TECHNICAL SUPPORT DOCUMENT (TSD)

I. General Comments:

A. Company Information

1. Pima County Department of Environmental Quality-Solid Waste Management Division Tangerine Landfill

2. Physical Address: 10220 West Tangerine Road, Marana, AZ 85653.
   Mailing Address: 5301 West Ina Road, Tucson, AZ 85743.

B. Background

The landfill is a municipal solid waste landfill that began accepting waste at the beginning of 1984. Since December 1, 2013, the landfill has been closed to the public. The facility began accepting waste at the beginning of 1984. The landfill originally occupied 80 acres. In 1998, and additional 7.9 acres was acquired as a property buffer. The landfill has two disposal units, separated by a utility easement that runs through the property, combining for a waste footprint of 55 acres. The landfill accepted municipal solid waste, green waste, construction debris, manure livestock waste, inert materials, and dead animals.

In 2005 the landfill exceeded a design capacity of 2.5 million cubic meters or 2.5 million megagrams and therefore is subject to Title V regulations as part of conformance to the NSPS for Municipal Solid Waste Landfills, promulgated under 40 CFR 60, Subparts Cc and WWW, and codified under Pima County Code (PCC) 17.16.490.

Landfills subject to Subpart WWW with non-methane organic compound (NMOC) emissions that exceed 50 Mg/yr are required to design, construct, and operate a gas collection and control system (GCCS). The air quality modeling submitted with the application predicts that NMOC emissions will peak in 2014, at 16.2 Mg/yr. This is less than 50 Mg/yr and therefore Tangerine Landfill has not triggered the requirement to install a gas collection and control system (GCCS).

C. Attainment Classification

The Landfill is located in a region that is designated as attainment for all criteria pollutants.

II. Source Description

A. Process Description

Activities conducted at the Landfill include limited landfilling operations (currently limited to wastes not defined as solid wastes per 40 CFR 60.751), leachate management, cover operations, and recycling activities. The activities are described in detail below.

1. Landfill Operations

   Municipal solid waste (MSW) and other types of solid waste, when disposed at the facility, are brought to the facility via trucks or vehicles. MSW, when disposed, is disposed in a lined disposal area, and is compacted by heavy equipment and covered at the end of each workday. Cover is imported as needed to the facility as there are no soil stockpiles on site. Landfill equipment that may be used includes compactors, dozers, scrapers, motor graders, loaders, water trucks and other on-site vehicles.

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2. Leachate Management

Leachate generated within the Landfill is collected via a leachate management system. Collected leachate is sent to a lined evaporation pond where the leachate is held while it evaporates.

3. Recycling Activities

Recyclable materials such as aluminum, scrap metal, computers, and white goods are stored in designated areas and Freon–containing appliances are stored separately from other appliances prior to removal of Freon in accordance with 40 CFR 82 regulations.

B. Operating Schedule

The Landfill is permitted to operate 24 hours a day, 7 days per week (8760 hours per year).

C. Applicability Categories

The following categories are addressed by the permit:

1. Municipal Solid Waste Landfill. (NSPS)
2. Particulate Matter Standards.
3. Odor Limiting Standards.

D. Air Pollution Control Equipment

The Landfill utilizes water trucks to control fugitive dust at the site.

III. Regulatory History

On December 23, 2011 the facility received a Notice of Violation (NOV) for failing to submit Annual Compliance Certification Reports and Semiannual Reports of Required Monitoring, and to conduct required fugitive dust monitoring. Compliance has since been achieved and the NOV action was closed on March 14, 2012.

A. Testing & Inspections

Tier 2 sampling and testing of monitoring wells was conducted in November 2012 and the results are included with this renewal application. Full compliance evaluations were conducted of the facility and air quality operating permit in December 2011 and December 2013.

B. Excess Emissions

There has been no history of Notices of Violations for any excess emissions at this site.

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IV. Emission Estimates

Pollutants emitted from the Landfill and operations include volatile organic compounds (VOCs), various hazardous air pollutants (HAPs), and particulate matter (including PM_{10} and $PM_{2.5)}$,. Particulate matter emissions are fugitive and insignificant. (i.e. from non-point and non-road engine vehicle sources). Fugitive particulate emissions are only estimated for Pima County State Implementation Plan (SIP) purposes but not for Title V. Emission calculations have been submitted, reviewed and approved. The table below is a summary of the emissions at the facility.

These values may be used for the following purposes:

(i). Ascertaining "major source" status pursuant to CAA Sec 501 (2);
(ii). Comparing source potential-to-emit with emission rates allowable by relevant standards; and
(iii). Comparing source potential-to-emit with emissions inventory and test data.

Facility-Wide Potential Emissions of Pollutants (tons/yr)											
Conventional or Criteria								**NSPS**	**HAPs**		**GHG**
$PM_{2.5}$	**PM_{10}**	**PM**	**NOx**	**VOC[1]**	**CO**	**SO_x**	**Lead**	**NMOC**	**Total**	**Single**	**CO_2e**
0.00	0.01	0.01	ND	6.80	ND	ND	ND	17.43	5.03	0.95	136,995

ND = No Data. Emissions of these pollutants are insignificant.

[1] 39% of NMOC as hexane per AP-42, Table 2.4-2
CO_2e = carbon dioxide emissions (tons/year) + 21 x methane emissions (tons/year);
[Ref. Page 4 of Permit application dated July 30, 2014]

For further details on the modeling to determine the methane generation and emissions, NMOC emissions, Tier 2 sampling data, and estimates of conventional and HAP pollutants from operations and activities at the facility please see Attachment 1.

V. Applicable Requirements

A. Regulations identified as applicable:

40 CFR, Part 60 Standards of Performance for New Stationary Sources

Subpart A	General Provisions
Subpart WWW	Standards of Performance for Municipal Solid Waste Landfills
Appendix A	Test Methods

Pima County State Implementation Plan

Rule 224	Fugitive Dust Producing Activities
Rule 315	Roads and Streets parts E, and F
Rule 316	Particulate Materials
Rule 318	Vacant Lots and Open Spaces
Rule 321	Emissions-Discharge: Opacity Limiting Standards and Applicability
Rule 343	Visibility Limiting Standard
Rule 344	Odor limiting Standard

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Pima County Code Title 17, Chapter 17.12 – Permits and Permit Revisions

Article I – General Provisions

17.12.010 Statutory Authority
17.12.020 Planning, Constructing, or Operating Without a Permit
17.12.035 Affirmative defenses for excess emissions due to malfunction, startup, and shudown
17.12.040 Reporting requirements
17.12.045 Test methods and procedures
17.12.050 Performance tests
17.12.080 Permit Display or Posting

Article II – Individual Source Permits

17.12.160 Permit application processing procedures for Class I permits
17.12.180 Permit contents for Class I permits
17.12.220 Compliance Plan - Certification
17.12.230 Facility Changes allowed without permit revisions Class I
17.12.245 Administrative permit amendments
17.12.255 Minor Permit Revision
17.12.260 Significant Permit Revision
17.12.270 Permit Reopenings – Revocation and reissuance – Termination
17.12.310 Permit shields
17.12.320 Annual emissions inventory questionnaire
17.12.350 Material permit condition

Article VI – Fees

17.12.510 Fees related to Class I permits

Pima County Code Title 17, Chapter 17.16 – Emission Limiting Standards

Article I – General Provisions

17.16.010 Local rules and standards; Applicability of more than one standard
17.16.020 Noncompliance with applicable standards
17.16.030 Odor limiting standards

Article II – Visible Emission Standards

17.16.040 Standards and applicability (includes NESHAP)
17.16.050 Visibility limiting standard

Article III – Emissions from Existing and New Nonpoint Sources

17.16.060 Fugitive dust producing activities
17.16.080 Vacant lots and open spaces
17.16.090 Roads and streets
17.16.100 Particulate materials
17.16.110 Storage piles

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Article IV – New and Existing Stationary Source Performance Standards

17.16.130 Applicability
17.16.390 Municipal Solid Waste Landfills

Pima County Code Title 17, Chapter 17.20 – Emissions Source Testing and Monitoring

17.20.010 Source sampling, monitoring and testing
17.20.040 Concealment of emissions

Pima County Code Title 17, Chapter 17.24 – Emissions Source Recordkeeping and Reporting

17.24.020 Recordkeeping for compliance determination

B. Regulations which are not applicable:

PSD/NSR. PSD is not applicable because emissions at the facility are less than 250 TPY. Non-attainment NSR is not applicable because the facility is in an area that is classified as attainment for all pollutants.

VI. Permit Contents

A. Emission Limits/Standards:

1. Municipal Solid Waste Landfill (NSPS and NESHAP) [II.A of Part B of the permit]

   a. The Permittee is required to comply with 40 CFR 60 Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills" by recalculating the NMOC emission rate annually and submitting an annual emission report to the Control Officer. The procedures for calculating the emission rate are provided in the permit.

   b. If the NMOC emission rate, exceeds 50 megagrams per year, the Permittee is required to install a collection and control system in compliance with 40 CFR 60.752(b)(2).

   c. When the landfill is permanently closed, the Permittee is required to submit a closure notification to the Control Officer as provided for in 40 CFR 60.757(d).

2. Particulate matter standards

   a. Opacity limiting standards [II.B.1 of Part B of the permit]

   These are standard opacity requirements for sources operating in Pima County.

   b. Visibility limiting standards

   These visibility standards prevent the Permittee from having visible emissions go beyond the property line of the facility. The Permittee is required to control air born particulate matter at all times using reasonable measures. As long as the Permittee is using reasonable measures, the Permittee is in compliance when the wind speed exceeds twenty five miles per hour. Emissions from undisturbed land are not affected by this requirement.

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c. The Permittee is required to apply adequate amounts of water, or other effective dust suppressants until the area becomes permanently stabilized.

d. Vacant lots, open spaces, roads and streets

These generic Pima County Code dust control standards describe how the Permittee should control dust from on site activities.

e. Particulate Materials and Fugitive Dust Producing Activities

These generic Pima County Code dust control standards describe how the Permittee should control dust from on site activities which may include construction, transportation and storage of particulate matter.

f. Odor Limiting Standard

This standard requires the Permittee to control all odors from operations at the facility so as not to cause air pollution.

B. Monitoring

1. Municipal Solid Waste Landfill (NSPS)

a. This standard requires the Permittee to calculate the NMOC emission rate using the actual year-to-year solid waste acceptance rate and the equation provided by the standard.

b. After calculating the emission rate the Permittee compares the calculated NMOC mass emission rate to the standard of 50 megagrams per year. If the NMOC emission rate calculated is less than 50 megagrams per year, then the Permittee is required to submit an annual emission rate report with the recalculated NMOC mass emission rate. If the calculated NMOC emission rate is equal to or greater than 50 megagrams per year, then the Permittee is required to install a gas collection system. The Permittee may determine a site-specific NMOC concentration and recalculate the NMOC emission rate. If this rate is still equal to or greater than 50 megagrams per year then the Permittee will install the gas collection system required above.

2 Particulate Matter

The Permittee is required to conduct a survey of any visible emissions from sources of fugitive dust. If the emissions appear to exceed 20% the Permittee is required to conduct a Method 9 observation. If the Method 9 results show that the visible emissions exceed 20% then the Permittee shall take immediate action to reduce the opacity below 20%.

C. Recordkeeping:

1. Municipal Solid Waste Landfill (NSPS)

The Permittee is required to keep readily accessible on site records of all required monitoring for at least 5 years. Keeping these records verifies that the Permittee is recalculating the design capacity of the landfill.

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2. The Permittee is required to keep records of the following: the name of the observer, the date the observations were made, fugitive dust sources observed, results of the observations, and any corrective actions taken. These records verify that the Permittee is monitoring all fugitive dust sources and showing compliance with emission limits and standards. Pima County Code requires all records to be kept on site or readily accessible for a period of five years.

D. Reporting:

1. Municipal Solid Waste Landfill (NSPS)

   a. The Permittee submitted the initial design capacity report as required by federal regulations.

   b. The Permittee is required to submit an NMOC emission rate report to the Control Officer annually. The Control Officer may request such additional information as may be necessary to verify the reported NMOC emission rate. The NMOC emission rate report shall include all the data, calculations, sample reports and measurements used to estimate the annual emissions.

2. Facility Wide Requirements

   These are standard Pima County Code permit reporting requirements for Title V sources which include excess emissions and deviations, compliance certifications, semi annual reports of required monitoring and emissions inventory reports. Reports are to be submitted as required by the permit and Pima County Code.

E. Testing

1. The only required testing is EPA Method 9, visible emissions observation test. This test is to be used as required by the permit when emissions appear to exceed 20% opacity.

2. If any other tests are necessary or required by the Control Officer, a written request with the appropriate test methods shall be made to the Control Officer or Permittee respectively.

VII. Previous Permit Conditions

A. Condition I.C and other references in the permit were changed to remove NESHAP Subpart AAAA applicability to the landfill. The landfill has not triggered the greater than 50 Mg/yr NMOC emission rate requirements. If the the source exceeds the NSPS emission limit the source will be required to submit a significant permit revision to incorporate the standards, monitoring and recordkeeping requirements for the gas collection and control device and the applicability of NESHAP Subpart AAAA.

B. Municipal Solid Waste Landfill (NSPS): Condition II.A.3 was changed to be a material permit condition in accordance with PCC 17.12.320.

C. Fugitive Dust Producing Activities: Condition II.B.8 was changed to add applicability to the Permittee or its subcontractors.

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ATTACHMENT 1

PTE Table and Appendices
A, B, C, D, I, J, and K as
Provided in the permit application dated November 5, 2014.

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20.0 Potential to Emit (PTE)

Table 20-1 Potential to Emit Summary

Potential to Emit Summary										
Emission Source	PM	PM_{10}	CO	NO_X	SO_2	VOC	NMOC	H_2S	HAP	CO_2
	TPY	TPY	TPY	TPY	TPY	TPY		TPY	TPY	TPY
Landfill Waste (Fugitive)[2]						6.80	17.43		5.03	11,772
Cover (Fugitive)	3.00E-03	1.98E-02								
Leachate (non-Fugitive)									1.75E-06	
Dozer (non-Fugitive)	1.48E-03	1.34E-03	1.05E-02	4.88E-02	3.23E-03	3.89E-05			7.02E-05	
Water Truck (non-Fugitive)	6.21E-04	5.65E-04	2.09E-02	9.68E-02	6.40E-03	7.71E-05			1.39E-04	
Light Vehicles (non-Fugitive)	3.38E-03	3.05E-03								
Facility Totals=	1.19E-02	2.78E-02	0	0	0	7	17	0	5	11,772
Class I Permit Thresholds[1]=	100	100	100	100	100	100	100	100	25	N/A

Notes:

1. Thresholds per Pima County Code (PCC), Title 17

Calculations for **Table 20-1** are in appendix B, C, D, I, and J.

Appendix A

Tier 2 Lab Results

Tangerine Landfill 2012 Tier 2 Lab Sampling Results

					Field Analysis				Combined Lab Analysis				
	Probe IDs	Coordinates	Date	Time	CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	TGNMNEO (ppmv as methane)	CH_4 (%)	CO_2 (%)	O_2 (%)	N_2 (%)
p													
Sample #7046	Probe 33	N 32° 25.418' W -111° 11.119'	11/26/2012	1001	49.7	46.2	1.1	3.0	3220	51.8	42.7	0.202	4.92
	Probe 34	N 32° 25.415' W -111° 11.103'	11/26/2012	1015	52.3	45.8	1.1	0.8					
Sample #6620	Probe 35	N 32° 25.397' W -111° 11.099'	11/26/2012	1114	48.3	43.4	1.3	6.9	1810	45.2	39.1	0.228	14.7
	Probe 36	N 32° 25.388' W -111° 11.094'	11/26/2012	1128	44.5	40.9	1.3	13.3					
Sample #7057	Probe 37	N 32° 25.406' W -111° 11.073'	11/26/2012	1207	44.0	38.9	2.0	15.0	1240	32.7	26.0	6.12	34.6
	Probe 38	N 32° 25.409' W -111° 11.062'	11/26/2012	1225	46.3	40.2	1.5	12.0					
Sample #7038	Probe 39	N 32° 25.387' W -111° 11.066'	11/26/2012	1355	38.0	43.3	1.1	17.6	1430	42.2	40.3	0.235	16.5
	Probe 40	N 32° 25.376' W -111° 11.067'	11/26/2012	1407	42.7	44.8	1.0	11.4					
Sample #7041	Probe 41	N 32° 25.359' W -111° 11.065'	11/26/2012	1425	40.0	43.3	1.7	15.0	1760	43.7	41.1	0.199	14.5
	Probe 42	N 32° 25.347' W -111° 11.055'	11/26/2012	1439	45.3	43.9	2.2	8.8					
Sample #7054	Probe 44	N 32° 25.372' W -111° 11.032'	11/26/2012	1507	40.9	41.9	1.5	16.2	2230	44.2	40.4	0.274	14.6
	Probe 43	N 32° 25.386' W -111° 11.035'	11/26/2012	1520	43.0	43.1	1.8	12.1					
Sample #7050	Probe 45	N 32° 25.340' W -111° 11.018'	11/27/2012	0815	41.1	42.4	1.8	14.6	1710	44.5	34.0	1.123	19.7
	Probe 46	N 32° 25.331' W -111° 11.022'	11/27/2012	0838	47.6	42.5	2.1	7.8					
Sample #7056	Probe 31	N 32° 25.314' W -111° 11.163'	11/27/2012	0937	45.7	36.6	2.0	15.7	1170	51.1	39.5	0.234	8.8
	Probe 32	N 32° 25.300' W -111° 11.173'	11/27/2012	0959	44.3	37.9	3.1	14.8					
Sample #7048	Probe 30	N 32° 25.288' W -111° 11.224'	11/27/2012	1024	53.9	41.3	1.7	3.1	1730	48.9	33.6	0.457	16.4
	Probe 29	N 32° 25.289' W -111° 11.243'	11/27/2012	1044	50.0	43.9	0.2	5.6					
Sample #7051	Probe 24	N 32° 25.298' W -111° 11.296'	11/27/2012	1104	56.7	43.0	0.2	0.1	1280	57.6	39.9	0.142	1.92
	Probe 23	N 32° 25.295' W -111° 11.306'	11/27/2012	1121	56.3	43.4	0.1	0.1					
Sample #7037	Probe 16	N 32° 25.296' W -111° 11.349'	11/27/2012	1149	57.7	42.4	0.2	0.1	1010	56.7	33.2	0.187	9.49
	Probe 15	N 32° 25.293' W -111° 11.365'	11/27/2012	1205	57.3	42.4	0.2	0.1					
Sample #7053	Probe 7	N 32° 25.291' W -111° 11.416'	11/27/2012	1338	57.4	42.4	0.1	0.2	910	51.5	31.1	0.152	16.7
	Probe 8	N 32° 25.294' W -111° 11.430'	11/27/2012	1351	57.9	41.6	0.4	0.1					

Tangerine Landfill 2012 Tier 2 Lab Sampling Results

	Probe IDs	Coordinates	Date	Time	Field Analysis CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	Combined Lab Analysis TGNMNEO (ppmv as methane)	CH_4 (%)	CO_2 (%)	O_2 (%)	N_2 (%)
p													
Sample #5955	Probe 6	N 32° 25.326' W -111° 11.422'	11/27/2012	1405	59.9	39.8	0.2	0.1	771	55.5	31.2	0.107	12.9
	Probe 5	N 32° 25.340' W -111° 11.426'	11/27/2012	1417	57.1	42.7	0.1	0.1					
Sample #5946	Probe 4	N 32° 25.365' W -111° 11.424'	11/27/2012	1428	55.4	44.4	0.0	0.1	803	52.6	38.4	0.0849	8.36
	Probe 3	N 32° 25.381' W -111° 11.423'	11/27/2012	1438	56.2	43.5	0.1	0.2					
Sample #5954	Probe 1	N 32° 25.413' W -111° 11.427'	11/27/2012	1452	56.1	43.7	0.2	0.1	1800	52.3	38.0	0.108	9.07
	Probe 2	N 32° 25.415' W -111° 11.414'	11/27/2012	1505	55.4	44.3	0.2	0.1					
Sample #5942	Probe 9	N 32° 25.418' W -111° 11.380'	11/28/2012	0815	55.9	43.8	0.1	0.2	2740	57.2	39.1	0.107	3.14
	Probe 10	N 32° 25.420' W -111° 11.360'	11/28/2012	0830	57.5	42.1	0.3	0.1					
Sample #6624	Probe 17	N 32° 25.426' W -111° 11.326'	11/28/2012	0851	57.8	41.9	0.2	0.1	2800	57.4	32.4	0.143	9.46
	Probe 18	N 32° 25.429' W -111° 11.307'	11/28/2012	0904	58.8	40.6	0.5	0.2					
Sample #5916	Probe 14	N 32° 25.326' W -111° 11.381'	11/28/2012	0924	58.1	41.5	0.3	0.1	1140	55.8	32.0	0.178	11.7
	Probe 13	N 32° 25.337' W -111° 11.375'	11/28/2012	0935	57.9	40.6	0.5	0.8					
Sample #5943	Probe 12	N 32° 25.373' W -111° 11.369'	11/28/2012	0955	62.1	37.5	0.2	0.2	647	57.1	30.5	0.156	11.6
	Probe 11	N 32° 25.369' W -111° 11.354'	11/28/2012	1006	59.0	40.7	0.2	0.1					
Sample #6626	Probe 19	N 32° 25.371' W -111° 11.299'	11/28/2012	1024	55.0	38.3	0.2	6.5	667	46.5	28.0	2.27	22.8
	Probe 20	N 32° 25.353' W -111° 11.294'	11/28/2012	1035	60.1	39.5	0.3	0.1					
Sample #6602	Probe 21	N 32° 25.327' W -111° 11.327'	11/28/2012	1052	56.1	43.5	0.2	0.1	908	58.7	38.4	0.0859	2.29
	Probe 22	N 32° 25.329' W -111° 11.308'	11/28/2012	1104	57.7	42.0	0.2	0.1					
Sample #6612	Probe 25	N 32° 25.367' W -111° 11.248'	11/28/2012	1135	52.4	45.8	0.2	1.4	3710	42.8	40.5	0.224	15.9
	Probe 26	N 32° 25.384' W -111° 11.257'	11/28/2012	1152	38.6	48.1	0.0	13.3					
Sample #6611	Probe 28	N 32° 25.315' W -111° 11.237'	11/28/2012	1206	50.1	49.7	0.1	0.1	2150	46.3	40.2	0.177	12.9
	Probe 27	N 32° 25.320' W -111° 11.228'	11/28/2012	1222	46.2	47.4	0.2	6.2					
								Average	1636	50.1	36.1	0.6	12.7
								Min	647	32.7	26.0	0.1	1.9
								Max	3710	58.7	42.7	6.1	34.6

Appendix B

Landfill Gas Generation Calculations

Anticipated Methane Emissions for Tangerine Landfill

Methane Gas Generation
From Land GEM Ver 3.02 based on 40
CFR §60.755(1)(ii):

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_0 \left(\frac{M_i}{10}\right) e^{-kt_{ij}}$$

Where, G_{CH4} = Modeled methane generation rate in reporting year T (metric tons CH_4).

x = Year in which waste was disposed.

S =	1984	Start year of calculation. Use the year 1960 or the opening year of the landfill, whichever is more recent.
T =	2013	Year for which emissions are calculated.
t_i=	T-x	Age of section i, yr.
L_0=	170	Methane generation potential, m3/Mg.

M_X = Quantity of waste disposed in the landfill in year "x" from measurement data, tipping fee receipts, or other company records (wet weight metric tons, as received).

k = Rate constant from Table HH–1 to this subpart (yr^{-1}) - most applicable k value for the majority of the past 10 years (or operating life, whichever is shorter).

k = 0.02 (e.g., k for landfill location with precipition less than 20 inches per year).

Q_{CH4} = modeled methane generation rate in reporting year T, metric tons

TANGERINE LANDFILL - MODELED METHANE GENERATION RATE CALCULATIONS:

T	X	n	Wx	Wx	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	e(-k(n+j))	Q_{CH4}
		(T-X-1)			j	j	j	j	j	j	j	j	j	j	
(year)	(year)		(short tons)	(metric tons)	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	(m^3/year)
2013	1984	28	42,266	38,343	0.5712	0.5701	0.5689	0.5678	0.5667	0.5655	0.5644	0.5633	0.5621	0.5610	73,801
2013	1985	27	88,988	80,729	0.5827	0.5816	0.5804	0.5793	0.5781	0.5769	0.5758	0.5746	0.5735	0.5724	158,521
2013	1986	26	93,676	84,981	0.5945	0.5933	0.5921	0.5910	0.5898	0.5886	0.5874	0.5863	0.5851	0.5839	170,243
2013	1987	25	98,594	89,443	0.6065	0.6053	0.6041	0.6029	0.6017	0.6005	0.5993	0.5981	0.5969	0.5957	182,800
2013	1988	24	103,786	94,153	0.6188	0.6175	0.6163	0.6151	0.6139	0.6126	0.6114	0.6102	0.6090	0.6077	196,314
2013	1989	23	109,250	99,110	0.6313	0.6300	0.6288	0.6275	0.6263	0.6250	0.6238	0.6225	0.6213	0.6200	210,824
2013	1990	22	115,008	104,334	0.6440	0.6427	0.6415	0.6402	0.6389	0.6376	0.6364	0.6351	0.6338	0.6325	226,418
2013	1991	21	121,056	109,820	0.6570	0.6557	0.6544	0.6531	0.6518	0.6505	0.6492	0.6479	0.6466	0.6453	243,140
2013	1992	20	117,830	106,894	0.6703	0.6690	0.6676	0.6663	0.6650	0.6637	0.6623	0.6610	0.6597	0.6584	241,441
2013	1993	19	143,972	130,609	0.6839	0.6825	0.6811	0.6798	0.6784	0.6771	0.6757	0.6744	0.6730	0.6717	300,967
2013	1994	18	148,600	134,808	0.6977	0.6963	0.6949	0.6935	0.6921	0.6907	0.6894	0.6880	0.6866	0.6852	316,917
2013	1995	17	186,960	169,607	0.7118	0.7103	0.7089	0.7075	0.7061	0.7047	0.7033	0.7019	0.7005	0.6991	406,782
2013	1996	16	186,490	169,181	0.7261	0.7247	0.7233	0.7218	0.7204	0.7189	0.7175	0.7161	0.7146	0.7132	413,956
2013	1997	15	205,140	186,100	0.7408	0.7393	0.7379	0.7364	0.7349	0.7334	0.7320	0.7305	0.7291	0.7276	464,553
2013	1998	14	74,495	67,581	0.7558	0.7543	0.7528	0.7513	0.7498	0.7483	0.7468	0.7453	0.7438	0.7423	172,107
2013	1999	13	73,883	67,026	0.7711	0.7695	0.7680	0.7664	0.7649	0.7634	0.7619	0.7603	0.7588	0.7573	174,141
2013	2000	12	93,351	84,687	0.7866	0.7851	0.7835	0.7819	0.7804	0.7788	0.7772	0.7757	0.7741	0.7726	224,472
2013	2001	11	111,955	101,564	0.8025	0.8009	0.7993	0.7977	0.7961	0.7945	0.7929	0.7914	0.7898	0.7882	274,645
2013	2002	10	128,457	116,534	0.8187	0.8171	0.8155	0.8138	0.8122	0.8106	0.8090	0.8073	0.8057	0.8041	321,493
2013	2003	9	140,323	127,299	0.8353	0.8336	0.8319	0.8303	0.8286	0.8270	0.8253	0.8237	0.8220	0.8204	358,285
2013	2004	8	166,503	151,049	0.8521	0.8504	0.8487	0.8470	0.8454	0.8437	0.8420	0.8403	0.8386	0.8369	433,719
2013	2005	7	163,270	148,116	0.8694	0.8676	0.8659	0.8642	0.8624	0.8607	0.8590	0.8573	0.8556	0.8538	433,889
2013	2006	6	165,000	149,685	0.8869	0.8851	0.8834	0.8816	0.8799	0.8781	0.8763	0.8746	0.8728	0.8711	447,344
2013	2007	5	163,000	147,871	0.9048	0.9030	0.9012	0.8994	0.8976	0.8958	0.8940	0.8923	0.8905	0.8887	450,849
2013	2008	4	162,000	146,964	0.9231	0.9213	0.9194	0.9176	0.9158	0.9139	0.9121	0.9103	0.9085	0.9066	457,135
2013	2009	3	84,900	77,020	0.9418	0.9399	0.9380	0.9361	0.9343	0.9324	0.9305	0.9287	0.9268	0.9250	244,412
2013	2010	2	40,000	36,287	0.9608	0.9589	0.9570	0.9550	0.9531	0.9512	0.9493	0.9474	0.9455	0.9436	117,479
2013	2011	1	44,630	40,488	0.9802	0.9782	0.9763	0.9743	0.9724	0.9704	0.9685	0.9666	0.9646	0.9627	133,725
2013	2012	0	49,366	44,784	1.0000	0.9980	0.9960	0.9940	0.9920	0.9900	0.9881	0.9861	0.9841	0.9822	150,904

ΣQ_{CH4} = **8,001,276**

Landfill Gas Generation Rates

Year	Waste Accepted Short Tons	Waste Accepted Mg Tons	CH_4 Generation m^3/year	LFG Generation m^3/year	NMOC Generation m^3/year	NMOC Generation tons/year
1984	42,266	38,343	0	0	0	0.00
1985	88,988	80,729	129,201	257,885	70	0.28
1986	93,676	84,981	398,665	795,738	217	0.87
1987	98,594	89,443	677,123	1,351,544	369	1.48
1988	103,786	94,153	965,102	1,926,351	525	2.10
1989	109,250	99,110	1,263,249	2,521,455	688	2.75
1990	115,008	104,334	1,572,195	3,138,114	856	3.43
1991	121,056	109,820	1,892,625	3,777,695	1,030	4.12
1992	117,830	106,894	2,225,198	4,441,512	1,211	4.85
1993	143,972	130,609	2,541,324	5,072,502	1,383	5.54
1994	148,600	134,808	2,931,102	5,850,503	1,596	6.39
1995	186,960	169,607	3,327,309	6,641,336	1,811	7.25
1996	186,490	169,181	3,832,931	7,650,562	2,086	8.35
1997	205,140	186,100	4,327,105	8,636,936	2,356	9.43
1998	74,495	67,581	4,868,503	9,717,572	2,650	10.61
1999	73,883	67,026	4,999,820	9,979,681	2,722	10.89
2000	93,351	84,687	5,126,666	10,232,866	2,791	11.17
2001	111,955	101,564	5,310,510	10,599,821	2,891	11.57
2002	128,457	116,534	5,547,584	11,073,022	3,020	12.09
2003	140,323	127,299	5,830,408	11,637,540	3,174	12.70
2004	166,503	151,049	6,143,903	12,263,280	3,344	13.39
2005	163,270	148,116	6,531,219	13,036,366	3,555	14.23
2006	165,000	149,685	6,900,983	13,774,418	3,757	15.04
2007	163,000	147,871	7,268,714	14,508,411	3,957	15.84
2008	162,000	146,964	7,623,049	15,215,667	4,150	16.61
2009	84,900	77,020	7,967,311	15,902,817	4,337	17.36
2010	40,000	36,287	8,069,074	16,105,936	4,392	17.58
2011	44,630	40,488	8,031,569	16,031,076	4,372	17.50
2012	49,366	44,784	8,008,960	15,985,949	4,360	17.45
2013	121,697	110,402	8,001,276	15,970,612	4,356	17.43
2014	0	0	8,214,849	16,396,905	4,472	17.90
2015	0	0	8,052,184	16,072,224	4,383	17.55
2016	0	0	7,892,740	15,753,973	4,296	17.20
2017	0	0	7,736,454	15,442,023	4,211	16.86
2018	0	0	7,583,262	15,136,251	4,128	16.52
2019	0	0	7,433,103	14,836,533	4,046	16.20
2020	0	0	7,285,918	14,542,750	3,966	15.88
Totals	3,544,446	3,215,467	186,511,189	372,277,823	101,529	406

Methane generation potential, m3/Mg. =	170
Rate constant from Table HH–1 to this subpart (yr^{-1}) =	0.02
Methane Concentration =	50.10%
NMOC Concentration (ppmv as Hexane) =	273
NMOC Molecular Weight =	86.2

Landfill Gas Generation Rates

Example Calculations

(CH_4 Generation)

See "Anticipated Methane Emissions for Tangerine Landfill" for example calculations

(LFG Generation)

(LFG Generation)= (CH4 Generation)/(Methane Concentration/100)= (8,001,276 m3/year)/(50.1%/100)= 15,970,612 m3/year

(NMOC Generation)(m3/years)

(NMOC Generation)(m3/years)= (LFG Generation) * (NMOC Concentration/10^6)= (15,970,612 m3/year) * (273/10^6)= 4,356 m3/year

(NMOC Generation)(tons/years)

(NMOC Generation)(tons/years)= ((Standard Pressure) * (Total Landfill Gas Volume) * (NMOC Molecular Weight) * (NMOC Concentration/10^6))/((Gas Constant)*(Standard Temperature))*(1Mg/1000kg)*(1 Short Ton/0.909099512610609 Mg)= (101325 Pa * 15,970,612 m3/year * 86.2 kg/kgmol * 273 ppmv/10^6)/(8314 J/(kgmole*K) * 288.7 K)*(1Mg/1000kg)*(1 Short Ton/0.909099512610609 Mg)=17.43 Tons/year

(Mg to Tons)

(Mg to Tons) = 1 Short Ton/0.909099512610609 Mg

Total Constituent Table

Constituent	Molar Mass	Concentration[5]	Volume of Emissions[4]	Mass of Emissions[4]	
		Percentage	(m^3/year)	(Mg/year)	(Tons/year)
Methane	16.05	50.10%	8,001,276	5,421	5,963
CO_2	44.01	36.07%	5,760,530	10,702	11,772
Nitrogen	28.02	12.74%	2,034,170	2,406	2,647
Oxygen	32.00	0.57%	91,614	124	136
Total Landfill Gas[1]	27.67		15,970,612	18,653	20,518
		ppmv			
NMOCs (as Hexane)	86.20	273	4,356	15.85	17.43
VOCs (as Hexane)[2]	86.20	106	1,699	6.18	6.80
Total HAPs (as Hexane)[3]	N/A	N/A	1,183	4.57	5.03

Notes:

1. Totals of Methane, Carbon Dioxide, Nitrogen, and Oxygen
2. 39% of NMOCs per AP-42 Table 2.4-2
3. Data take from Hazardous Air Pollutant Emissions
4. Estimation of emissions from the year 2013
5. From Tangerine Landfill 2012 Tier 2 Lab Sampling Results

Example Calculations

(LFG Generation)

(Total Landfill Gas)= (Methane)/(Methane Concentration/100)= (8,001,276 m3/year)/(50.1%/100)= 15,970,612 m3/year

(Methane)(m3/years)

See "Anticipated Methane Emissions for Tangerine Landfill" for example calculations

(Methane Generation)(tons/years)

(Methane)(tons/years)= ((Standard Pressure) * (Methane Volume) * (Methane Molecular Weight))/((Gas Constant)*(Standard Temperature))*(1Mg/1000kg)= (101325 Pa * 8,001,276 m3/year* 16.05 kg/kgmol)/(8314 J/(kgmole*K) * 288.7 K)*(1Mg/1000kg)=5,421 Mg/year

(NMOC Generation)(m3/years)

(NMOCs)(m3/years)= (LFG Generation) * (NMOC Concentration/10^6)= (15,970,612 m3/year) * (273/10^6)= 4,356 m3/year

(NMOC Generation)(tons/years)

(NMOCs)(tons/years)= ((Standard Pressure) * (NMOC Volume) * (NMOC Molecular Weight))/((Gas Constant)*(Standard Temperature))*(1Mg/1000kg)= (101325 Pa * 4,356 m3/year* 86.2 kg/kgmol)/(8314 J/(kgmole*K) * 288.7 K)*(1Mg/1000kg)=15.85 Mg/year

(Mg to Tons)

(Mg to Tons) = 1 Short Ton/0.909099512610609 Mg

Appendix C

Hazardous Air Pollutants Emissions Calculations

Hazardous Air Pollutant Emissions

DEFAULT CONCENTRATIONS FOR LFG CONSTITUENTS[a]					
Constituent	Molecular Weight (kg/kgmole)	Default Concentration [c] (ppmv)	Volume of Emissions (m3/year)	Mass of Emissions (Mg/year)	Mass of Emissions (Tons/years)
1,1,1-Trichloroethane (methyl chloroform) [a]	133.41	0.48	7.67	4.32E-02	4.75E-02
1,1,2,2-Tetrachloroethane [a]	167.85	1.11	17.73	1.26E-01	1.38E-01
1,1-Dichloroethane (ethylidene dichloride) [a]	98.97	2.35	37.53	1.57E-01	1.72E-01
1,1-Dichloroethene (vinylidene chloride) [a]	96.94	0.2	3.19	1.31E-02	1.44E-02
1,2-Dichloroethane (ethylene dichloride) [a]	98.96	0.41	6.55	2.74E-02	3.01E-02
1,2-Dichloropropane (propylene dichloride) [a]	112.99	0.18	2.87	1.37E-02	1.51E-02
Acrylonitrile [a]	53.06	6.33	101.09	2.26E-01	2.49E-01
Carbon disulfide [a]	76.13	0.58	9.26	2.98E-02	3.27E-02
Carbon tetrachloride [a]	153.84	0.004	0.06	4.15E-04	4.56E-04
Carbonyl sulfide [a]	60.07	0.49	7.83	1.98E-02	2.18E-02
Chlorobenzene [a]	112.56	0.25	3.99	1.90E-02	2.09E-02
Chloroethane (ethyl chloride) [a]	64.52	1.25	19.96	5.44E-02	5.98E-02
Chloroform [a]	119.39	0.03	0.48	2.41E-03	2.66E-03
Dichloromethane (methylene chloride) [a]	84.94	14.3	228.38	8.19E-01	9.01E-01
Ethylbenzene [a]	106.16	4.61	73.62	3.30E-01	3.63E-01
Hexane [a]	86.18	6.57	104.93	3.82E-01	4.20E-01
Mercury (total) [a,b]	200.61	0.000292	0.00	3.95E-05	4.34E-05
Methyl ethyl ketone [a]	72.11	7.1	113.39	3.45E-01	3.80E-01
Methyl isobutyl ketone [a]	100.16	1.9	30.34	1.28E-01	1.41E-01
Perchloroethylene (tetrachloroethylene) [a]	165.83	3.7	59.09	4.14E-01	4.55E-01
Trichloroethylene (trichloroethene) [a]	131.4	2.8	44.72	2.48E-01	2.73E-01
Vinyl chloride [a]	62.5	7.3	116.59	3.08E-01	3.38E-01
Xylenes [a]	106.16	12.1	193.24	8.66E-01	9.53E-01
Total HAPs			1,183	4.57	5.03

Note:
a Hazardous Air Pollutants listed in Title III of the 1990 Clean Air Act Amendments.
b No data were available to speciate total Hg into the elemental and organic forms.
c Per Table 2.4-1 in AP-42
d Emissions based on the year 2013 estimates

Given:	Volume of Emissions (m3/year)
Total Landfill Gas[d]=	15,970,612

Example Calculations
(Volume of Emissions)
(Volume of Emissions)=(Default Concentration)/10^6 * (Total Landfill Gas Volume)=0.48 ppmv/10^6 * 15,970,612 m3/year=7.67 m3/year
(Mass of Emissions)
(Mass of Emissions)= ((Standard Pressure) * (Total Landfill Gas Volume) * (Molecular Weight))/((Gas Constant)*(Standard Temperature))*(1Mg/1000kg)= (101325 Pa * 15,970,612 m3/year * 133.41)/(8314 J/(kgmole*K) * 288.7 K)*(1Mg/1000kg)=0.0432 Mg/year
(Mg to Tons)
(Mg to Tons) = 1 Short Ton/0.909099512610609 Mg

Appendix D

Particulate Emissions Calculations

TANGERINE LANDFILL WATER TRUCK PARTICULATE EMISSIONS

NOTES:

1. Assume Tangerine Landfill will use a Sterling LT9500 which weights about 7,000 pounds (3.5 tons)
2. Water PM10 emission factor calculated per AP42-13.2.2, Equation (1a).
3. The % silt used below was estimated by using the vehicle weight ratio to % silt listed in AP42 Table 13.2.2-3
4. Assume 1 water travels quarterly to Tangerine Landfill
5. Approximate landfill permeter of Tangerine Landfill is 7000 ft (1.33 mi) (per google earth 3-27-2014 image)
6. Assume total trip for dozer is equilivalent to permeter of Tangerine Landfill

$E = (k) \times ((s/12)^a) \times (W/3)^b$

where,

E = size-specific emission factor (LB/VMT)			
s = surface material silt (%)	=	4.82 %	(See note #3 above)
W = mean vehicle weight (tons)	=	3.50 tons	
k = size-specific constant (lbs/VMT)	=	0.15	Per AP42 Table 13.2.2-2 for PM-2.5
k = size-specific constant (lbs/VMT)	=	1.5	Per AP42 Table 13.2.2-2 for PM-10
a = size-specific factor (1)	=	0.9	Per AP42 Table 13.2.2-2 for PM-10/2.5
b = size-specific factor (2)	=	0.45	Per AP42 Table 13.2.2-2 for PM-10/2.5

$E = (0.15) \times ((4.82/12)^{0.9}) \times (3.5/3)^{0.45}$

E = 0.07 LB/VMT (LF Water Truck) w/o control ($PM_{2.5}$)

E = 0.71 LB/VMT (LF Water Truck) w/o control (PM_{10})

E = 2.12E-02 LB/VMT (LF Water Truck) w/control ($PM_{2.5}$)

E = 2.12E-01 LB/VMT (LF Water Truck) w/control (PM_{10})

Miles per yr (VMT) = 1.33 miles/trip x 4 trips/yr x 1 Vehicle

Miles per yr (VMT) = 5

$PM_{2.5}$ (Water Truck) = E x (Miles per yr)

$PM_{2.5}$ (Water Truck) = 0.0212 LBs/VMT x 5 VMT x (1 ton / 2,000 lbs)

$PM_{2.5}$ (Water Truck) = 5.65E-05 Tons/Yr ($PM_{2.5}$)

PM_{10} (Water Truck) = 5.65E-04 Tons/Yr (PM_{10})

TANGERINE LANDFILL DOZER PARTICULATE EMISSIONS

NOTES:

1. Assume Tangerine Landfill will use a CAT D6 Dozer which weights 48,036 pounds (24.02 tons)
2. Dozer PM10 emission factor calculated per AP42-13.2.2, Equation (1a).
3. The % silt used below was estimated by using the vehicle weight ratio to % silt listed in AP42 Table 13.2.2-3
4. Assume 1 dozer travels quarterly to Tangerine Landfill
5. Approximate landfill permeter of Tangerine Landfill is 7000 ft (1.33 mi) (per google earth 3-27-2014 image)
6. Assume total trip for dozer is equilivalent to permeter of Tangerine Landfill

$E = (k) \times ((s/12)^a) \times (W/3)^b$

where,

E = size-specific emission factor (LB/VMT)			
s = surface material silt (%)	=	4.82 %	(See note #3 above)
W = mean vehicle weight (tons)	=	24.02 tons	
k = size-specific constant (lbs/VMT)	=	0.15	Per AP42 Table 13.2.2-2 for PM-2.5
k = size-specific constant (lbs/VMT)	=	1.5	Per AP42 Table 13.2.2-2 for PM-10
a = size-specific factor (1)	=	0.9	Per AP42 Table 13.2.2-2 for PM-10/2.5
b = size-specific factor (2)	=	0.45	Per AP42 Table 13.2.2-2 for PM-10/2.5

$E = (0.15) \times ((4.82/12)^{0.9}) \times (24.02/3)^{0.45}$

E = 0.17 LB/VMT (LF Dozer) w/o control ($PM_{2.5}$)

E = 1.68 LB/VMT (LF Dozer) w/o control (PM_{10})

E = 5.05E-02 LB/VMT (LF Dozer) w/control ($PM_{2.5}$)

E = 5.05E-01 LB/VMT (LF Dozer) w/control (PM_{10})

Miles per yr (VMT) = 1.33 miles/trip x 4 trips/yr x 1 Vehicle

Miles per yr (VMT) = 5

$PM_{2.5}$ (Scrapper) = E x (Miles per yr)

$PM_{2.5}$ (Scrapper) = 0.0505 LBs/VMT x 5 VMT x (1 ton / 2,000 lbs)

$PM_{2.5}$ (Scrapper) = 1.34E-04 Tons/Yr ($PM_{2.5}$)

PM_{10} (Scrapper) = 1.34E-03 Tons/Yr (PM_{10})

TANGERINE LANDFILL LIGHT DUTY VEHICLES PARTICULATE EMISSIONS FROM PAVED ROADS

NOTES:

1 The length of roadway (roundtrip) is 0.20 miles

2 Assume 2 Light duty vehicles travel twice a month to Tangerine Landfill

$E = (k) \times (sL)^{0.91} \times (W)^{1.02}$

where,

E = size-specific emission factor (LB/VMT)

sL = road surface silt loading (grains/square foot)	=	10.6 grains/sqft	Per AP42 Table 13.2.1.10
W = mean vehicle weight (tons)	=	2.35 tons	
k = size-specific constant (lbs/VMT)	=	0.00054	Per AP42 Table 13.2.2-1 for PM-2.5
k = size-specific constant (lbs/VMT)	=	0.0022	Per AP42 Table 13.2.2-1 for PM-10

$E = (0.00054) \times (10.6)^{0.91} \times (2.35)^{1.02}$

E = 0.01 LB/VMT w/o control ($PM_{2.5}$)

E = 0.05 LB/VMT w/o control (PM_{10})

E = 3.32E-03 LB/VMT w/control ($PM_{2.5}$)

E = 1.35E-02 LB/VMT w/control (PM_{10})

Miles per yr (VMT) = 1.33 miles/trip x 24 trips/yr x 2 Vehicle

Miles per yr (VMT) = 64

$PM_{2.5}$ = E x (Miles per yr)

$PM_{2.5}$ = 0.0033 LBs/VMT x 64VMT x (1 ton / 2,000 lbs)

$PM_{2.5}$ = 1.06E-04 Tons/Yr ($PM_{2.5}$)

PM_{10} = 4.32E-04 Tons/Yr (PM_{10})

TANGERINE LANDFILL LIGHT DUTY VEHICLES PARTICULATE EMISSIONS FROM UNPAVED ROADS

NOTES:

1. Assume 2 Light duty vehicles travel twice a month to Tangerine Landfill
2. Approximate landfill permeter of Tangerine Landfill is 7000 ft (1.33 mi) (per google earth 3-27-2014 image)
3. Assume total trip for light duty vehicles is equilivalent to permeter of Tangerine Landfill
4. The % silt used below was estimated by using the vehicle weight ratio to % silt listed in AP42 Table 13.2.2-3
5. The 2 light duty vehicles each weight 4,700 lbs (2.35 tons)

$E = (k) \times ((s/12)^a) \times (W/3)^b$

where,

E = size-specific emission factor (LB/VMT)			
s = surface material silt (%)	=	4.82 %	(See note #5 above)
W = mean vehicle weight (tons)	=	2.35 tons	
k = size-specific constant (lbs/VMT)	=	0.15	Per AP42 Table 13.2.2-2 for PM-2.5
k = size-specific constant (lbs/VMT)	=	1.5	Per AP42 Table 13.2.2-2 for PM-10
a = size-specific factor (1)	=	0.9	Per AP42 Table 13.2.2-2 for PM-10/2.5
b = size-specific factor (2)	=	0.45	Per AP42 Table 13.2.2-2 for PM-10/2.5

$E = (0.15) \times ((4.82/12)^{0.9}) \times (2.35/3)^{0.45}$

E = 0.06 LB/VMT w/o control ($PM_{2.5}$)

E = 0.59 LB/VMT w/o control (PM_{10})

E = 1.77E-02 LB/VMT w/control ($PM_{2.5}$)

E = 1.77E-01 LB/VMT w/control (PM_{10})

Miles per yr (VMT) = 1.33 miles/trip x 24 trips/yr x 2 Vehicle

Miles per yr (VMT) = 64

$PM_{2.5}$ = E x (Miles per yr)

$PM_{2.5}$ = 0.064 LBs/VMT x 32 VMT x (1 ton / 2,000 lbs)

$PM_{2.5}$ = 5.66E-04 Tons/Yr ($PM_{2.5}$)

PM_{10} = 5.66E-03 Tons/Yr (PM_{10})

TANGERINE LANDFILL FINAL COVER PARTICULATE EMISSIONS FROM WIND

NOTES:

1. Assume 2 Light duty vehicles travel monthly to Tangerine Landfill
2. Approximate landfill permeter of Tangerine Landfill is 7000 ft (1.33 mi) (per google earth 3-27-2014 image)
3. Assume total trip for light duty vehicles is equilivalent to permeter of Tangerine Landfill
4. Assume density of cover assumed to be 3,240 lbs/yd3
5. Assume 3 feet of cover
6. Approximate landfill area of Tangerine Landfill is 2,772,590 sqft (63.65 Acres) (per google earth 3-27-2014 image)

$E = (k)(0.0032)((U/2.2)^{1.3}/((M)/2)^{1.4})$

where,

E = size-specific emission factor (LB/VMT)			
U = mean wind speed, meters per second (miles per hour [mph])	=	5 mph	
M = material moisture content (%)	=	12 %	Per AP42 Table 13.2.4-1
k = particle size multiplier (dimensionless)	=	0.053	Per AP42 13.2.4-4 for PM-2.5
k = particle size multiplier (dimensionless)	=	0.35	Per AP42 13.2.4-4 for PM-10

$E\ (lbs/tons) = (0.053)(0.0032)((5/2.2)^{1.3}/((12)/2)^{1.4})$

E (lbs/tons) = 4.01E-05 LB/VMT w/o control ($PM_{2.5}$)

E (lbs/tons) = 2.65E-04 LB/VMT w/o control (PM_{10})

E (lbs/tons) = 1.20E-05 LB/VMT w/control ($PM_{2.5}$)

E (lbs/tons) = 7.95E-05 LB/VMT w/control (PM_{10})

Weight of Cover(W)= (2,772,590 sqft x 3 ft) x (1yd3 / 27 ft3) x(3,240 lbs/yd3) x (1 ton / 2000 lbs)

Weight of Cover(W)= 499,066 tons

$PM_{2.5}$ = E x (W)

$PM_{2.5}$ = 0.00000012 lbs/tons x 499,066 tons x (1 ton / 2,000 lbs)

$PM_{2.5}$ = 3.00E-03 Tons/Yr ($PM_{2.5}$)

PM_{10} = 1.98E-02 Tons/Yr (PM_{10})

Appendix I

Diesel Emissions

Dozer Emissions Calculation Methodology

Emission factors for PM_{10}, $PM_{2.5}$, NO_x, SO_2, CO, and organic compounds are obtained from AP42, Chapter 3 - Table 3.3-1 and Table 3.3-2 (Stationary Internal Combustion Sources).

Emission Calculation Input Parameters

Engine Power =	227 hp	*Assuming Engine is Working at Capacity (See Appendix H)*
Distance Traveled per Trip =	1.33 miles	*Assume total trip is equilivalent to permeter of Tangerine Landfill*
Average Speed per Trip =	2.3 miles per hour	*Assuming Transmission is at 1.5 Forward (See Appendix H)*
Trips per Year =	24 Trips	
Average BSFC(1) (efficiency) =	7,000 Btu/hp-hr	*(reference, AP42 Table 3.3-1, footnote "a")*
Working Hours per Year =	13.88 hrs/yr	*= (1.33 miles)/(2.3 miles per hour)*(24 Trips)*

(1) Brake Specific Fuel Consumption (BSFC) is a measure of fuel efficiency within a shaft reciprocating engine.

Fuel Heat Input Calculation

Fuel Heat Input = (227 hp) * (13.88 hrs/yr) *(7,000 Btu/hp-hr)

Fuel Heat Input =	2.21E+07 Btu/yr	=	22	MMBtu/yr
Fuel Heat Input =	1.59E+06 Btu/hr		2	MMBtu/hr

Dozer (PTE) - Con't

Power Output Calculation

Power Output = (227 hp) * (13.88 hrs/yr)

Annual Power Output =	3.15E+03 hp-hr
Hourly Power Output =	2.27E+02 hp-hr

Emergency Generator Non-HAP Pollutant Emission Factors :

POLLUTANT	EMISSION FACTORS lb/MMBtu (fuel input)	lb/hp-hr (power output)	REFERENCE
PM^1	7.21E-04	--	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
PM_{10}	7.21E-04	--	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
CO	--	6.68E-03	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
NO_X	--	3.10E-02	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
SO_2	--	2.05E-03	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
VOC^2	--	2.47E-05	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*

(1) Assume PM_{10} are equal to PM

(2) Assume TOCs are equal to VOCs

Dozer HAP Emission Factors :

POLLUTANT	EMISSION FACTORS lb/MMBtu (fuel input)	REFERENCE
Benzene	9.33E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Toluene	4.09E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Xylenes	2.85E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Propylene	2.58E-03	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
1,3-Butadiene	3.91E-05	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Formaldehyde	1.18E-03	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Acetaldehyde	7.67E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Acrolein	9.25E-05	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Naphthalene	8.48E-05	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*

Dozer HAP and Non-HAP Emissions:

POLLUTANT	EMISSIONS (lbs/hr)	(lbs/day)	(tons/yr)
PM	1.15E-03	2.75E-02	7.95E-06
PM_{10}	1.15E-03	2.75E-02	7.95E-06
CO	1.52E+00	3.64E+01	1.05E-02
NO_X	7.04E+00	1.69E+02	4.88E-02
SO_2	4.65E-01	1.12E+01	3.23E-03
VOC	5.61E-03	1.35E-01	3.89E-05
Benzene	1.48E-03	3.56E-02	1.03E-05
Toluene	6.50E-04	1.56E-02	4.51E-06
Xylenes	4.53E-04	1.09E-02	3.14E-06
Propylene	4.10E-03	9.84E-02	2.84E-05
1,3-Butadiene	6.21E-05	1.49E-03	4.31E-07
Formaldehyde	1.88E-03	4.50E-02	1.30E-05
Acetaldehyde	1.22E-03	2.93E-02	8.46E-06
Acrolein	1.47E-04	3.53E-03	1.02E-06
Naphthalene	1.35E-04	3.23E-03	9.35E-07
Total HAPs =	**1.01E-02**	**2.43E-01**	**7.02E-05**

Water Truck Emissions Calculation Methodology

Emission factors for PM_{10}, $PM_{2.5}$, NO_x, SO_2, CO, and organic compounds are obtained from AP42, Chapter 3 - Table 3.3-1 and Table 3.3-2 (Stationary Internal Combustion Sources).

Emission Calculation Input Parameters

Engine Power =	450 hp	*Assuming Engine is Working at Capacity (See Appendix H)*
Distance Traveled per Trip =	1.33 miles	*Assume total trip is equilivalent to permeter of Tangerine Landfill*
Average Speed per Trip =	2.3 miles per hour	*Assuming water truck travels at the same speed as dozer*
Trips per Year =	24 Trips	
Average BSFC[1] (efficiency) =	7,000 Btu/hp-hr	*(reference, AP42 Table 3.3-1, footnote "a")*
Working Hours per Year =	13.88 hrs/yr	*= (1.33 miles)/(2.3 miles per hour)*(24 Trips)*

(1) Brake Specific Fuel Consumption (BSFC) is a measure of fuel efficiency within a shaft reciprocating engine.

Fuel Heat Input Calculation

Fuel Heat Input = (450 hp) * (13.88 hrs/yr) *(7,000 Btu/hp-hr)

Fuel Heat Input =	4.37E+07 Btu/yr	=	44	MMBtu/yr
Fuel Heat Input =	3.15E+06 Btu/hr		3	MMBtu/hr

Water Truck (PTE) - Con't

Power Output Calculation

Power Output = (450 hp) * (13.88 hrs/yr)

Annual Power Output = 6.25E+03 hp-hr

Hourly Power Output = 4.50E+02 hp-hr

Water Truck Non-HAP Pollutant Emission Factors :

POLLUTANT	EMISSION FACTORS lb/MMBtu (fuel input)	lb/hp-hr (power output)	REFERENCE
PM[1]	7.21E-04	--	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
PM_{10}	7.21E-04	--	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
CO	--	6.68E-03	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
NO_X	--	3.10E-02	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
SO_2	--	2.05E-03	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*
VOC[2]	--	2.47E-05	*AP42 Table 3.4-1 (10/96) Stationary Internal Combustion Sources*

(1) Assume PM_{10} are equal to PM

(2) Assume TOCs are equal to VOCs

Water Truck HAP Emission Factors :

POLLUTANT	EMISSION FACTORS lb/MMBtu (fuel input)	REFERENCE
Benzene	9.33E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Toluene	4.09E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Xylenes	2.85E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Propylene	2.58E-03	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
1,3-Butadiene	3.91E-05	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Formaldehyde	1.18E-03	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Acetaldehyde	7.67E-04	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Acrolein	9.25E-05	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*
Naphthalene	8.48E-05	*AP42 Table 3.4-3 (10/96) Stationary Internal Combustion Sources*

Water Truck HAP and Non-HAP Emissions:

POLLUTANT	EMISSIONS (lbs/hr)	(lbs/day)	(tons/yr)
PM	2.27E-03	5.45E-02	1.58E-05
PM_{10}	2.27E-03	5.45E-02	1.58E-05
CO	3.01E+00	7.21E+01	2.09E-02
NO_X	1.40E+01	3.35E+02	9.68E-02
SO_2	9.23E-01	2.21E+01	6.40E-03
VOC	1.11E-02	2.67E-01	7.71E-05
Benzene	2.94E-03	7.05E-02	2.04E-05
Toluene	1.29E-03	3.09E-02	8.94E-06
Xylenes	8.98E-04	2.15E-02	6.23E-06
Propylene	8.13E-03	1.95E-01	5.64E-05
1,3-Butadiene	1.23E-04	2.96E-03	8.55E-07
Formaldehyde	3.72E-03	8.92E-02	2.58E-05
Acetaldehyde	2.42E-03	5.80E-02	1.68E-05
Acrolein	2.91E-04	6.99E-03	2.02E-06
Naphthalene	2.67E-04	6.41E-03	1.85E-06
Total HAPs =	**2.01E-02**	**4.82E-01**	**1.39E-04**

Appendix J

Leachate Emissions

Hazardous Air Pollutant Emissions from Leachate Collection

LEACHATE COLLECTION			
Constituent	Concentration[a] (µg/L)	Mass of Emissions[b] (mg/year)	Mass of Emissions[b] (Tons/years)
1,1,1-Trichloroethane	1	18.93	2.09E-08
1,1,2,2-Tetrachloroethane	1	18.93	2.09E-08
1,1,2-Trichloroethane	1	18.93	2.09E-08
1,1-Dichloroethane	1	18.93	2.09E-08
1,1-Dichloroethene	1	18.93	2.09E-08
1,2,4-Trichlorobenzene	1	18.93	2.09E-08
1,2-Dibromoethane (EDB)	1	18.93	2.09E-08
1,2-Dichloroethane	1	18.93	2.09E-08
1,2-Dichlorpropane	1	18.93	2.09E-08
1,4-Dichlorobenzene	10.1	191.16	2.11E-07
2-Butanone (MEK)	5	94.64	1.04E-07
Benzene	2	37.85	4.17E-08
Bromoform	1	18.93	2.09E-08
Bromomethane	5	94.64	1.04E-07
Carbon Tetrachloride	1	18.93	2.09E-08
Chlorobenzene	4.3	81.39	8.97E-08
Chloroethane	1	18.93	2.09E-08
Chloroform	1	18.93	2.09E-08
Chloromethane	5	94.64	1.04E-07
Ethylbenzene	25.5	482.64	5.32E-07
Methylene chloride	2	37.85	4.17E-08
Styrene	1	18.93	2.09E-08
Tetrachlorethylene	1	18.93	2.09E-08
Toluene	1.2	22.71	2.50E-08
Trichloroethene	1	18.93	2.09E-08
Vinyl Acetate	1	18.93	2.09E-08
Vinyl Chloride	1.2	22.71	2.50E-08
Xylenes	5.4	102.21	1.13E-07
Total HAPs		1,584	1.75E-06

Note:

(a) Based on leachate analysis performed on 1/20/2005 at the Tangerine Landfill. VOC and HAP emission estimates were calculated by using detection limits for compounds listed as non-detect.

(b) Assuming 100% of leachate will vaporize

Given:	Volume of Emissions	
	(gallon/year)	(m^3/year)
Leachate Generation=	5,000	18.93

Example Calculations

(Mass of Emissions)

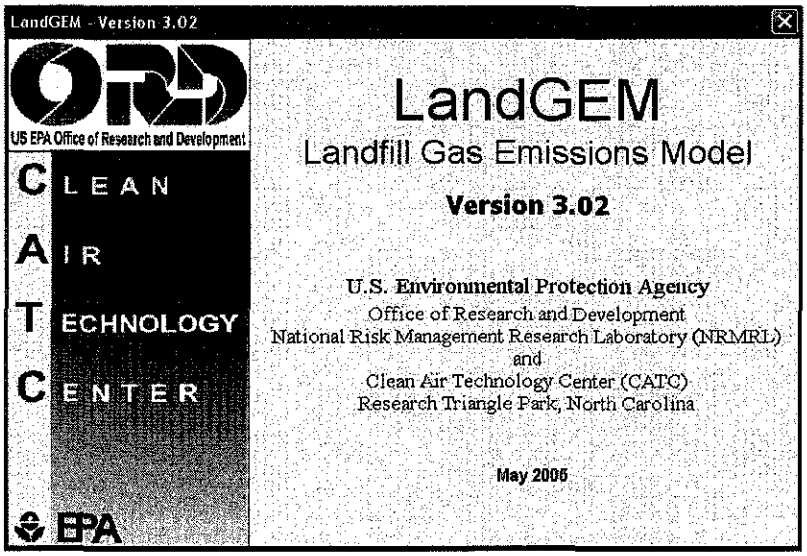
(Mass of Emissions)= (Volume of Emissions) * (Concentration) * (1000 L/1 m^3) * (1 mg/1000 µg) = (18.93 m^3/year) * (1 µg/L) * (1000 L/1 m3) * (1 mg/1000 µg)=18.93 mg/year

(mg to Tons)

(mg to Tons) = 1 Short Ton/907184000 mg

Appendix K

LandGEM Model



Summary Report

Landfill Name or Identifier: Tangerine Landfill

Date: Tuesday, November 04, 2014

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

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

Where,

Q_{CH4} = 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 ith year (Mg)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith 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 convential 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	**1984**	
Landfill Closure Year (with 80-year limit)	**2013**	
Actual Closure Year (without limit)	***2013***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.020**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**170**	*m^3/Mg*
NMOC Concentration	**273**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

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

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1984	38,424	42,266	0	0
1985	80,898	88,988	38,424	42,266
1986	85,160	93,676	119,322	131,254
1987	89,631	98,594	204,482	224,930
1988	94,351	103,786	294,113	323,524
1989	99,318	109,250	388,464	427,310
1990	104,553	115,008	487,782	536,560
1991	110,051	121,056	592,335	651,568
1992	107,118	117,830	702,385	772,624
1993	130,884	143,972	809,504	890,454
1994	135,091	148,600	940,387	1,034,426
1995	169,964	186,960	1,075,478	1,183,026
1996	169,536	186,490	1,245,442	1,369,986
1997	186,491	205,140	1,414,978	1,556,476
1998	67,723	74,495	1,601,469	1,761,616
1999	67,166	73,883	1,669,192	1,836,111
2000	84,865	93,351	1,736,358	1,909,994
2001	101,777	111,955	1,821,223	2,003,345
2002	116,779	128,457	1,923,000	2,115,300
2003	127,566	140,323	2,039,779	2,243,757
2004	151,366	166,503	2,167,345	2,384,080
2005	148,427	163,270	2,318,712	2,550,583
2006	150,000	165,000	2,467,139	2,713,853
2007	148,182	163,000	2,617,139	2,878,853
2008	147,273	162,000	2,765,321	3,041,853
2009	77,182	84,900	2,912,594	3,203,853
2010	36,364	40,000	2,989,775	3,288,753
2011	40,573	44,630	3,026,139	3,328,753
2012	44,878	49,366	3,066,712	3,373,383
2013	110,634	121,697	3,111,590	3,422,749
2014	0	0	3,222,224	3,544,446
2015	0	0	3,222,224	3,544,446
2016	0	0	3,222,224	3,544,446
2017	0	0	3,222,224	3,544,446
2018	0	0	3,222,224	3,544,446
2019	0	0	3,222,224	3,544,446
2020	0	0	3,222,224	3,544,446
2021	0	0	3,222,224	3,544,446
2022	0	0	3,222,224	3,544,446
2023	0	0	3,222,224	3,544,446

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2024	0	0	3,222,224	3,544,446
2025	0	0	3,222,224	3,544,446
2026	0	0	3,222,224	3,544,446
2027	0	0	3,222,224	3,544,446
2028	0	0	3,222,224	3,544,446
2029	0	0	3,222,224	3,544,446
2030	0	0	3,222,224	3,544,446
2031	0	0	3,222,224	3,544,446
2032	0	0	3,222,224	3,544,446
2033	0	0	3,222,224	3,544,446
2034	0	0	3,222,224	3,544,446
2035	0	0	3,222,224	3,544,446
2036	0	0	3,222,224	3,544,446
2037	0	0	3,222,224	3,544,446
2038	0	0	3,222,224	3,544,446
2039	0	0	3,222,224	3,544,446
2040	0	0	3,222,224	3,544,446
2041	0	0	3,222,224	3,544,446
2042	0	0	3,222,224	3,544,446
2043	0	0	3,222,224	3,544,446
2044	0	0	3,222,224	3,544,446
2045	0	0	3,222,224	3,544,446
2046	0	0	3,222,224	3,544,446
2047	0	0	3,222,224	3,544,446
2048	0	0	3,222,224	3,544,446
2049	0	0	3,222,224	3,544,446
2050	0	0	3,222,224	3,544,446
2051	0	0	3,222,224	3,544,446
2052	0	0	3,222,224	3,544,446
2053	0	0	3,222,224	3,544,446
2054	0	0	3,222,224	3,544,446
2055	0	0	3,222,224	3,544,446
2056	0	0	3,222,224	3,544,446
2057	0	0	3,222,224	3,544,446
2058	0	0	3,222,224	3,544,446
2059	0	0	3,222,224	3,544,446
2060	0	0	3,222,224	3,544,446
2061	0	0	3,222,224	3,544,446
2062	0	0	3,222,224	3,544,446
2063	0	0	3,222,224	3,544,446

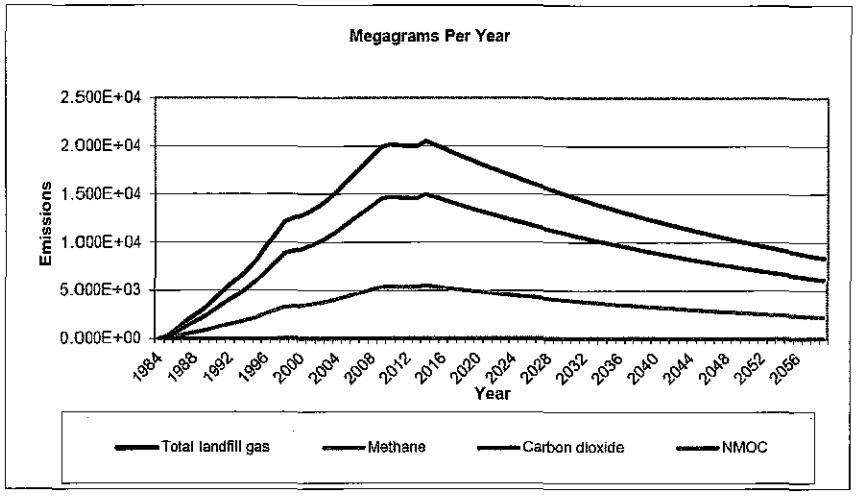
Pollutant Parameters

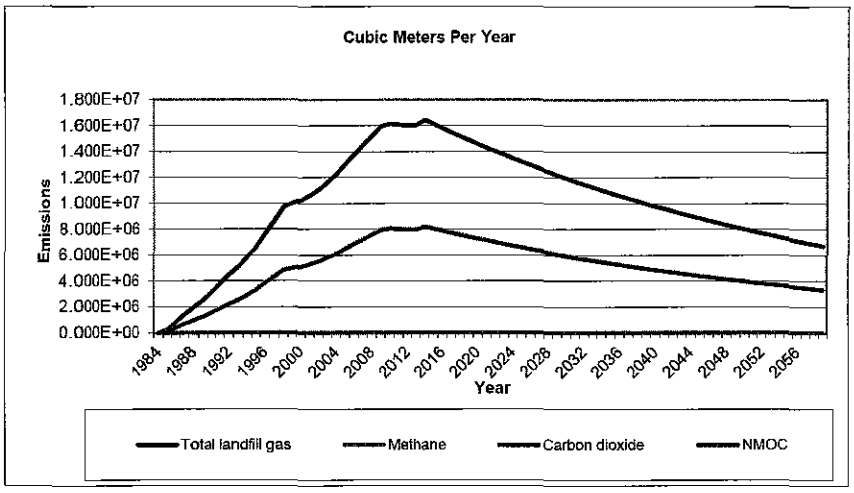
	Compound	Gas / Pollutant Default Parameters: Concentration (ppmv)	Molecular Weight	User-specified Pollutant Parameters: Concentration (ppmv)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform)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

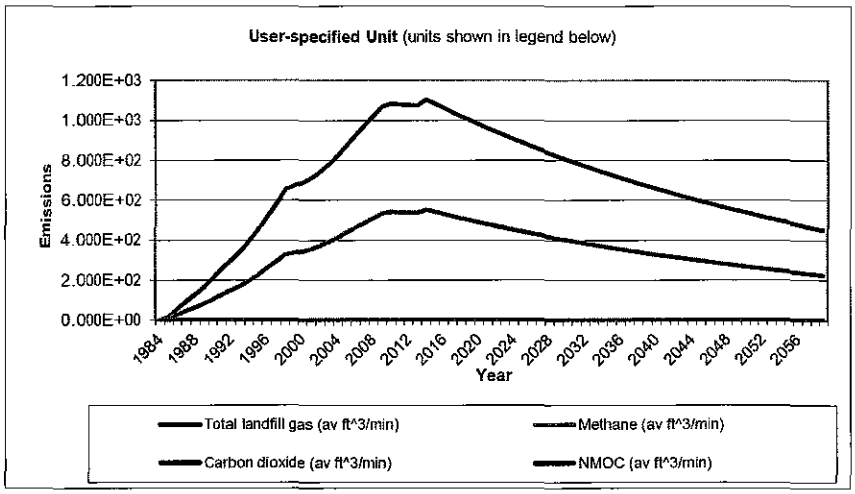
Pollutant Parameters (Continued)

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

Graphs


Megagrams Per Year
Emissions
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1984	0	0	0	0	0	0
1985	3.229E+02	2.584E+05	1.736E+01	8.638E+01	1.295E+05	8.699E+00
1986	9.964E+02	7.974E+05	5.358E+01	2.665E+02	3.995E+05	2.684E+01
1987	1.692E+03	1.354E+06	9.100E+01	4.527E+02	6.785E+05	4.559E+01
1988	2.412E+03	1.930E+06	1.297E+02	6.452E+02	9.671E+05	6.498E+01
1989	3.157E+03	2.527E+06	1.698E+02	8.445E+02	1.266E+06	8.506E+01
1990	3.929E+03	3.145E+06	2.113E+02	1.051E+03	1.575E+06	1.059E+02
1991	4.730E+03	3.786E+06	2.544E+02	1.265E+03	1.897E+06	1.274E+02
1992	5.561E+03	4.451E+06	2.991E+02	1.488E+03	2.230E+06	1.498E+02
1993	6.351E+03	5.083E+06	3.415E+02	1.699E+03	2.547E+06	1.711E+02
1994	7.326E+03	5.863E+06	3.939E+02	1.960E+03	2.937E+06	1.974E+02
1995	8.316E+03	6.655E+06	4.472E+02	2.224E+03	3.334E+06	2.240E+02
1996	9.579E+03	7.667E+06	5.151E+02	2.563E+03	3.841E+06	2.581E+02
1997	1.081E+04	8.655E+06	5.815E+02	2.893E+03	4.336E+06	2.913E+02
1998	1.217E+04	9.738E+06	6.543E+02	3.255E+03	4.879E+06	3.278E+02
1999	1.250E+04	1.000E+07	6.719E+02	3.343E+03	5.010E+06	3.366E+02
2000	1.281E+04	1.025E+07	6.890E+02	3.427E+03	5.137E+06	3.452E+02
2001	1.327E+04	1.062E+07	7.137E+02	3.550E+03	5.322E+06	3.576E+02
2002	1.386E+04	1.110E+07	7.456E+02	3.709E+03	5.559E+06	3.735E+02
2003	1.457E+04	1.166E+07	7.836E+02	3.898E+03	5.843E+06	3.926E+02
2004	1.536E+04	1.229E+07	8.257E+02	4.108E+03	6.157E+06	4.137E+02
2005	1.632E+04	1.306E+07	8.778E+02	4.366E+03	6.545E+06	4.398E+02
2006	1.725E+04	1.380E+07	9.274E+02	4.614E+03	6.915E+06	4.647E+02
2007	1.817E+04	1.454E+07	9.769E+02	4.860E+03	7.284E+06	4.894E+02
2008	1.905E+04	1.525E+07	1.024E+03	5.096E+03	7.639E+06	5.133E+02
2009	1.991E+04	1.594E+07	1.071E+03	5.327E+03	7.984E+06	5.364E+02
2010	2.017E+04	1.614E+07	1.084E+03	5.395E+03	8.086E+06	5.433E+02
2011	2.007E+04	1.606E+07	1.079E+03	5.370E+03	8.048E+06	5.408E+02
2012	2.002E+04	1.602E+07	1.076E+03	5.354E+03	8.026E+06	5.393E+02
2013	2.000E+04	1.600E+07	1.075E+03	5.349E+03	8.018E+06	5.387E+02
2014	2.053E+04	1.643E+07	1.104E+03	5.492E+03	8.232E+06	5.531E+02
2015	2.012E+04	1.611E+07	1.082E+03	5.383E+03	8.069E+06	5.422E+02
2016	1.973E+04	1.579E+07	1.061E+03	5.277E+03	7.909E+06	5.314E+02
2017	1.934E+04	1.547E+07	1.040E+03	5.172E+03	7.753E+06	5.209E+02
2018	1.895E+04	1.517E+07	1.019E+03	5.070E+03	7.599E+06	5.106E+02
2019	1.858E+04	1.487E+07	9.990E+02	4.969E+03	7.449E+06	5.005E+02
2020	1.821E+04	1.457E+07	9.792E+02	4.871E+03	7.301E+06	4.906E+02
2021	1.785E+04	1.428E+07	9.598E+02	4.775E+03	7.157E+06	4.809E+02
2022	1.750E+04	1.400E+07	9.408E+02	4.680E+03	7.015E+06	4.713E+02
2023	1.715E+04	1.372E+07	9.222E+02	4.587E+03	6.876E+06	4.620E+02
2024	1.681E+04	1.345E+07	9.039E+02	4.497E+03	6.740E+06	4.529E+02
2025	1.648E+04	1.319E+07	8.860E+02	4.407E+03	6.606E+06	4.439E+02
2026	1.615E+04	1.293E+07	8.685E+02	4.320E+03	6.476E+06	4.351E+02
2027	1.583E+04	1.267E+07	8.513E+02	4.235E+03	6.347E+06	4.265E+02
2028	1.552E+04	1.242E+07	8.344E+02	4.151E+03	6.222E+06	4.180E+02
2029	1.521E+04	1.217E+07	8.179E+02	4.069E+03	6.098E+06	4.098E+02
2030	1.491E+04	1.193E+07	8.017E+02	3.988E+03	5.978E+06	4.016E+02
2031	1.461E+04	1.170E+07	7.858E+02	3.909E+03	5.859E+06	3.937E+02
2032	1.432E+04	1.146E+07	7.702E+02	3.832E+03	5.743E+06	3.859E+02
2033	1.404E+04	1.124E+07	7.550E+02	3.756E+03	5.630E+06	3.783E+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)
2034	1.376E+04	1.101E+07	7.400E+02	3.681E+03	5.518E+06	3.708E+02
2035	1.349E+04	1.080E+07	7.254E+02	3.609E+03	5.409E+06	3.634E+02
2036	1.322E+04	1.058E+07	7.110E+02	3.537E+03	5.302E+06	3.562E+02
2037	1.296E+04	1.037E+07	6.970E+02	3.467E+03	5.197E+06	3.492E+02
2038	1.270E+04	1.017E+07	6.831E+02	3.398E+03	5.094E+06	3.423E+02
2039	1.245E+04	9.966E+06	6.696E+02	3.331E+03	4.993E+06	3.355E+02
2040	1.221E+04	9.769E+06	6.564E+02	3.265E+03	4.894E+06	3.288E+02
2041	1.196E+04	9.575E+06	6.434E+02	3.200E+03	4.797E+06	3.223E+02
2042	1.173E+04	9.386E+06	6.306E+02	3.137E+03	4.702E+06	3.159E+02
2043	1.150E+04	9.200E+06	6.181E+02	3.075E+03	4.609E+06	3.097E+02
2044	1.127E+04	9.018E+06	6.059E+02	3.014E+03	4.518E+06	3.036E+02
2045	1.104E+04	8.839E+06	5.939E+02	2.954E+03	4.428E+06	2.975E+02
2046	1.083E+04	8.664E+06	5.821E+02	2.896E+03	4.341E+06	2.917E+02
2047	1.061E+04	8.493E+06	5.706E+02	2.839E+03	4.255E+06	2.859E+02
2048	1.040E+04	8.324E+06	5.593E+02	2.782E+03	4.171E+06	2.802E+02
2049	1.020E+04	8.160E+06	5.482E+02	2.727E+03	4.088E+06	2.747E+02
2050	9.993E+03	7.998E+06	5.374E+02	2.673E+03	4.007E+06	2.692E+02
2051	9.796E+03	7.840E+06	5.267E+02	2.620E+03	3.928E+06	2.639E+02
2052	9.602E+03	7.684E+06	5.163E+02	2.568E+03	3.850E+06	2.587E+02
2053	9.411E+03	7.532E+06	5.061E+02	2.518E+03	3.774E+06	2.536E+02
2054	9.225E+03	7.383E+06	4.961E+02	2.468E+03	3.699E+06	2.485E+02
2055	9.042E+03	7.237E+06	4.862E+02	2.419E+03	3.626E+06	2.436E+02
2056	8.863E+03	7.094E+06	4.766E+02	2.371E+03	3.554E+06	2.388E+02
2057	8.688E+03	6.953E+06	4.672E+02	2.324E+03	3.484E+06	2.341E+02
2058	8.516E+03	6.815E+06	4.579E+02	2.278E+03	3.415E+06	2.294E+02
2059	8.347E+03	6.680E+06	4.489E+02	2.233E+03	3.347E+06	2.249E+02
2060	8.182E+03	6.548E+06	4.400E+02	2.189E+03	3.281E+06	2.204E+02
2061	8.020E+03	6.419E+06	4.313E+02	2.145E+03	3.216E+06	2.161E+02
2062	7.861E+03	6.291E+06	4.227E+02	2.103E+03	3.152E+06	2.118E+02
2063	7.705E+03	6.167E+06	4.144E+02	2.061E+03	3.090E+06	2.076E+02
2064	7.553E+03	6.045E+06	4.061E+02	2.020E+03	3.028E+06	2.035E+02
2065	7.403E+03	5.925E+06	3.981E+02	1.980E+03	2.968E+06	1.995E+02
2066	7.257E+03	5.808E+06	3.902E+02	1.941E+03	2.910E+06	1.955E+02
2067	7.113E+03	5.693E+06	3.825E+02	1.903E+03	2.852E+06	1.916E+02
2068	6.972E+03	5.580E+06	3.749E+02	1.865E+03	2.796E+06	1.878E+02
2069	6.834E+03	5.470E+06	3.675E+02	1.828E+03	2.740E+06	1.841E+02
2070	6.699E+03	5.361E+06	3.602E+02	1.792E+03	2.686E+06	1.805E+02
2071	6.566E+03	5.255E+06	3.531E+02	1.756E+03	2.633E+06	1.769E+02
2072	6.436E+03	5.151E+06	3.461E+02	1.722E+03	2.581E+06	1.734E+02
2073	6.309E+03	5.049E+06	3.392E+02	1.688E+03	2.530E+06	1.700E+02
2074	6.184E+03	4.949E+06	3.325E+02	1.654E+03	2.479E+06	1.666E+02
2075	6.061E+03	4.851E+06	3.259E+02	1.621E+03	2.430E+06	1.633E+02
2076	5.941E+03	4.755E+06	3.195E+02	1.589E+03	2.382E+06	1.601E+02
2077	5.824E+03	4.661E+06	3.132E+02	1.558E+03	2.335E+06	1.569E+02
2078	5.708E+03	4.569E+06	3.070E+02	1.527E+03	2.289E+06	1.538E+02
2079	5.595E+03	4.478E+06	3.009E+02	1.497E+03	2.244E+06	1.507E+02
2080	5.485E+03	4.389E+06	2.949E+02	1.467E+03	2.199E+06	1.478E+02
2081	5.376E+03	4.302E+06	2.891E+02	1.438E+03	2.156E+06	1.448E+02
2082	5.269E+03	4.217E+06	2.834E+02	1.410E+03	2.113E+06	1.420E+02
2083	5.165E+03	4.134E+06	2.777E+02	1.382E+03	2.071E+06	1.392E+02
2084	5.063E+03	4.052E+06	2.722E+02	1.354E+03	2.030E+06	1.364E+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)
2085	4.963E+03	3.972E+06	2.669E+02	1.328E+03	1.990E+06	1.337E+02
2086	4.864E+03	3.893E+06	2.616E+02	1.301E+03	1.950E+06	1.310E+02
2087	4.768E+03	3.816E+06	2.564E+02	1.275E+03	1.912E+06	1.285E+02
2088	4.674E+03	3.740E+06	2.513E+02	1.250E+03	1.874E+06	1.259E+02
2089	4.581E+03	3.666E+06	2.463E+02	1.225E+03	1.837E+06	1.234E+02
2090	4.490E+03	3.594E+06	2.415E+02	1.201E+03	1.800E+06	1.210E+02
2091	4.401E+03	3.523E+06	2.367E+02	1.177E+03	1.765E+06	1.186E+02
2092	4.314E+03	3.453E+06	2.320E+02	1.154E+03	1.730E+06	1.162E+02
2093	4.229E+03	3.384E+06	2.274E+02	1.131E+03	1.696E+06	1.139E+02
2094	4.145E+03	3.317E+06	2.229E+02	1.109E+03	1.662E+06	1.117E+02
2095	4.063E+03	3.252E+06	2.185E+02	1.087E+03	1.629E+06	1.095E+02
2096	3.983E+03	3.187E+06	2.142E+02	1.065E+03	1.597E+06	1.073E+02
2097	3.904E+03	3.124E+06	2.099E+02	1.044E+03	1.565E+06	1.052E+02
2098	3.826E+03	3.062E+06	2.058E+02	1.024E+03	1.534E+06	1.031E+02
2099	3.751E+03	3.002E+06	2.017E+02	1.003E+03	1.504E+06	1.010E+02
2100	3.676E+03	2.942E+06	1.977E+02	9.834E+02	1.474E+06	9.904E+01
2101	3.604E+03	2.884E+06	1.938E+02	9.640E+02	1.445E+06	9.708E+01
2102	3.532E+03	2.827E+06	1.899E+02	9.449E+02	1.416E+06	9.516E+01
2103	3.462E+03	2.771E+06	1.862E+02	9.262E+02	1.388E+06	9.328E+01
2104	3.394E+03	2.716E+06	1.825E+02	9.078E+02	1.361E+06	9.143E+01
2105	3.327E+03	2.662E+06	1.789E+02	8.899E+02	1.334E+06	8.962E+01
2106	3.261E+03	2.610E+06	1.753E+02	8.722E+02	1.307E+06	8.784E+01
2107	3.196E+03	2.558E+06	1.719E+02	8.550E+02	1.282E+06	8.610E+01
2108	3.133E+03	2.507E+06	1.685E+02	8.380E+02	1.256E+06	8.440E+01
2109	3.071E+03	2.458E+06	1.651E+02	8.214E+02	1.231E+06	8.273E+01
2110	3.010E+03	2.409E+06	1.619E+02	8.052E+02	1.207E+06	8.109E+01
2111	2.950E+03	2.361E+06	1.587E+02	7.892E+02	1.183E+06	7.948E+01
2112	2.892E+03	2.314E+06	1.555E+02	7.736E+02	1.160E+06	7.791E+01
2113	2.835E+03	2.269E+06	1.524E+02	7.583E+02	1.137E+06	7.637E+01
2114	2.779E+03	2.224E+06	1.494E+02	7.433E+02	1.114E+06	7.486E+01
2115	2.724E+03	2.180E+06	1.465E+02	7.285E+02	1.092E+06	7.337E+01
2116	2.670E+03	2.137E+06	1.436E+02	7.141E+02	1.070E+06	7.192E+01
2117	2.617E+03	2.094E+06	1.407E+02	7.000E+02	1.049E+06	7.050E+01
2118	2.565E+03	2.053E+06	1.379E+02	6.861E+02	1.028E+06	6.910E+01
2119	2.514E+03	2.012E+06	1.352E+02	6.725E+02	1.008E+06	6.773E+01
2120	2.464E+03	1.972E+06	1.325E+02	6.592E+02	9.881E+05	6.639E+01
2121	2.416E+03	1.933E+06	1.299E+02	6.462E+02	9.685E+05	6.508E+01
2122	2.368E+03	1.895E+06	1.273E+02	6.334E+02	9.494E+05	6.379E+01
2123	2.321E+03	1.857E+06	1.248E+02	6.208E+02	9.306E+05	6.252E+01
2124	2.275E+03	1.821E+06	1.223E+02	6.085E+02	9.121E+05	6.129E+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)
1984	0	0	0	0	0	0
1985	2.361E+02	1.290E+05	8.664E+00	2.529E-01	7.055E+01	4.740E-03
1986	7.284E+02	3.979E+05	2.674E+01	7.803E-01	2.177E+02	1.463E-02
1987	1.237E+03	6.758E+05	4.541E+01	1.325E+00	3.697E+02	2.484E-02
1988	1.763E+03	9.633E+05	6.472E+01	1.889E+00	5.270E+02	3.541E-02
1989	2.308E+03	1.261E+06	8.472E+01	2.473E+00	6.898E+02	4.635E-02
1990	2.872E+03	1.569E+06	1.054E+02	3.077E+00	8.585E+02	5.768E-02
1991	3.458E+03	1.889E+06	1.269E+02	3.704E+00	1.033E+03	6.944E-02
1992	4.065E+03	2.221E+06	1.492E+02	4.355E+00	1.215E+03	8.164E-02
1993	4.643E+03	2.536E+06	1.704E+02	4.974E+00	1.388E+03	9.324E-02
1994	5.355E+03	2.926E+06	1.966E+02	5.737E+00	1.601E+03	1.075E-01
1995	6.079E+03	3.321E+06	2.231E+02	6.513E+00	1.817E+03	1.221E-01
1996	7.003E+03	3.826E+06	2.570E+02	7.502E+00	2.093E+03	1.406E-01
1997	7.906E+03	4.319E+06	2.902E+02	8.470E+00	2.363E+03	1.588E-01
1998	8.895E+03	4.859E+06	3.265E+02	9.529E+00	2.658E+03	1.786E-01
1999	9.135E+03	4.990E+06	3.353E+02	9.786E+00	2.730E+03	1.834E-01
2000	9.367E+03	5.117E+06	3.438E+02	1.003E+01	2.799E+03	1.881E-01
2001	9.702E+03	5.300E+06	3.561E+02	1.039E+01	2.900E+03	1.948E-01
2002	1.014E+04	5.537E+06	3.720E+02	1.086E+01	3.029E+03	2.035E-01
2003	1.065E+04	5.819E+06	3.910E+02	1.141E+01	3.184E+03	2.139E-01
2004	1.123E+04	6.132E+06	4.120E+02	1.203E+01	3.355E+03	2.254E-01
2005	1.193E+04	6.519E+06	4.380E+02	1.278E+01	3.566E+03	2.396E-01
2006	1.261E+04	6.888E+06	4.628E+02	1.351E+01	3.768E+03	2.532E-01
2007	1.328E+04	7.255E+06	4.875E+02	1.423E+01	3.969E+03	2.667E-01
2008	1.393E+04	7.609E+06	5.112E+02	1.492E+01	4.163E+03	2.797E-01
2009	1.456E+04	7.952E+06	5.343E+02	1.559E+01	4.351E+03	2.923E-01
2010	1.474E+04	8.054E+06	5.411E+02	1.579E+01	4.406E+03	2.960E-01
2011	1.467E+04	8.016E+06	5.386E+02	1.572E+01	4.386E+03	2.947E-01
2012	1.463E+04	7.994E+06	5.371E+02	1.568E+01	4.373E+03	2.938E-01
2013	1.462E+04	7.986E+06	5.366E+02	1.566E+01	4.369E+03	2.936E-01
2014	1.501E+04	8.199E+06	5.509E+02	1.608E+01	4.486E+03	3.014E-01
2015	1.471E+04	8.037E+06	5.400E+02	1.576E+01	4.397E+03	2.954E-01
2016	1.442E+04	7.878E+06	5.293E+02	1.545E+01	4.310E+03	2.896E-01
2017	1.413E+04	7.722E+06	5.188E+02	1.514E+01	4.225E+03	2.838E-01
2018	1.385E+04	7.569E+06	5.086E+02	1.484E+01	4.141E+03	2.782E-01
2019	1.358E+04	7.419E+06	4.985E+02	1.455E+01	4.059E+03	2.727E-01
2020	1.331E+04	7.272E+06	4.886E+02	1.426E+01	3.979E+03	2.673E-01
2021	1.305E+04	7.128E+06	4.789E+02	1.398E+01	3.900E+03	2.620E-01
2022	1.279E+04	6.987E+06	4.695E+02	1.370E+01	3.823E+03	2.568E-01
2023	1.254E+04	6.849E+06	4.602E+02	1.343E+01	3.747E+03	2.517E-01
2024	1.229E+04	6.713E+06	4.510E+02	1.316E+01	3.673E+03	2.468E-01
2025	1.204E+04	6.580E+06	4.421E+02	1.290E+01	3.600E+03	2.419E-01
2026	1.181E+04	6.450E+06	4.334E+02	1.265E+01	3.529E+03	2.371E-01
2027	1.157E+04	6.322E+06	4.248E+02	1.240E+01	3.459E+03	2.324E-01
2028	1.134E+04	6.197E+06	4.164E+02	1.215E+01	3.390E+03	2.278E-01
2029	1.112E+04	6.074E+06	4.081E+02	1.191E+01	3.323E+03	2.233E-01
2030	1.090E+04	5.954E+06	4.000E+02	1.168E+01	3.257E+03	2.189E-01
2031	1.068E+04	5.836E+06	3.921E+02	1.144E+01	3.193E+03	2.145E-01
2032	1.047E+04	5.720E+06	3.844E+02	1.122E+01	3.130E+03	2.103E-01
2033	1.026E+04	5.607E+06	3.767E+02	1.100E+01	3.068E+03	2.061E-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)
2034	1.006E+04	5.496E+06	3.693E+02	1.078E+01	3.007E+03	2.020E-01
2035	9.861E+03	5.387E+06	3.620E+02	1.056E+01	2.947E+03	1.980E-01
2036	9.666E+03	5.281E+06	3.548E+02	1.036E+01	2.889E+03	1.941E-01
2037	9.475E+03	5.176E+06	3.478E+02	1.015E+01	2.832E+03	1.903E-01
2038	9.287E+03	5.074E+06	3.409E+02	9.949E+00	2.776E+03	1.865E-01
2039	9.103E+03	4.973E+06	3.341E+02	9.752E+00	2.721E+03	1.828E-01
2040	8.923E+03	4.875E+06	3.275E+02	9.559E+00	2.667E+03	1.792E-01
2041	8.746E+03	4.778E+06	3.210E+02	9.370E+00	2.614E+03	1.756E-01
2042	8.573E+03	4.683E+06	3.147E+02	9.185E+00	2.562E+03	1.722E-01
2043	8.403E+03	4.591E+06	3.085E+02	9.003E+00	2.512E+03	1.688E-01
2044	8.237E+03	4.500E+06	3.023E+02	8.824E+00	2.462E+03	1.654E-01
2045	8.074E+03	4.411E+06	2.964E+02	8.650E+00	2.413E+03	1.621E-01
2046	7.914E+03	4.323E+06	2.905E+02	8.478E+00	2.365E+03	1.589E-01
2047	7.757E+03	4.238E+06	2.847E+02	8.310E+00	2.318E+03	1.558E-01
2048	7.604E+03	4.154E+06	2.791E+02	8.146E+00	2.273E+03	1.527E-01
2049	7.453E+03	4.072E+06	2.736E+02	7.985E+00	2.228E+03	1.497E-01
2050	7.306E+03	3.991E+06	2.682E+02	7.827E+00	2.183E+03	1.467E-01
2051	7.161E+03	3.912E+06	2.628E+02	7.672E+00	2.140E+03	1.438E-01
2052	7.019E+03	3.835E+06	2.576E+02	7.520E+00	2.098E+03	1.410E-01
2053	6.880E+03	3.759E+06	2.525E+02	7.371E+00	2.056E+03	1.382E-01
2054	6.744E+03	3.684E+06	2.475E+02	7.225E+00	2.016E+03	1.354E-01
2055	6.610E+03	3.611E+06	2.426E+02	7.082E+00	1.976E+03	1.327E-01
2056	6.479E+03	3.540E+06	2.378E+02	6.941E+00	1.937E+03	1.301E-01
2057	6.351E+03	3.470E+06	2.331E+02	6.804E+00	1.898E+03	1.275E-01
2058	6.225E+03	3.401E+06	2.285E+02	6.669E+00	1.861E+03	1.250E-01
2059	6.102E+03	3.334E+06	2.240E+02	6.537E+00	1.824E+03	1.225E-01
2060	5.981E+03	3.268E+06	2.195E+02	6.408E+00	1.788E+03	1.201E-01
2061	5.863E+03	3.203E+06	2.152E+02	6.281E+00	1.752E+03	1.177E-01
2062	5.747E+03	3.139E+06	2.109E+02	6.157E+00	1.718E+03	1.154E-01
2063	5.633E+03	3.077E+06	2.068E+02	6.035E+00	1.684E+03	1.131E-01
2064	5.521E+03	3.016E+06	2.027E+02	5.915E+00	1.650E+03	1.109E-01
2065	5.412E+03	2.957E+06	1.987E+02	5.798E+00	1.618E+03	1.087E-01
2066	5.305E+03	2.898E+06	1.947E+02	5.683E+00	1.586E+03	1.065E-01
2067	5.200E+03	2.841E+06	1.909E+02	5.571E+00	1.554E+03	1.044E-01
2068	5.097E+03	2.784E+06	1.871E+02	5.460E+00	1.523E+03	1.024E-01
2069	4.996E+03	2.729E+06	1.834E+02	5.352E+00	1.493E+03	1.003E-01
2070	4.897E+03	2.675E+06	1.797E+02	5.246E+00	1.464E+03	9.834E-02
2071	4.800E+03	2.622E+06	1.762E+02	5.142E+00	1.435E+03	9.639E-02
2072	4.705E+03	2.570E+06	1.727E+02	5.041E+00	1.406E+03	9.448E-02
2073	4.612E+03	2.519E+06	1.693E+02	4.941E+00	1.378E+03	9.261E-02
2074	4.521E+03	2.470E+06	1.659E+02	4.843E+00	1.351E+03	9.078E-02
2075	4.431E+03	2.421E+06	1.626E+02	4.747E+00	1.324E+03	8.898E-02
2076	4.343E+03	2.373E+06	1.594E+02	4.653E+00	1.298E+03	8.722E-02
2077	4.257E+03	2.326E+06	1.563E+02	4.561E+00	1.272E+03	8.549E-02
2078	4.173E+03	2.280E+06	1.532E+02	4.471E+00	1.247E+03	8.380E-02
2079	4.090E+03	2.235E+06	1.501E+02	4.382E+00	1.223E+03	8.214E-02
2080	4.009E+03	2.190E+06	1.472E+02	4.295E+00	1.198E+03	8.051E-02
2081	3.930E+03	2.147E+06	1.443E+02	4.210E+00	1.175E+03	7.892E-02
2082	3.852E+03	2.104E+06	1.414E+02	4.127E+00	1.151E+03	7.736E-02
2083	3.776E+03	2.063E+06	1.386E+02	4.045E+00	1.129E+03	7.583E-02
2084	3.701E+03	2.022E+06	1.359E+02	3.965E+00	1.106E+03	7.432E-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)
2085	3.628E+03	1.982E+06	1.332E+02	3.887E+00	1.084E+03	7.285E-02
2086	3.556E+03	1.943E+06	1.305E+02	3.810E+00	1.063E+03	7.141E-02
2087	3.486E+03	1.904E+06	1.279E+02	3.734E+00	1.042E+03	7.000E-02
2088	3.417E+03	1.866E+06	1.254E+02	3.660E+00	1.021E+03	6.861E-02
2089	3.349E+03	1.829E+06	1.229E+02	3.588E+00	1.001E+03	6.725E-02
2090	3.283E+03	1.793E+06	1.205E+02	3.517E+00	9.811E+02	6.592E-02
2091	3.218E+03	1.758E+06	1.181E+02	3.447E+00	9.617E+02	6.461E-02
2092	3.154E+03	1.723E+06	1.158E+02	3.379E+00	9.426E+02	6.333E-02
2093	3.091E+03	1.689E+06	1.135E+02	3.312E+00	9.240E+02	6.208E-02
2094	3.030E+03	1.655E+06	1.112E+02	3.246E+00	9.057E+02	6.085E-02
2095	2.970E+03	1.623E+06	1.090E+02	3.182E+00	8.877E+02	5.965E-02
2096	2.911E+03	1.590E+06	1.069E+02	3.119E+00	8.701E+02	5.847E-02
2097	2.854E+03	1.559E+06	1.047E+02	3.057E+00	8.529E+02	5.731E-02
2098	2.797E+03	1.528E+06	1.027E+02	2.997E+00	8.360E+02	5.617E-02
2099	2.742E+03	1.498E+06	1.006E+02	2.937E+00	8.195E+02	5.506E-02
2100	2.688E+03	1.468E+06	9.865E+01	2.879E+00	8.032E+02	5.397E-02
2101	2.634E+03	1.439E+06	9.670E+01	2.822E+00	7.873E+02	5.290E-02
2102	2.582E+03	1.411E+06	9.478E+01	2.766E+00	7.718E+02	5.185E-02
2103	2.531E+03	1.383E+06	9.290E+01	2.712E+00	7.565E+02	5.083E-02
2104	2.481E+03	1.355E+06	9.106E+01	2.658E+00	7.415E+02	4.982E-02
2105	2.432E+03	1.328E+06	8.926E+01	2.605E+00	7.268E+02	4.883E-02
2106	2.384E+03	1.302E+06	8.749E+01	2.554E+00	7.124E+02	4.787E-02
2107	2.336E+03	1.276E+06	8.576E+01	2.503E+00	6.983E+02	4.692E-02
2108	2.290E+03	1.251E+06	8.406E+01	2.454E+00	6.845E+02	4.599E-02
2109	2.245E+03	1.226E+06	8.240E+01	2.405E+00	6.709E+02	4.508E-02
2110	2.200E+03	1.202E+06	8.077E+01	2.357E+00	6.576E+02	4.419E-02
2111	2.157E+03	1.178E+06	7.917E+01	2.311E+00	6.446E+02	4.331E-02
2112	2.114E+03	1.155E+06	7.760E+01	2.265E+00	6.319E+02	4.245E-02
2113	2.072E+03	1.132E+06	7.606E+01	2.220E+00	6.193E+02	4.161E-02
2114	2.031E+03	1.110E+06	7.456E+01	2.176E+00	6.071E+02	4.079E-02
2115	1.991E+03	1.088E+06	7.308E+01	2.133E+00	5.951E+02	3.998E-02
2116	1.952E+03	1.066E+06	7.163E+01	2.091E+00	5.833E+02	3.919E-02
2117	1.913E+03	1.045E+06	7.022E+01	2.049E+00	5.717E+02	3.841E-02
2118	1.875E+03	1.024E+06	6.882E+01	2.009E+00	5.604E+02	3.765E-02
2119	1.838E+03	1.004E+06	6.746E+01	1.969E+00	5.493E+02	3.691E-02
2120	1.802E+03	9.842E+05	6.613E+01	1.930E+00	5.384E+02	3.618E-02
2121	1.766E+03	9.647E+05	6.482E+01	1.892E+00	5.278E+02	3.546E-02
2122	1.731E+03	9.456E+05	6.353E+01	1.854E+00	5.173E+02	3.476E-02
2123	1.697E+03	9.269E+05	6.228E+01	1.818E+00	5.071E+02	3.407E-02
2124	1.663E+03	9.085E+05	6.104E+01	1.782E+00	4.970E+02	3.340E-02