2,815,389	3,096,928
1982	89,491	98,440	2,901,545	3,191,699
1983	94,047	103,452	2,991,035	3,290,139
1984	105,866	116,453	3,085,083	3,393,591
1985	113,622	124,984	3,190,949	3,510,044
1986	110,130	121,143	3,304,571	3,635,028
1987	94,748	104,223	3,414,701	3,756,171
1988	87,713	96,484	3,509,449	3,860,394
1989	95,408	104,949	3,597,162	3,956,878
1990	78,794	86,673	3,692,570	4,061,827
1991	82,578	90,836	3,771,364	4,148,500
1992	76,309	83,940	3,853,942	4,239,336
1993	67,201	73,921	3,930,251	4,323,276
1994	29,856	32,842	3,997,452	4,397,197

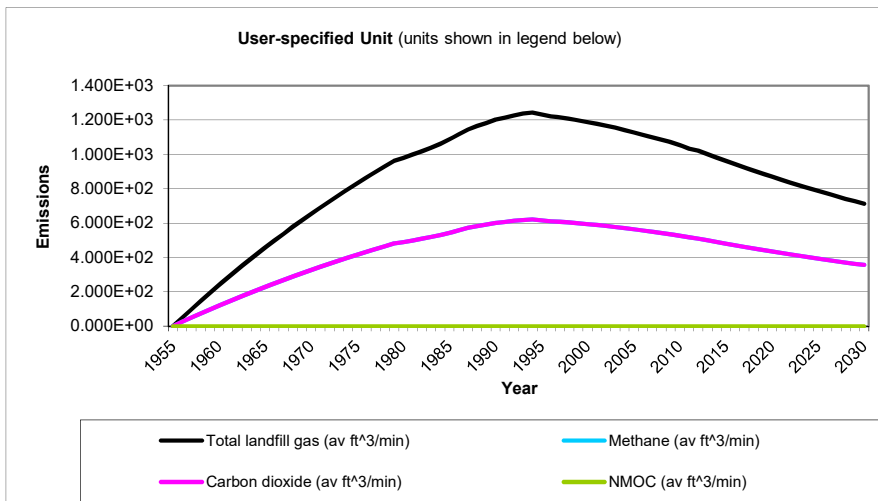
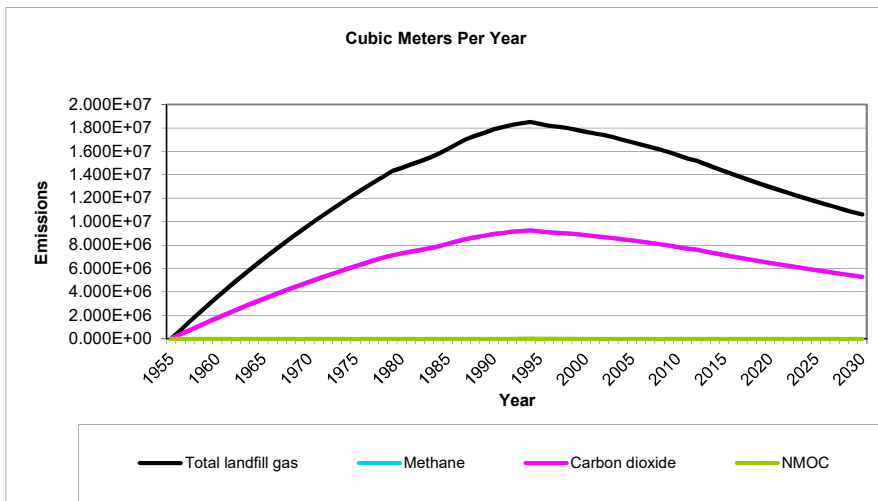
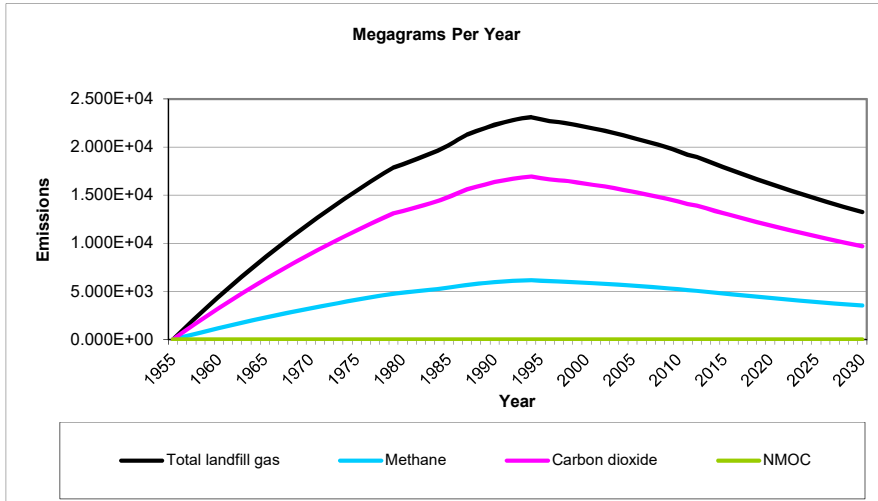
WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1995	30,203	33,223	4,027,308	4,430,039
1996	40,439	44,483	4,057,511	4,463,262
1997	38,703	42,573	4,097,950	4,507,745
1998	28,165	30,982	4,136,653	4,550,318
1999	29,949	32,944	4,164,818	4,581,300
2000	31,485	34,634	4,194,767	4,614,244
2001	28,170	30,987	4,226,253	4,648,878
2002	23,421	25,763	4,254,423	4,679,865
2003	20,502	22,552	4,277,844	4,705,628
2004	19,873	21,860	4,298,345	4,728,180
2005	18,173	19,990	4,318,218	4,750,040
2006	19,802	21,782	4,336,391	4,770,030
2007	15,601	17,161	4,356,193	4,791,812
2008	14,980	16,478	4,371,794	4,808,973
2009	5,821	6,403	4,386,774	4,825,451
2010	4,285	4,714	4,392,595	4,831,854
2011	17,530	19,283	4,396,880	4,836,568
2012	0	0	4,414,410	4,855,851
2013	0	0	4,414,410	4,855,851
2014	0	0	4,414,410	4,855,851
2015	0	0	4,414,410	4,855,851
2016	0	0	4,414,410	4,855,851
2017	0	0	4,414,410	4,855,851
2018	0	0	4,414,410	4,855,851
2019	0	0	4,414,410	4,855,851
2020	0	0	4,414,410	4,855,851
2021	0	0	4,414,410	4,855,851
2022	0	0	4,414,410	4,855,851
2023	0	0	4,414,410	4,855,851
2024	0	0	4,414,410	4,855,851
2025	0	0	4,414,410	4,855,851
2026	0	0	4,414,410	4,855,851
2027	0	0	4,414,410	4,855,851
2028	0	0	4,414,410	4,855,851
2029	0	0	4,414,410	4,855,851
2030	0	0	4,414,410	4,855,851
2031	0	0	4,414,410	4,855,851
2032	0	0	4,414,410	4,855,851
2033	0	0	4,414,410	4,855,851
2034	0	0	4,414,410	4,855,851

Pollutant Parameters

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

Graphs



Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1955	0	0	0	0	0	0
1956	9.292E+02	7.441E+05	4.999E+01	2.482E+02	3.720E+05	2.500E+01
1957	1.840E+03	1.473E+06	9.900E+01	4.915E+02	7.367E+05	4.950E+01
1958	2.733E+03	2.188E+06	1.470E+02	7.300E+02	1.094E+06	7.351E+01
1959	3.608E+03	2.889E+06	1.941E+02	9.637E+02	1.445E+06	9.706E+01
1960	4.466E+03	3.576E+06	2.403E+02	1.193E+03	1.788E+06	1.201E+02
1961	5.306E+03	4.249E+06	2.855E+02	1.417E+03	2.125E+06	1.427E+02
1962	6.131E+03	4.909E+06	3.298E+02	1.638E+03	2.455E+06	1.649E+02
1963	6.938E+03	5.556E+06	3.733E+02	1.853E+03	2.778E+06	1.866E+02
1964	7.730E+03	6.190E+06	4.159E+02	2.065E+03	3.095E+06	2.080E+02
1965	8.506E+03	6.811E+06	4.577E+02	2.272E+03	3.406E+06	2.288E+02
1966	9.267E+03	7.421E+06	4.986E+02	2.475E+03	3.710E+06	2.493E+02
1967	1.001E+04	8.018E+06	5.387E+02	2.675E+03	4.009E+06	2.694E+02
1968	1.074E+04	8.603E+06	5.780E+02	2.870E+03	4.302E+06	2.890E+02
1969	1.146E+04	9.177E+06	6.166E+02	3.061E+03	4.588E+06	3.083E+02
1970	1.216E+04	9.739E+06	6.544E+02	3.249E+03	4.870E+06	3.272E+02
1971	1.285E+04	1.029E+07	6.914E+02	3.433E+03	5.145E+06	3.457E+02
1972	1.353E+04	1.083E+07	7.277E+02	3.613E+03	5.415E+06	3.639E+02
1973	1.419E+04	1.136E+07	7.633E+02	3.789E+03	5.680E+06	3.816E+02
1974	1.484E+04	1.188E+07	7.982E+02	3.963E+03	5.940E+06	3.991E+02
1975	1.547E+04	1.239E+07	8.324E+02	4.132E+03	6.194E+06	4.162E+02
1976	1.609E+04	1.289E+07	8.659E+02	4.299E+03	6.443E+06	4.329E+02
1977	1.670E+04	1.338E+07	8.987E+02	4.462E+03	6.688E+06	4.494E+02
1978	1.730E+04	1.386E+07	9.309E+02	4.622E+03	6.928E+06	4.655E+02
1979	1.789E+04	1.432E+07	9.625E+02	4.778E+03	7.162E+06	4.812E+02
1980	1.821E+04	1.459E+07	9.800E+02	4.865E+03	7.293E+06	4.900E+02
1981	1.857E+04	1.487E+07	9.990E+02	4.960E+03	7.434E+06	4.995E+02
1982	1.893E+04	1.515E+07	1.018E+03	5.055E+03	7.577E+06	5.091E+02
1983	1.930E+04	1.546E+07	1.039E+03	5.156E+03	7.729E+06	5.193E+02
1984	1.971E+04	1.579E+07	1.061E+03	5.266E+03	7.893E+06	5.303E+02
1985	2.021E+04	1.619E+07	1.088E+03	5.399E+03	8.093E+06	5.438E+02
1986	2.077E+04	1.663E+07	1.117E+03	5.548E+03	8.316E+06	5.587E+02
1987	2.129E+04	1.704E+07	1.145E+03	5.685E+03	8.522E+06	5.726E+02
1988	2.166E+04	1.735E+07	1.165E+03	5.786E+03	8.673E+06	5.827E+02
1989	2.197E+04	1.759E+07	1.182E+03	5.869E+03	8.796E+06	5.910E+02
1990	2.234E+04	1.789E+07	1.202E+03	5.967E+03	8.944E+06	6.009E+02
1991	2.256E+04	1.806E+07	1.214E+03	6.026E+03	9.032E+06	6.069E+02
1992	2.281E+04	1.826E+07	1.227E+03	6.092E+03	9.132E+06	6.135E+02
1993	2.300E+04	1.842E+07	1.237E+03	6.143E+03	9.208E+06	6.187E+02
1994	2.311E+04	1.850E+07	1.243E+03	6.172E+03	9.252E+06	6.216E+02
1995	2.290E+04	1.834E+07	1.232E+03	6.117E+03	9.169E+06	6.161E+02
1996	2.270E+04	1.818E+07	1.221E+03	6.064E+03	9.090E+06	6.107E+02
1997	2.259E+04	1.809E+07	1.216E+03	6.035E+03	9.046E+06	6.078E+02
1998	2.247E+04	1.799E+07	1.209E+03	6.002E+03	8.997E+06	6.045E+02
1999	2.226E+04	1.783E+07	1.198E+03	5.947E+03	8.914E+06	5.989E+02
2000	2.207E+04	1.768E+07	1.188E+03	5.896E+03	8.838E+06	5.938E+02
2001	2.190E+04	1.754E+07	1.178E+03	5.850E+03	8.769E+06	5.892E+02
2002	2.171E+04	1.738E+07	1.168E+03	5.798E+03	8.691E+06	5.839E+02
2003	2.147E+04	1.719E+07	1.155E+03	5.736E+03	8.597E+06	5.777E+02
2004	2.122E+04	1.699E+07	1.142E+03	5.668E+03	8.496E+06	5.709E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2005	2.097E+04	1.679E+07	1.128E+03	5.601E+03	8.395E+06	5.641E+02
2006	2.071E+04	1.658E+07	1.114E+03	5.531E+03	8.290E+06	5.570E+02
2007	2.046E+04	1.639E+07	1.101E+03	5.466E+03	8.193E+06	5.505E+02
2008	2.019E+04	1.617E+07	1.086E+03	5.393E+03	8.083E+06	5.431E+02
2009	1.991E+04	1.595E+07	1.071E+03	5.319E+03	7.973E+06	5.357E+02
2010	1.957E+04	1.567E+07	1.053E+03	5.227E+03	7.835E+06	5.264E+02
2011	1.922E+04	1.539E+07	1.034E+03	5.133E+03	7.694E+06	5.170E+02
2012	1.898E+04	1.520E+07	1.021E+03	5.071E+03	7.601E+06	5.107E+02
2013	1.861E+04	1.490E+07	1.001E+03	4.971E+03	7.451E+06	5.006E+02
2014	1.824E+04	1.461E+07	9.814E+02	4.872E+03	7.303E+06	4.907E+02
2015	1.788E+04	1.432E+07	9.620E+02	4.776E+03	7.158E+06	4.810E+02
2016	1.753E+04	1.403E+07	9.429E+02	4.681E+03	7.017E+06	4.715E+02
2017	1.718E+04	1.376E+07	9.242E+02	4.589E+03	6.878E+06	4.621E+02
2018	1.684E+04	1.348E+07	9.059E+02	4.498E+03	6.742E+06	4.530E+02
2019	1.650E+04	1.322E+07	8.880E+02	4.409E+03	6.608E+06	4.440E+02
2020	1.618E+04	1.295E+07	8.704E+02	4.321E+03	6.477E+06	4.352E+02
2021	1.586E+04	1.270E+07	8.532E+02	4.236E+03	6.349E+06	4.266E+02
2022	1.554E+04	1.245E+07	8.363E+02	4.152E+03	6.223E+06	4.181E+02
2023	1.524E+04	1.220E+07	8.197E+02	4.070E+03	6.100E+06	4.099E+02
2024	1.493E+04	1.196E+07	8.035E+02	3.989E+03	5.979E+06	4.017E+02
2025	1.464E+04	1.172E+07	7.876E+02	3.910E+03	5.861E+06	3.938E+02
2026	1.435E+04	1.149E+07	7.720E+02	3.833E+03	5.745E+06	3.860E+02
2027	1.406E+04	1.126E+07	7.567E+02	3.757E+03	5.631E+06	3.783E+02
2028	1.379E+04	1.104E+07	7.417E+02	3.682E+03	5.520E+06	3.709E+02
2029	1.351E+04	1.082E+07	7.270E+02	3.609E+03	5.410E+06	3.635E+02
2030	1.325E+04	1.061E+07	7.126E+02	3.538E+03	5.303E+06	3.563E+02
2031	1.298E+04	1.040E+07	6.985E+02	3.468E+03	5.198E+06	3.493E+02
2032	1.273E+04	1.019E+07	6.847E+02	3.399E+03	5.095E+06	3.423E+02
2033	1.247E+04	9.989E+06	6.711E+02	3.332E+03	4.994E+06	3.356E+02
2034	1.223E+04	9.791E+06	6.578E+02	3.266E+03	4.895E+06	3.289E+02
2035	1.198E+04	9.597E+06	6.448E+02	3.201E+03	4.798E+06	3.224E+02
2036	1.175E+04	9.407E+06	6.320E+02	3.138E+03	4.703E+06	3.160E+02
2037	1.151E+04	9.221E+06	6.195E+02	3.076E+03	4.610E+06	3.098E+02
2038	1.129E+04	9.038E+06	6.073E+02	3.015E+03	4.519E+06	3.036E+02
2039	1.106E+04	8.859E+06	5.952E+02	2.955E+03	4.430E+06	2.976E+02
2040	1.084E+04	8.684E+06	5.835E+02	2.897E+03	4.342E+06	2.917E+02
2041	1.063E+04	8.512E+06	5.719E+02	2.839E+03	4.256E+06	2.860E+02
2042	1.042E+04	8.343E+06	5.606E+02	2.783E+03	4.172E+06	2.803E+02
2043	1.021E+04	8.178E+06	5.495E+02	2.728E+03	4.089E+06	2.747E+02
2044	1.001E+04	8.016E+06	5.386E+02	2.674E+03	4.008E+06	2.693E+02
2045	9.812E+03	7.857E+06	5.279E+02	2.621E+03	3.929E+06	2.640E+02
2046	9.618E+03	7.702E+06	5.175E+02	2.569E+03	3.851E+06	2.587E+02
2047	9.428E+03	7.549E+06	5.072E+02	2.518E+03	3.775E+06	2.536E+02
2048	9.241E+03	7.400E+06	4.972E+02	2.468E+03	3.700E+06	2.486E+02
2049	9.058E+03	7.253E+06	4.873E+02	2.419E+03	3.627E+06	2.437E+02
2050	8.879E+03	7.110E+06	4.777E+02	2.372E+03	3.555E+06	2.388E+02
2051	8.703E+03	6.969E+06	4.682E+02	2.325E+03	3.484E+06	2.341E+02
2052	8.530E+03	6.831E+06	4.590E+02	2.279E+03	3.415E+06	2.295E+02
2053	8.362E+03	6.696E+06	4.499E+02	2.233E+03	3.348E+06	2.249E+02
2054	8.196E+03	6.563E+06	4.410E+02	2.189E+03	3.281E+06	2.205E+02
2055	8.034E+03	6.433E+06	4.322E+02	2.146E+03	3.217E+06	2.161E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2056	7.875E+03	6.306E+06	4.237E+02	2.103E+03	3.153E+06	2.118E+02
2057	7.719E+03	6.181E+06	4.153E+02	2.062E+03	3.090E+06	2.076E+02
2058	7.566E+03	6.058E+06	4.071E+02	2.021E+03	3.029E+06	2.035E+02
2059	7.416E+03	5.938E+06	3.990E+02	1.981E+03	2.969E+06	1.995E+02
2060	7.269E+03	5.821E+06	3.911E+02	1.942E+03	2.910E+06	1.956E+02
2061	7.125E+03	5.706E+06	3.834E+02	1.903E+03	2.853E+06	1.917E+02
2062	6.984E+03	5.593E+06	3.758E+02	1.866E+03	2.796E+06	1.879E+02
2063	6.846E+03	5.482E+06	3.683E+02	1.829E+03	2.741E+06	1.842E+02
2064	6.710E+03	5.373E+06	3.610E+02	1.792E+03	2.687E+06	1.805E+02
2065	6.577E+03	5.267E+06	3.539E+02	1.757E+03	2.633E+06	1.769E+02
2066	6.447E+03	5.163E+06	3.469E+02	1.722E+03	2.581E+06	1.734E+02
2067	6.320E+03	5.060E+06	3.400E+02	1.688E+03	2.530E+06	1.700E+02
2068	6.194E+03	4.960E+06	3.333E+02	1.655E+03	2.480E+06	1.666E+02
2069	6.072E+03	4.862E+06	3.267E+02	1.622E+03	2.431E+06	1.633E+02
2070	5.952E+03	4.766E+06	3.202E+02	1.590E+03	2.383E+06	1.601E+02
2071	5.834E+03	4.671E+06	3.139E+02	1.558E+03	2.336E+06	1.569E+02
2072	5.718E+03	4.579E+06	3.077E+02	1.527E+03	2.289E+06	1.538E+02
2073	5.605E+03	4.488E+06	3.016E+02	1.497E+03	2.244E+06	1.508E+02
2074	5.494E+03	4.399E+06	2.956E+02	1.467E+03	2.200E+06	1.478E+02
2075	5.385E+03	4.312E+06	2.897E+02	1.438E+03	2.156E+06	1.449E+02
2076	5.279E+03	4.227E+06	2.840E+02	1.410E+03	2.113E+06	1.420E+02
2077	5.174E+03	4.143E+06	2.784E+02	1.382E+03	2.072E+06	1.392E+02
2078	5.072E+03	4.061E+06	2.729E+02	1.355E+03	2.031E+06	1.364E+02
2079	4.971E+03	3.981E+06	2.675E+02	1.328E+03	1.990E+06	1.337E+02
2080	4.873E+03	3.902E+06	2.622E+02	1.302E+03	1.951E+06	1.311E+02
2081	4.776E+03	3.825E+06	2.570E+02	1.276E+03	1.912E+06	1.285E+02
2082	4.682E+03	3.749E+06	2.519E+02	1.251E+03	1.874E+06	1.259E+02
2083	4.589E+03	3.675E+06	2.469E+02	1.226E+03	1.837E+06	1.234E+02
2084	4.498E+03	3.602E+06	2.420E+02	1.201E+03	1.801E+06	1.210E+02
2085	4.409E+03	3.531E+06	2.372E+02	1.178E+03	1.765E+06	1.186E+02
2086	4.322E+03	3.461E+06	2.325E+02	1.154E+03	1.730E+06	1.163E+02
2087	4.236E+03	3.392E+06	2.279E+02	1.132E+03	1.696E+06	1.140E+02
2088	4.152E+03	3.325E+06	2.234E+02	1.109E+03	1.662E+06	1.117E+02
2089	4.070E+03	3.259E+06	2.190E+02	1.087E+03	1.630E+06	1.095E+02
2090	3.989E+03	3.195E+06	2.146E+02	1.066E+03	1.597E+06	1.073E+02
2091	3.910E+03	3.131E+06	2.104E+02	1.045E+03	1.566E+06	1.052E+02
2092	3.833E+03	3.069E+06	2.062E+02	1.024E+03	1.535E+06	1.031E+02
2093	3.757E+03	3.009E+06	2.021E+02	1.004E+03	1.504E+06	1.011E+02
2094	3.683E+03	2.949E+06	1.981E+02	9.837E+02	1.474E+06	9.907E+01
2095	3.610E+03	2.891E+06	1.942E+02	9.642E+02	1.445E+06	9.711E+01

Results (Continued)

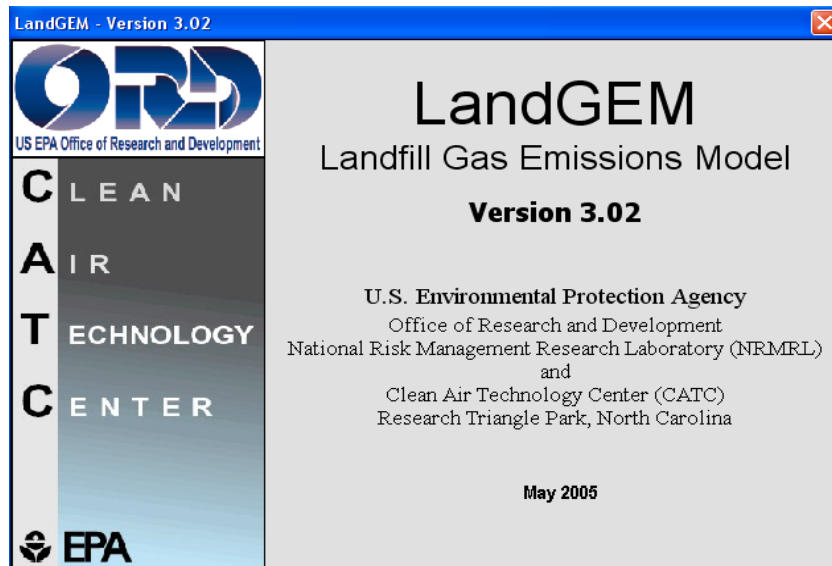
Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1955	0	0	0	0	0	0
1956	6.810E+02	3.720E+05	2.500E+01	2.200E-01	6.139E+01	4.124E-03
1957	1.349E+03	7.367E+05	4.950E+01	4.357E-01	1.216E+02	8.167E-03
1958	2.003E+03	1.094E+06	7.351E+01	6.471E-01	1.805E+02	1.213E-02
1959	2.644E+03	1.445E+06	9.706E+01	8.543E-01	2.383E+02	1.601E-02
1960	3.273E+03	1.788E+06	1.201E+02	1.057E+00	2.950E+02	1.982E-02
1961	3.889E+03	2.125E+06	1.427E+02	1.257E+00	3.506E+02	2.355E-02
1962	4.493E+03	2.455E+06	1.649E+02	1.452E+00	4.050E+02	2.721E-02
1963	5.085E+03	2.778E+06	1.866E+02	1.643E+00	4.584E+02	3.080E-02
1964	5.665E+03	3.095E+06	2.080E+02	1.830E+00	5.107E+02	3.431E-02
1965	6.234E+03	3.406E+06	2.288E+02	2.014E+00	5.619E+02	3.776E-02
1966	6.792E+03	3.710E+06	2.493E+02	2.194E+00	6.122E+02	4.113E-02
1967	7.338E+03	4.009E+06	2.694E+02	2.371E+00	6.615E+02	4.444E-02
1968	7.874E+03	4.302E+06	2.890E+02	2.544E+00	7.098E+02	4.769E-02
1969	8.399E+03	4.588E+06	3.083E+02	2.714E+00	7.571E+02	5.087E-02
1970	8.914E+03	4.870E+06	3.272E+02	2.880E+00	8.035E+02	5.399E-02
1971	9.418E+03	5.145E+06	3.457E+02	3.043E+00	8.490E+02	5.704E-02
1972	9.913E+03	5.415E+06	3.639E+02	3.203E+00	8.935E+02	6.004E-02
1973	1.040E+04	5.680E+06	3.816E+02	3.359E+00	9.372E+02	6.297E-02
1974	1.087E+04	5.940E+06	3.991E+02	3.513E+00	9.800E+02	6.585E-02
1975	1.134E+04	6.194E+06	4.162E+02	3.663E+00	1.022E+03	6.867E-02
1976	1.179E+04	6.443E+06	4.329E+02	3.811E+00	1.063E+03	7.143E-02
1977	1.224E+04	6.688E+06	4.494E+02	3.955E+00	1.104E+03	7.414E-02
1978	1.268E+04	6.928E+06	4.655E+02	4.097E+00	1.143E+03	7.680E-02
1979	1.311E+04	7.162E+06	4.812E+02	4.236E+00	1.182E+03	7.940E-02
1980	1.335E+04	7.293E+06	4.900E+02	4.313E+00	1.203E+03	8.085E-02
1981	1.361E+04	7.434E+06	4.995E+02	4.397E+00	1.227E+03	8.242E-02
1982	1.387E+04	7.577E+06	5.091E+02	4.481E+00	1.250E+03	8.400E-02
1983	1.415E+04	7.729E+06	5.193E+02	4.571E+00	1.275E+03	8.568E-02
1984	1.445E+04	7.893E+06	5.303E+02	4.668E+00	1.302E+03	8.750E-02
1985	1.481E+04	8.093E+06	5.438E+02	4.787E+00	1.335E+03	8.972E-02
1986	1.522E+04	8.316E+06	5.587E+02	4.918E+00	1.372E+03	9.219E-02
1987	1.560E+04	8.522E+06	5.726E+02	5.040E+00	1.406E+03	9.448E-02
1988	1.588E+04	8.673E+06	5.827E+02	5.129E+00	1.431E+03	9.615E-02
1989	1.610E+04	8.796E+06	5.910E+02	5.203E+00	1.451E+03	9.752E-02
1990	1.637E+04	8.944E+06	6.009E+02	5.290E+00	1.476E+03	9.915E-02
1991	1.653E+04	9.032E+06	6.069E+02	5.342E+00	1.490E+03	1.001E-01
1992	1.672E+04	9.132E+06	6.135E+02	5.401E+00	1.507E+03	1.012E-01
1993	1.685E+04	9.208E+06	6.187E+02	5.446E+00	1.519E+03	1.021E-01
1994	1.694E+04	9.252E+06	6.216E+02	5.472E+00	1.527E+03	1.026E-01
1995	1.678E+04	9.169E+06	6.161E+02	5.423E+00	1.513E+03	1.017E-01
1996	1.664E+04	9.090E+06	6.107E+02	5.376E+00	1.500E+03	1.008E-01
1997	1.656E+04	9.046E+06	6.078E+02	5.350E+00	1.493E+03	1.003E-01
1998	1.647E+04	8.997E+06	6.045E+02	5.321E+00	1.485E+03	9.975E-02
1999	1.632E+04	8.914E+06	5.989E+02	5.272E+00	1.471E+03	9.882E-02
2000	1.618E+04	8.838E+06	5.938E+02	5.227E+00	1.458E+03	9.798E-02
2001	1.605E+04	8.769E+06	5.892E+02	5.187E+00	1.447E+03	9.722E-02
2002	1.591E+04	8.691E+06	5.839E+02	5.140E+00	1.434E+03	9.635E-02
2003	1.574E+04	8.597E+06	5.777E+02	5.085E+00	1.419E+03	9.531E-02
2004	1.555E+04	8.496E+06	5.709E+02	5.025E+00	1.402E+03	9.419E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2005	1.537E+04	8.395E+06	5.641E+02	4.965E+00	1.385E+03	9.307E-02
2006	1.517E+04	8.290E+06	5.570E+02	4.903E+00	1.368E+03	9.191E-02
2007	1.500E+04	8.193E+06	5.505E+02	4.845E+00	1.352E+03	9.083E-02
2008	1.480E+04	8.083E+06	5.431E+02	4.781E+00	1.334E+03	8.961E-02
2009	1.460E+04	7.973E+06	5.357E+02	4.716E+00	1.316E+03	8.840E-02
2010	1.434E+04	7.835E+06	5.264E+02	4.634E+00	1.293E+03	8.686E-02
2011	1.408E+04	7.694E+06	5.170E+02	4.551E+00	1.270E+03	8.530E-02
2012	1.391E+04	7.601E+06	5.107E+02	4.496E+00	1.254E+03	8.427E-02
2013	1.364E+04	7.451E+06	5.006E+02	4.407E+00	1.229E+03	8.260E-02
2014	1.337E+04	7.303E+06	4.907E+02	4.319E+00	1.205E+03	8.096E-02
2015	1.310E+04	7.158E+06	4.810E+02	4.234E+00	1.181E+03	7.936E-02
2016	1.284E+04	7.017E+06	4.715E+02	4.150E+00	1.158E+03	7.779E-02
2017	1.259E+04	6.878E+06	4.621E+02	4.068E+00	1.135E+03	7.625E-02
2018	1.234E+04	6.742E+06	4.530E+02	3.987E+00	1.112E+03	7.474E-02
2019	1.210E+04	6.608E+06	4.440E+02	3.908E+00	1.090E+03	7.326E-02
2020	1.186E+04	6.477E+06	4.352E+02	3.831E+00	1.069E+03	7.181E-02
2021	1.162E+04	6.349E+06	4.266E+02	3.755E+00	1.048E+03	7.039E-02
2022	1.139E+04	6.223E+06	4.181E+02	3.681E+00	1.027E+03	6.899E-02
2023	1.117E+04	6.100E+06	4.099E+02	3.608E+00	1.007E+03	6.763E-02
2024	1.095E+04	5.979E+06	4.017E+02	3.536E+00	9.866E+02	6.629E-02
2025	1.073E+04	5.861E+06	3.938E+02	3.466E+00	9.670E+02	6.498E-02
2026	1.052E+04	5.745E+06	3.860E+02	3.398E+00	9.479E+02	6.369E-02
2027	1.031E+04	5.631E+06	3.783E+02	3.330E+00	9.291E+02	6.243E-02
2028	1.010E+04	5.520E+06	3.709E+02	3.264E+00	9.107E+02	6.119E-02
2029	9.903E+03	5.410E+06	3.635E+02	3.200E+00	8.927E+02	5.998E-02
2030	9.707E+03	5.303E+06	3.563E+02	3.136E+00	8.750E+02	5.879E-02
2031	9.515E+03	5.198E+06	3.493E+02	3.074E+00	8.577E+02	5.763E-02
2032	9.327E+03	5.095E+06	3.423E+02	3.013E+00	8.407E+02	5.649E-02
2033	9.142E+03	4.994E+06	3.356E+02	2.954E+00	8.241E+02	5.537E-02
2034	8.961E+03	4.895E+06	3.289E+02	2.895E+00	8.077E+02	5.427E-02
2035	8.784E+03	4.798E+06	3.224E+02	2.838E+00	7.917E+02	5.320E-02
2036	8.610E+03	4.703E+06	3.160E+02	2.782E+00	7.761E+02	5.214E-02
2037	8.439E+03	4.610E+06	3.098E+02	2.727E+00	7.607E+02	5.111E-02
2038	8.272E+03	4.519E+06	3.036E+02	2.673E+00	7.456E+02	5.010E-02
2039	8.108E+03	4.430E+06	2.976E+02	2.620E+00	7.309E+02	4.911E-02
2040	7.948E+03	4.342E+06	2.917E+02	2.568E+00	7.164E+02	4.813E-02
2041	7.790E+03	4.256E+06	2.860E+02	2.517E+00	7.022E+02	4.718E-02
2042	7.636E+03	4.172E+06	2.803E+02	2.467E+00	6.883E+02	4.625E-02
2043	7.485E+03	4.089E+06	2.747E+02	2.418E+00	6.747E+02	4.533E-02
2044	7.337E+03	4.008E+06	2.693E+02	2.370E+00	6.613E+02	4.443E-02
2045	7.191E+03	3.929E+06	2.640E+02	2.324E+00	6.482E+02	4.355E-02
2046	7.049E+03	3.851E+06	2.587E+02	2.278E+00	6.354E+02	4.269E-02
2047	6.909E+03	3.775E+06	2.536E+02	2.232E+00	6.228E+02	4.185E-02
2048	6.773E+03	3.700E+06	2.486E+02	2.188E+00	6.105E+02	4.102E-02
2049	6.638E+03	3.627E+06	2.437E+02	2.145E+00	5.984E+02	4.021E-02
2050	6.507E+03	3.555E+06	2.388E+02	2.102E+00	5.865E+02	3.941E-02
2051	6.378E+03	3.484E+06	2.341E+02	2.061E+00	5.749E+02	3.863E-02
2052	6.252E+03	3.415E+06	2.295E+02	2.020E+00	5.635E+02	3.786E-02
2053	6.128E+03	3.348E+06	2.249E+02	1.980E+00	5.524E+02	3.711E-02
2054	6.007E+03	3.281E+06	2.205E+02	1.941E+00	5.414E+02	3.638E-02
2055	5.888E+03	3.217E+06	2.161E+02	1.902E+00	5.307E+02	3.566E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2056	5.771E+03	3.153E+06	2.118E+02	1.865E+00	5.202E+02	3.495E-02
2057	5.657E+03	3.090E+06	2.076E+02	1.828E+00	5.099E+02	3.426E-02
2058	5.545E+03	3.029E+06	2.035E+02	1.792E+00	4.998E+02	3.358E-02
2059	5.435E+03	2.969E+06	1.995E+02	1.756E+00	4.899E+02	3.292E-02
2060	5.328E+03	2.910E+06	1.956E+02	1.721E+00	4.802E+02	3.227E-02
2061	5.222E+03	2.853E+06	1.917E+02	1.687E+00	4.707E+02	3.163E-02
2062	5.119E+03	2.796E+06	1.879E+02	1.654E+00	4.614E+02	3.100E-02
2063	5.017E+03	2.741E+06	1.842E+02	1.621E+00	4.523E+02	3.039E-02
2064	4.918E+03	2.687E+06	1.805E+02	1.589E+00	4.433E+02	2.979E-02
2065	4.821E+03	2.633E+06	1.769E+02	1.558E+00	4.345E+02	2.920E-02
2066	4.725E+03	2.581E+06	1.734E+02	1.527E+00	4.259E+02	2.862E-02
2067	4.632E+03	2.530E+06	1.700E+02	1.496E+00	4.175E+02	2.805E-02
2068	4.540E+03	2.480E+06	1.666E+02	1.467E+00	4.092E+02	2.750E-02
2069	4.450E+03	2.431E+06	1.633E+02	1.438E+00	4.011E+02	2.695E-02
2070	4.362E+03	2.383E+06	1.601E+02	1.409E+00	3.932E+02	2.642E-02
2071	4.275E+03	2.336E+06	1.569E+02	1.381E+00	3.854E+02	2.589E-02
2072	4.191E+03	2.289E+06	1.538E+02	1.354E+00	3.778E+02	2.538E-02
2073	4.108E+03	2.244E+06	1.508E+02	1.327E+00	3.703E+02	2.488E-02
2074	4.026E+03	2.200E+06	1.478E+02	1.301E+00	3.629E+02	2.439E-02
2075	3.947E+03	2.156E+06	1.449E+02	1.275E+00	3.558E+02	2.390E-02
2076	3.869E+03	2.113E+06	1.420E+02	1.250E+00	3.487E+02	2.343E-02
2077	3.792E+03	2.072E+06	1.392E+02	1.225E+00	3.418E+02	2.297E-02
2078	3.717E+03	2.031E+06	1.364E+02	1.201E+00	3.350E+02	2.251E-02
2079	3.643E+03	1.990E+06	1.337E+02	1.177E+00	3.284E+02	2.207E-02
2080	3.571E+03	1.951E+06	1.311E+02	1.154E+00	3.219E+02	2.163E-02
2081	3.500E+03	1.912E+06	1.285E+02	1.131E+00	3.155E+02	2.120E-02
2082	3.431E+03	1.874E+06	1.259E+02	1.109E+00	3.093E+02	2.078E-02
2083	3.363E+03	1.837E+06	1.234E+02	1.087E+00	3.032E+02	2.037E-02
2084	3.297E+03	1.801E+06	1.210E+02	1.065E+00	2.972E+02	1.997E-02
2085	3.231E+03	1.765E+06	1.186E+02	1.044E+00	2.913E+02	1.957E-02
2086	3.167E+03	1.730E+06	1.163E+02	1.023E+00	2.855E+02	1.918E-02
2087	3.105E+03	1.696E+06	1.140E+02	1.003E+00	2.798E+02	1.880E-02
2088	3.043E+03	1.662E+06	1.117E+02	9.832E-01	2.743E+02	1.843E-02
2089	2.983E+03	1.630E+06	1.095E+02	9.638E-01	2.689E+02	1.807E-02
2090	2.924E+03	1.597E+06	1.073E+02	9.447E-01	2.635E+02	1.771E-02
2091	2.866E+03	1.566E+06	1.052E+02	9.260E-01	2.583E+02	1.736E-02
2092	2.809E+03	1.535E+06	1.031E+02	9.076E-01	2.532E+02	1.701E-02
2093	2.754E+03	1.504E+06	1.011E+02	8.897E-01	2.482E+02	1.668E-02
2094	2.699E+03	1.474E+06	9.907E+01	8.721E-01	2.433E+02	1.635E-02
2095	2.646E+03	1.445E+06	9.711E+01	8.548E-01	2.385E+02	1.602E-02



Summary Report

Landfill Name or Identifier: Palo Alto Landfill - January 2019 NMOC Data

Date: Monday, July 29, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

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

Where,

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

i = 1-year time increment

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

j = 0.1-year time increment

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

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

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

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

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

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

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	1955	
Landfill Closure Year (with 80-year limit)	2011	
Actual Closure Year (without limit)	2011	
Have Model Calculate Closure Year?	No	
Waste Design Capacity		<i>megagrams</i>

MODEL PARAMETERS

Methane Generation Rate, k	0.020	<i>year⁻¹</i>
Potential Methane Generation Capacity, L ₀	170	<i>m³/Mg</i>
NMOC Concentration	82	<i>ppmv as hexane</i>
Methane Content	50	<i>% by volume</i>

GASES / POLLUTANTS SELECTED

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

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1955	110,408	121,449	0	0
1956	110,408	121,449	110,408	121,449
1957	110,408	121,449	220,816	242,898
1958	110,408	121,449	331,225	364,347
1959	110,408	121,449	441,633	485,796
1960	110,408	121,449	552,041	607,245
1961	110,408	121,449	662,449	728,694
1962	110,408	121,449	772,857	850,143
1963	110,408	121,449	883,265	971,592
1964	110,408	121,449	993,674	1,093,041
1965	110,408	121,449	1,104,082	1,214,490
1966	110,408	121,449	1,214,490	1,335,939
1967	110,408	121,449	1,324,898	1,457,388
1968	110,408	121,449	1,435,306	1,578,837
1969	110,408	121,449	1,545,715	1,700,286
1970	110,408	121,449	1,656,123	1,821,735
1971	110,408	121,449	1,766,531	1,943,184
1972	110,408	121,449	1,876,939	2,064,633
1973	110,408	121,449	1,987,347	2,186,082
1974	110,408	121,449	2,097,755	2,307,531
1975	110,408	121,449	2,208,164	2,428,980
1976	110,408	121,449	2,318,572	2,550,429
1977	110,408	121,449	2,428,980	2,671,878
1978	110,408	121,449	2,539,388	2,793,327
1979	80,784	88,862	2,649,796	2,914,776
1980	84,809	93,290	2,730,580	3,003,638
1981	86,155	94,771	2,815,389	3,096,928
1982	89,491	98,440	2,901,545	3,191,699
1983	94,047	103,452	2,991,035	3,290,139
1984	105,866	116,453	3,085,083	3,393,591
1985	113,622	124,984	3,190,949	3,510,044
1986	110,130	121,143	3,304,571	3,635,028
1987	94,748	104,223	3,414,701	3,756,171
1988	87,713	96,484	3,509,449	3,860,394
1989	95,408	104,949	3,597,162	3,956,878
1990	78,794	86,673	3,692,570	4,061,827
1991	82,578	90,836	3,771,364	4,148,500
1992	76,309	83,940	3,853,942	4,239,336
1993	67,201	73,921	3,930,251	4,323,276
1994	29,856	32,842	3,997,452	4,397,197

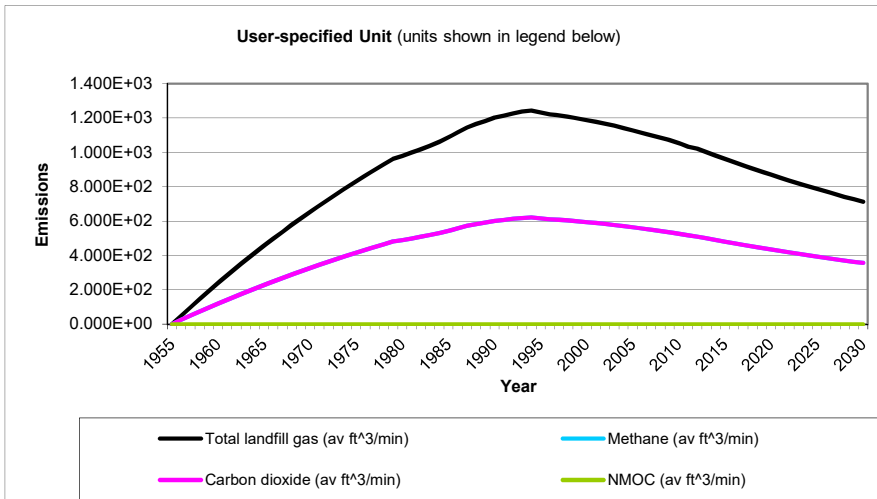
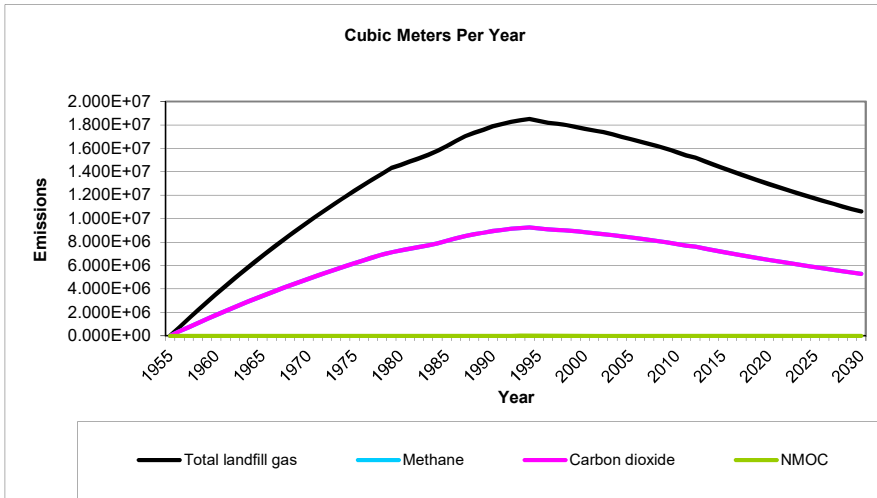
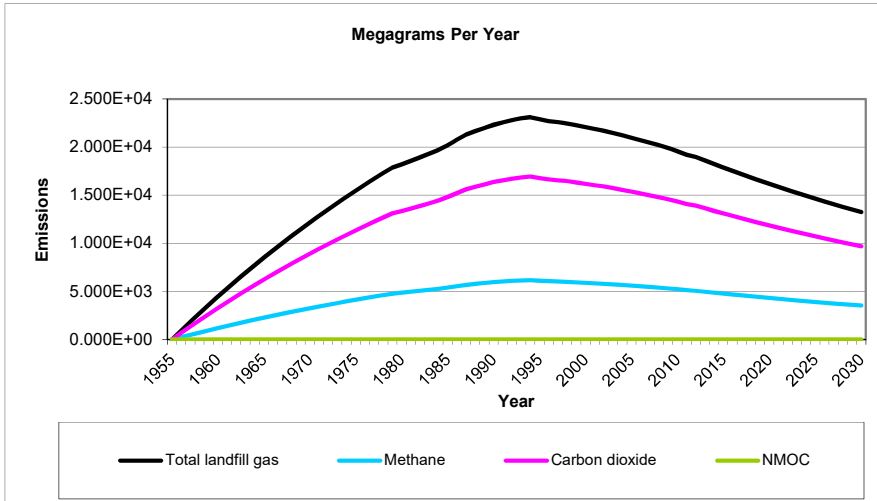
WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1995	30,203	33,223	4,027,308	4,430,039
1996	40,439	44,483	4,057,511	4,463,262
1997	38,703	42,573	4,097,950	4,507,745
1998	28,165	30,982	4,136,653	4,550,318
1999	29,949	32,944	4,164,818	4,581,300
2000	31,485	34,634	4,194,767	4,614,244
2001	28,170	30,987	4,226,253	4,648,878
2002	23,421	25,763	4,254,423	4,679,865
2003	20,502	22,552	4,277,844	4,705,628
2004	19,873	21,860	4,298,345	4,728,180
2005	18,173	19,990	4,318,218	4,750,040
2006	19,802	21,782	4,336,391	4,770,030
2007	15,601	17,161	4,356,193	4,791,812
2008	14,980	16,478	4,371,794	4,808,973
2009	5,821	6,403	4,386,774	4,825,451
2010	4,285	4,714	4,392,595	4,831,854
2011	17,530	19,283	4,396,880	4,836,568
2012	0	0	4,414,410	4,855,851
2013	0	0	4,414,410	4,855,851
2014	0	0	4,414,410	4,855,851
2015	0	0	4,414,410	4,855,851
2016	0	0	4,414,410	4,855,851
2017	0	0	4,414,410	4,855,851
2018	0	0	4,414,410	4,855,851
2019	0	0	4,414,410	4,855,851
2020	0	0	4,414,410	4,855,851
2021	0	0	4,414,410	4,855,851
2022	0	0	4,414,410	4,855,851
2023	0	0	4,414,410	4,855,851
2024	0	0	4,414,410	4,855,851
2025	0	0	4,414,410	4,855,851
2026	0	0	4,414,410	4,855,851
2027	0	0	4,414,410	4,855,851
2028	0	0	4,414,410	4,855,851
2029	0	0	4,414,410	4,855,851
2030	0	0	4,414,410	4,855,851
2031	0	0	4,414,410	4,855,851
2032	0	0	4,414,410	4,855,851
2033	0	0	4,414,410	4,855,851
2034	0	0	4,414,410	4,855,851

Pollutant Parameters

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

Graphs



Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1955	0	0	0	0	0	0
1956	9.292E+02	7.441E+05	4.999E+01	2.482E+02	3.720E+05	2.500E+01
1957	1.840E+03	1.473E+06	9.900E+01	4.915E+02	7.367E+05	4.950E+01
1958	2.733E+03	2.188E+06	1.470E+02	7.300E+02	1.094E+06	7.351E+01
1959	3.608E+03	2.889E+06	1.941E+02	9.637E+02	1.445E+06	9.706E+01
1960	4.466E+03	3.576E+06	2.403E+02	1.193E+03	1.788E+06	1.201E+02
1961	5.306E+03	4.249E+06	2.855E+02	1.417E+03	2.125E+06	1.427E+02
1962	6.131E+03	4.909E+06	3.298E+02	1.638E+03	2.455E+06	1.649E+02
1963	6.938E+03	5.556E+06	3.733E+02	1.853E+03	2.778E+06	1.866E+02
1964	7.730E+03	6.190E+06	4.159E+02	2.065E+03	3.095E+06	2.080E+02
1965	8.506E+03	6.811E+06	4.577E+02	2.272E+03	3.406E+06	2.288E+02
1966	9.267E+03	7.421E+06	4.986E+02	2.475E+03	3.710E+06	2.493E+02
1967	1.001E+04	8.018E+06	5.387E+02	2.675E+03	4.009E+06	2.694E+02
1968	1.074E+04	8.603E+06	5.780E+02	2.870E+03	4.302E+06	2.890E+02
1969	1.146E+04	9.177E+06	6.166E+02	3.061E+03	4.588E+06	3.083E+02
1970	1.216E+04	9.739E+06	6.544E+02	3.249E+03	4.870E+06	3.272E+02
1971	1.285E+04	1.029E+07	6.914E+02	3.433E+03	5.145E+06	3.457E+02
1972	1.353E+04	1.083E+07	7.277E+02	3.613E+03	5.415E+06	3.639E+02
1973	1.419E+04	1.136E+07	7.633E+02	3.789E+03	5.680E+06	3.816E+02
1974	1.484E+04	1.188E+07	7.982E+02	3.963E+03	5.940E+06	3.991E+02
1975	1.547E+04	1.239E+07	8.324E+02	4.132E+03	6.194E+06	4.162E+02
1976	1.609E+04	1.289E+07	8.659E+02	4.299E+03	6.443E+06	4.329E+02
1977	1.670E+04	1.338E+07	8.987E+02	4.462E+03	6.688E+06	4.494E+02
1978	1.730E+04	1.386E+07	9.309E+02	4.622E+03	6.928E+06	4.655E+02
1979	1.789E+04	1.432E+07	9.625E+02	4.778E+03	7.162E+06	4.812E+02
1980	1.821E+04	1.459E+07	9.800E+02	4.865E+03	7.293E+06	4.900E+02
1981	1.857E+04	1.487E+07	9.990E+02	4.960E+03	7.434E+06	4.995E+02
1982	1.893E+04	1.515E+07	1.018E+03	5.055E+03	7.577E+06	5.091E+02
1983	1.930E+04	1.546E+07	1.039E+03	5.156E+03	7.729E+06	5.193E+02
1984	1.971E+04	1.579E+07	1.061E+03	5.266E+03	7.893E+06	5.303E+02
1985	2.021E+04	1.619E+07	1.088E+03	5.399E+03	8.093E+06	5.438E+02
1986	2.077E+04	1.663E+07	1.117E+03	5.548E+03	8.316E+06	5.587E+02
1987	2.129E+04	1.704E+07	1.145E+03	5.685E+03	8.522E+06	5.726E+02
1988	2.166E+04	1.735E+07	1.165E+03	5.786E+03	8.673E+06	5.827E+02
1989	2.197E+04	1.759E+07	1.182E+03	5.869E+03	8.796E+06	5.910E+02
1990	2.234E+04	1.789E+07	1.202E+03	5.967E+03	8.944E+06	6.009E+02
1991	2.256E+04	1.806E+07	1.214E+03	6.026E+03	9.032E+06	6.069E+02
1992	2.281E+04	1.826E+07	1.227E+03	6.092E+03	9.132E+06	6.135E+02
1993	2.300E+04	1.842E+07	1.237E+03	6.143E+03	9.208E+06	6.187E+02
1994	2.311E+04	1.850E+07	1.243E+03	6.172E+03	9.252E+06	6.216E+02
1995	2.290E+04	1.834E+07	1.232E+03	6.117E+03	9.169E+06	6.161E+02
1996	2.270E+04	1.818E+07	1.221E+03	6.064E+03	9.090E+06	6.107E+02
1997	2.259E+04	1.809E+07	1.216E+03	6.035E+03	9.046E+06	6.078E+02
1998	2.247E+04	1.799E+07	1.209E+03	6.002E+03	8.997E+06	6.045E+02
1999	2.226E+04	1.783E+07	1.198E+03	5.947E+03	8.914E+06	5.989E+02
2000	2.207E+04	1.768E+07	1.188E+03	5.896E+03	8.838E+06	5.938E+02
2001	2.190E+04	1.754E+07	1.178E+03	5.850E+03	8.769E+06	5.892E+02
2002	2.171E+04	1.738E+07	1.168E+03	5.798E+03	8.691E+06	5.839E+02
2003	2.147E+04	1.719E+07	1.155E+03	5.736E+03	8.597E+06	5.777E+02
2004	2.122E+04	1.699E+07	1.142E+03	5.668E+03	8.496E+06	5.709E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2005	2.097E+04	1.679E+07	1.128E+03	5.601E+03	8.395E+06	5.641E+02
2006	2.071E+04	1.658E+07	1.114E+03	5.531E+03	8.290E+06	5.570E+02
2007	2.046E+04	1.639E+07	1.101E+03	5.466E+03	8.193E+06	5.505E+02
2008	2.019E+04	1.617E+07	1.086E+03	5.393E+03	8.083E+06	5.431E+02
2009	1.991E+04	1.595E+07	1.071E+03	5.319E+03	7.973E+06	5.357E+02
2010	1.957E+04	1.567E+07	1.053E+03	5.227E+03	7.835E+06	5.264E+02
2011	1.922E+04	1.539E+07	1.034E+03	5.133E+03	7.694E+06	5.170E+02
2012	1.898E+04	1.520E+07	1.021E+03	5.071E+03	7.601E+06	5.107E+02
2013	1.861E+04	1.490E+07	1.001E+03	4.971E+03	7.451E+06	5.006E+02
2014	1.824E+04	1.461E+07	9.814E+02	4.872E+03	7.303E+06	4.907E+02
2015	1.788E+04	1.432E+07	9.620E+02	4.776E+03	7.158E+06	4.810E+02
2016	1.753E+04	1.403E+07	9.429E+02	4.681E+03	7.017E+06	4.715E+02
2017	1.718E+04	1.376E+07	9.242E+02	4.589E+03	6.878E+06	4.621E+02
2018	1.684E+04	1.348E+07	9.059E+02	4.498E+03	6.742E+06	4.530E+02
2019	1.650E+04	1.322E+07	8.880E+02	4.409E+03	6.608E+06	4.440E+02
2020	1.618E+04	1.295E+07	8.704E+02	4.321E+03	6.477E+06	4.352E+02
2021	1.586E+04	1.270E+07	8.532E+02	4.236E+03	6.349E+06	4.266E+02
2022	1.554E+04	1.245E+07	8.363E+02	4.152E+03	6.223E+06	4.181E+02
2023	1.524E+04	1.220E+07	8.197E+02	4.070E+03	6.100E+06	4.099E+02
2024	1.493E+04	1.196E+07	8.035E+02	3.989E+03	5.979E+06	4.017E+02
2025	1.464E+04	1.172E+07	7.876E+02	3.910E+03	5.861E+06	3.938E+02
2026	1.435E+04	1.149E+07	7.720E+02	3.833E+03	5.745E+06	3.860E+02
2027	1.406E+04	1.126E+07	7.567E+02	3.757E+03	5.631E+06	3.783E+02
2028	1.379E+04	1.104E+07	7.417E+02	3.682E+03	5.520E+06	3.709E+02
2029	1.351E+04	1.082E+07	7.270E+02	3.609E+03	5.410E+06	3.635E+02
2030	1.325E+04	1.061E+07	7.126E+02	3.538E+03	5.303E+06	3.563E+02
2031	1.298E+04	1.040E+07	6.985E+02	3.468E+03	5.198E+06	3.493E+02
2032	1.273E+04	1.019E+07	6.847E+02	3.399E+03	5.095E+06	3.423E+02
2033	1.247E+04	9.989E+06	6.711E+02	3.332E+03	4.994E+06	3.356E+02
2034	1.223E+04	9.791E+06	6.578E+02	3.266E+03	4.895E+06	3.289E+02
2035	1.198E+04	9.597E+06	6.448E+02	3.201E+03	4.798E+06	3.224E+02
2036	1.175E+04	9.407E+06	6.320E+02	3.138E+03	4.703E+06	3.160E+02
2037	1.151E+04	9.221E+06	6.195E+02	3.076E+03	4.610E+06	3.098E+02
2038	1.129E+04	9.038E+06	6.073E+02	3.015E+03	4.519E+06	3.036E+02
2039	1.106E+04	8.859E+06	5.952E+02	2.955E+03	4.430E+06	2.976E+02
2040	1.084E+04	8.684E+06	5.835E+02	2.897E+03	4.342E+06	2.917E+02
2041	1.063E+04	8.512E+06	5.719E+02	2.839E+03	4.256E+06	2.860E+02
2042	1.042E+04	8.343E+06	5.606E+02	2.783E+03	4.172E+06	2.803E+02
2043	1.021E+04	8.178E+06	5.495E+02	2.728E+03	4.089E+06	2.747E+02
2044	1.001E+04	8.016E+06	5.386E+02	2.674E+03	4.008E+06	2.693E+02
2045	9.812E+03	7.857E+06	5.279E+02	2.621E+03	3.929E+06	2.640E+02
2046	9.618E+03	7.702E+06	5.175E+02	2.569E+03	3.851E+06	2.587E+02
2047	9.428E+03	7.549E+06	5.072E+02	2.518E+03	3.775E+06	2.536E+02
2048	9.241E+03	7.400E+06	4.972E+02	2.468E+03	3.700E+06	2.486E+02
2049	9.058E+03	7.253E+06	4.873E+02	2.419E+03	3.627E+06	2.437E+02
2050	8.879E+03	7.110E+06	4.777E+02	2.372E+03	3.555E+06	2.388E+02
2051	8.703E+03	6.969E+06	4.682E+02	2.325E+03	3.484E+06	2.341E+02
2052	8.530E+03	6.831E+06	4.590E+02	2.279E+03	3.415E+06	2.295E+02
2053	8.362E+03	6.696E+06	4.499E+02	2.233E+03	3.348E+06	2.249E+02
2054	8.196E+03	6.563E+06	4.410E+02	2.189E+03	3.281E+06	2.205E+02
2055	8.034E+03	6.433E+06	4.322E+02	2.146E+03	3.217E+06	2.161E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2056	7.875E+03	6.306E+06	4.237E+02	2.103E+03	3.153E+06	2.118E+02
2057	7.719E+03	6.181E+06	4.153E+02	2.062E+03	3.090E+06	2.076E+02
2058	7.566E+03	6.058E+06	4.071E+02	2.021E+03	3.029E+06	2.035E+02
2059	7.416E+03	5.938E+06	3.990E+02	1.981E+03	2.969E+06	1.995E+02
2060	7.269E+03	5.821E+06	3.911E+02	1.942E+03	2.910E+06	1.956E+02
2061	7.125E+03	5.706E+06	3.834E+02	1.903E+03	2.853E+06	1.917E+02
2062	6.984E+03	5.593E+06	3.758E+02	1.866E+03	2.796E+06	1.879E+02
2063	6.846E+03	5.482E+06	3.683E+02	1.829E+03	2.741E+06	1.842E+02
2064	6.710E+03	5.373E+06	3.610E+02	1.792E+03	2.687E+06	1.805E+02
2065	6.577E+03	5.267E+06	3.539E+02	1.757E+03	2.633E+06	1.769E+02
2066	6.447E+03	5.163E+06	3.469E+02	1.722E+03	2.581E+06	1.734E+02
2067	6.320E+03	5.060E+06	3.400E+02	1.688E+03	2.530E+06	1.700E+02
2068	6.194E+03	4.960E+06	3.333E+02	1.655E+03	2.480E+06	1.666E+02
2069	6.072E+03	4.862E+06	3.267E+02	1.622E+03	2.431E+06	1.633E+02
2070	5.952E+03	4.766E+06	3.202E+02	1.590E+03	2.383E+06	1.601E+02
2071	5.834E+03	4.671E+06	3.139E+02	1.558E+03	2.336E+06	1.569E+02
2072	5.718E+03	4.579E+06	3.077E+02	1.527E+03	2.289E+06	1.538E+02
2073	5.605E+03	4.488E+06	3.016E+02	1.497E+03	2.244E+06	1.508E+02
2074	5.494E+03	4.399E+06	2.956E+02	1.467E+03	2.200E+06	1.478E+02
2075	5.385E+03	4.312E+06	2.897E+02	1.438E+03	2.156E+06	1.449E+02
2076	5.279E+03	4.227E+06	2.840E+02	1.410E+03	2.113E+06	1.420E+02
2077	5.174E+03	4.143E+06	2.784E+02	1.382E+03	2.072E+06	1.392E+02
2078	5.072E+03	4.061E+06	2.729E+02	1.355E+03	2.031E+06	1.364E+02
2079	4.971E+03	3.981E+06	2.675E+02	1.328E+03	1.990E+06	1.337E+02
2080	4.873E+03	3.902E+06	2.622E+02	1.302E+03	1.951E+06	1.311E+02
2081	4.776E+03	3.825E+06	2.570E+02	1.276E+03	1.912E+06	1.285E+02
2082	4.682E+03	3.749E+06	2.519E+02	1.251E+03	1.874E+06	1.259E+02
2083	4.589E+03	3.675E+06	2.469E+02	1.226E+03	1.837E+06	1.234E+02
2084	4.498E+03	3.602E+06	2.420E+02	1.201E+03	1.801E+06	1.210E+02
2085	4.409E+03	3.531E+06	2.372E+02	1.178E+03	1.765E+06	1.186E+02
2086	4.322E+03	3.461E+06	2.325E+02	1.154E+03	1.730E+06	1.163E+02
2087	4.236E+03	3.392E+06	2.279E+02	1.132E+03	1.696E+06	1.140E+02
2088	4.152E+03	3.325E+06	2.234E+02	1.109E+03	1.662E+06	1.117E+02
2089	4.070E+03	3.259E+06	2.190E+02	1.087E+03	1.630E+06	1.095E+02
2090	3.989E+03	3.195E+06	2.146E+02	1.066E+03	1.597E+06	1.073E+02
2091	3.910E+03	3.131E+06	2.104E+02	1.045E+03	1.566E+06	1.052E+02
2092	3.833E+03	3.069E+06	2.062E+02	1.024E+03	1.535E+06	1.031E+02
2093	3.757E+03	3.009E+06	2.021E+02	1.004E+03	1.504E+06	1.011E+02
2094	3.683E+03	2.949E+06	1.981E+02	9.837E+02	1.474E+06	9.907E+01
2095	3.610E+03	2.891E+06	1.942E+02	9.642E+02	1.445E+06	9.711E+01

Results (Continued)

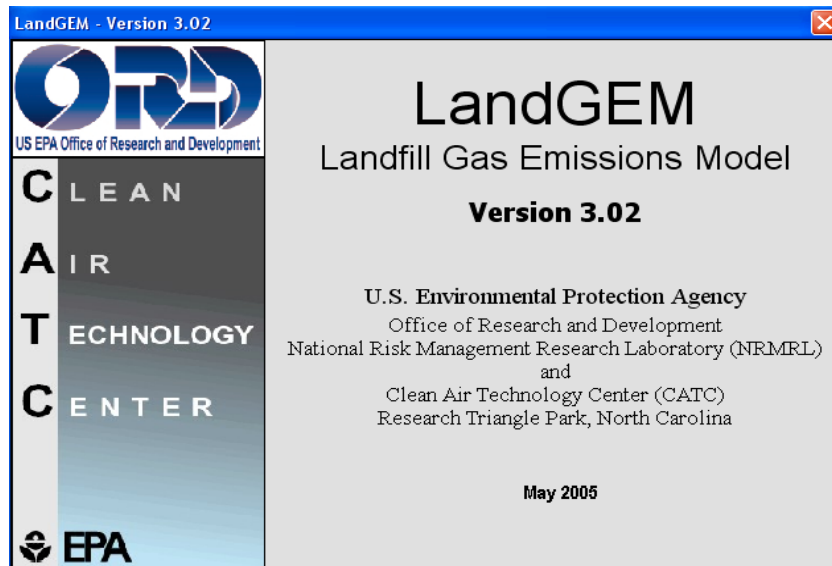
Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1955	0	0	0	0	0	0
1956	6.810E+02	3.720E+05	2.500E+01	2.192E-01	6.114E+01	4.108E-03
1957	1.349E+03	7.367E+05	4.950E+01	4.340E-01	1.211E+02	8.135E-03
1958	2.003E+03	1.094E+06	7.351E+01	6.445E-01	1.798E+02	1.208E-02
1959	2.644E+03	1.445E+06	9.706E+01	8.509E-01	2.374E+02	1.595E-02
1960	3.273E+03	1.788E+06	1.201E+02	1.053E+00	2.938E+02	1.974E-02
1961	3.889E+03	2.125E+06	1.427E+02	1.252E+00	3.491E+02	2.346E-02
1962	4.493E+03	2.455E+06	1.649E+02	1.446E+00	4.034E+02	2.710E-02
1963	5.085E+03	2.778E+06	1.866E+02	1.636E+00	4.565E+02	3.067E-02
1964	5.665E+03	3.095E+06	2.080E+02	1.823E+00	5.086E+02	3.417E-02
1965	6.234E+03	3.406E+06	2.288E+02	2.006E+00	5.597E+02	3.761E-02
1966	6.792E+03	3.710E+06	2.493E+02	2.186E+00	6.098E+02	4.097E-02
1967	7.338E+03	4.009E+06	2.694E+02	2.362E+00	6.588E+02	4.427E-02
1968	7.874E+03	4.302E+06	2.890E+02	2.534E+00	7.069E+02	4.750E-02
1969	8.399E+03	4.588E+06	3.083E+02	2.703E+00	7.541E+02	5.066E-02
1970	8.914E+03	4.870E+06	3.272E+02	2.869E+00	8.003E+02	5.377E-02
1971	9.418E+03	5.145E+06	3.457E+02	3.031E+00	8.456E+02	5.681E-02
1972	9.913E+03	5.415E+06	3.639E+02	3.190E+00	8.900E+02	5.980E-02
1973	1.040E+04	5.680E+06	3.816E+02	3.346E+00	9.335E+02	6.272E-02
1974	1.087E+04	5.940E+06	3.991E+02	3.499E+00	9.761E+02	6.559E-02
1975	1.134E+04	6.194E+06	4.162E+02	3.649E+00	1.018E+03	6.839E-02
1976	1.179E+04	6.443E+06	4.329E+02	3.796E+00	1.059E+03	7.115E-02
1977	1.224E+04	6.688E+06	4.494E+02	3.940E+00	1.099E+03	7.385E-02
1978	1.268E+04	6.928E+06	4.655E+02	4.081E+00	1.138E+03	7.649E-02
1979	1.311E+04	7.162E+06	4.812E+02	4.219E+00	1.177E+03	7.909E-02
1980	1.335E+04	7.293E+06	4.900E+02	4.296E+00	1.198E+03	8.053E-02
1981	1.361E+04	7.434E+06	4.995E+02	4.379E+00	1.222E+03	8.209E-02
1982	1.387E+04	7.577E+06	5.091E+02	4.464E+00	1.245E+03	8.367E-02
1983	1.415E+04	7.729E+06	5.193E+02	4.553E+00	1.270E+03	8.534E-02
1984	1.445E+04	7.893E+06	5.303E+02	4.649E+00	1.297E+03	8.715E-02
1985	1.481E+04	8.093E+06	5.438E+02	4.767E+00	1.330E+03	8.936E-02
1986	1.522E+04	8.316E+06	5.587E+02	4.899E+00	1.367E+03	9.182E-02
1987	1.560E+04	8.522E+06	5.726E+02	5.020E+00	1.401E+03	9.410E-02
1988	1.588E+04	8.673E+06	5.827E+02	5.109E+00	1.425E+03	9.576E-02
1989	1.610E+04	8.796E+06	5.910E+02	5.182E+00	1.446E+03	9.713E-02
1990	1.637E+04	8.944E+06	6.009E+02	5.268E+00	1.470E+03	9.876E-02
1991	1.653E+04	9.032E+06	6.069E+02	5.321E+00	1.484E+03	9.973E-02
1992	1.672E+04	9.132E+06	6.135E+02	5.379E+00	1.501E+03	1.008E-01
1993	1.685E+04	9.208E+06	6.187E+02	5.424E+00	1.513E+03	1.017E-01
1994	1.694E+04	9.252E+06	6.216E+02	5.450E+00	1.520E+03	1.022E-01
1995	1.678E+04	9.169E+06	6.161E+02	5.401E+00	1.507E+03	1.012E-01
1996	1.664E+04	9.090E+06	6.107E+02	5.354E+00	1.494E+03	1.004E-01
1997	1.656E+04	9.046E+06	6.078E+02	5.329E+00	1.487E+03	9.988E-02
1998	1.647E+04	8.997E+06	6.045E+02	5.300E+00	1.479E+03	9.935E-02
1999	1.632E+04	8.914E+06	5.989E+02	5.251E+00	1.465E+03	9.843E-02
2000	1.618E+04	8.838E+06	5.938E+02	5.206E+00	1.452E+03	9.759E-02
2001	1.605E+04	8.769E+06	5.892E+02	5.166E+00	1.441E+03	9.683E-02
2002	1.591E+04	8.691E+06	5.839E+02	5.119E+00	1.428E+03	9.596E-02
2003	1.574E+04	8.597E+06	5.777E+02	5.065E+00	1.413E+03	9.493E-02
2004	1.555E+04	8.496E+06	5.709E+02	5.005E+00	1.396E+03	9.382E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2005	1.537E+04	8.395E+06	5.641E+02	4.945E+00	1.380E+03	9.270E-02
2006	1.517E+04	8.290E+06	5.570E+02	4.883E+00	1.362E+03	9.154E-02
2007	1.500E+04	8.193E+06	5.505E+02	4.826E+00	1.346E+03	9.046E-02
2008	1.480E+04	8.083E+06	5.431E+02	4.761E+00	1.328E+03	8.925E-02
2009	1.460E+04	7.973E+06	5.357E+02	4.697E+00	1.310E+03	8.804E-02
2010	1.434E+04	7.835E+06	5.264E+02	4.615E+00	1.288E+03	8.652E-02
2011	1.408E+04	7.694E+06	5.170E+02	4.533E+00	1.265E+03	8.496E-02
2012	1.391E+04	7.601E+06	5.107E+02	4.478E+00	1.249E+03	8.393E-02
2013	1.364E+04	7.451E+06	5.006E+02	4.389E+00	1.224E+03	8.227E-02
2014	1.337E+04	7.303E+06	4.907E+02	4.302E+00	1.200E+03	8.064E-02
2015	1.310E+04	7.158E+06	4.810E+02	4.217E+00	1.176E+03	7.904E-02
2016	1.284E+04	7.017E+06	4.715E+02	4.133E+00	1.153E+03	7.748E-02
2017	1.259E+04	6.878E+06	4.621E+02	4.052E+00	1.130E+03	7.594E-02
2018	1.234E+04	6.742E+06	4.530E+02	3.971E+00	1.108E+03	7.444E-02
2019	1.210E+04	6.608E+06	4.440E+02	3.893E+00	1.086E+03	7.297E-02
2020	1.186E+04	6.477E+06	4.352E+02	3.816E+00	1.064E+03	7.152E-02
2021	1.162E+04	6.349E+06	4.266E+02	3.740E+00	1.043E+03	7.011E-02
2022	1.139E+04	6.223E+06	4.181E+02	3.666E+00	1.023E+03	6.872E-02
2023	1.117E+04	6.100E+06	4.099E+02	3.593E+00	1.002E+03	6.736E-02
2024	1.095E+04	5.979E+06	4.017E+02	3.522E+00	9.826E+02	6.602E-02
2025	1.073E+04	5.861E+06	3.938E+02	3.452E+00	9.632E+02	6.472E-02
2026	1.052E+04	5.745E+06	3.860E+02	3.384E+00	9.441E+02	6.343E-02
2027	1.031E+04	5.631E+06	3.783E+02	3.317E+00	9.254E+02	6.218E-02
2028	1.010E+04	5.520E+06	3.709E+02	3.251E+00	9.071E+02	6.095E-02
2029	9.903E+03	5.410E+06	3.635E+02	3.187E+00	8.891E+02	5.974E-02
2030	9.707E+03	5.303E+06	3.563E+02	3.124E+00	8.715E+02	5.856E-02
2031	9.515E+03	5.198E+06	3.493E+02	3.062E+00	8.543E+02	5.740E-02
2032	9.327E+03	5.095E+06	3.423E+02	3.001E+00	8.373E+02	5.626E-02
2033	9.142E+03	4.994E+06	3.356E+02	2.942E+00	8.208E+02	5.515E-02
2034	8.961E+03	4.895E+06	3.289E+02	2.884E+00	8.045E+02	5.405E-02
2035	8.784E+03	4.798E+06	3.224E+02	2.827E+00	7.886E+02	5.298E-02
2036	8.610E+03	4.703E+06	3.160E+02	2.771E+00	7.730E+02	5.194E-02
2037	8.439E+03	4.610E+06	3.098E+02	2.716E+00	7.577E+02	5.091E-02
2038	8.272E+03	4.519E+06	3.036E+02	2.662E+00	7.427E+02	4.990E-02
2039	8.108E+03	4.430E+06	2.976E+02	2.609E+00	7.280E+02	4.891E-02
2040	7.948E+03	4.342E+06	2.917E+02	2.558E+00	7.135E+02	4.794E-02
2041	7.790E+03	4.256E+06	2.860E+02	2.507E+00	6.994E+02	4.699E-02
2042	7.636E+03	4.172E+06	2.803E+02	2.457E+00	6.856E+02	4.606E-02
2043	7.485E+03	4.089E+06	2.747E+02	2.409E+00	6.720E+02	4.515E-02
2044	7.337E+03	4.008E+06	2.693E+02	2.361E+00	6.587E+02	4.426E-02
2045	7.191E+03	3.929E+06	2.640E+02	2.314E+00	6.456E+02	4.338E-02
2046	7.049E+03	3.851E+06	2.587E+02	2.268E+00	6.329E+02	4.252E-02
2047	6.909E+03	3.775E+06	2.536E+02	2.224E+00	6.203E+02	4.168E-02
2048	6.773E+03	3.700E+06	2.486E+02	2.179E+00	6.080E+02	4.085E-02
2049	6.638E+03	3.627E+06	2.437E+02	2.136E+00	5.960E+02	4.004E-02
2050	6.507E+03	3.555E+06	2.388E+02	2.094E+00	5.842E+02	3.925E-02
2051	6.378E+03	3.484E+06	2.341E+02	2.053E+00	5.726E+02	3.847E-02
2052	6.252E+03	3.415E+06	2.295E+02	2.012E+00	5.613E+02	3.771E-02
2053	6.128E+03	3.348E+06	2.249E+02	1.972E+00	5.502E+02	3.697E-02
2054	6.007E+03	3.281E+06	2.205E+02	1.933E+00	5.393E+02	3.623E-02
2055	5.888E+03	3.217E+06	2.161E+02	1.895E+00	5.286E+02	3.552E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2056	5.771E+03	3.153E+06	2.118E+02	1.857E+00	5.181E+02	3.481E-02
2057	5.657E+03	3.090E+06	2.076E+02	1.820E+00	5.079E+02	3.412E-02
2058	5.545E+03	3.029E+06	2.035E+02	1.784E+00	4.978E+02	3.345E-02
2059	5.435E+03	2.969E+06	1.995E+02	1.749E+00	4.880E+02	3.279E-02
2060	5.328E+03	2.910E+06	1.956E+02	1.714E+00	4.783E+02	3.214E-02
2061	5.222E+03	2.853E+06	1.917E+02	1.680E+00	4.688E+02	3.150E-02
2062	5.119E+03	2.796E+06	1.879E+02	1.647E+00	4.595E+02	3.088E-02
2063	5.017E+03	2.741E+06	1.842E+02	1.615E+00	4.504E+02	3.027E-02
2064	4.918E+03	2.687E+06	1.805E+02	1.583E+00	4.415E+02	2.967E-02
2065	4.821E+03	2.633E+06	1.769E+02	1.551E+00	4.328E+02	2.908E-02
2066	4.725E+03	2.581E+06	1.734E+02	1.521E+00	4.242E+02	2.850E-02
2067	4.632E+03	2.530E+06	1.700E+02	1.490E+00	4.158E+02	2.794E-02
2068	4.540E+03	2.480E+06	1.666E+02	1.461E+00	4.076E+02	2.739E-02
2069	4.450E+03	2.431E+06	1.633E+02	1.432E+00	3.995E+02	2.684E-02
2070	4.362E+03	2.383E+06	1.601E+02	1.404E+00	3.916E+02	2.631E-02
2071	4.275E+03	2.336E+06	1.569E+02	1.376E+00	3.838E+02	2.579E-02
2072	4.191E+03	2.289E+06	1.538E+02	1.349E+00	3.762E+02	2.528E-02
2073	4.108E+03	2.244E+06	1.508E+02	1.322E+00	3.688E+02	2.478E-02
2074	4.026E+03	2.200E+06	1.478E+02	1.296E+00	3.615E+02	2.429E-02
2075	3.947E+03	2.156E+06	1.449E+02	1.270E+00	3.543E+02	2.381E-02
2076	3.869E+03	2.113E+06	1.420E+02	1.245E+00	3.473E+02	2.334E-02
2077	3.792E+03	2.072E+06	1.392E+02	1.220E+00	3.404E+02	2.287E-02
2078	3.717E+03	2.031E+06	1.364E+02	1.196E+00	3.337E+02	2.242E-02
2079	3.643E+03	1.990E+06	1.337E+02	1.172E+00	3.271E+02	2.198E-02
2080	3.571E+03	1.951E+06	1.311E+02	1.149E+00	3.206E+02	2.154E-02
2081	3.500E+03	1.912E+06	1.285E+02	1.126E+00	3.143E+02	2.112E-02
2082	3.431E+03	1.874E+06	1.259E+02	1.104E+00	3.080E+02	2.070E-02
2083	3.363E+03	1.837E+06	1.234E+02	1.082E+00	3.019E+02	2.029E-02
2084	3.297E+03	1.801E+06	1.210E+02	1.061E+00	2.960E+02	1.989E-02
2085	3.231E+03	1.765E+06	1.186E+02	1.040E+00	2.901E+02	1.949E-02
2086	3.167E+03	1.730E+06	1.163E+02	1.019E+00	2.844E+02	1.911E-02
2087	3.105E+03	1.696E+06	1.140E+02	9.991E-01	2.787E+02	1.873E-02
2088	3.043E+03	1.662E+06	1.117E+02	9.793E-01	2.732E+02	1.836E-02
2089	2.983E+03	1.630E+06	1.095E+02	9.599E-01	2.678E+02	1.799E-02
2090	2.924E+03	1.597E+06	1.073E+02	9.409E-01	2.625E+02	1.764E-02
2091	2.866E+03	1.566E+06	1.052E+02	9.223E-01	2.573E+02	1.729E-02
2092	2.809E+03	1.535E+06	1.031E+02	9.040E-01	2.522E+02	1.695E-02
2093	2.754E+03	1.504E+06	1.011E+02	8.861E-01	2.472E+02	1.661E-02
2094	2.699E+03	1.474E+06	9.907E+01	8.686E-01	2.423E+02	1.628E-02
2095	2.646E+03	1.445E+06	9.711E+01	8.514E-01	2.375E+02	1.596E-02



Summary Report

Landfill Name or Identifier: Palo Alto Landfill - May 2019 NMOC Data

Date: Monday, July 29, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

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

Where,

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

i = 1-year time increment

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

j = 0.1-year time increment

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

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

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

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

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

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

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	1955	
Landfill Closure Year (with 80-year limit)	2011	
Actual Closure Year (without limit)	2011	
Have Model Calculate Closure Year?	No	
Waste Design Capacity		<i>megagrams</i>

MODEL PARAMETERS

Methane Generation Rate, k	0.020	<i>year⁻¹</i>
Potential Methane Generation Capacity, L ₀	170	<i>m³/Mg</i>
NMOC Concentration	154	<i>ppmv as hexane</i>
Methane Content	50	<i>% by volume</i>

GASES / POLLUTANTS SELECTED

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

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1955	110,408	121,449	0	0
1956	110,408	121,449	110,408	121,449
1957	110,408	121,449	220,816	242,898
1958	110,408	121,449	331,225	364,347
1959	110,408	121,449	441,633	485,796
1960	110,408	121,449	552,041	607,245
1961	110,408	121,449	662,449	728,694
1962	110,408	121,449	772,857	850,143
1963	110,408	121,449	883,265	971,592
1964	110,408	121,449	993,674	1,093,041
1965	110,408	121,449	1,104,082	1,214,490
1966	110,408	121,449	1,214,490	1,335,939
1967	110,408	121,449	1,324,898	1,457,388
1968	110,408	121,449	1,435,306	1,578,837
1969	110,408	121,449	1,545,715	1,700,286
1970	110,408	121,449	1,656,123	1,821,735
1971	110,408	121,449	1,766,531	1,943,184
1972	110,408	121,449	1,876,939	2,064,633
1973	110,408	121,449	1,987,347	2,186,082
1974	110,408	121,449	2,097,755	2,307,531
1975	110,408	121,449	2,208,164	2,428,980
1976	110,408	121,449	2,318,572	2,550,429
1977	110,408	121,449	2,428,980	2,671,878
1978	110,408	121,449	2,539,388	2,793,327
1979	80,784	88,862	2,649,796	2,914,776
1980	84,809	93,290	2,730,580	3,003,638
1981	86,155	94,771	2,815,389	3,096,928
1982	89,491	98,440	2,901,545	3,191,699
1983	94,047	103,452	2,991,035	3,290,139
1984	105,866	116,453	3,085,083	3,393,591
1985	113,622	124,984	3,190,949	3,510,044
1986	110,130	121,143	3,304,571	3,635,028
1987	94,748	104,223	3,414,701	3,756,171
1988	87,713	96,484	3,509,449	3,860,394
1989	95,408	104,949	3,597,162	3,956,878
1990	78,794	86,673	3,692,570	4,061,827
1991	82,578	90,836	3,771,364	4,148,500
1992	76,309	83,940	3,853,942	4,239,336
1993	67,201	73,921	3,930,251	4,323,276
1994	29,856	32,842	3,997,452	4,397,197

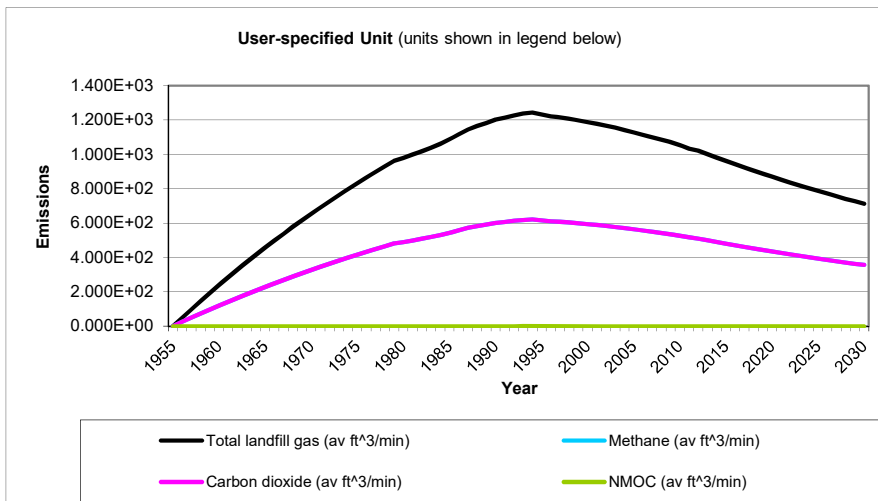
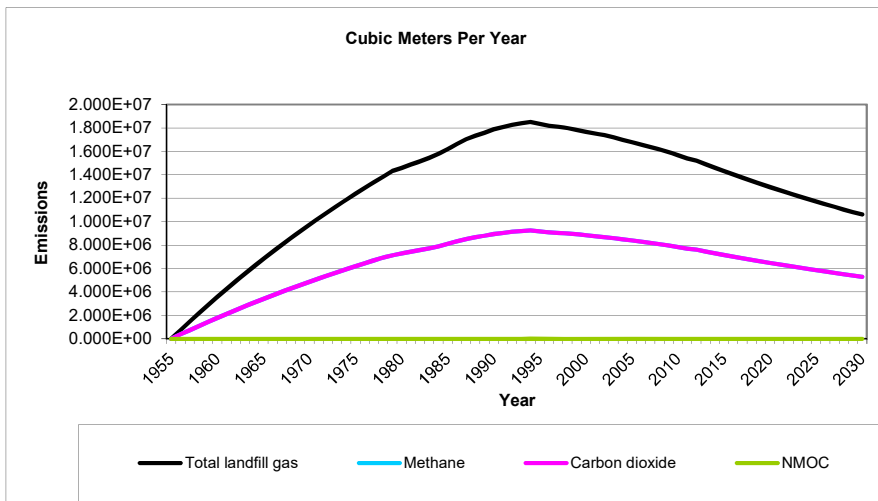
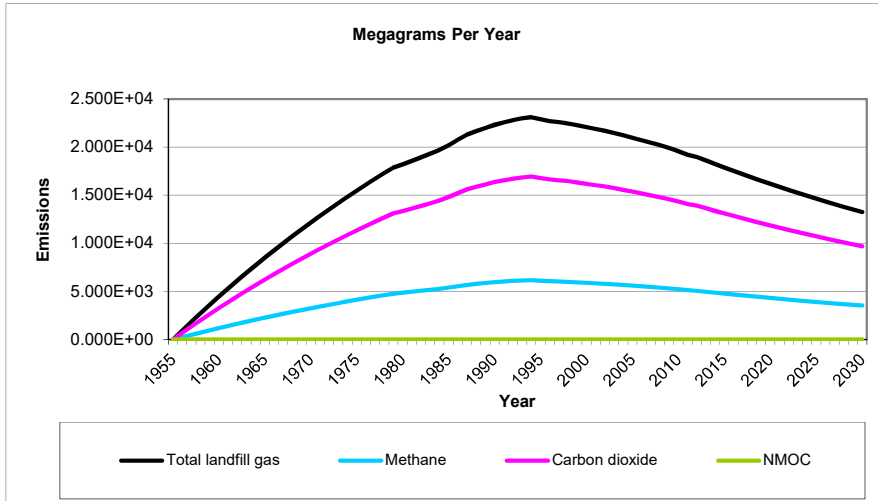
WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1995	30,203	33,223	4,027,308	4,430,039
1996	40,439	44,483	4,057,511	4,463,262
1997	38,703	42,573	4,097,950	4,507,745
1998	28,165	30,982	4,136,653	4,550,318
1999	29,949	32,944	4,164,818	4,581,300
2000	31,485	34,634	4,194,767	4,614,244
2001	28,170	30,987	4,226,253	4,648,878
2002	23,421	25,763	4,254,423	4,679,865
2003	20,502	22,552	4,277,844	4,705,628
2004	19,873	21,860	4,298,345	4,728,180
2005	18,173	19,990	4,318,218	4,750,040
2006	19,802	21,782	4,336,391	4,770,030
2007	15,601	17,161	4,356,193	4,791,812
2008	14,980	16,478	4,371,794	4,808,973
2009	5,821	6,403	4,386,774	4,825,451
2010	4,285	4,714	4,392,595	4,831,854
2011	17,530	19,283	4,396,880	4,836,568
2012	0	0	4,414,410	4,855,851
2013	0	0	4,414,410	4,855,851
2014	0	0	4,414,410	4,855,851
2015	0	0	4,414,410	4,855,851
2016	0	0	4,414,410	4,855,851
2017	0	0	4,414,410	4,855,851
2018	0	0	4,414,410	4,855,851
2019	0	0	4,414,410	4,855,851
2020	0	0	4,414,410	4,855,851
2021	0	0	4,414,410	4,855,851
2022	0	0	4,414,410	4,855,851
2023	0	0	4,414,410	4,855,851
2024	0	0	4,414,410	4,855,851
2025	0	0	4,414,410	4,855,851
2026	0	0	4,414,410	4,855,851
2027	0	0	4,414,410	4,855,851
2028	0	0	4,414,410	4,855,851
2029	0	0	4,414,410	4,855,851
2030	0	0	4,414,410	4,855,851
2031	0	0	4,414,410	4,855,851
2032	0	0	4,414,410	4,855,851
2033	0	0	4,414,410	4,855,851
2034	0	0	4,414,410	4,855,851

Pollutant Parameters

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

Graphs



Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1955	0	0	0	0	0	0
1956	9.292E+02	7.441E+05	4.999E+01	2.482E+02	3.720E+05	2.500E+01
1957	1.840E+03	1.473E+06	9.900E+01	4.915E+02	7.367E+05	4.950E+01
1958	2.733E+03	2.188E+06	1.470E+02	7.300E+02	1.094E+06	7.351E+01
1959	3.608E+03	2.889E+06	1.941E+02	9.637E+02	1.445E+06	9.706E+01
1960	4.466E+03	3.576E+06	2.403E+02	1.193E+03	1.788E+06	1.201E+02
1961	5.306E+03	4.249E+06	2.855E+02	1.417E+03	2.125E+06	1.427E+02
1962	6.131E+03	4.909E+06	3.298E+02	1.638E+03	2.455E+06	1.649E+02
1963	6.938E+03	5.556E+06	3.733E+02	1.853E+03	2.778E+06	1.866E+02
1964	7.730E+03	6.190E+06	4.159E+02	2.065E+03	3.095E+06	2.080E+02
1965	8.506E+03	6.811E+06	4.577E+02	2.272E+03	3.406E+06	2.288E+02
1966	9.267E+03	7.421E+06	4.986E+02	2.475E+03	3.710E+06	2.493E+02
1967	1.001E+04	8.018E+06	5.387E+02	2.675E+03	4.009E+06	2.694E+02
1968	1.074E+04	8.603E+06	5.780E+02	2.870E+03	4.302E+06	2.890E+02
1969	1.146E+04	9.177E+06	6.166E+02	3.061E+03	4.588E+06	3.083E+02
1970	1.216E+04	9.739E+06	6.544E+02	3.249E+03	4.870E+06	3.272E+02
1971	1.285E+04	1.029E+07	6.914E+02	3.433E+03	5.145E+06	3.457E+02
1972	1.353E+04	1.083E+07	7.277E+02	3.613E+03	5.415E+06	3.639E+02
1973	1.419E+04	1.136E+07	7.633E+02	3.789E+03	5.680E+06	3.816E+02
1974	1.484E+04	1.188E+07	7.982E+02	3.963E+03	5.940E+06	3.991E+02
1975	1.547E+04	1.239E+07	8.324E+02	4.132E+03	6.194E+06	4.162E+02
1976	1.609E+04	1.289E+07	8.659E+02	4.299E+03	6.443E+06	4.329E+02
1977	1.670E+04	1.338E+07	8.987E+02	4.462E+03	6.688E+06	4.494E+02
1978	1.730E+04	1.386E+07	9.309E+02	4.622E+03	6.928E+06	4.655E+02
1979	1.789E+04	1.432E+07	9.625E+02	4.778E+03	7.162E+06	4.812E+02
1980	1.821E+04	1.459E+07	9.800E+02	4.865E+03	7.293E+06	4.900E+02
1981	1.857E+04	1.487E+07	9.990E+02	4.960E+03	7.434E+06	4.995E+02
1982	1.893E+04	1.515E+07	1.018E+03	5.055E+03	7.577E+06	5.091E+02
1983	1.930E+04	1.546E+07	1.039E+03	5.156E+03	7.729E+06	5.193E+02
1984	1.971E+04	1.579E+07	1.061E+03	5.266E+03	7.893E+06	5.303E+02
1985	2.021E+04	1.619E+07	1.088E+03	5.399E+03	8.093E+06	5.438E+02
1986	2.077E+04	1.663E+07	1.117E+03	5.548E+03	8.316E+06	5.587E+02
1987	2.129E+04	1.704E+07	1.145E+03	5.685E+03	8.522E+06	5.726E+02
1988	2.166E+04	1.735E+07	1.165E+03	5.786E+03	8.673E+06	5.827E+02
1989	2.197E+04	1.759E+07	1.182E+03	5.869E+03	8.796E+06	5.910E+02
1990	2.234E+04	1.789E+07	1.202E+03	5.967E+03	8.944E+06	6.009E+02
1991	2.256E+04	1.806E+07	1.214E+03	6.026E+03	9.032E+06	6.069E+02
1992	2.281E+04	1.826E+07	1.227E+03	6.092E+03	9.132E+06	6.135E+02
1993	2.300E+04	1.842E+07	1.237E+03	6.143E+03	9.208E+06	6.187E+02
1994	2.311E+04	1.850E+07	1.243E+03	6.172E+03	9.252E+06	6.216E+02
1995	2.290E+04	1.834E+07	1.232E+03	6.117E+03	9.169E+06	6.161E+02
1996	2.270E+04	1.818E+07	1.221E+03	6.064E+03	9.090E+06	6.107E+02
1997	2.259E+04	1.809E+07	1.216E+03	6.035E+03	9.046E+06	6.078E+02
1998	2.247E+04	1.799E+07	1.209E+03	6.002E+03	8.997E+06	6.045E+02
1999	2.226E+04	1.783E+07	1.198E+03	5.947E+03	8.914E+06	5.989E+02
2000	2.207E+04	1.768E+07	1.188E+03	5.896E+03	8.838E+06	5.938E+02
2001	2.190E+04	1.754E+07	1.178E+03	5.850E+03	8.769E+06	5.892E+02
2002	2.171E+04	1.738E+07	1.168E+03	5.798E+03	8.691E+06	5.839E+02
2003	2.147E+04	1.719E+07	1.155E+03	5.736E+03	8.597E+06	5.777E+02
2004	2.122E+04	1.699E+07	1.142E+03	5.668E+03	8.496E+06	5.709E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2005	2.097E+04	1.679E+07	1.128E+03	5.601E+03	8.395E+06	5.641E+02
2006	2.071E+04	1.658E+07	1.114E+03	5.531E+03	8.290E+06	5.570E+02
2007	2.046E+04	1.639E+07	1.101E+03	5.466E+03	8.193E+06	5.505E+02
2008	2.019E+04	1.617E+07	1.086E+03	5.393E+03	8.083E+06	5.431E+02
2009	1.991E+04	1.595E+07	1.071E+03	5.319E+03	7.973E+06	5.357E+02
2010	1.957E+04	1.567E+07	1.053E+03	5.227E+03	7.835E+06	5.264E+02
2011	1.922E+04	1.539E+07	1.034E+03	5.133E+03	7.694E+06	5.170E+02
2012	1.898E+04	1.520E+07	1.021E+03	5.071E+03	7.601E+06	5.107E+02
2013	1.861E+04	1.490E+07	1.001E+03	4.971E+03	7.451E+06	5.006E+02
2014	1.824E+04	1.461E+07	9.814E+02	4.872E+03	7.303E+06	4.907E+02
2015	1.788E+04	1.432E+07	9.620E+02	4.776E+03	7.158E+06	4.810E+02
2016	1.753E+04	1.403E+07	9.429E+02	4.681E+03	7.017E+06	4.715E+02
2017	1.718E+04	1.376E+07	9.242E+02	4.589E+03	6.878E+06	4.621E+02
2018	1.684E+04	1.348E+07	9.059E+02	4.498E+03	6.742E+06	4.530E+02
2019	1.650E+04	1.322E+07	8.880E+02	4.409E+03	6.608E+06	4.440E+02
2020	1.618E+04	1.295E+07	8.704E+02	4.321E+03	6.477E+06	4.352E+02
2021	1.586E+04	1.270E+07	8.532E+02	4.236E+03	6.349E+06	4.266E+02
2022	1.554E+04	1.245E+07	8.363E+02	4.152E+03	6.223E+06	4.181E+02
2023	1.524E+04	1.220E+07	8.197E+02	4.070E+03	6.100E+06	4.099E+02
2024	1.493E+04	1.196E+07	8.035E+02	3.989E+03	5.979E+06	4.017E+02
2025	1.464E+04	1.172E+07	7.876E+02	3.910E+03	5.861E+06	3.938E+02
2026	1.435E+04	1.149E+07	7.720E+02	3.833E+03	5.745E+06	3.860E+02
2027	1.406E+04	1.126E+07	7.567E+02	3.757E+03	5.631E+06	3.783E+02
2028	1.379E+04	1.104E+07	7.417E+02	3.682E+03	5.520E+06	3.709E+02
2029	1.351E+04	1.082E+07	7.270E+02	3.609E+03	5.410E+06	3.635E+02
2030	1.325E+04	1.061E+07	7.126E+02	3.538E+03	5.303E+06	3.563E+02
2031	1.298E+04	1.040E+07	6.985E+02	3.468E+03	5.198E+06	3.493E+02
2032	1.273E+04	1.019E+07	6.847E+02	3.399E+03	5.095E+06	3.423E+02
2033	1.247E+04	9.989E+06	6.711E+02	3.332E+03	4.994E+06	3.356E+02
2034	1.223E+04	9.791E+06	6.578E+02	3.266E+03	4.895E+06	3.289E+02
2035	1.198E+04	9.597E+06	6.448E+02	3.201E+03	4.798E+06	3.224E+02
2036	1.175E+04	9.407E+06	6.320E+02	3.138E+03	4.703E+06	3.160E+02
2037	1.151E+04	9.221E+06	6.195E+02	3.076E+03	4.610E+06	3.098E+02
2038	1.129E+04	9.038E+06	6.073E+02	3.015E+03	4.519E+06	3.036E+02
2039	1.106E+04	8.859E+06	5.952E+02	2.955E+03	4.430E+06	2.976E+02
2040	1.084E+04	8.684E+06	5.835E+02	2.897E+03	4.342E+06	2.917E+02
2041	1.063E+04	8.512E+06	5.719E+02	2.839E+03	4.256E+06	2.860E+02
2042	1.042E+04	8.343E+06	5.606E+02	2.783E+03	4.172E+06	2.803E+02
2043	1.021E+04	8.178E+06	5.495E+02	2.728E+03	4.089E+06	2.747E+02
2044	1.001E+04	8.016E+06	5.386E+02	2.674E+03	4.008E+06	2.693E+02
2045	9.812E+03	7.857E+06	5.279E+02	2.621E+03	3.929E+06	2.640E+02
2046	9.618E+03	7.702E+06	5.175E+02	2.569E+03	3.851E+06	2.587E+02
2047	9.428E+03	7.549E+06	5.072E+02	2.518E+03	3.775E+06	2.536E+02
2048	9.241E+03	7.400E+06	4.972E+02	2.468E+03	3.700E+06	2.486E+02
2049	9.058E+03	7.253E+06	4.873E+02	2.419E+03	3.627E+06	2.437E+02
2050	8.879E+03	7.110E+06	4.777E+02	2.372E+03	3.555E+06	2.388E+02
2051	8.703E+03	6.969E+06	4.682E+02	2.325E+03	3.484E+06	2.341E+02
2052	8.530E+03	6.831E+06	4.590E+02	2.279E+03	3.415E+06	2.295E+02
2053	8.362E+03	6.696E+06	4.499E+02	2.233E+03	3.348E+06	2.249E+02
2054	8.196E+03	6.563E+06	4.410E+02	2.189E+03	3.281E+06	2.205E+02
2055	8.034E+03	6.433E+06	4.322E+02	2.146E+03	3.217E+06	2.161E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2056	7.875E+03	6.306E+06	4.237E+02	2.103E+03	3.153E+06	2.118E+02
2057	7.719E+03	6.181E+06	4.153E+02	2.062E+03	3.090E+06	2.076E+02
2058	7.566E+03	6.058E+06	4.071E+02	2.021E+03	3.029E+06	2.035E+02
2059	7.416E+03	5.938E+06	3.990E+02	1.981E+03	2.969E+06	1.995E+02
2060	7.269E+03	5.821E+06	3.911E+02	1.942E+03	2.910E+06	1.956E+02
2061	7.125E+03	5.706E+06	3.834E+02	1.903E+03	2.853E+06	1.917E+02
2062	6.984E+03	5.593E+06	3.758E+02	1.866E+03	2.796E+06	1.879E+02
2063	6.846E+03	5.482E+06	3.683E+02	1.829E+03	2.741E+06	1.842E+02
2064	6.710E+03	5.373E+06	3.610E+02	1.792E+03	2.687E+06	1.805E+02
2065	6.577E+03	5.267E+06	3.539E+02	1.757E+03	2.633E+06	1.769E+02
2066	6.447E+03	5.163E+06	3.469E+02	1.722E+03	2.581E+06	1.734E+02
2067	6.320E+03	5.060E+06	3.400E+02	1.688E+03	2.530E+06	1.700E+02
2068	6.194E+03	4.960E+06	3.333E+02	1.655E+03	2.480E+06	1.666E+02
2069	6.072E+03	4.862E+06	3.267E+02	1.622E+03	2.431E+06	1.633E+02
2070	5.952E+03	4.766E+06	3.202E+02	1.590E+03	2.383E+06	1.601E+02
2071	5.834E+03	4.671E+06	3.139E+02	1.558E+03	2.336E+06	1.569E+02
2072	5.718E+03	4.579E+06	3.077E+02	1.527E+03	2.289E+06	1.538E+02
2073	5.605E+03	4.488E+06	3.016E+02	1.497E+03	2.244E+06	1.508E+02
2074	5.494E+03	4.399E+06	2.956E+02	1.467E+03	2.200E+06	1.478E+02
2075	5.385E+03	4.312E+06	2.897E+02	1.438E+03	2.156E+06	1.449E+02
2076	5.279E+03	4.227E+06	2.840E+02	1.410E+03	2.113E+06	1.420E+02
2077	5.174E+03	4.143E+06	2.784E+02	1.382E+03	2.072E+06	1.392E+02
2078	5.072E+03	4.061E+06	2.729E+02	1.355E+03	2.031E+06	1.364E+02
2079	4.971E+03	3.981E+06	2.675E+02	1.328E+03	1.990E+06	1.337E+02
2080	4.873E+03	3.902E+06	2.622E+02	1.302E+03	1.951E+06	1.311E+02
2081	4.776E+03	3.825E+06	2.570E+02	1.276E+03	1.912E+06	1.285E+02
2082	4.682E+03	3.749E+06	2.519E+02	1.251E+03	1.874E+06	1.259E+02
2083	4.589E+03	3.675E+06	2.469E+02	1.226E+03	1.837E+06	1.234E+02
2084	4.498E+03	3.602E+06	2.420E+02	1.201E+03	1.801E+06	1.210E+02
2085	4.409E+03	3.531E+06	2.372E+02	1.178E+03	1.765E+06	1.186E+02
2086	4.322E+03	3.461E+06	2.325E+02	1.154E+03	1.730E+06	1.163E+02
2087	4.236E+03	3.392E+06	2.279E+02	1.132E+03	1.696E+06	1.140E+02
2088	4.152E+03	3.325E+06	2.234E+02	1.109E+03	1.662E+06	1.117E+02
2089	4.070E+03	3.259E+06	2.190E+02	1.087E+03	1.630E+06	1.095E+02
2090	3.989E+03	3.195E+06	2.146E+02	1.066E+03	1.597E+06	1.073E+02
2091	3.910E+03	3.131E+06	2.104E+02	1.045E+03	1.566E+06	1.052E+02
2092	3.833E+03	3.069E+06	2.062E+02	1.024E+03	1.535E+06	1.031E+02
2093	3.757E+03	3.009E+06	2.021E+02	1.004E+03	1.504E+06	1.011E+02
2094	3.683E+03	2.949E+06	1.981E+02	9.837E+02	1.474E+06	9.907E+01
2095	3.610E+03	2.891E+06	1.942E+02	9.642E+02	1.445E+06	9.711E+01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1955	0	0	0	0	0	0
1956	6.810E+02	3.720E+05	2.500E+01	4.099E-01	1.144E+02	7.684E-03
1957	1.349E+03	7.367E+05	4.950E+01	8.117E-01	2.265E+02	1.522E-02
1958	2.003E+03	1.094E+06	7.351E+01	1.206E+00	3.363E+02	2.260E-02
1959	2.644E+03	1.445E+06	9.706E+01	1.592E+00	4.440E+02	2.984E-02
1960	3.273E+03	1.788E+06	1.201E+02	1.970E+00	5.496E+02	3.693E-02
1961	3.889E+03	2.125E+06	1.427E+02	2.341E+00	6.531E+02	4.388E-02
1962	4.493E+03	2.455E+06	1.649E+02	2.705E+00	7.545E+02	5.070E-02
1963	5.085E+03	2.778E+06	1.866E+02	3.061E+00	8.539E+02	5.738E-02
1964	5.665E+03	3.095E+06	2.080E+02	3.410E+00	9.514E+02	6.392E-02
1965	6.234E+03	3.406E+06	2.288E+02	3.753E+00	1.047E+03	7.034E-02
1966	6.792E+03	3.710E+06	2.493E+02	4.088E+00	1.141E+03	7.663E-02
1967	7.338E+03	4.009E+06	2.694E+02	4.417E+00	1.232E+03	8.280E-02
1968	7.874E+03	4.302E+06	2.890E+02	4.740E+00	1.322E+03	8.884E-02
1969	8.399E+03	4.588E+06	3.083E+02	5.056E+00	1.410E+03	9.477E-02
1970	8.914E+03	4.870E+06	3.272E+02	5.366E+00	1.497E+03	1.006E-01
1971	9.418E+03	5.145E+06	3.457E+02	5.669E+00	1.582E+03	1.063E-01
1972	9.913E+03	5.415E+06	3.639E+02	5.967E+00	1.665E+03	1.118E-01
1973	1.040E+04	5.680E+06	3.816E+02	6.259E+00	1.746E+03	1.173E-01
1974	1.087E+04	5.940E+06	3.991E+02	6.545E+00	1.826E+03	1.227E-01
1975	1.134E+04	6.194E+06	4.162E+02	6.825E+00	1.904E+03	1.279E-01
1976	1.179E+04	6.443E+06	4.329E+02	7.100E+00	1.981E+03	1.331E-01
1977	1.224E+04	6.688E+06	4.494E+02	7.369E+00	2.056E+03	1.381E-01
1978	1.268E+04	6.928E+06	4.655E+02	7.633E+00	2.130E+03	1.431E-01
1979	1.311E+04	7.162E+06	4.812E+02	7.892E+00	2.202E+03	1.479E-01
1980	1.335E+04	7.293E+06	4.900E+02	8.036E+00	2.242E+03	1.506E-01
1981	1.361E+04	7.434E+06	4.995E+02	8.191E+00	2.285E+03	1.535E-01
1982	1.387E+04	7.577E+06	5.091E+02	8.349E+00	2.329E+03	1.565E-01
1983	1.415E+04	7.729E+06	5.193E+02	8.516E+00	2.376E+03	1.596E-01
1984	1.445E+04	7.893E+06	5.303E+02	8.697E+00	2.426E+03	1.630E-01
1985	1.481E+04	8.093E+06	5.438E+02	8.917E+00	2.488E+03	1.672E-01
1986	1.522E+04	8.316E+06	5.587E+02	9.163E+00	2.556E+03	1.718E-01
1987	1.560E+04	8.522E+06	5.726E+02	9.390E+00	2.620E+03	1.760E-01
1988	1.588E+04	8.673E+06	5.827E+02	9.556E+00	2.666E+03	1.791E-01
1989	1.610E+04	8.796E+06	5.910E+02	9.692E+00	2.704E+03	1.817E-01
1990	1.637E+04	8.944E+06	6.009E+02	9.855E+00	2.749E+03	1.847E-01
1991	1.653E+04	9.032E+06	6.069E+02	9.952E+00	2.776E+03	1.866E-01
1992	1.672E+04	9.132E+06	6.135E+02	1.006E+01	2.807E+03	1.886E-01
1993	1.685E+04	9.208E+06	6.187E+02	1.015E+01	2.830E+03	1.902E-01
1994	1.694E+04	9.252E+06	6.216E+02	1.019E+01	2.844E+03	1.911E-01
1995	1.678E+04	9.169E+06	6.161E+02	1.010E+01	2.819E+03	1.894E-01
1996	1.664E+04	9.090E+06	6.107E+02	1.002E+01	2.794E+03	1.877E-01
1997	1.656E+04	9.046E+06	6.078E+02	9.967E+00	2.781E+03	1.868E-01
1998	1.647E+04	8.997E+06	6.045E+02	9.914E+00	2.766E+03	1.858E-01
1999	1.632E+04	8.914E+06	5.989E+02	9.822E+00	2.740E+03	1.841E-01
2000	1.618E+04	8.838E+06	5.938E+02	9.739E+00	2.717E+03	1.825E-01
2001	1.605E+04	8.769E+06	5.892E+02	9.663E+00	2.696E+03	1.811E-01
2002	1.591E+04	8.691E+06	5.839E+02	9.576E+00	2.672E+03	1.795E-01
2003	1.574E+04	8.597E+06	5.777E+02	9.473E+00	2.643E+03	1.776E-01
2004	1.555E+04	8.496E+06	5.709E+02	9.362E+00	2.612E+03	1.755E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2005	1.537E+04	8.395E+06	5.641E+02	9.250E+00	2.581E+03	1.734E-01
2006	1.517E+04	8.290E+06	5.570E+02	9.135E+00	2.548E+03	1.712E-01
2007	1.500E+04	8.193E+06	5.505E+02	9.027E+00	2.518E+03	1.692E-01
2008	1.480E+04	8.083E+06	5.431E+02	8.906E+00	2.485E+03	1.669E-01
2009	1.460E+04	7.973E+06	5.357E+02	8.786E+00	2.451E+03	1.647E-01
2010	1.434E+04	7.835E+06	5.264E+02	8.633E+00	2.409E+03	1.618E-01
2011	1.408E+04	7.694E+06	5.170E+02	8.478E+00	2.365E+03	1.589E-01
2012	1.391E+04	7.601E+06	5.107E+02	8.375E+00	2.337E+03	1.570E-01
2013	1.364E+04	7.451E+06	5.006E+02	8.210E+00	2.290E+03	1.539E-01
2014	1.337E+04	7.303E+06	4.907E+02	8.047E+00	2.245E+03	1.508E-01
2015	1.310E+04	7.158E+06	4.810E+02	7.888E+00	2.201E+03	1.479E-01
2016	1.284E+04	7.017E+06	4.715E+02	7.731E+00	2.157E+03	1.449E-01
2017	1.259E+04	6.878E+06	4.621E+02	7.578E+00	2.114E+03	1.421E-01
2018	1.234E+04	6.742E+06	4.530E+02	7.428E+00	2.072E+03	1.392E-01
2019	1.210E+04	6.608E+06	4.440E+02	7.281E+00	2.031E+03	1.365E-01
2020	1.186E+04	6.477E+06	4.352E+02	7.137E+00	1.991E+03	1.338E-01
2021	1.162E+04	6.349E+06	4.266E+02	6.996E+00	1.952E+03	1.311E-01
2022	1.139E+04	6.223E+06	4.181E+02	6.857E+00	1.913E+03	1.285E-01
2023	1.117E+04	6.100E+06	4.099E+02	6.721E+00	1.875E+03	1.260E-01
2024	1.095E+04	5.979E+06	4.017E+02	6.588E+00	1.838E+03	1.235E-01
2025	1.073E+04	5.861E+06	3.938E+02	6.458E+00	1.802E+03	1.211E-01
2026	1.052E+04	5.745E+06	3.860E+02	6.330E+00	1.766E+03	1.187E-01
2027	1.031E+04	5.631E+06	3.783E+02	6.205E+00	1.731E+03	1.163E-01
2028	1.010E+04	5.520E+06	3.709E+02	6.082E+00	1.697E+03	1.140E-01
2029	9.903E+03	5.410E+06	3.635E+02	5.961E+00	1.663E+03	1.117E-01
2030	9.707E+03	5.303E+06	3.563E+02	5.843E+00	1.630E+03	1.095E-01
2031	9.515E+03	5.198E+06	3.493E+02	5.728E+00	1.598E+03	1.074E-01
2032	9.327E+03	5.095E+06	3.423E+02	5.614E+00	1.566E+03	1.052E-01
2033	9.142E+03	4.994E+06	3.356E+02	5.503E+00	1.535E+03	1.032E-01
2034	8.961E+03	4.895E+06	3.289E+02	5.394E+00	1.505E+03	1.011E-01
2035	8.784E+03	4.798E+06	3.224E+02	5.287E+00	1.475E+03	9.911E-02
2036	8.610E+03	4.703E+06	3.160E+02	5.183E+00	1.446E+03	9.715E-02
2037	8.439E+03	4.610E+06	3.098E+02	5.080E+00	1.417E+03	9.522E-02
2038	8.272E+03	4.519E+06	3.036E+02	4.979E+00	1.389E+03	9.334E-02
2039	8.108E+03	4.430E+06	2.976E+02	4.881E+00	1.362E+03	9.149E-02
2040	7.948E+03	4.342E+06	2.917E+02	4.784E+00	1.335E+03	8.968E-02
2041	7.790E+03	4.256E+06	2.860E+02	4.689E+00	1.308E+03	8.790E-02
2042	7.636E+03	4.172E+06	2.803E+02	4.597E+00	1.282E+03	8.616E-02
2043	7.485E+03	4.089E+06	2.747E+02	4.506E+00	1.257E+03	8.445E-02
2044	7.337E+03	4.008E+06	2.693E+02	4.416E+00	1.232E+03	8.278E-02
2045	7.191E+03	3.929E+06	2.640E+02	4.329E+00	1.208E+03	8.114E-02
2046	7.049E+03	3.851E+06	2.587E+02	4.243E+00	1.184E+03	7.954E-02
2047	6.909E+03	3.775E+06	2.536E+02	4.159E+00	1.160E+03	7.796E-02
2048	6.773E+03	3.700E+06	2.486E+02	4.077E+00	1.137E+03	7.642E-02
2049	6.638E+03	3.627E+06	2.437E+02	3.996E+00	1.115E+03	7.490E-02
2050	6.507E+03	3.555E+06	2.388E+02	3.917E+00	1.093E+03	7.342E-02
2051	6.378E+03	3.484E+06	2.341E+02	3.839E+00	1.071E+03	7.197E-02
2052	6.252E+03	3.415E+06	2.295E+02	3.763E+00	1.050E+03	7.054E-02
2053	6.128E+03	3.348E+06	2.249E+02	3.689E+00	1.029E+03	6.915E-02
2054	6.007E+03	3.281E+06	2.205E+02	3.616E+00	1.009E+03	6.778E-02
2055	5.888E+03	3.217E+06	2.161E+02	3.544E+00	9.888E+02	6.643E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2056	5.771E+03	3.153E+06	2.118E+02	3.474E+00	9.692E+02	6.512E-02
2057	5.657E+03	3.090E+06	2.076E+02	3.405E+00	9.500E+02	6.383E-02
2058	5.545E+03	3.029E+06	2.035E+02	3.338E+00	9.312E+02	6.257E-02
2059	5.435E+03	2.969E+06	1.995E+02	3.272E+00	9.127E+02	6.133E-02
2060	5.328E+03	2.910E+06	1.956E+02	3.207E+00	8.947E+02	6.011E-02
2061	5.222E+03	2.853E+06	1.917E+02	3.143E+00	8.769E+02	5.892E-02
2062	5.119E+03	2.796E+06	1.879E+02	3.081E+00	8.596E+02	5.776E-02
2063	5.017E+03	2.741E+06	1.842E+02	3.020E+00	8.426E+02	5.661E-02
2064	4.918E+03	2.687E+06	1.805E+02	2.960E+00	8.259E+02	5.549E-02
2065	4.821E+03	2.633E+06	1.769E+02	2.902E+00	8.095E+02	5.439E-02
2066	4.725E+03	2.581E+06	1.734E+02	2.844E+00	7.935E+02	5.331E-02
2067	4.632E+03	2.530E+06	1.700E+02	2.788E+00	7.778E+02	5.226E-02
2068	4.540E+03	2.480E+06	1.666E+02	2.733E+00	7.624E+02	5.122E-02
2069	4.450E+03	2.431E+06	1.633E+02	2.679E+00	7.473E+02	5.021E-02
2070	4.362E+03	2.383E+06	1.601E+02	2.626E+00	7.325E+02	4.922E-02
2071	4.275E+03	2.336E+06	1.569E+02	2.574E+00	7.180E+02	4.824E-02
2072	4.191E+03	2.289E+06	1.538E+02	2.523E+00	7.038E+02	4.729E-02
2073	4.108E+03	2.244E+06	1.508E+02	2.473E+00	6.898E+02	4.635E-02
2074	4.026E+03	2.200E+06	1.478E+02	2.424E+00	6.762E+02	4.543E-02
2075	3.947E+03	2.156E+06	1.449E+02	2.376E+00	6.628E+02	4.453E-02
2076	3.869E+03	2.113E+06	1.420E+02	2.329E+00	6.497E+02	4.365E-02
2077	3.792E+03	2.072E+06	1.392E+02	2.283E+00	6.368E+02	4.279E-02
2078	3.717E+03	2.031E+06	1.364E+02	2.237E+00	6.242E+02	4.194E-02
2079	3.643E+03	1.990E+06	1.337E+02	2.193E+00	6.118E+02	4.111E-02
2080	3.571E+03	1.951E+06	1.311E+02	2.150E+00	5.997E+02	4.029E-02
2081	3.500E+03	1.912E+06	1.285E+02	2.107E+00	5.878E+02	3.950E-02
2082	3.431E+03	1.874E+06	1.259E+02	2.065E+00	5.762E+02	3.871E-02
2083	3.363E+03	1.837E+06	1.234E+02	2.024E+00	5.648E+02	3.795E-02
2084	3.297E+03	1.801E+06	1.210E+02	1.984E+00	5.536E+02	3.720E-02
2085	3.231E+03	1.765E+06	1.186E+02	1.945E+00	5.426E+02	3.646E-02
2086	3.167E+03	1.730E+06	1.163E+02	1.907E+00	5.319E+02	3.574E-02
2087	3.105E+03	1.696E+06	1.140E+02	1.869E+00	5.214E+02	3.503E-02
2088	3.043E+03	1.662E+06	1.117E+02	1.832E+00	5.110E+02	3.434E-02
2089	2.983E+03	1.630E+06	1.095E+02	1.796E+00	5.009E+02	3.366E-02
2090	2.924E+03	1.597E+06	1.073E+02	1.760E+00	4.910E+02	3.299E-02
2091	2.866E+03	1.566E+06	1.052E+02	1.725E+00	4.813E+02	3.234E-02
2092	2.809E+03	1.535E+06	1.031E+02	1.691E+00	4.717E+02	3.170E-02
2093	2.754E+03	1.504E+06	1.011E+02	1.657E+00	4.624E+02	3.107E-02
2094	2.699E+03	1.474E+06	9.907E+01	1.625E+00	4.533E+02	3.045E-02
2095	2.646E+03	1.445E+06	9.711E+01	1.592E+00	4.443E+02	2.985E-02