INITIAL CLASS I (TITLE V) PERMIT APPLICATION

MARANA REGIONAL LANDFILL

PIMA COUNTY
DEPARTMENT OF ENVIRONMENTAL QUALITY

Prepared for
DKL Holdings
P.O. Box 32803
Tucson, AZ 85751-2803

September 2011

Prepared by

CORNERSTONE
Environmental Group, LLC
17 West Wetmore Road, Suite 310
Tucson, Arizona 85705

Project 090250

Class I Permit Application
Marana Regional Landfill
Pima County Department of Environmental Quality

The material and data in this report were prepared under the supervision and direction of the undersigned.

Cornerstone Environmental Group, LLC

Craig W. Young, PE
Project Manager

Kay Gilmer
Client Manager

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1 INTRODUCTION

The Marana Regional Landfill (MRLF) is a proposed municipal solid waste (MSW) disposal facility, which will be constructed within the jurisdictional boundaries of the Pima County Air Quality Control District operating within the Pima County Department of Environmental Quality (PDEQ). The MRLF property is a 591.21 acre parcel located approximately 8 miles west of Interstate 10 off of Avra Valley Road at the western jurisdictional limits of the town of Marana, Arizona, near the Pima/Pinal county line. This landfill is owned and operated by DKL Holdings (DKL).

A Solid Waste Facility Plan (SWFP) was submitted to the Arizona Department of Environmental Quality (ADEQ) (ADEQ having jurisdiction on solid waste plan approvals) on May 9th, 2011 for approval to construct the landfill. However, the facility must also obtain an air quality permit from PDEQ, which is the air permitting authority for facilities constructed within Pima County [Title 49, Chapter 3, Article 1, Section 49-401 Arizona Revised Statutes].

The PDEQ air permitting program is considered a "unified" program, in that, a new facility would apply for and obtain one permit which represents both the authorization to construct and operate the new facility. This unified permit is further classified as either a Class I or Class II permit dependent upon several criteria. Based upon its date of installation, MRLF would be subject to New Source Performance Standards for Municipal Solid Waste Landfills 40 Code of Federal Regulation (CFR) Part 60 Subpart WWW (NSPS) and would therefore require pre-construction approval from PDEQ. Since MRLF's design capacity is greater than 2.5 mega grams, the NSPS also require the MRLF to obtain a Title V Operating Permit or Class I permit. This application contains the information and forms required by PDEQ for a Class I permit.

A description of the facility, emission sources, and operating scenarios are presented in Section 2; MRLF potential to emit (PTE) is presented in Section 3; emissions abatement are described in Section 4; applicable requirements and compliance verification are in Section 5; and the application forms are included in Section 6.

2 FACILITY DESCRIPTION

This section describes the facility, wastes to be disposed of in the facility, proposed facility operations, the stationary sources of pollutant emissions, and future operating plans for the landfill.

2.1 Facility Description

The total property size is approximately 591.21 acres. The site is located in Township 12 South, Range 10 East, Section 1, Pima County, Arizona. The approximate latitude and longitude of the site are 32 degrees, 24 minutes, and 54 seconds north and 111 degrees, 16 minutes, and 38 seconds west, respectively. The Pima County Assessor's office parcel identification number for the site is 208-24-0010. Recording information is Docket No. 13705, Page 2054. The site is a former cotton field surrounded by vacant land and cotton fields. The estimated final landfill footprint is approximately 415 acres. The landfill will be developed in phases. The maximum design capacity of the MRLF is approximately 76,000,000 tons. The maximum volume of waste received at the new site on an average daily basis is estimated to be 2,000 tons.

The MRLF will be primarily operated under the area fill method of disposal. During the landfill operations, waste is evenly spread in layers and compacted. A layer of soil or approved alternate material is then spread in a layer of at least 6 inches over the waste as daily cover. The refuse will be covered at the end of each operating day in accordance with the requirements of 40 CFR §258.21.

Alternate daily cover (ADC) material proposed for use at the site include, but is not limited to, tarps, shredded/processed green wastes, bottom ash, shredded waste tires, petroleum contaminated soils (PCS), auto shredder fluff, and crushed glass. These materials are widely used in other parts of Arizona and other states.

Only non-hazardous municipal solid wastes will be accepted at the site. Waste is delivered to the site by transfer trucks from transfer stations, commercial vehicles, and private vehicles.

2.2 Waste Description

The waste types received at the MRLF consist of non-hazardous residential, commercial, industrial and inert waste. The municipal solid waste categories are described as follows:

- Municipal Solid Waste (MSW): including household waste, commercial solid waste, non-hazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste.
- Vegetative (Green) Waste: as defined at ARS §49.701.36, vegetative (green) waste includes waste derived from plants, including tree limbs and branches, stumps, grass clippings and other waste plant materials.
- Construction and Demolition Debris: as defined at ARS §49.701.5 & 7, construction and demolition debris includes solid waste derived from the construction, repair, remodeling, or demolition of building or other structures.
- Inert Material: as defined at ARS §49.701.15, inert material is material that is not flammable, will not decompose, and will not leach substances in concentrations that exceed Aquifer Water Quality Standards using a water leach test that is designed to approximate natural infiltrating waters. Inert materials include concrete, asphaltic pavement, brick, rock, gravel, sand, soil and metal, if used as reinforcement in concrete, but does not include special waste, hazardous waste, glass or other metal.
- White Goods: White goods containing CFCs must have a certification that the CFCs have been properly recycled by a certified technician.
- Automobiles.
- Animal Carcasses. The carcass(es) is placed in an excavation made in or near the working face and immediately covered with other MSW or daily cover soil.
- Pesticide and other empty containers from conditionally exempt small quantity generators.
- Non-hazardous, non-infectious, treated, biomedical wastes.
- Special Wastes: As defined by ARS §49-851, special wastes are non-hazardous wastes which require special handling and management to protect the public health or environment. These wastes include waste categories listed at ARS §49-852 or adopted by rule pursuant to ARS §49-855. This plan constitutes a special waste management plan in accordance with ARS §40.857. Disposal of special wastes will comply with BMPs as adopted by the Department.
- Petroleum contaminated soil (PCS) as defined in ARS §49-852(A)(1) and ARS §49-851(A)(3) may be accepted and will be managed in accordance with ARS §49-855.
- Non-friable and regulated asbestos-containing material.
- Shredded, sliced, or quartered tires. (Including “alligator” pieces.)
- Landscape rubble as defined in ARS §49-701.17.
- Sewage sludge, septage and other wastes passing the paint filter test.
- Other Non-Hazardous Wastes: Any other non-hazardous solid waste, as defined at ARS §49-701.01 or 40 CFR §258.2 which is not prohibited by statute or regulation from receipt at an MSWLF may be accepted at MRLF.

All wastes requiring special handling will be identified at the scale-house through identification by the customer or load check program prior to disposal in the landfill. These wastes are immediately placed into the working face of the landfill upon receipt. Loads identified as putrid or with an otherwise objectionable odor will be immediately covered with soil.

The maximum daily refuse capacity that the facility can handle on a continuous basis during the period of this permit, with existing operational systems, is 2,000 tons per day (tpd) maximum. The initial average daily waste inflow is expected to be approximately 300 to 500 tpd, and is expected to increase to approximately 2,000 tpd by the end of the fifth year of the permit.

2.3 Emission Units and Pollutants of Concern

The primary stationary sources currently proposed to be operated at the site include the MSW landfill operation and facility roadways and parking areas. These are described in Section 2.3.1 below. Additional, ancillary sources are also proposed. These include internal combustion engines and storage tanks. These ancillary sources are described in Section 2.3.2 – Miscellaneous Sources.

2.3.1 The Landfill and Landfill Surface

Landfill gases are generated as a result of solid wastes decomposing following disposal. Organic wastes decompose aerobically as long as oxygen is present. Once oxygen becomes depleted, anaerobic decomposition becomes dominant. Inorganic wastes primarily decompose by chemical oxidation. Gas composition in a landfill varies, depending on the types of wastes and conditions that occur during decomposition. The duration of the waste decomposition can vary from a few years to over 100 years, depending on the presence and amount of oxygen, refuse moisture, pH, and temperature. Decomposition products of concern to this permitting action include carbon dioxide, methane (greenhouse gases), and non-methane organic compounds (NMOC). These pollutants will be emitted unabated through the surface of the landfill. A small quantity of organic compounds have been identified as Hazardous Air Pollutants by the Environmental Protection Agency.

Fugitive particulate emissions result from the operation of vehicles on the landfill surface and material handling activities, such as loading and unloading to storage piles. These are reported as particulate matter less than ten microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$).

2.3.2 Miscellaneous Sources

2.3.2.1 Fuel Fired Equipment

There are sixteen (16) fuel burning pieces of equipment proposed for use on-site. The equipment is as follows:

LANDFILL ENGINES					
Unit Description	**Manu/model Serial No.***	**Fuel Type**	**HP**	**kW**	**Notes**
Water Pump (to fill water pull)	***Klein Hurricane Bravo 12XD***	**Diesel**	**110**	**NA**	**Stationary**
Light Plant Engines(2)	TBD	Diesel	16	**NA**	Non-Road Engine
Tipper Engines(2)	TBD	Diesel	115	**NA**	Non-Road Engine
Storm Water Pump	TBD	Diesel	175	**NA**	Non-Road Engine
Storm Water Pump	TBD	Diesel	85.	**NA**	Non-Road Engine
Tarpomatic Engine	TBD	Diesel	25	**NA**	Non-Road Engine
Power Washer Engine	NA	Diesel	20	**NA**	Trivial
Welder	NA	Diesel	25	**NA**	Trivial
Welder	NA	Diesel	75	**NA**	Trivial
Air Compressor(2)	NA	Diesel	25	**NA**	Trivial
Generator(2)	NA	Gasoline	<10		Trivial
Wash Out Truck Engine	NA	Gasoline	10	**NA**	Trivial

*** MRLF had not purchased these units when this application was prepared. Specific equipment listed under insignificant or trivial may be changed as needed throughout the construction process. MRLF may substitute similar equipment with emissions that are equivalent (or less) if necessary.**

The emission units noted above as meeting the definition of "trivial" in Pima County Code (P.C.C.) Title 17, Chapter 17.04, Article IX are not required to be included within this application. Those units noted above as "non-road engines" have been evaluated using the **Form 1 Questionnaire** in the ADEQ's *Air Quality Control Determination Packet for Non-Road Engines* and qualify as non-road engines accordingly. These units also are not required to be included in this application, however emission calculations

have been provided to PDEQ in Appendix A as part of the non-road engine determination.

2.3.2.2 Storage Tanks

Small storage tanks are planned at the site, including a 1,000 gallon gasoline storage tank, and 2,000 gallon used oil tank. These tanks would be classified as "insignificant" in accordance with P.C.C. 17.04.304 (114) (b) and (j). Six smaller oil product tanks containing maintenance oils, such as transmission and hydraulic oils, will also be utilized at the site for maintenance activities. These would be classified as "trivial" in accordance with P.C.C. 17.04.304(237)(m). Emission calcuations for insignificant and trivial activities are not required as part of the Class I application and therefore have not been included. During the initial MRLF construction phase, different or additional tanks may be determined to be necessary. None of these tanks would be expected to be significant sources, however.

2.4 Current Operating Scenario

Normal working hours are from approximately 4:00 a.m. to 5:00 p.m. Monday through Saturday. Special circumstances may require occasional operations outside of these normal hours of operation, which is authorized under the Town of Marana Development Agreement. Public disposal operations are from approximately 4:00 a.m. to 5:00 p.m. Monday through Saturday. Operations continue until a daily cover has been placed that minimizes odors and protects the landfill from vectors, birds, and litter. The facility is generally closed on Sundays and major holidays.

2.5 Future (Alternative) Operating Scenarios

A modification to the facility or operations that would require preparation of a permit application to PDEQ is not expected to be submitted during the period of this Title V operating permit. Therefore, an alternate operating scenario is not proposed.

3 MRLF POTENTIAL TO EMIT

This section presents the potential to emit (PTE) estimates for the landfill and landfill operations, exclusive of emissions from trivial and non-road engine sources. The facility PTE has included emissions from insignificant activities for completeness purposes. All emission calculations have been provided in Appendix A.

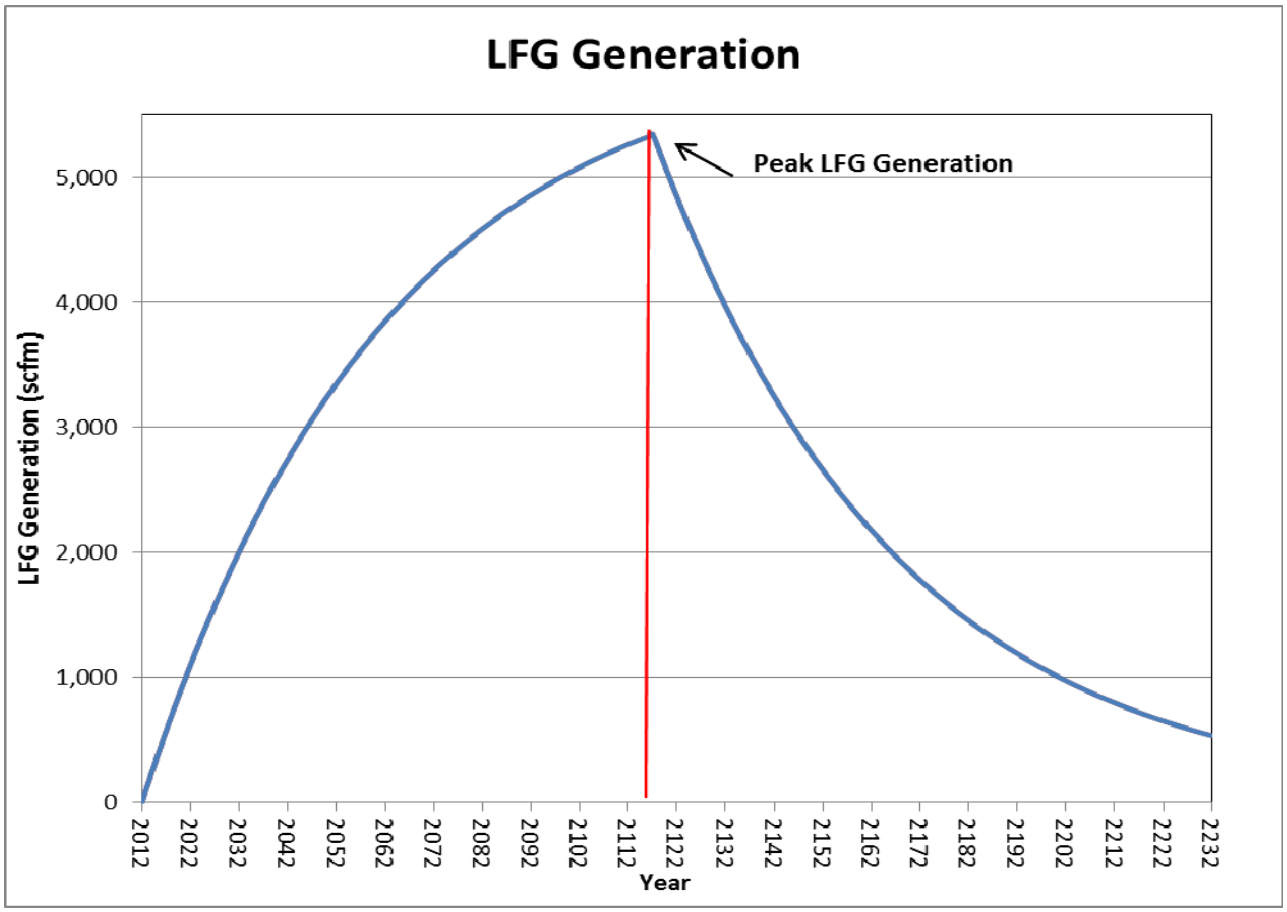
The PTE of a stationary source is defined within the Pima County Code (P.C.C.), Title 17, Chapter 17.04, Article IX as:

"the maximum capacity of as stationary source to emit pollutant, excluding secondary emissions, under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable"

In accordance with this definition, the PTE for a new facility must be based upon the design capacity when operating 8760 hours per year, exclusive of controls or limitations unless those are federally enforceable, as in permit terms and conditions. However, defining the PTE of a MSW landfill in this manner is not so straight forward since the final design capacity and, therefore, the potential landfill gas (LFG) generation is not realized until many years into the future.

MRLF has developed a LFG generation and collection curve using the USEPA's Landfill Gas Estimation Model (LandGEM) Version 3.02, to provide a reasonable worst case estimation of the site's LFG generation rate over the life of the landfill. LandGEM is based upon a first-order decomposition rate equation for qualifying emissions from the decomposition of landfilled waste in a MSW landfill. This model is based upon the law of conservation of mass/matter. The model output is presented in Appendix B.

As the curve shown below indicates LFG production peaks over one hundred years into the future then reduces over time due to the waste materials' organic matter being converted to methane by anaerobic decomposition leaving only the inorganic material.



A more reasonable approach to the landfill PTE is to use a representative timeframe which is within the period encompassed by an effective air permit or associated with construction phases. Based upon pre-application discussions with PDEQ, the PTE for MRLF, as shown in this application, has been calculated for the five (5) year permit term and would approximately represent the initial project phases of the MRLF construction.

3.1 Landfill Emissions

Two sources of emissions are associated with the landfill operations. The first is fugitive organic and greenhouse gas pollutants from the uncontrolled landfill gas. The second is fugitive dust or particulate matter from the landfill surface due to truck and heavy equipment operations and material handling activities.

3.1.1 Landfill Gas

The landfill gas generation rate during the first 5 years of operations was estimated using the MRLF LandGEM results. The LandGEM estimates the total methane generated from the landfill based on the amount of waste in the landfill, the landfill age, and other variables. The total fugitive landfill gas emissions are typically estimated by subtracting

the landfill gas flow rate to the landfill gas collection and control system (GCCS) from the total landfill gas generated by the landfill. Since a GCCS will not be required during the term of this permit, all generated landfill gas is assumed to be emitted to the atmosphere. The landfill gas generation rate during the permit period is presented in Table 1

Fugitive, uncontrolled emissions of specific organic compounds were estimated from the total fugitive landfill gas emissions, landfill gas analyses (if available), and emission factors. The organic compound concentrations used in the calculations are based on assumptions specified by EPA in 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: *Stationary Point and Area sources*' (AP-42). The emission rate of the non-methane pollutants in the landfill gas is presented in Table 2.

Odorous pollutants are also emitted from the landfill surface. The primary odorous pollutant emitted to the atmosphere is hydrogen sulfide. Its emission rate and those of the other odorous pollutants present in the landfill gas is presented in Table 3.

3.1.2 Fugitive Dust Emissions Calculations

3.1.2.1 Roadway and Parking Areas

Fugitive dust emissions from vehicle operations can be conservatively estimated using EPA AP-42 methodology (Appendix C). The following equation was used to calculate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

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

where k, a, and b are empirical constants:

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)

The equation constants are based on the aerodynamic particle size as shown below:

CONSTANTS

Constant	PM-2.5	PM-10	PM-30[a]
k (lb/VMT)	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45

[a] Assumed equivalent to total suspended particulate (TSP).

The values listed above were used to estimate a conservative PM_{10} and $PM_{2.5}$ emission factor for vehicle miles traveled.

$$E = 1.5\ (s/12)^{0.9}(W/3)^{0.45}$$

An AP-42 average value for landfills for silt content (6.4%) was used. The value of W and M are calculated based on estimates of the maximum expected number and type of vehicles entering the landfill. It is estimated that approximately 200 vehicles per day will travel on the site under maximum waste transport conditions. In addition, it is assumed that articulated trucks will be used for excavation hauling and one scraper will be used to bring cover soil to the working face for daily cover. The average fleet weight and vehicle miles traveled (VMT) is shown in Table 4.

All roads are subject to some natural mitigation due to rainfall. The equation can be modified to estimate annual average uncontrolled conditions including natural mitigation using the assumption that the annual average emissions are inversely proportional to the number of days with measurable precipitation. Thus,

$$E = 1.5\ (6.4/12)^{0.9}(W/3)^{0.45} * \frac{[365 - p]}{365}$$

where p = number of days with at least 0.01 inches of precipitation per year.

For the purposes of these calculations, a value of 32 (days) was assigned for p. Substituting all variables into the above equations results in a value for E of 1.58 lbs PM_{10}/VMT.

The fugitive dust emissions to be governed by the permit result from the round-trip movement of vehicles from the entrance to the landfill to the working face as well as along miscellaneous haul roads. For the calculations, a conservative distance of 1.4 miles each way was used (Table 4). This distance was the estimated maximum a vehicle would have to travel during the 5 year permit term based on potential operating scenarios.

Water abatement is used on all roads in the landfill on an as-needed basis. A control efficiency of 50% of all fugitive dust emissions was calculated based on similar landfills in Arizona.

3.1.2.2 Storage Piles and Material Handling

Fugitive emissions from the soil stockpiles were calculated based on methodologies from AP 42 Section 13.2.4. Emissions are based on the material handled multiplied by the emissions factor. The emissions factor (E) is calculated as:

$$E= k(0.0032) * [(U/5) \wedge 1.3] / [(M/2)\wedge 1.4]$$

Where k = particle size multiplier (k=0.35 for PM_{10} from AP 42)
U = mean wind speed

M = material moisture content (%)

For the MRLF, U = 6.98 mph based on annual weather data for the Marana Regional Airport Weather Station and M = 12.0 from AP 42 Table 13.2.4-1 for mean moisture content for Municipal Solid Waste Landfills Cover soil.

3.1.3 Miscellaneous Sources

3.1.3.1 Stationary Internal Combustion Engines

Emissions from the proposed stationary diesel water pump at MRLF were estimated using the rated capacity (110 hp) operating at 8760 hours per year and using emission factors from AP 42 Tables 3.3-1 through 3.3-2 for diesel engines. Calculations are included in Appendix A.

3.1.3.2 Storage Tanks

Based upon the size and materials stored in the proposed storage tanks identified in Section 2.3.2.2 emissions are expected to be negligible. These sources have been determined to be either insignificant or trivial activities, therefore, specific emission calculations have not been included as part of this application.

3.2 Total Facility Emissions

3.2.1 Facility PTE

The total emissions from the MRLF which excludes those emissions from non-road engines and trivial sources are presented in Table 5.

3.2.2 Applicability of Major New Source Review (P.C.C., Title 17, Chapter 17.16, Article VIII)

In determining the PTE for P.C.C., Title 17, Chapter 17.16, Article VIII, major New Source Review (NSR) applicability, only point source emissions are considered. Fugitive emissions are excluded unless the source falls within specific listed source categories. MSW landfills are not one of the listed categories and therefore fugitive emissions are not to be considered in the facility's PTE for NSR applicability purposes. All MRLF landfill emissions prior to triggering emission controls pursuant to NSPS would be fugitive by definition and not consider in major NSR applicability, therefore, the MRLF project implemented during the 5 year permit term does not exceed major NSR thresholds.

The federal NSPS requires emission controls, a gas collection and control system (GCCS), be installed at the MSW landfill thirty (30) months from when the LandGEM predicted emission rate for non-methane organic compounds (NMOC) reaches 50 megagrams. The NSPS allows for a tiered approach in estimating the landfill's NMOC

emissions. Preliminary estimates from the MRLF LandGEM model using the NSPS Tier 1 default values (4,000 parts per million (ppm) NMOC concentration) indicate MRLF would emit 50 megagrams NMOC very early in the initial construction phase. A more realistic Tier 2 model, using an NMOC gas concentration of 1900 ppm, a value at the low end of NMOC concentrations noted in sampling results for Tier 2 testing and flare source testing (inlet gas) at two similar landfills in Arizona, indicates that a GCCS would be required at MRLF in compliance with the NSPS by calendar year (CY) 2016.

At such time as NSPS controls are triggered, CY2016 or beyond, additional permits will be necessary for the agency's approval of the installation of the selected control devices. A reassessment of the MRLF's PTE, considering the control strategy selected, would be part of any permit application at that time and the applicability of major NSR would be further addressed for the modification project.

4 EMISSIONS ABATEMENT

4.1 Landfill Gas

There are no landfill gas emission controls planned or required per applicable regulations for the landfill gas generated as a result of the initial phases at MRLF during this permit term. At the time the applicable regulations require landfill gas controls MRLF will provide PDEQ with the appropriate permit applications to reflect this change in operations.

4.2 Fugitive Particulate Matter

Fugitive dust emissions from roadways and parking areas will be controlled at MRLF by the following methods:

- Watering and proper maintenance of haul roads, and/or application of chemical dust suppressant; and/or
- Water spraying of soil cover areas when conditions exist that may result in formation of fugitive dust; and/or
- Applying water or planting temporary vegetation on intermediate soil cover, as needed; and/or
- Planting and maintaining a vegetative cover on completed fill and excavation slopes (not anticipated to occur during the five-year period of this permit); and/or
- Gravel or Paving of haul and/or entrance roads, and/or
- All paved roadways will be maintained in good conditions and free of tracked soils.

Water truck(s) will be used to transport and spray water on all roads, service areas, and waste unloading areas prone to dust generation. To further reduce dust generation, traffic speed will be limited on unpaved roadways to 15 MPH. Water will also be applied, as needed, to inactive, disturbed surfaces of the landfill that have not received final cover or other stabilization.

Fugitive dust generated from material handling, such as loading and unloading from storage piles, will be controlled by minimizing the drop heights and use of water spray, where appropriate, to maintain sufficient moisture to prevent windblown dust.

5 APPLICABLE REQUIREMENTS AND COMPLIANCE VERFICATION

MRLF has conducted an assessment of the applicable requirements for the proposed project as required in the Class I application. These requirements are presented in Table 6.

MRLF commits to operating the landfill and ancillary emissions sources in compliance with the applicable requirements at all times. The methods proposed to ensure compliance include, but are not limited to, the following:

- Applying best practices at all times an emission source is in operation to minimize emissions;
- Using water or other dust suprressants, roadway improvements and/or limited access, covered loads and minimum drop heights for fugitive dust sources, such as roadways, parking areas, construction areas and storage piles;
- Use of low-sulfur fuels where applicable in stationary internal combustion sources;
- Including only submerged fill petroleum storage vessels, and
- Minimizing cold start-up periods for off-road machinery.

MRLF will perform all monitoring, recordkeeping and reporting as required by the applicable rules and final Class I permit issued by the PDEQ in the timeframes prescribed. Records will be maintained at MRLF.

MRLF will submit annual compliance certifications to the PDEQ in accordance with the schedule established within the final Class I permit, but no less frequently than annually.

MRLF also commits to ensuring compliance with any additional applicable requirements which may become effective subsequent to the issuance of the Class I permit. Compliance will be demonstrated during the permit period through the relevant testing, monitoring, recordkeeping and reporting as may be required by the specific requirement.

6 APPLICATION FORMS

The following pages are the completed forms required by PDEQ. The PDEQ *Air Quality Permit Application Completeness Check List for Class I* has been reviewed during the preparation of this application to ensure the application is complete.

PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY
Air Program
33 N. Stone Avenue • Suite 700 • Tucson, AZ 85701 • Phone: (520) 243-7400

STANDARD PERMIT APPLICATION FORM FOR CLASS I SOURCES

(As required by A.R.S. § 49-480, and Title 17 of the Pima County Code)

1. **Permit to be issued to (Arizona Corporate Commission Registered Name):** DKL Holdings, Inc. DBA Marana Regional Landfill

2. **Mailing Address:** P.O. Box 32803
   City: Tuscon **State:** AZ **ZIP:** 85751-2803

3. **Plant Name (if different than item #1):** Marana Regional Landfill

4. **Name (or names) of Owner or Operator:** DKL Holdings
   FAX #: 480-419-3542 **Phone:** 602-390-6846
   Email: pwslarry@msn.com

5. **Name of Owner's Agent:** Cornerstone Environmental Group, LLC
   FAX #: 520-888-4604 **Phone:** 520-888-4800

6. **Plant/Site Manager/Contact Person:** Kurt Wahl
   FAX #: 480-419-3543 **Phone:**
   Email: pwskurt@msn.com

7. **Proposed Equipment/Plant Location Address:** 14805 W. Avra Valley Road
   City: Marana **State:** AZ **ZIP:** 85653
   Indian Reservation (if applicable): _____ **T/R/S, Lat/Long, Elev:** 32deg 24'54"N, 110 deg 16'38"W T12S, R 10R, Sec 1

8. **General Nature of Business:** MSW Landfill
   Standard Industrial Classification Code: _____ **State Permit Class:** _____

9. **Type of Organization:** ☒ Corporation ☐ Individual Owner ☐ Partnership ☐ Government Entity ☐ Other

10. **Permit Application Basis** ***(Check all that apply):*** ☒ New Source ☐ General Permit
    ☐ Renewal ***Revision:*** ☐ Administrative ☐ Minor ☐ Significant **Existing Permit #** _____
    Date of Commencement of Construction or Modification: upon permit issuance
    Is any of the equipment to be leased to another individual or entity? ☐ Yes ☐ No

11. **Signature of Responsible Official of Organization:** [signature]
    Official Title of Signer: President

12. **Typed or Printed Name & E-mail of Signer:** Larry Hank, pwslarry@msn.com
    Date: 9/22/2011 **Telephone Number:** 602-390-6846

EQUIPMENT LIST

The following table should include all equipment utilized at the facility and be complete with all data requested. The date of manufacture must be included in order to determine if portions of the facility are subject to NSPS. Make additional copies of this form if necessary.

Type of Equipment	Maximum Rated Capacity	Make	Model	Serial Number	Equipment ID Number	Date of Manufacture
Diesel Water Pump	110 hp	Klein Hurricane Bravo 12XD				

EMISSION SOURCES

COMPANY NAME: DKL Holdings

See Appendix A for detailed emissions calculations

DATE 9/22/2011

Estimated "Potential to Emit" per 17.04.340.A.164.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT [1]		CHEMICAL COMPOSITION OF TOTAL STREAM	REG. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT [5]			STACK SOURCES [6]					NONPOINT SOURCES [7]	
								HEIGHT ABOVE GROUND (ft)	HEIGHT ABOVE STRUC. (ft)	EXIT DATA				
NUMBER	NAME	REGULATED AIR POLLUTANT NAME [2]	#/HR. [3]	TONS/YEAR [4]	ZONE	EAST (Mtrs)	NORTH (Mtrs)			DIA. (ft)	VEL (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)
	MSW Landfill	NMOC	NA	12.9	657548.7,	11251303.0		NA	NA	NA	NA	NA	see	map
	MSW Landfill	GHG (CO2e)	NA	67,884	657548.7,	11251303.0		NA	NA	NA	NA	NA	see	map
	MSW Landfill	VOC	NA	5.05	657548.7,	11251303.0		NA	NA	NA	NA	NA	see	map
	MSW Landfill	PM10	NA	124.7	657548.7,	11251303.0		NA	NA	NA	NA	NA	see	map
	Diesel Water Pump	VOC	0.27	1.19	TBD	TBD	TBD	TBD	NA	TBD	TBD	TBD	NA	NA
	Diesel Water Pump	NOx	3.41	14.9	TBD	TBD	TBD	TBD	NA	TBD	TBD	TBD	NA	NA
	Diesel Water Pump	CO	0.74	3.2	TBD	TBD	TBD	TBD	NA	TBD	TBD	TBD	NA	NA
	Diesel Water Pump	SO2	0.23	0.99	TBD	TBD	TBD	TBD	NA	TBD	TBD	TBD	NA	NA
	Diesel Water Pump	PM10	0.24	1.06	TBD	TBD	TBD	TBD	NA	TBD	TBD	TBD	NA	NA
	Roadways	PM10	NA	59.0	657548.7,	11251303.0		NA	NA	NA	NA	NA	see	map

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL _____ feet. PDEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (17.04.340.A.210)

General Instructions:

1. Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.
2. Components to be listed include regulated air pollutants as defined in 17.04.340.A.182. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 times the "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in 17.04.34.A.147.

Certification of Compliance with all Applicable Requirements

Permit Number (If existing source) _____

This certification must be signed by a Responsible Official. Applications without a signed certification will be deemed incomplete.

> *The responsible official is defined as a person who is in charge of principal business functions or who performs policy or decision making functions for the business. This may also include an authorized representative for such persons. For a complete definition, see Pima County Air Quality Control, Title 17, Section 17.04.340(A)(186).*

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Pima County Department of Environmental Quality (PDEQ) as public record. I also attest that I am in compliance with the applicable requirements and will continue to comply with such requirements and any future requirements that become effective during the life of my permit. I will present a certification of compliance to PDEQ no less than annually and more frequently if specified by PDEQ. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the requirements of Title 17 of the Pima County Code and any permit issued thereof.

Name (Print/Type): Larry D. Henk Title: President

(Signature): [signature] Date: 9/22/2011

Certification of Truth, Accuracy, and Completeness

17.12.160(H) - Certification of Truth, Accuracy, and Completeness. Any application form, report, or compliance certification submitted pursuant to this Chapter shall contain certification by a responsible official of truth, accuracy, and completeness. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the documents are true, accurate, and complete.

By my signature I,(Name) Larry D. Henk, hereby certify that based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete.

Signature of Responsible Official of Organization: [signature]

Title: President Date: 9/22/2011

Pima County Department of Environmental Quality
Air Quality Permit Fees – Revised 2010
Fees adjusted annually using Consumer Price Index (CPI) per PCC 17.12.510.F

Class I Sources – Individual Permit

Annual Administrative Fees:

Aerospace	$16,500.00
Cement Plant	$50,540.00
Combustion/Boiler	$12,290.00
Compressor Station	$10,100.00
Copper or Nickel Mine	$11,890.00
Copper Smelter	$50,540.00
Electronics	$16,260.00
Expandable Foam	$11,650.00
Foundry	$15,490.00
Gold Mine	$11,890.00
Landfill	$12,660.00
Lime Plant	$47,340.00
Mobile Home Manufacturing	$11,780.00
Other	$12,660.00
Other with Continuous Emissions Monitoring	$16,260.00
Paper Coater	$12,290.00
Paper Mill	$16,250.00
Petroleum Products Terminal Facility	$18,040.00
Polymeric Fabric Coater	$16,250.00
Reinforced Plastics	$12,290.00
Semiconductor Fabrication	$21,380.00
Utility: Fossil Fuel Except Natural Gas	$25,840.00
Utility: Natural Gas	$13,050.00
Vitamin/Pharmaceutical Manufacturing	$12,540.00
Wood Furniture	$12,290.00

Annual Emission-Based Fee:

$15.03
per ton, per pollutant, for
all regulated pollutants

Permit Processing Fee:

$112.10 per hour

Accelerated Permit Application Fee:

$15,000.00

LIMITATIONS

The work product included in the attached was undertaken in full conformity with generally accepted professional consulting principles and practices and to the fullest extent as allowed by law we expressly disclaim all warranties, express or implied, including warranties of merchantability or fitness for a particular purpose. The work product was completed in full conformity with the contract with our client and this document is solely for the use and reliance of our client (unless previously agreed upon that a third party could rely on the work product) and any reliance on this work product by an unapproved outside party is at such party's risk.

The work product herein (including opinions, conclusions, suggestions, etc.) was prepared based on the situations and circumstances as found at the time, location, scope and goal of our performance and thus should be relied upon and used by our client recognizing these considerations and limitations. Cornerstone shall not be liable for the consequences of any change in environmental standards, practices, or regulations following the completion of our work and there is no warrant to the veracity of information provided by third parties, or the partial utilization of this work product.

TABLES

Table 1
Landfill Gas Generation During Permit Period

Year	Estimated Landfill Gas Generation (ft^3/min)[a]	Fugitive Emissions from Landfill Surface (ft^3/min)
2012	0	0
2013	120.5	120.5
2014	238.7	238.7
2015	254.4	254.4
2016	468.0	468.0

[a] Based on EPA Landfill Gas Model (Appendix B)

Table 2
Fugitive Landfill Gas Emissions During Permit Period

LFG Fugitive Flow = 468 scfm

LFG Compound	HAP	VOC	CAS	MW (lb/lb-mol)	Conc in Inlet Gas (ppmv)[1]	Landfill Emissions (lb/hr)	Landfill Emissions (tpy)
1,1,1 - Trichloroethane (methyl chloroform)	x	--	71-55-6	133.41	0.48	4.74E-03	2.08E-02
1,1,2,2 - Tetrachloroethane	x	x	79-34-5	167.85	1.11	1.38E-02	6.04E-02
1,1 - Dichloroethane (ethylidene dichloride)	x	x	75-34-3	98.96	2.35	1.72E-02	7.54E-02
1,1 - Dichloroethene (vinylidene chloride)	x	x	75-35-4	96.94	0.201	1.44E-03	6.32E-03
1,2 - Dichloroethane (ethylene dichloride)	x	x	107-06-2	98.96	0.407	2.98E-03	1.31E-02
1,2 - Dichloropropane (propylene dichloride)	x	x	78-87-5	112.99	0.18	1.50E-03	6.59E-03
2-Propanol (isopropyl alcohol)	--	x	67-63-0	60.11	50.1	2.23E-01	9.76E-01
Acetone (2-propanone)	--	--	67-64-1	58.08	7.01	3.01E-02	1.32E-01
Acrylonitrile (Propenenitrile)	x	x	107-13-1	53.06	6.33	2.49E-02	1.09E-01
Benzene	x	x	71-43-2	78.12	1.91	1.10E-02	4.84E-02
Bromodichloromethane	--	x	75-27-4	163.83	3.13	3.79E-02	1.66E-01
Butane	--	x	106-97-8	58.12	5.03	2.16E-02	9.48E-02
Carbon Disulfide	x	x	75-15-0	76.14	0.58	3.27E-03	1.43E-02
Carbon Tetrachloride	x	x	56-23-5	153.84	0.004	4.55E-05	1.99E-04
Carbonyl Sulfide	x	x	463-58-1	60.07	0.49	2.18E-03	9.54E-03
Chlorobenzene (monochlorobenzene)	x	x	108-90-7	112.56	0.254	2.12E-03	9.27E-03
Chlorodifluoromethane (CFC-22, freon-22)	--	--	75-45-6	86.47	1.3	8.32E-03	3.64E-02
Chloroethane (ethyl chloride)	x	x	75-00-3	64.52	1.25	5.97E-03	2.61E-02
Chloroform (trichloromethane)	x	x	67-66-3	119.38	0.03	2.65E-04	1.16E-03
Chloromethane (methyl chloride)	x	x	74-87-3	50.49	1.21	4.52E-03	1.98E-02
1,4 Dichlorobenzene (p-dichlorobenzene)	x	x	106-46-7	147	0.213	2.32E-03	1.01E-02
Dichlorodifluoromethane (CFC-12, freon-12)	--	--	75-71-8	120.91	15.7	1.40E-01	6.15E-01
Dichlorofluoromethane (freon-21)	--	--	75-43-4	102.92	2.62	2.00E-02	8.74E-02
Dichloromethane (methylene chloride)	x	--	75-09-2	84.93	14.3	8.99E-02	3.94E-01
Dimethyl Sulfide (methyl sulfide)	--	x	75-18-3	62.13	7.82	3.60E-02	1.57E-01
Ethane	--	--	74-84-0	30.07	889	1.98E+00	8.66E+00
Ethanol (ethyl alcohol)	--	x	64-17-5	46.08	27.2	9.27E-02	4.06E-01
Ethyl Mercaptan (ethanehiol)	--	x	75-08-1	62.13	2.25	1.03E-02	4.53E-02
Ethylbenzene	x	x	100-41-4	106.17	4.61	3.62E-02	1.59E-01
Ethylene dibromide (1,2 dibromoethane)	x	x	106-93-4	187.88	0.001	1.39E-05	6.09E-05
Fluorotrichloromethane (CFC-11, freon-11)	--	--	75-69-4	137.37	0.76	7.73E-03	3.38E-02
Hexane	x	x	110-54-3	86.18	6.57	4.19E-02	1.84E-01
Hydrogen Sulfide	--	--	7783-06-4	34.08	35.5	8.95E-02	3.92E-01
Mercury (total)	x	--	7439-97-6	200.61	2.92E-04	4.33E-06	1.90E-05
Methyl Ethyl Ketone (2-butanone)	--	x	78-93-3	72.11	7.09	3.78E-02	1.66E-01
Methyl Isobutyl Ketone (hexone)	x	x	108-10-1	100.16	1.87	1.39E-02	6.07E-02
Methyl Mercaptan	--	x	74-93-1	48.11	2.49	8.86E-03	3.88E-02
Pentane	--	x	109-66-0	72.15	3.29	1.76E-02	7.69E-02
Tetrachloroethylene (perchloroethylene, -ethene)	x	--	127-18-4	165.83	3.73	4.58E-02	2.00E-01
Propane	--	x	74-98-6	44.1	11.1	3.62E-02	1.59E-01
Toluene (methylbenzene)	x	x	108-88-3	92.14	39.3	2.68E-01	1.17E+00
Trichloroethylene (trichloroethene)	x	x	79-01-6	131.38	2.82	2.74E-02	1.20E-01
t - 1,2 - Dichloroethene (1,2 dichloroethylene)	--	x	156-60-5	96.94	2.84	2.04E-02	8.92E-02
Vinyl Chloride (chloroethylene, VCM)	x	x	75-01-4	62.50	7.34	3.39E-02	1.49E-01
Xylenes (m, o, p)	x	x	1330-20-7	106.17	12.1	9.51E-02	4.16E-01
Carbon Dioxide[2]	--	--	124-38-9	44.01	548,816	1787	7,828
Methane	--	--	74-82-8	16.04	550,000	653	2,860
Total HAP						0.75	3.29
Maximum Single HAP						0.27	1.17
VOC						1.15	5.05

[1] AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998

[2] Concentration derived from the sum of the LFG compounds and the methane concentration

Table 3
Fugitive Odorous Emissions
During Permit Period

Pollutant[a]	Molecular Weight	Average Concentration (ppm)[a]	Pollutant In Landfill Gas (lb/hr)[b]	Pollutant In Landfill Gas (t/yr)	Title III Potential to Emit Odor (t/yr)[c]
Carbon disulfide[c]	76.13	0.58	3.27E-03	1.43E-02	1.43E-02
Carbonyl sulfide	60.07	0.49	2.18E-03	9.54E-03	
Dimethyl sulfide	62.14	7.8	3.60E-02	1.57E-01	
Ethyl mercaptan	62.23	2.28	1.03E-02	4.53E-02	
Hydrogen sulfide	34.08	35.5	8.95E-02	3.92E-01	
Methyl mercaptan	48.11	2.5	8.86E-03	3.88E-02	
Total Potential to Emit			0.15	0.73	1.43E-02

a - Pollutant and concentration from AP-42, Table 2.4-1

b - Based on the fugitive landfill surface emission rate of 468 scfm.

c - Title III designated hazardous air pollutant.

Table 4
Vehicle Weight and Miles Traveled

Potential to Emit Conditions - 2000 tons/day

Vehicle Type	Number of Vehicles per day	Ave. Weight per Vehicle[a] (tons)	Total Weight (tons)	Landfill Roadway - Number of VMT per trip	VMT
Transfer Trailer	60	29	1740	1.4	84.0
Front Loader	10	25	250	1.4	14.0
Rear Loader	5	28	140	1.4	7.0
Roll Off	25	20	500	1.4	35.0
Pickup	100	3	300	1.4	140
	200		2930		280
	Average Weight (W) [b]		14.5		

[a] Round trip - enters loaded, exits empty
[b] Average weight of cars, pickups, dump trucks, and transfer trucks excludes scrappers

Table 5
Facility Potential to Emit During the Permit Period

Source	Pollutant	PTE (tpy)
Landfill Gas	NMOC	12.95
	VOC	5.05
	HAP	3.29
	CO_{2e}	67,884
Material Handling/Material Hauling (includes waste and soil)[1]	PM_{10}	183.71
	$PM_{2.5}$	18.7
Diesel Engines	NOx	14.94
	CO	3.22
	VOC	1.19
	PM_{10}	1.06
	SOx	0.99
	HAP	0.02
Totals	**NMOC**	**12.95**
	VOC	**6.24**
	HAP	**3.31**
	PM_{10}	**184.77**
	$PM_{2.5}$	**18.7**
	NOx	**14.94**
	CO	**3.22**
	SOx	**0.99**
	CO_{2e}	**67,884**

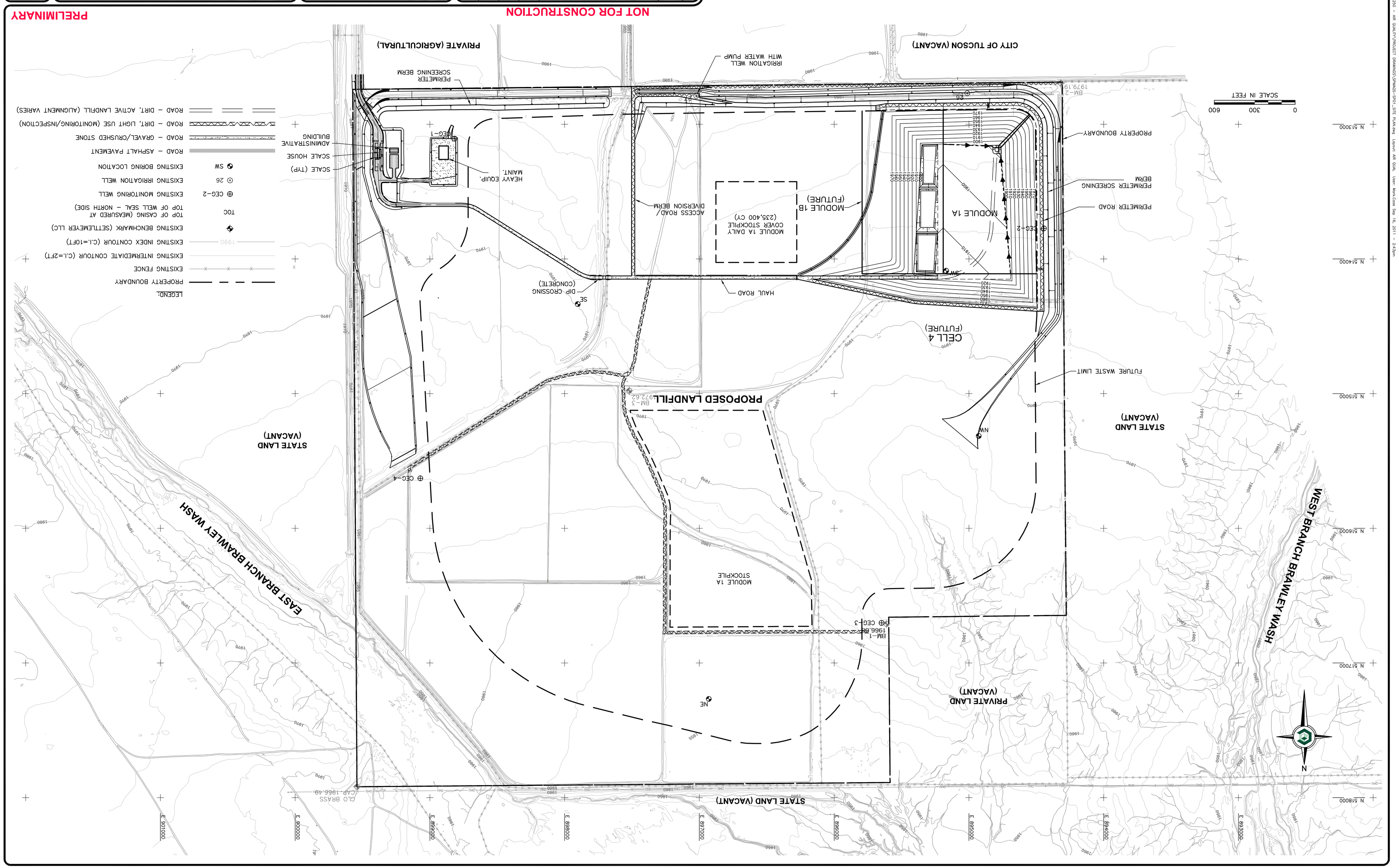
[1] Includes Unpaved haul roads, Stockpile Wind Erosion, and Waste Placement and Daily Cover

Table 6
Applicable Requirements

Rule Citation	Description	PDEQ	Federal Rule (NSPS)
17.16.010	Local rules and standards	X	
17.16.020	Noncompliance with applicable standards	X	
17.16.030	Odor limiting standards	X	
17.16.040	Standards and applicability (includes NESHAP)	X	
17.16.050	Visibility limiting standard	X	
17.16.055	General	X	
17.26.060	Fugitive dust producing activities	X	
17.26.070	Fugitive dust emissions standards for motor vehicle operation	X	
17.16.080	Vacant lots and open spaces	X	
17.16.090	Roads and streets	X	
17.16.100	Particulate materials	X	
17.16.110	Storage Piles	X	
17.16.230	Standards of performance for storage vessels for petroleum liquids	X	
17.16.340	Standards of performance for stationary rotating machinery	X	
17.16.450	Off-road machinery	X	
17.16.470	Roadway and site cleaning machinery	X	
17.16.520	Standards of performance for storage vessels for petroleum liquids	X	
17.16.490 40 CFR Part 60 Subpart A & WWW	Standards of performance for new stationary sources (NSPS) – Subparts A and WWW	X	X
17.16.530(A)(8) 40 CFR Part 61 Subpart M	NESHAP for asbestos	X	X
17.16.490(A)(81) 40 CFR Part 60 Subpart IIII	NSPS for Stationary Compression Ignition Internal Combustion Engines	X	X
40 CFR Part 82 Subpart F	Protection of Stratospheric Ozone		X

FIGURES

Site Location Map



TOPOGRAPHY PREPARED BY COOPER AERIAL. THIS COMPUTER PLOTTED MAP WAS GENERATED FROM DATA COMPILED BY DIGITAL STEREO METHODS USING AERIAL PHOTOGRAPHY TAKEN ON APRIL 6, 2010.

GROUND CONTROL BY SETTLEMEYER LLC.

File: X:\PROJECTS\MARANA\090250 – AIR QUALITY\PROJECT DRAWINGS\MNA09-SP01-SITE PLAN.dwg Layout: AIR QUAL User: Mark.Case Sep 16, 2011 – 2:43pm

1" 1/2" 0"

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DATE OF ISSUE	DRAWN BY	CHECKED BY
SEPT. 2011	MDC	CEB
DESIGNED BY		APPROVED BY
MDC		GRB

CORNERSTONE Environmental Group, LLC

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DKL HOLDINGS
MARANA REGIONAL LANDFILL
MARANA, ARIZONA
TITLE V PERMIT APPLICATION

SITE PLAN

SHEET NO. **1**

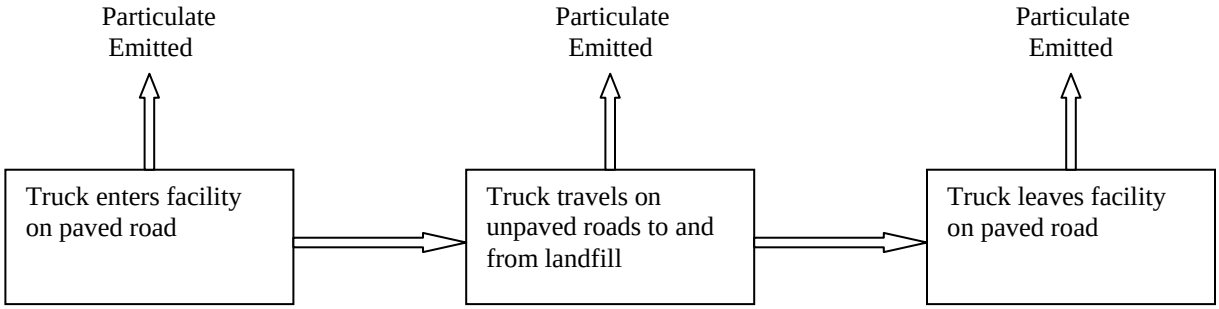
PROJECT NO. 090250.4

DRAWINGS

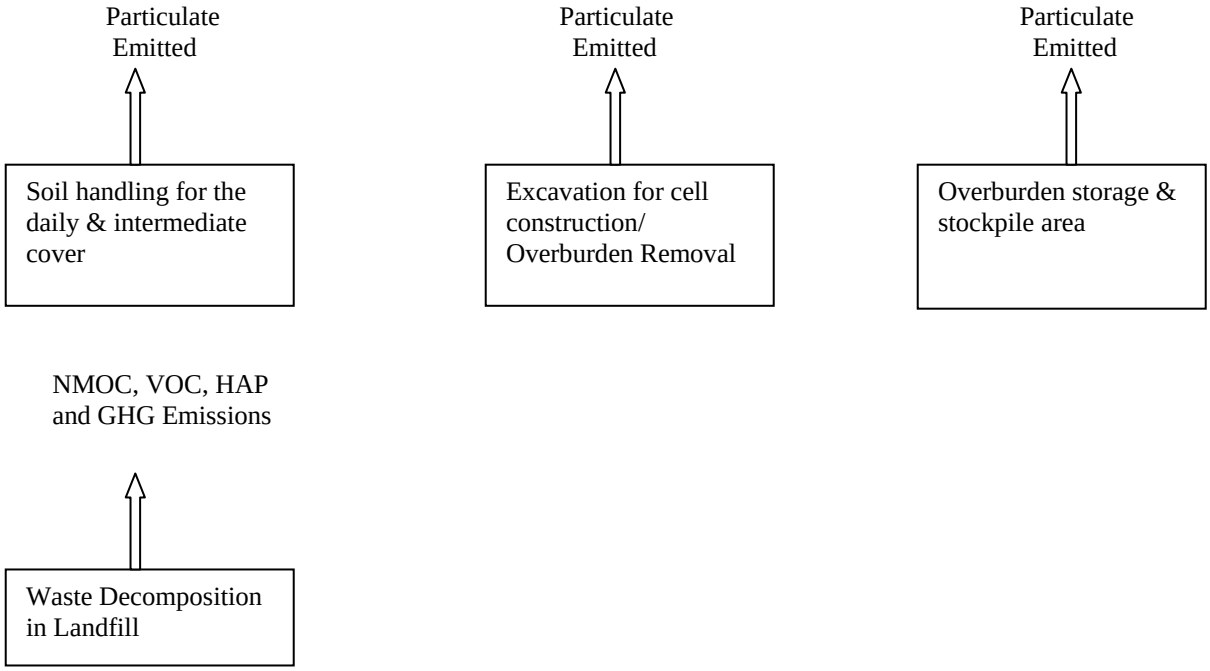
Process Flow Diagram

Marana Landfill - Process Flow Diagram

Fugitive Emissions: Paved and Unpaved Roadways



Fugitive Emissions: Landfill Operations



APPENDIX A

MRLF EMISSIONS CALCULATIONS

Waste Handling/Hauling Fugitive PM Calculations

Emissions Summary

Emission Unit	Description	Calculated Emisisons		
		$PM_{2.5}$ (tpy)	PM_{10} (tpy)	PM_{30} (TSP) (tpy)
--	Paved Road(s)	0.55	2.25	11.24
--	Unpaved Road(s)	5.67	56.75	210.21
--	Material Handling/Storage Piles	6.14E-03	4.06E-02	8.58E-02
	Total	**6.23**	**59.04**	**221.5**

Site Specific Information	Value	
Paved Road Length, 1-way (1)	0.3 mi	
Unpaved Road Length, 1-way (1)	1.0 mi	
No. of Hours of Operation Per Day (1)	24 hr/day	
No. of Days in Averaging Period, N (1)	365 day/yr	
No. of Hours of Operation Per Averaging Period	8760 hr/yr	
No. of "Wet" Days (i.e., at least 0.01 in. precip), P (3)	32 day	3
Silt Loading, sL (3)	7.4 g/m2	
Surface Material Silt Content, s (3)	6.4%	
Control Efficiency, CE (1,5)	50%	

Calculation of Mean Vehicle Weight

Vehicle Type	Vehicle Weight[1] Unloaded (ton)	Loaded (ton)	Average (ton)	Vehicles Per Day[1]
Transfer Trailer	17	40	29	60
Front Loader	20	30	25	10
Rear Loader	20	35	28	5
Roll Off	15	25	20	25
Pickup	2	4	3	100

Total Vehicle Count ..... 200 per day
Mean Vehicle Weight, W ..... 14.5 ton

Paved Road Emissions	Value	
Predictive Emission Factor Equation (3)	$E = \{[k*(sL)^{0.91}*(W)^{1.02}]*(1-P/4N)\}*CE$	
Particle Size Multiplier - PM2.5, k	0.00054	
Particle Size Multiplier - PM10, k	0.0022	
Particle Size Multiplier2 - PM30, k	0.011	
Calculated Emission Factor - PM2.5, E	0.05 lb/VMT	
Calculated Emission Factor - PM10, E	0.20 lb/VMT	
Calculated Emission Factor - PM30, E	1.02 lb/VMT	
Total Miles Travelled - Paved Roads	44,242 VMT/yr	
Calculated Emissions - PM2.5	0.55 tpy	0.126 lb/hr
Calculated Emissions - PM10	2.25 tpy	0.513 lb/hr
Calculated Emissions - PM30	11.24 tpy	2.566 lb/hr

Unpaved Road Emissions	Value	
Predictive Emission Factor Equation (4)	$[k*(s/12)^a*(W/3)^b]*[(365-P)/365)$	
Particle Size Multiplier - PM2.5, k	0.15	
Particle Size Multiplier - PM10, k	1.50	
Particle Size Multiplier2 - PM30, k	4.90	
Calculated Emission Factor - PM2.5, E	0.16 lb/VMT	
Calculated Emission Factor - PM10, E	1.58 lb/VMT	
Calculated Emission Factor - PM30, E	5.85 lb/VMT	
Total Miles Travelled - Unpaved Roads	143,788 VMT/yr	
Calculated Emissions - PM2.5	5.67 tpy	1.30 lb/hr
Calculated Emissions - PM10	56.75 tpy	12.96 lb/hr
Calculated Emissions - PM30	210.21 tpy	47.99 lb/hr

[1] Site Specific - Specify Actual Source

[2] Actual weather data from www.wunderground.com for Marana Regional Airport Weather Station.

[3] EPA, "Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors," Section 13.2.1, Jan. 2011.

[4] EPA, "Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors," Section 13.2.2, Nov. 2006.

Site Specific Information	Value	
Amount of Material Handled Per Day (1).....	2,000 ton/day	
No. of Hours of Operation Per Day (1).....	24 hr/day	
No. of Days in Averaging Period, N (1).....	365 day/yr	
No. of Hours of Operation Per Averaging Period.....	8760 hr/yr	
Mean Wind Speed, U (2).....	6.98 mph	2
Surface Material Moisture Content, M (3).....	14.2%	

Material Handling Emissions	Value	
Predictive Emission Factor Equation (3).....	$E = [k*0.0032]*[((U/5)^{1.3})/((M/2)^{1.4})]$	
Particle Size Multiplier - PM2.5, k.....	0.053	
Particle Size Multiplier - PM10, k.....	0.35	
Particle Size Multiplier2 - PM30, k.....	0.74	
Calculated Emission Factor - PM2.5, E.....	1.68E-05 lb/ton	
Calculated Emission Factor - PM10, E.....	1.11E-04 lb/ton	
Calculated Emission Factor - PM30, E.....	2.35E-04 lb/ton	
Calculated Emissions - PM2.5.....	6.14E-03 tpy	1.40E-03 lb/hr
Calculated Emissions - PM10.....	4.06E-02 tpy	9.26E-03 lb/hr
Calculated Emissions - PM30.....	8.58E-02 tpy	1.96E-02 lb/hr

[1] Site provided daily waste acceptance, operational data based on worst-case scenario.
[2] Actual weather data from www.wunderground.com for Marana Regional Airport Weather Station.
[3] EPA, "Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors," Section 13.2.4, Nov. 2006.

Letter Symbol	Definition
E	emission factor (lb/VMT or g/VMT)
g/m2	grams per meter squared
g/VMT	grams per vehicle mile travelled
hr	hour
lb/hr	pounds per hour
lb/VMT	pounds per vehicle mile travelled
mi	mile (or VMT)
mph	miles per hour
P	number of "wet" days (at least 0.01 in. precip)
PMx	particulate matter less than or equal to "x" microns
sL	silt loading
tpy	tons per year
W	mean vehicle weight
s	surface material silt content
S	mean vehicle speed
TSP	total suspended particulate
M	surface moisture content
U	mean wind speed

Soil Handling/Hauling Fugitive PM Calculations

Emissions Summary

Emission Unit	Description	Calculated Emisisons		
		$PM_{2.5}$ (tpy)	PM_{10} (tpy)	PM_{30} (TSP) (tpy)
--	Paved Road(s)	0.00	0.00	0.00
--	Unpaved Road(s)	12.46	124.60	461.54
--	Material Handling	1.17E-02	7.72E-02	1.63E-01
	Total	**12.47**	**124.67**	**461.7**

Site Specific Information	Value	
Paved Road Length, 1-way (1)	0.0 mi	
Unpaved Road Length, 1-way (1)	1.4 mi	
No. of Hours of Operation Per Day (1)	24 hr/day	
No. of Days in Averaging Period, N (1)	365 day/yr	
No. of Hours of Operation Per Averaging Period	8760 hr/yr	
No. of "Wet" Days (i.e., at least 0.01 in. precip), P (2)	32 day	3
Silt Loading, sL (3)	7.4 g/m2	
Surface Material Silt Content, s (3)	6.4%	
Control Efficiency, CE (1,5)	50%	

Calculation of Mean Vehicle Weight

Vehicle Type	Vehicle Weight[1] Unloaded (ton)	Loaded (ton)	Average (ton)	Vehicles Per Day[1]
Transfer Trailer	17	37	27	0
Front Loader	20	26	23	0
Rear Loader	20	34	27	0
Articulated Truck	39	63	51	150
Scraper	20	29	25	30

Total Vehicle Count ..... 180 per day
Mean Vehicle Weight, W ..... 46.6 ton

Paved Road Emissions	Value	
Predictive Emission Factor Equation (3)	$E = \{[k*(sL)^{0.91}*(W)^{1.02}]*(1-P/4N)\}*CE$	
Particle Size Multiplier - PM2.5, k	0.00054	
Particle Size Multiplier - PM10, k	0.0022	
Particle Size Multiplier2 - PM30, k	0.011	
Calculated Emission Factor - PM2.5, E	0.16 lb/VMT	
Calculated Emission Factor - PM10, E	0.67 lb/VMT	
Calculated Emission Factor - PM30, E	3.34 lb/VMT	
Total Miles Travelled - Paved Roads	VMT/yr	
Calculated Emissions - PM2.5	0.00 tpy	0.000 lb/hr
Calculated Emissions - PM10	0.00 tpy	0.000 lb/hr
Calculated Emissions - PM30	0.00 tpy	0.000 lb/hr

Unpaved Road Emissions	Value	
Predictive Emission Factor Equation (4)	$[k*(s/12)^a*(W/3)^b]*[(365-P)/365)$	
Particle Size Multiplier - PM2.5, k	0.15	
Particle Size Multiplier - PM10, k	1.50	
Particle Size Multiplier2 - PM30, k	4.90	
Calculated Emission Factor - PM2.5, E	0.27 lb/VMT	
Calculated Emission Factor - PM10, E	2.67 lb/VMT	
Calculated Emission Factor - PM30, E	9.89 lb/VMT	
Total Miles Travelled - Unpaved Roads	186,648 VMT/yr	
Calculated Emissions - PM2.5	12.46 tpy	2.84 lb/hr
Calculated Emissions - PM10	124.60 tpy	28.45 lb/hr
Calculated Emissions - PM30	461.54 tpy	105.37 lb/hr

[1] Site Specific - Specify Actual Source
[2] Actual weather data from www.wunderground.com for Marana Regional Airport Weather Station.
[3] EPA, "Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors," Section 13.2.1, Jan. 2011.
[4] EPA, "Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors," Section 13.2.2, Nov. 2006.

Site Specific Information	Value	
Amount of Material Handled Per Day (1).....	3,805 ton/day	
No. of Hours of Operation Per Day (1).....	24 hr/day	
No. of Days in Averaging Period, N (1).....	365 day/yr	
No. of Hours of Operation Per Averaging Period.....	8760 hr/yr	
Mean Wind Speed, U (2).....	7 mph	2
Surface Material Moisture Content, M (3).....	14.2%	

Material Handling Emissions	Value	
Predictive Emission Factor Equation (3).....	$E = [k*0.0032]*[((U/5)^{1.3})/((M/2)^{1.4})]$	
Particle Size Multiplier - PM2.5, k.....	0.053	
Particle Size Multiplier - PM10, k.....	0.35	
Particle Size Multiplier2 - PM30, k.....	0.74	
Calculated Emission Factor - PM2.5, E.....	1.68E-05 lb/ton	
Calculated Emission Factor - PM10, E.....	1.11E-04 lb/ton	
Calculated Emission Factor - PM30, E.....	2.35E-04 lb/ton	
Calculated Emissions - PM2.5.....	1.17E-02 tpy	2.67E-03 lb/hr
Calculated Emissions - PM10.....	7.72E-02 tpy	1.76E-02 lb/hr
Calculated Emissions - PM30.....	1.63E-01 tpy	3.72E-02 lb/hr

[1] Site Specific - Specify Actual Source

[2] Actual weather data from www.wunderground.com for Marana Regional Airport Weather Station.

[3] EPA, "Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors," Section 13.2.4, Nov. 2006.

Letter Symbol	Definition
E	emission factor (lb/VMT or g/VMT)
g/m2	grams per meter squared
g/VMT	grams per vehicle mile travelled
hr	hour
lb/hr	pounds per hour
lb/VMT	pounds per vehicle mile travelled
mi	mile (or VMT)
mph	miles per hour
P	number of "wet" days (at least 0.01 in. precip)
PMx	particulate matter less than or equal to "x" microns
sL	silt loading
tpy	tons per year
W	mean vehicle weight
s	surface material silt content
S	mean vehicle speed
TSP	total suspended particulate
M	surface moisture content
U	mean wind speed

Assumptions for Fugitive PM Calculations

Marana Landfill Fugitive PM Assumptions

Waste Hauling:

2000 tons/day waste accepted

Number and types of vehicles provided by site
Assumed haul weights for each vehicle type

Road lengths based on site drawing

Soil Hauling:

Initial excavation

2.9 million cy * 900 lb/cy / 2000lb/tom = 1,305,000 tons
assume excavation in one year
1,305,000 tons / 365 days = 3,575 tons/day

Daily cover

512 cy/day * 900 lb/cy / 2000 lb/ton = 230 tons/day

Total daily soil

3,575 tons + 230 tons = 3805 tons/day

Road lengths based on site drawing

Assumed construction vehicle information based on daily tonnage hauled

Weather information gathered for Marana Regional Airport Weather Station via wunderground.com.

Calculations of Fugitives from Landfill Gas

Emission Unit	Description	LFG Flow (scfm)	VOC (lb/hr) (tpy)	HAP (T) (lb/hr) (tpy)	HAP (S) (lb/hr) (tpy)	CO_2 (lb/hr) (tpy)	CH_4 (lb/hr) (tpy)	CO_{2e} (lb/hr) (tpy)
1	Landfill	468	1.15	0.75	0.27	1787	653	15,499
			5.05	3.29	1.17	7,828	2,860	67,884

CORNERSTONE Environmental Group, LLC

Standard Conditions and Assumptions	Value
Standard Temperature	60 deg F
Standard Temperature (absolute)	520 R
Standard Pressure	1 atm
Universal Gas Constant	0.7302 atm-ft3/lb-mol-R

Landfill Gas Generation

Landfill Gas Generation (1)	468 scfm

Collection Efficiency of Gas Collection System

Control Efficiency (2)	0%

Portion of Landfill Covered by Gas Collection System

Portion of Landfill Covered by Collection System (3)	0%

Gas Information	Value
Methane Heating Value (HHV)	1013 Btu/scf
LFG Moisture (2)	8%
LFG Methane Content (2)	55%
LFG Heating Value	557 Btu/scf
LFG Temperature (4)	77 deg F
LFG Fugitive Flow	468 scfm

Operating Schedule	Value
Hours Per Day	24 hr/day
Days Per Year	365 day/yr
Hours Per Year	8760 hr/yr

[1] LandGEM v3.02

[2] Assumed

[3] Site Specific

[4] AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Page 2.4-5, Nov. 1998; Use AP 42 value if LFG temp not known

LFG Fugitive Flow = 468 scfm

LFG Compound	HAP	VOC	CAS	MW (lb/lb-mol)	Conc in Inlet Gas (ppmv)[1]	Landfill Emissions (lb/hr)	Landfill Emissions (tpy)
1,1,1 - Trichloroethane (methyl chloroform)	x	--	71-55-6	133.41	0.48	4.74E-03	2.08E-02
1,1,2,2 - Tetrachloroethane	x	x	79-34-5	167.85	1.11	1.38E-02	6.04E-02
1,1 - Dichloroethane (ethylidene dichloride)	x	x	75-34-3	98.96	2.35	1.72E-02	7.54E-02
1,1 - Dichloroethene (vinylidene chloride)	x	x	75-35-4	96.94	0.201	1.44E-03	6.32E-03
1,2 - Dichloroethane (ethylene dichloride)	x	x	107-06-2	98.96	0.407	2.98E-03	1.31E-02
1,2 - Dichloropropane (propylene dichloride)	x	x	78-87-5	112.99	0.18	1.50E-03	6.59E-03
2-Propanol (isopropyl alcohol)	--	x	67-63-0	60.11	50.1	2.23E-01	9.76E-01
Acetone (2-propanone)	--	--	67-64-1	58.08	7.01	3.01E-02	1.32E-01
Acrylonitrile (Propenenitrile)	x	x	107-13-1	53.06	6.33	2.49E-02	1.09E-01
Benzene	x	x	71-43-2	78.12	1.91	1.10E-02	4.84E-02
Bromodichloromethane	--	x	75-27-4	163.83	3.13	3.79E-02	1.66E-01
Butane	--	x	106-97-8	58.12	5.03	2.16E-02	9.48E-02
Carbon Disulfide	x	x	75-15-0	76.14	0.58	3.27E-03	1.43E-02
Carbon Tetrachloride	x	x	56-23-5	153.84	0.004	4.55E-05	1.99E-04
Carbonyl Sulfide	x	x	463-58-1	60.07	0.49	2.18E-03	9.54E-03
Chlorobenzene (monochlorobenzene)	x	x	108-90-7	112.56	0.254	2.12E-03	9.27E-03
Chlorodifluoromethane (CFC-22, freon-22)	--	--	75-45-6	86.47	1.3	8.32E-03	3.64E-02
Chloroethane (ethyl chloride)	x	x	75-00-3	64.52	1.25	5.97E-03	2.61E-02
Chloroform (trichloromethane)	x	x	67-66-3	119.38	0.03	2.65E-04	1.16E-03
Chloromethane (methyl chloride)	x	x	74-87-3	50.49	1.21	4.52E-03	1.98E-02
1,4 Dichlorobenzene (p-dichlorobenzene)	x	x	106-46-7	147	0.213	2.32E-03	1.01E-02
Dichlorodifluoromethane (CFC-12, freon-12)	--	--	75-71-8	120.91	15.7	1.40E-01	6.15E-01
Dichlorofluoromethane (freon-21)	--	--	75-43-4	102.92	2.62	2.00E-02	8.74E-02
Dichloromethane (methylene chloride)	x	--	75-09-2	84.93	14.3	8.99E-02	3.94E-01
Dimethyl Sulfide (methyl sulfide)	--	x	75-18-3	62.13	7.82	3.60E-02	1.57E-01
Ethane	--	--	74-84-0	30.07	889	1.98E+00	8.66E+00
Ethanol (ethyl alcohol)	--	x	64-17-5	46.08	27.2	9.27E-02	4.06E-01
Ethyl Mercaptan (ethanehiol)	--	x	75-08-1	62.13	2.25	1.03E-02	4.53E-02
Ethylbenzene	x	x	100-41-4	106.17	4.61	3.62E-02	1.59E-01
Ethylene dibromide (1,2 dibromoethane)	x	x	106-93-4	187.88	0.001	1.39E-05	6.09E-05
Fluorotrichloromethane (CFC-11, freon-11)	--	--	75-69-4	137.37	0.76	7.73E-03	3.38E-02
Hexane	x	x	110-54-3	86.18	6.57	4.19E-02	1.84E-01
Hydrogen Sulfide	--	--	7783-06-4	34.08	35.5	8.95E-02	3.92E-01
Mercury (total)	x	--	7439-97-6	200.61	2.92E-04	4.33E-06	1.90E-05
Methyl Ethyl Ketone (2-butanone)	--	x	78-93-3	72.11	7.09	3.78E-02	1.66E-01
Methyl Isobutyl Ketone (hexone)	x	x	108-10-1	100.16	1.87	1.39E-02	6.07E-02
Methyl Mercaptan	--	x	74-93-1	48.11	2.49	8.86E-03	3.88E-02
Pentane	--	x	109-66-0	72.15	3.29	1.76E-02	7.69E-02
Tetrachloroethylene (perchloroethylene, -ethene)	x	--	127-18-4	165.83	3.73	4.58E-02	2.00E-01
Propane	--	x	74-98-6	44.1	11.1	3.62E-02	1.59E-01
Toluene (methylbenzene)	x	x	108-88-3	92.14	39.3	2.68E-01	1.17E+00
Trichloroethylene (trichloroethene)	x	x	79-01-6	131.38	2.82	2.74E-02	1.20E-01
t - 1,2 - Dichloroethene (1,2 dichloroethylene)	--	x	156-60-5	96.94	2.84	2.04E-02	8.92E-02
Vinyl Chloride (chloroethylene, VCM)	x	x	75-01-4	62.50	7.34	3.39E-02	1.49E-01
Xylenes (m, o, p)	x	x	1330-20-7	106.17	12.1	9.51E-02	4.16E-01
Carbon Dioxide[2]	--	--	124-38-9	44.01	548,816	1787	7,828
Methane	--	--	74-82-8	16.04	550,000	653	2,860
Total HAP						0.75	3.29
Maximum Single HAP						0.27	1.17
VOC						1.15	5.05

[1] AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998

[2] Concentration derived from the sum of the LFG compounds and the methane concentration

R = ^{o}F + 460
standard temperature = 60 ^{o}F
standard pressure = 1 atm
Universal gas constant (R) = 0.7302 atm-ft^3/lb-mol-R

Flow
dscfm= scfm*(1-%moisture)
acfm = scfm*(actual temp[R]) ÷ (standard temp[R])*{(standard press[atm]) ÷ (actual press [atm])}

PM_{10} Emissions
(dscfm) x (CH_4 component) x (1E-6 MMscf/scf) x (lb PM/MMscf CH_4) x (60 min/hr) = lb/hr

VOC Emissions
[(scfm x 60 min/hr x (ppmv $_{compound\ x}$ 1E-06 x MW $_{compound}$)] ÷ (R x T) x (1-control efficiency) = lb/hr
OR
VOCs are 39 percent of NMOC, as prescribed in AP-42
ppmv $_{VOC}$ = (ppmv $_{NMOC}$) x 0.39

LFG Compound Emissions
[(scfm x 60 min/hr x ppmv $_{compound\ x}$ MW $_{compound}$) ÷ (R x T)] x (1-control efficiency)

HAP Emissions
[(scfm) x (60 min/hr) x (ppmv pollutant$_{conc}$) x (MW $_{pollutant}$) ÷ (R x T)] = lb/hr

GHG Emissions
CH_4 emissions (lb/hr) * GWP for CH_4 (21) + CO_2 emissions (lb/hr) * GWP for CO_2 (1) = CO_{2e} emissions (lb/hr)

Temperature Conversions
°C = (5/9) x (°F + 32), °F = (1.8°C + 32)
°F = R − 459.67, R = °F + 459.67, K = R ÷ 1.8, R = K × 1.8, °C = (R ÷ 1.8) – 273.15, R = (°C + 273.15)

Diesel Water Pump

Marana Landfill
Marana, AZ

Diesel Water Pump

Emission Source	Regulated Pollutants	Average Engine Rating	Hours of Operation		Emission Factors[3]	Actual Emissions		PTE Emissions
			Actual Hours[1]	PTE Hours[2]				
		(hp)	(hrs/yr)	(hrs/yr)	(lb/hp-hr)	(lbs/hr)	(tons/yr)	(tons/yr)
110 hp Diesel Water Pump	VOCs	110	8,760	8,760	2.470E-03	0.272	1.190	1.190
	NO_x	110	8,760	8,760	0.031	3.410	14.936	14.936
	SO_x	110	8,760	8,760	0.00205	0.226	0.988	0.988
	CO	110	8,760	8,760	0.00668	0.735	3.218	3.218
	PM_{10}[4]	110	8,760	8,760	0.0022	0.242	1.060	1.060
	Acetaldehyde	110	8,760	8,760	5.37E-06	5.91E-04	2.59E-03	2.59E-03
	Acrolein	110	8,760	8,760	6.48E-07	7.12E-05	3.12E-04	3.12E-04
	Benzene	110	8,760	8,760	6.53E-06	7.18E-04	3.15E-03	3.15E-03
	Formaldehyde	110	8,760	8,760	8.26E-06	9.09E-04	3.98E-03	3.98E-03
	1,3-Butadiene	110	8,760	8,760	2.74E-07	3.01E-05	1.32E-04	1.32E-04
	Napthalene	110	8,760	8,760	5.94E-07	6.53E-05	2.86E-04	2.86E-04
	Propylene	110	8,760	8,760	1.81E-05	1.99E-03	8.70E-03	8.70E-03
	Toluene	110	8,760	8,760	2.86E-06	3.15E-04	1.38E-03	1.38E-03
	Xylenes	110	8,760	8,760	2.00E-06	2.19E-04	9.61E-04	9.61E-04
	Total HAPs					4.91E-03	2.15E-02	2.15E-02

COMMENTS:
110 hp Diesel Water Pump

NOTES:
(1) Actual hours of operations are unknown, hours are assumed.
(2) PTE hours of operation are for 24 hours a day, 365 days per year.
(3) Emissions factors for criteria pollutants and HAPs for diesel engines are from AP-42 (10/96) Tables 3.3-1 through 3.3-2 (assumes 7000 Btu/hp-hr).
(4) For the purposes of calculating particulate, PM_{10} = PM

Non-Road Engines

Marana Landfill
Marana, AZ

Diesel Non-Road Engines

Emission Source	Regulated Pollutants	Average Engine Rating (hp)	PTE Hours of Operation[1] (hrs/yr)	Emission Factors[2] (lb/hp-hr)	PTE Emissions (each) (lbs/hr)	PTE Emissions (each) (tons/yr)
Light Plants (2)	VOCs	16	8,760	2.470E-03	0.040	0.173
	NO_x	16	8,760	0.031	0.496	2.172
	SO_x	16	8,760	0.00205	0.033	0.144
	CO	16	8,760	0.00668	0.107	0.468
	PM_{10}[3]	16	8,760	0.0022	0.035	0.154
	Acetaldehyde	16	8,760	5.37E-06	8.59E-05	3.76E-04
	Acrolein	16	8,760	6.48E-07	1.04E-05	4.54E-05
	Benzene	16	8,760	6.53E-06	1.04E-04	4.58E-04
	Formaldehyde	16	8,760	8.26E-06	1.32E-04	5.79E-04
	1,3-Butadiene	16	8,760	2.74E-07	4.38E-06	1.92E-05
	Napthalene	16	8,760	5.94E-07	9.50E-06	4.16E-05
	Propylene	16	8,760	1.81E-05	2.89E-04	1.27E-03
	Toluene	16	8,760	2.86E-06	4.58E-05	2.01E-04
	Xylenes	16	8,760	2.00E-06	3.19E-05	1.40E-04
	Total HAPs				7.13E-04	3.13E-03

COMMENTS:
Two 16 hp diesel fueled light plants.

Emission Source	Regulated Pollutants	Engine Rating (hp)	PTE Hours of Operation[1] (hrs/yr)	Emission Factors[2] (lb/hp-hr)	PTE Emissions (lbs/hr)	PTE Emissions (tons/yr)
Stormwater pump	VOCs	175	8,760	2.470E-03	0.432	1.893
	NO_x	175	8,760	0.031	5.425	23.762
	SO_x	175	8,760	0.00205	0.359	1.571
	CO	175	8,760	0.00668	1.169	5.120
	PM_{10}[3]	175	8,760	0.0022	0.385	1.686
	Acetaldehyde	175	8,760	5.37E-06	9.40E-04	4.12E-03
	Acrolein	175	8,760	6.48E-07	1.13E-04	4.96E-04
	Benzene	175	8,760	6.53E-06	1.14E-03	5.01E-03
	Formaldehyde	175	8,760	8.26E-06	1.45E-03	6.33E-03
	1,3-Butadiene	175	8,760	2.74E-07	4.79E-05	2.10E-04
	Napthalene	175	8,760	5.94E-07	1.04E-04	4.55E-04
	Propylene	175	8,760	1.81E-05	3.16E-03	1.38E-02
	Toluene	175	8,760	2.86E-06	5.01E-04	2.19E-03
	Xylenes	175	8,760	2.00E-06	3.49E-04	1.53E-03
	Total HAPs				7.80E-03	3.42E-02

COMMENTS:
175 hp diesel fueled stormwater pump

Emission Source	Regulated Pollutants	Engine Rating (hp)	PTE Hours of Operation[1] (hrs/yr)	Emission Factors[2] (lb/hp-hr)	PTE Emissions (lbs/hr)	PTE Emissions (tons/yr)
Stormwater pump	VOCs	85	8,760	2.470E-03	0.210	0.920
	NO_x	85	8,760	0.031	2.635	11.541
	SO_x	85	8,760	0.00205	0.174	0.763
	CO	85	8,760	0.00668	0.568	2.487
	PM_{10}[3]	85	8,760	0.0022	0.187	0.819
	Acetaldehyde	85	8,760	5.37E-06	4.56E-04	2.00E-03
	Acrolein	85	8,760	6.48E-07	5.50E-05	2.41E-04
	Benzene	85	8,760	6.53E-06	5.55E-04	2.43E-03
	Formaldehyde	85	8,760	8.26E-06	7.02E-04	3.08E-03
	1,3-Butadiene	85	8,760	2.74E-07	2.33E-05	1.02E-04
	Napthalene	85	8,760	5.94E-07	5.05E-05	2.21E-04
	Propylene	85	8,760	1.81E-05	1.54E-03	6.72E-03
	Toluene	85	8,760	2.86E-06	2.43E-04	1.07E-03
	Xylenes	85	8,760	2.00E-06	1.70E-04	7.43E-04
	Total HAPs				3.79E-03	1.66E-02

COMMENTS:
85 hp diesel fueled stormwater pump

Emission Source	Regulated Pollutants	Engine Rating (hp)	PTE Hours of Operation[1] (hrs/yr)	Emission Factors[3] (lb/hp-hr)	PTE Emissions (lbs/hr)	PTE Emissions (tons/yr)
Tarpomatic Engine	VOCs	25	8,760	2.470E-03	0.062	0.270
	NO_x	25	8,760	0.031	0.775	3.395
	SO_x	25	8,760	0.00205	0.051	0.224
	CO	25	8,760	0.00668	0.167	0.731
	PM_{10}[3]	25	8,760	0.0022	0.055	0.241
	Acetaldehyde	25	8,760	5.37E-06	1.34E-04	5.88E-04
	Acrolein	25	8,760	6.48E-07	1.62E-05	7.09E-05
	Benzene	25	8,760	6.53E-06	1.63E-04	7.15E-04
	Formaldehyde	25	8,760	8.26E-06	2.07E-04	9.04E-04
	1,3-Butadiene	25	8,760	2.74E-07	6.84E-06	3.00E-05
	Napthalene	25	8,760	5.94E-07	1.48E-05	6.50E-05
	Propylene	25	8,760	1.81E-05	4.52E-04	1.98E-03
	Toluene	25	8,760	2.86E-06	7.16E-05	3.13E-04
	Xylenes	25	8,760	2.00E-06	4.99E-05	2.18E-04
	Total HAPs				1.11E-03	4.88E-03

COMMENTS:
25 hp diesel fueled tarpomatic engine

Emission Source	Regulated Pollutants	Average Engine Rating (hp)	PTE Hours of Operation[1] (hrs/yr)	Emission Factors[3] (lb/hp-hr)	PTE Emissions (each) (lbs/hr)	PTE Emissions (each) (tons/yr)
Tippers	VOCs	115	8,760	2.470E-03	0.284	1.244
	NO_x	115	8,760	0.031	3.565	15.615
	SO_x	115	8,760	0.00205	0.236	1.033
	CO	115	8,760	0.00668	0.768	3.365
	PM_{10}[3]	115	8,760	0.0022	0.253	1.108
	Acetaldehyde	115	8,760	5.37E-06	6.17E-04	2.70E-03
	Acrolein	115	8,760	6.48E-07	7.45E-05	3.26E-04
	Benzene	115	8,760	6.53E-06	7.51E-04	3.29E-03
	Formaldehyde	115	8,760	8.26E-06	9.50E-04	4.16E-03
	1,3-Butadiene	115	8,760	2.74E-07	3.15E-05	1.38E-04
	Napthalene	115	8,760	5.94E-07	6.83E-05	2.99E-04
	Propylene	115	8,760	1.81E-05	2.08E-03	9.10E-03
	Toluene	115	8,760	2.86E-06	3.29E-04	1.44E-03
	Xylenes	115	8,760	2.00E-06	2.29E-04	1.00E-03
	Total HAPs				5.13E-03	2.25E-02

COMMENTS:
Two 115 hp diesel fueled tippers

NOTES:
(1) PTE hours of operation are for 24 hours a day, 365 days per year.
(2) Emissions factors for criteria pollutants and HAPs for diesel engines are from AP-42 (10/96) Tables 3.3-1 through 3.3-2 (assumes 7000 Btu/hp-hr).
(3) For the purposes of calculating particulate, PM_{10} = PM

NON-ROAD ENGINES: The following summary is intended to succinctly state the background/genesis of the non-road (USEPA spells nonroad) program.

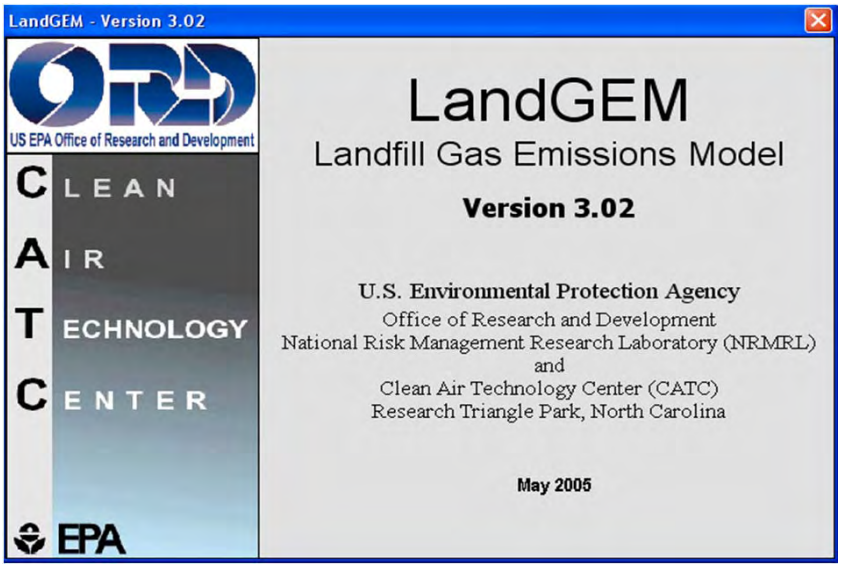
USEPA published the final nonroad engine definition and its response to comments received regarding the final definition in the Federal Register on June 17, 1994. In this document titled, "Control of Air Pollution; Determination of Significance for Nonroad Sources and Emission Standards for New Nonroad Compression Ignition Engines At or Above 37 Kilowatts", USEPA clearly states that they intended to regulate nonroad engines based upon "use of the engine, which is a more appropriate and reliable indicator of its classification."

In USEPA's efforts to explain this significant aspect, USEPA defined the term "location" within the nonroad definition. Below is an excerpt from the above document:
"The term "location" has been defined so as to permit a "location" to exist within a facility. Section (2)(iii) of the revised definition defines "location" as "any single site at a building, structure, facility or installation." This definition of "location" provides more precision in classifying an engine as nonroad if the engine is actually intended to be used in a mobile manner within a stationary source. In other words, an engine would be considered nonroad if it moves to different sites within a stationary source."

Additionally, NSPS Subparts IIII and JJJJ definitions state that "stationary internal combustion engine" is not a non-road engine as defined at 40 CFR 1068.30.

APPENDIX B

LANDFILL GAS GENERATION RATES – EPA MODEL OUTPUT



Summary Report

Landfill Name or Identifier: Marana Landfill - 75% Organic

Date: Thursday, September 15, 2011

Description/Comments:
Marana Landfill landgem based on 76,000,000 ton design capacity * 75% organic = 57,000,000 tons. Annual waste acceptance based on 2,000 tpd * 365 days = 730,000 tpy * 75% organic = 547,500 tpy. NMOC is site specific. Lo and k values are based on arid area.

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

The 80-year waste acceptance limit of the model has been exceeded before the Waste Design Capacity was reached. The model will assume the 80th year of waste acceptance as the final year to estimate emissions. See Section 2.6 of the User's Manual.

LANDFILL CHARACTERISTICS

Landfill Open Year	**2012**	
Landfill Closure Year (with 80-year limit)	**2091**	
Actual Closure Year (without limit)	***2116***	
Have Model Calculate Closure Year?	**Yes**	
Waste Design Capacity	**57,000,000**	*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.020**	*year $^{-1}$*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**600**	*ppmv as hexane*
Methane Content	**55**	*% 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)*
2012	497,727	547,500	0	0
2013	497,727	547,500	497,727	547,500
2014	497,727	547,500	995,455	1,095,000
2015	497,727	547,500	1,493,182	1,642,500
2016	497,727	547,500	1,990,909	2,190,000
2017	497,727	547,500	2,488,636	2,737,500
2018	497,727	547,500	2,986,364	3,285,000
2019	497,727	547,500	3,484,091	3,832,500
2020	497,727	547,500	3,981,818	4,380,000
2021	497,727	547,500	4,479,545	4,927,500
2022	497,727	547,500	4,977,273	5,475,000
2023	497,727	547,500	5,475,000	6,022,500
2024	497,727	547,500	5,972,727	6,570,000
2025	497,727	547,500	6,470,455	7,117,500
2026	497,727	547,500	6,968,182	7,665,000
2027	497,727	547,500	7,465,909	8,212,500
2028	497,727	547,500	7,963,636	8,760,000
2029	497,727	547,500	8,461,364	9,307,500
2030	497,727	547,500	8,959,091	9,855,000
2031	497,727	547,500	9,456,818	10,402,500
2032	497,727	547,500	9,954,545	10,950,000
2033	497,727	547,500	10,452,273	11,497,500
2034	497,727	547,500	10,950,000	12,045,000
2035	497,727	547,500	11,447,727	12,592,500
2036	497,727	547,500	11,945,455	13,140,000
2037	497,727	547,500	12,443,182	13,687,500
2038	497,727	547,500	12,940,909	14,235,000
2039	497,727	547,500	13,438,636	14,782,500
2040	497,727	547,500	13,936,364	15,330,000
2041	497,727	547,500	14,434,091	15,877,500
2042	497,727	547,500	14,931,818	16,425,000
2043	497,727	547,500	15,429,545	16,972,500
2044	497,727	547,500	15,927,273	17,520,000
2045	497,727	547,500	16,425,000	18,067,500
2046	497,727	547,500	16,922,727	18,615,000
2047	497,727	547,500	17,420,455	19,162,500
2048	497,727	547,500	17,918,182	19,710,000
2049	497,727	547,500	18,415,909	20,257,500
2050	497,727	547,500	18,913,636	20,805,000
2051	497,727	547,500	19,411,364	21,352,500

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2052	497,727	547,500	19,909,091	21,900,000
2053	497,727	547,500	20,406,818	22,447,500
2054	497,727	547,500	20,904,545	22,995,000
2055	497,727	547,500	21,402,273	23,542,500
2056	497,727	547,500	21,900,000	24,090,000
2057	497,727	547,500	22,397,727	24,637,500
2058	497,727	547,500	22,895,455	25,185,000
2059	497,727	547,500	23,393,182	25,732,500
2060	497,727	547,500	23,890,909	26,280,000
2061	497,727	547,500	24,388,636	26,827,500
2062	497,727	547,500	24,886,364	27,375,000
2063	497,727	547,500	25,384,091	27,922,500
2064	497,727	547,500	25,881,818	28,470,000
2065	497,727	547,500	26,379,545	29,017,500
2066	497,727	547,500	26,877,273	29,565,000
2067	497,727	547,500	27,375,000	30,112,500
2068	497,727	547,500	27,872,727	30,660,000
2069	497,727	547,500	28,370,455	31,207,500
2070	497,727	547,500	28,868,182	31,755,000
2071	497,727	547,500	29,365,909	32,302,500
2072	497,727	547,500	29,863,636	32,850,000
2073	497,727	547,500	30,361,364	33,397,500
2074	497,727	547,500	30,859,091	33,945,000
2075	497,727	547,500	31,356,818	34,492,500
2076	497,727	547,500	31,854,545	35,040,000
2077	497,727	547,500	32,352,273	35,587,500
2078	497,727	547,500	32,850,000	36,135,000
2079	497,727	547,500	33,347,727	36,682,500
2080	497,727	547,500	33,845,455	37,230,000
2081	497,727	547,500	34,343,182	37,777,500
2082	497,727	547,500	34,840,909	38,325,000
2083	497,727	547,500	35,338,636	38,872,500
2084	497,727	547,500	35,836,364	39,420,000
2085	497,727	547,500	36,334,091	39,967,500
2086	497,727	547,500	36,831,818	40,515,000
2087	497,727	547,500	37,329,545	41,062,500
2088	497,727	547,500	37,827,273	41,610,000
2089	497,727	547,500	38,325,000	42,157,500
2090	497,727	547,500	38,822,727	42,705,000
2091	497,727	547,500	39,320,455	43,252,500

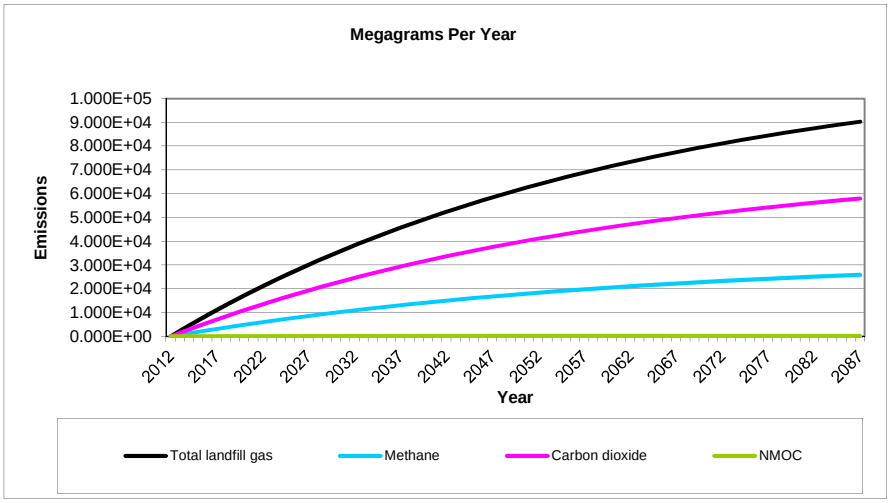
Pollutant Parameters

	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
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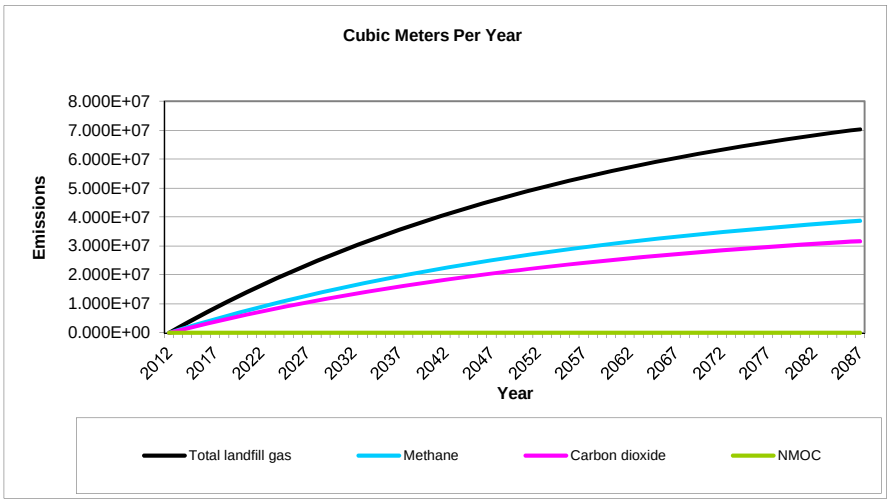
9.000E+04
8.000E+04
7.000E+04
6.000E+04
5.000E+04
4.000E+04
3.000E+04
2.000E+04
1.000E+04
0.000E+00
2012 2017 2022 2027 2032 2037 2042 2047 2052 2057 2062 2067 2072 2077 2082 2087
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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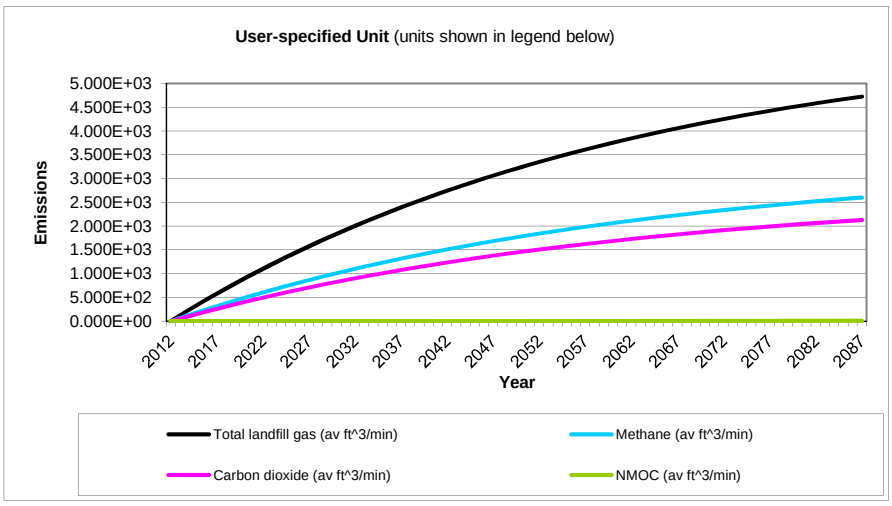
7.000E+07
6.000E+07
5.000E+07
4.000E+07
3.000E+07
2.000E+07
1.000E+07
0.000E+00
2012 2017 2022 2027 2032 2037 2042 2047 2052 2057 2062 2067 2072 2077 2082 2087
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
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4.500E+03
4.000E+03
3.500E+03
3.000E+03
2.500E+03
2.000E+03
1.500E+03
1.000E+03
5.000E+02
0.000E+00
2012 2017 2022 2027 2032 2037 2042 2047 2052 2057 2062 2067 2072 2077 2082 2087
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)*
2012	0	0	0	0	0	0
2013	2.300E+03	1.794E+06	1.205E+02	6.582E+02	9.866E+05	6.629E+01
2014	4.554E+03	3.552E+06	2.387E+02	1.303E+03	1.954E+06	1.313E+02
2015	6.764E+03	5.275E+06	3.544E+02	1.936E+03	2.901E+06	1.949E+02
2016	8.930E+03	6.965E+06	4.680E+02	2.556E+03	3.831E+06	2.574E+02
2017	1.105E+04	8.620E+06	5.792E+02	3.163E+03	4.741E+06	3.186E+02
2018	1.313E+04	1.024E+07	6.883E+02	3.759E+03	5.634E+06	3.785E+02
2019	1.517E+04	1.183E+07	7.951E+02	4.342E+03	6.509E+06	4.373E+02
2020	1.717E+04	1.339E+07	8.999E+02	4.915E+03	7.367E+06	4.950E+02
2021	1.913E+04	1.492E+07	1.003E+03	5.475E+03	8.207E+06	5.514E+02
2022	2.105E+04	1.642E+07	1.103E+03	6.025E+03	9.031E+06	6.068E+02
2023	2.294E+04	1.789E+07	1.202E+03	6.564E+03	9.839E+06	6.611E+02
2024	2.478E+04	1.933E+07	1.299E+03	7.092E+03	1.063E+07	7.143E+02
2025	2.659E+04	2.074E+07	1.393E+03	7.610E+03	1.141E+07	7.664E+02
2026	2.837E+04	2.212E+07	1.486E+03	8.118E+03	1.217E+07	8.175E+02
2027	3.010E+04	2.348E+07	1.578E+03	8.615E+03	1.291E+07	8.676E+02
2028	3.181E+04	2.481E+07	1.667E+03	9.103E+03	1.364E+07	9.167E+02
2029	3.348E+04	2.611E+07	1.754E+03	9.580E+03	1.436E+07	9.649E+02
2030	3.511E+04	2.739E+07	1.840E+03	1.005E+04	1.506E+07	1.012E+03
2031	3.672E+04	2.864E+07	1.924E+03	1.051E+04	1.575E+07	1.058E+03
2032	3.829E+04	2.986E+07	2.007E+03	1.096E+04	1.643E+07	1.104E+03
2033	3.983E+04	3.107E+07	2.087E+03	1.140E+04	1.709E+07	1.148E+03
2034	4.134E+04	3.225E+07	2.167E+03	1.183E+04	1.774E+07	1.192E+03
2035	4.283E+04	3.340E+07	2.244E+03	1.226E+04	1.837E+07	1.234E+03
2036	4.428E+04	3.453E+07	2.320E+03	1.267E+04	1.899E+07	1.276E+03
2037	4.570E+04	3.564E+07	2.395E+03	1.308E+04	1.960E+07	1.317E+03
2038	4.710E+04	3.673E+07	2.468E+03	1.348E+04	2.020E+07	1.357E+03
2039	4.846E+04	3.780E+07	2.540E+03	1.387E+04	2.079E+07	1.397E+03
2040	4.980E+04	3.884E+07	2.610E+03	1.425E+04	2.136E+07	1.435E+03
2041	5.112E+04	3.987E+07	2.679E+03	1.463E+04	2.193E+07	1.473E+03
2042	5.240E+04	4.087E+07	2.746E+03	1.500E+04	2.248E+07	1.510E+03
2043	5.367E+04	4.186E+07	2.812E+03	1.536E+04	2.302E+07	1.547E+03
2044	5.490E+04	4.282E+07	2.877E+03	1.571E+04	2.355E+07	1.582E+03
2045	5.612E+04	4.377E+07	2.941E+03	1.606E+04	2.407E+07	1.617E+03
2046	5.731E+04	4.469E+07	3.003E+03	1.640E+04	2.458E+07	1.652E+03
2047	5.847E+04	4.560E+07	3.064E+03	1.673E+04	2.508E+07	1.685E+03
2048	5.961E+04	4.649E+07	3.124E+03	1.706E+04	2.557E+07	1.718E+03
2049	6.073E+04	4.737E+07	3.183E+03	1.738E+04	2.605E+07	1.750E+03
2050	6.183E+04	4.822E+07	3.240E+03	1.769E+04	2.652E+07	1.782E+03
2051	6.291E+04	4.906E+07	3.296E+03	1.800E+04	2.698E+07	1.813E+03
2052	6.396E+04	4.988E+07	3.352E+03	1.830E+04	2.744E+07	1.843E+03
2053	6.499E+04	5.069E+07	3.406E+03	1.860E+04	2.788E+07	1.873E+03
2054	6.601E+04	5.148E+07	3.459E+03	1.889E+04	2.831E+07	1.902E+03
2055	6.700E+04	5.225E+07	3.511E+03	1.917E+04	2.874E+07	1.931E+03
2056	6.797E+04	5.301E+07	3.562E+03	1.945E+04	2.916E+07	1.959E+03
2057	6.893E+04	5.376E+07	3.612E+03	1.973E+04	2.957E+07	1.987E+03
2058	6.986E+04	5.449E+07	3.661E+03	1.999E+04	2.997E+07	2.013E+03
2059	7.078E+04	5.520E+07	3.709E+03	2.025E+04	3.036E+07	2.040E+03
2060	7.168E+04	5.590E+07	3.756E+03	2.051E+04	3.075E+07	2.066E+03
2061	7.256E+04	5.659E+07	3.802E+03	2.076E+04	3.112E+07	2.091E+03

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)*
2062	7.342E+04	5.726E+07	3.847E+03	2.101E+04	3.149E+07	2.116E+03
2063	7.427E+04	5.792E+07	3.892E+03	2.125E+04	3.186E+07	2.140E+03
2064	7.510E+04	5.857E+07	3.935E+03	2.149E+04	3.221E+07	2.164E+03
2065	7.591E+04	5.920E+07	3.978E+03	2.172E+04	3.256E+07	2.188E+03
2066	7.670E+04	5.982E+07	4.020E+03	2.195E+04	3.290E+07	2.211E+03
2067	7.749E+04	6.043E+07	4.060E+03	2.217E+04	3.324E+07	2.233E+03
2068	7.825E+04	6.103E+07	4.101E+03	2.239E+04	3.357E+07	2.255E+03
2069	7.900E+04	6.162E+07	4.140E+03	2.261E+04	3.389E+07	2.277E+03
2070	7.974E+04	6.219E+07	4.178E+03	2.282E+04	3.420E+07	2.298E+03
2071	8.046E+04	6.275E+07	4.216E+03	2.303E+04	3.451E+07	2.319E+03
2072	8.117E+04	6.330E+07	4.253E+03	2.323E+04	3.482E+07	2.339E+03
2073	8.186E+04	6.384E+07	4.290E+03	2.343E+04	3.511E+07	2.359E+03
2074	8.254E+04	6.437E+07	4.325E+03	2.362E+04	3.540E+07	2.379E+03
2075	8.320E+04	6.489E+07	4.360E+03	2.381E+04	3.569E+07	2.398E+03
2076	8.385E+04	6.540E+07	4.394E+03	2.400E+04	3.597E+07	2.417E+03
2077	8.449E+04	6.590E+07	4.428E+03	2.418E+04	3.624E+07	2.435E+03
2078	8.512E+04	6.639E+07	4.461E+03	2.436E+04	3.651E+07	2.453E+03
2079	8.574E+04	6.687E+07	4.493E+03	2.454E+04	3.678E+07	2.471E+03
2080	8.634E+04	6.734E+07	4.524E+03	2.471E+04	3.704E+07	2.488E+03
2081	8.693E+04	6.780E+07	4.555E+03	2.488E+04	3.729E+07	2.505E+03
2082	8.751E+04	6.825E+07	4.586E+03	2.504E+04	3.754E+07	2.522E+03
2083	8.807E+04	6.869E+07	4.615E+03	2.520E+04	3.778E+07	2.538E+03
2084	8.863E+04	6.912E+07	4.644E+03	2.536E+04	3.802E+07	2.554E+03
2085	8.917E+04	6.955E+07	4.673E+03	2.552E+04	3.825E+07	2.570E+03
2086	8.971E+04	6.997E+07	4.701E+03	2.567E+04	3.848E+07	2.586E+03
2087	9.023E+04	7.037E+07	4.728E+03	2.582E+04	3.871E+07	2.601E+03
2088	9.075E+04	7.077E+07	4.755E+03	2.597E+04	3.893E+07	2.615E+03
2089	9.125E+04	7.117E+07	4.782E+03	2.611E+04	3.914E+07	2.630E+03
2090	9.174E+04	7.155E+07	4.807E+03	2.625E+04	3.935E+07	2.644E+03
2091	9.222E+04	7.193E+07	4.833E+03	2.639E+04	3.956E+07	2.658E+03
2092	9.270E+04	7.230E+07	4.858E+03	2.653E+04	3.976E+07	2.672E+03
2093	9.086E+04	7.087E+07	4.761E+03	2.600E+04	3.898E+07	2.619E+03
2094	8.906E+04	6.946E+07	4.667E+03	2.549E+04	3.820E+07	2.567E+03
2095	8.730E+04	6.809E+07	4.575E+03	2.498E+04	3.745E+07	2.516E+03
2096	8.557E+04	6.674E+07	4.484E+03	2.449E+04	3.671E+07	2.466E+03
2097	8.388E+04	6.542E+07	4.395E+03	2.400E+04	3.598E+07	2.417E+03
2098	8.222E+04	6.412E+07	4.308E+03	2.353E+04	3.527E+07	2.370E+03
2099	8.059E+04	6.285E+07	4.223E+03	2.306E+04	3.457E+07	2.323E+03
2100	7.899E+04	6.161E+07	4.139E+03	2.261E+04	3.388E+07	2.277E+03
2101	7.743E+04	6.039E+07	4.057E+03	2.216E+04	3.321E+07	2.232E+03
2102	7.589E+04	5.919E+07	3.977E+03	2.172E+04	3.256E+07	2.187E+03
2103	7.439E+04	5.802E+07	3.898E+03	2.129E+04	3.191E+07	2.144E+03
2104	7.292E+04	5.687E+07	3.821E+03	2.087E+04	3.128E+07	2.102E+03
2105	7.148E+04	5.574E+07	3.745E+03	2.045E+04	3.066E+07	2.060E+03
2106	7.006E+04	5.464E+07	3.671E+03	2.005E+04	3.005E+07	2.019E+03
2107	6.867E+04	5.356E+07	3.599E+03	1.965E+04	2.946E+07	1.979E+03
2108	6.731E+04	5.250E+07	3.527E+03	1.926E+04	2.887E+07	1.940E+03
2109	6.598E+04	5.146E+07	3.458E+03	1.888E+04	2.830E+07	1.902E+03
2110	6.467E+04	5.044E+07	3.389E+03	1.851E+04	2.774E+07	1.864E+03
2111	6.339E+04	4.944E+07	3.322E+03	1.814E+04	2.719E+07	1.827E+03
2112	6.214E+04	4.846E+07	3.256E+03	1.778E+04	2.665E+07	1.791E+03

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)*
2113	6.091E+04	4.750E+07	3.192E+03	1.743E+04	2.613E+07	1.755E+03
2114	5.970E+04	4.656E+07	3.129E+03	1.709E+04	2.561E+07	1.721E+03
2115	5.852E+04	4.564E+07	3.067E+03	1.675E+04	2.510E+07	1.687E+03
2116	5.736E+04	4.474E+07	3.006E+03	1.642E+04	2.461E+07	1.653E+03
2117	5.622E+04	4.385E+07	2.946E+03	1.609E+04	2.412E+07	1.620E+03
2118	5.511E+04	4.298E+07	2.888E+03	1.577E+04	2.364E+07	1.588E+03
2119	5.402E+04	4.213E+07	2.831E+03	1.546E+04	2.317E+07	1.557E+03
2120	5.295E+04	4.130E+07	2.775E+03	1.515E+04	2.271E+07	1.526E+03
2121	5.190E+04	4.048E+07	2.720E+03	1.485E+04	2.226E+07	1.496E+03
2122	5.087E+04	3.968E+07	2.666E+03	1.456E+04	2.182E+07	1.466E+03
2123	4.987E+04	3.889E+07	2.613E+03	1.427E+04	2.139E+07	1.437E+03
2124	4.888E+04	3.812E+07	2.561E+03	1.399E+04	2.097E+07	1.409E+03
2125	4.791E+04	3.737E+07	2.511E+03	1.371E+04	2.055E+07	1.381E+03
2126	4.696E+04	3.663E+07	2.461E+03	1.344E+04	2.014E+07	1.354E+03
2127	4.603E+04	3.590E+07	2.412E+03	1.317E+04	1.975E+07	1.327E+03
2128	4.512E+04	3.519E+07	2.364E+03	1.291E+04	1.935E+07	1.300E+03
2129	4.423E+04	3.449E+07	2.318E+03	1.266E+04	1.897E+07	1.275E+03
2130	4.335E+04	3.381E+07	2.272E+03	1.241E+04	1.860E+07	1.249E+03
2131	4.249E+04	3.314E+07	2.227E+03	1.216E+04	1.823E+07	1.225E+03
2132	4.165E+04	3.249E+07	2.183E+03	1.192E+04	1.787E+07	1.200E+03
2133	4.083E+04	3.184E+07	2.139E+03	1.168E+04	1.751E+07	1.177E+03
2134	4.002E+04	3.121E+07	2.097E+03	1.145E+04	1.717E+07	1.153E+03
2135	3.923E+04	3.059E+07	2.056E+03	1.123E+04	1.683E+07	1.131E+03
2136	3.845E+04	2.999E+07	2.015E+03	1.100E+04	1.649E+07	1.108E+03
2137	3.769E+04	2.939E+07	1.975E+03	1.079E+04	1.617E+07	1.086E+03
2138	3.694E+04	2.881E+07	1.936E+03	1.057E+04	1.585E+07	1.065E+03
2139	3.621E+04	2.824E+07	1.898E+03	1.036E+04	1.553E+07	1.044E+03
2140	3.549E+04	2.768E+07	1.860E+03	1.016E+04	1.523E+07	1.023E+03
2141	3.479E+04	2.713E+07	1.823E+03	9.956E+03	1.492E+07	1.003E+03
2142	3.410E+04	2.660E+07	1.787E+03	9.759E+03	1.463E+07	9.829E+02
2143	3.343E+04	2.607E+07	1.752E+03	9.566E+03	1.434E+07	9.634E+02
2144	3.276E+04	2.555E+07	1.717E+03	9.377E+03	1.405E+07	9.443E+02
2145	3.212E+04	2.505E+07	1.683E+03	9.191E+03	1.378E+07	9.256E+02
2146	3.148E+04	2.455E+07	1.650E+03	9.009E+03	1.350E+07	9.073E+02
2147	3.086E+04	2.407E+07	1.617E+03	8.830E+03	1.324E+07	8.893E+02
2148	3.025E+04	2.359E+07	1.585E+03	8.656E+03	1.297E+07	8.717E+02
2149	2.965E+04	2.312E+07	1.554E+03	8.484E+03	1.272E+07	8.545E+02
2150	2.906E+04	2.266E+07	1.523E+03	8.316E+03	1.247E+07	8.375E+02
2151	2.848E+04	2.222E+07	1.493E+03	8.152E+03	1.222E+07	8.210E+02
2152	2.792E+04	2.178E+07	1.463E+03	7.990E+03	1.198E+07	8.047E+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)*
2012	0	0	0	0	0	0
2013	1.478E+03	8.072E+05	5.423E+01	3.858E+00	1.076E+03	7.231E-02
2014	2.926E+03	1.598E+06	1.074E+02	7.639E+00	2.131E+03	1.432E-01
2015	4.345E+03	2.374E+06	1.595E+02	1.135E+01	3.165E+03	2.127E-01
2016	5.737E+03	3.134E+06	2.106E+02	1.498E+01	4.179E+03	2.808E-01
2017	7.101E+03	3.879E+06	2.606E+02	1.854E+01	5.172E+03	3.475E-01
2018	8.438E+03	4.610E+06	3.097E+02	2.203E+01	6.146E+03	4.130E-01
2019	9.748E+03	5.325E+06	3.578E+02	2.545E+01	7.101E+03	4.771E-01
2020	1.103E+04	6.027E+06	4.050E+02	2.881E+01	8.036E+03	5.400E-01
2021	1.229E+04	6.715E+06	4.512E+02	3.209E+01	8.953E+03	6.016E-01
2022	1.353E+04	7.389E+06	4.965E+02	3.532E+01	9.852E+03	6.620E-01
2023	1.474E+04	8.050E+06	5.409E+02	3.847E+01	1.073E+04	7.212E-01
2024	1.592E+04	8.698E+06	5.844E+02	4.157E+01	1.160E+04	7.792E-01
2025	1.708E+04	9.333E+06	6.271E+02	4.460E+01	1.244E+04	8.361E-01
2026	1.822E+04	9.955E+06	6.689E+02	4.758E+01	1.327E+04	8.919E-01
2027	1.934E+04	1.057E+07	7.099E+02	5.049E+01	1.409E+04	9.465E-01
2028	2.043E+04	1.116E+07	7.501E+02	5.335E+01	1.488E+04	1.000E+00
2029	2.151E+04	1.175E+07	7.894E+02	5.615E+01	1.567E+04	1.053E+00
2030	2.256E+04	1.232E+07	8.280E+02	5.890E+01	1.643E+04	1.104E+00
2031	2.359E+04	1.289E+07	8.659E+02	6.159E+01	1.718E+04	1.155E+00
2032	2.460E+04	1.344E+07	9.030E+02	6.423E+01	1.792E+04	1.204E+00
2033	2.559E+04	1.398E+07	9.393E+02	6.681E+01	1.864E+04	1.252E+00
2034	2.656E+04	1.451E+07	9.750E+02	6.935E+01	1.935E+04	1.300E+00
2035	2.751E+04	1.503E+07	1.010E+03	7.183E+01	2.004E+04	1.347E+00
2036	2.845E+04	1.554E+07	1.044E+03	7.427E+01	2.072E+04	1.392E+00
2037	2.936E+04	1.604E+07	1.078E+03	7.666E+01	2.139E+04	1.437E+00
2038	3.026E+04	1.653E+07	1.111E+03	7.900E+01	2.204E+04	1.481E+00
2039	3.113E+04	1.701E+07	1.143E+03	8.129E+01	2.268E+04	1.524E+00
2040	3.200E+04	1.748E+07	1.174E+03	8.354E+01	2.331E+04	1.566E+00
2041	3.284E+04	1.794E+07	1.205E+03	8.574E+01	2.392E+04	1.607E+00
2042	3.367E+04	1.839E+07	1.236E+03	8.790E+01	2.452E+04	1.648E+00
2043	3.448E+04	1.884E+07	1.266E+03	9.002E+01	2.511E+04	1.687E+00
2044	3.527E+04	1.927E+07	1.295E+03	9.209E+01	2.569E+04	1.726E+00
2045	3.605E+04	1.970E+07	1.323E+03	9.413E+01	2.626E+04	1.764E+00
2046	3.682E+04	2.011E+07	1.351E+03	9.612E+01	2.682E+04	1.802E+00
2047	3.756E+04	2.052E+07	1.379E+03	9.808E+01	2.736E+04	1.838E+00
2048	3.830E+04	2.092E+07	1.406E+03	9.999E+01	2.790E+04	1.874E+00
2049	3.902E+04	2.131E+07	1.432E+03	1.019E+02	2.842E+04	1.910E+00
2050	3.972E+04	2.170E+07	1.458E+03	1.037E+02	2.893E+04	1.944E+00
2051	4.041E+04	2.208E+07	1.483E+03	1.055E+02	2.944E+04	1.978E+00
2052	4.109E+04	2.245E+07	1.508E+03	1.073E+02	2.993E+04	2.011E+00
2053	4.175E+04	2.281E+07	1.533E+03	1.090E+02	3.041E+04	2.043E+00
2054	4.240E+04	2.317E+07	1.556E+03	1.107E+02	3.089E+04	2.075E+00
2055	4.304E+04	2.351E+07	1.580E+03	1.124E+02	3.135E+04	2.107E+00
2056	4.367E+04	2.386E+07	1.603E+03	1.140E+02	3.181E+04	2.137E+00
2057	4.428E+04	2.419E+07	1.625E+03	1.156E+02	3.225E+04	2.167E+00
2058	4.488E+04	2.452E+07	1.647E+03	1.172E+02	3.269E+04	2.197E+00
2059	4.547E+04	2.484E+07	1.669E+03	1.187E+02	3.312E+04	2.225E+00
2060	4.605E+04	2.516E+07	1.690E+03	1.202E+02	3.354E+04	2.254E+00
2061	4.661E+04	2.546E+07	1.711E+03	1.217E+02	3.395E+04	2.281E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2062	4.717E+04	2.577E+07	1.731E+03	1.232E+02	3.436E+04	2.308E+00
2063	4.771E+04	2.606E+07	1.751E+03	1.246E+02	3.475E+04	2.335E+00
2064	4.824E+04	2.636E+07	1.771E+03	1.260E+02	3.514E+04	2.361E+00
2065	4.877E+04	2.664E+07	1.790E+03	1.273E+02	3.552E+04	2.387E+00
2066	4.928E+04	2.692E+07	1.809E+03	1.287E+02	3.589E+04	2.412E+00
2067	4.978E+04	2.719E+07	1.827E+03	1.300E+02	3.626E+04	2.436E+00
2068	5.027E+04	2.746E+07	1.845E+03	1.313E+02	3.662E+04	2.460E+00
2069	5.075E+04	2.773E+07	1.863E+03	1.325E+02	3.697E+04	2.484E+00
2070	5.123E+04	2.798E+07	1.880E+03	1.337E+02	3.731E+04	2.507E+00
2071	5.169E+04	2.824E+07	1.897E+03	1.350E+02	3.765E+04	2.530E+00
2072	5.214E+04	2.849E+07	1.914E+03	1.361E+02	3.798E+04	2.552E+00
2073	5.259E+04	2.873E+07	1.930E+03	1.373E+02	3.831E+04	2.574E+00
2074	5.302E+04	2.897E+07	1.946E+03	1.384E+02	3.862E+04	2.595E+00
2075	5.345E+04	2.920E+07	1.962E+03	1.396E+02	3.893E+04	2.616E+00
2076	5.387E+04	2.943E+07	1.977E+03	1.407E+02	3.924E+04	2.637E+00
2077	5.428E+04	2.965E+07	1.992E+03	1.417E+02	3.954E+04	2.657E+00
2078	5.469E+04	2.987E+07	2.007E+03	1.428E+02	3.983E+04	2.676E+00
2079	5.508E+04	3.009E+07	2.022E+03	1.438E+02	4.012E+04	2.696E+00
2080	5.547E+04	3.030E+07	2.036E+03	1.448E+02	4.040E+04	2.715E+00
2081	5.585E+04	3.051E+07	2.050E+03	1.458E+02	4.068E+04	2.733E+00
2082	5.622E+04	3.071E+07	2.064E+03	1.468E+02	4.095E+04	2.751E+00
2083	5.658E+04	3.091E+07	2.077E+03	1.477E+02	4.121E+04	2.769E+00
2084	5.694E+04	3.111E+07	2.090E+03	1.487E+02	4.147E+04	2.787E+00
2085	5.729E+04	3.130E+07	2.103E+03	1.496E+02	4.173E+04	2.804E+00
2086	5.763E+04	3.148E+07	2.115E+03	1.505E+02	4.198E+04	2.821E+00
2087	5.797E+04	3.167E+07	2.128E+03	1.514E+02	4.222E+04	2.837E+00
2088	5.830E+04	3.185E+07	2.140E+03	1.522E+02	4.246E+04	2.853E+00
2089	5.862E+04	3.202E+07	2.152E+03	1.531E+02	4.270E+04	2.869E+00
2090	5.894E+04	3.220E+07	2.163E+03	1.539E+02	4.293E+04	2.884E+00
2091	5.925E+04	3.237E+07	2.175E+03	1.547E+02	4.316E+04	2.900E+00
2092	5.955E+04	3.253E+07	2.186E+03	1.555E+02	4.338E+04	2.915E+00
2093	5.837E+04	3.189E+07	2.143E+03	1.524E+02	4.252E+04	2.857E+00
2094	5.722E+04	3.126E+07	2.100E+03	1.494E+02	4.168E+04	2.800E+00
2095	5.608E+04	3.064E+07	2.059E+03	1.464E+02	4.085E+04	2.745E+00
2096	5.497E+04	3.003E+07	2.018E+03	1.435E+02	4.004E+04	2.691E+00
2097	5.389E+04	2.944E+07	1.978E+03	1.407E+02	3.925E+04	2.637E+00
2098	5.282E+04	2.885E+07	1.939E+03	1.379E+02	3.847E+04	2.585E+00
2099	5.177E+04	2.828E+07	1.900E+03	1.352E+02	3.771E+04	2.534E+00
2100	5.075E+04	2.772E+07	1.863E+03	1.325E+02	3.696E+04	2.484E+00
2101	4.974E+04	2.717E+07	1.826E+03	1.299E+02	3.623E+04	2.434E+00
2102	4.876E+04	2.664E+07	1.790E+03	1.273E+02	3.552E+04	2.386E+00
2103	4.779E+04	2.611E+07	1.754E+03	1.248E+02	3.481E+04	2.339E+00
2104	4.685E+04	2.559E+07	1.720E+03	1.223E+02	3.412E+04	2.293E+00
2105	4.592E+04	2.509E+07	1.685E+03	1.199E+02	3.345E+04	2.247E+00
2106	4.501E+04	2.459E+07	1.652E+03	1.175E+02	3.278E+04	2.203E+00
2107	4.412E+04	2.410E+07	1.619E+03	1.152E+02	3.214E+04	2.159E+00
2108	4.324E+04	2.362E+07	1.587E+03	1.129E+02	3.150E+04	2.116E+00
2109	4.239E+04	2.316E+07	1.556E+03	1.107E+02	3.088E+04	2.075E+00
2110	4.155E+04	2.270E+07	1.525E+03	1.085E+02	3.026E+04	2.033E+00
2111	4.073E+04	2.225E+07	1.495E+03	1.063E+02	2.966E+04	1.993E+00
2112	3.992E+04	2.181E+07	1.465E+03	1.042E+02	2.908E+04	1.954E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2113	3.913E+04	2.138E+07	1.436E+03	1.022E+02	2.850E+04	1.915E+00
2114	3.835E+04	2.095E+07	1.408E+03	1.001E+02	2.794E+04	1.877E+00
2115	3.759E+04	2.054E+07	1.380E+03	9.816E+01	2.738E+04	1.840E+00
2116	3.685E+04	2.013E+07	1.353E+03	9.621E+01	2.684E+04	1.803E+00
2117	3.612E+04	1.973E+07	1.326E+03	9.431E+01	2.631E+04	1.768E+00
2118	3.541E+04	1.934E+07	1.300E+03	9.244E+01	2.579E+04	1.733E+00
2119	3.470E+04	1.896E+07	1.274E+03	9.061E+01	2.528E+04	1.698E+00
2120	3.402E+04	1.858E+07	1.249E+03	8.882E+01	2.478E+04	1.665E+00
2121	3.334E+04	1.822E+07	1.224E+03	8.706E+01	2.429E+04	1.632E+00
2122	3.268E+04	1.785E+07	1.200E+03	8.533E+01	2.381E+04	1.600E+00
2123	3.204E+04	1.750E+07	1.176E+03	8.364E+01	2.334E+04	1.568E+00
2124	3.140E+04	1.715E+07	1.153E+03	8.199E+01	2.287E+04	1.537E+00
2125	3.078E+04	1.682E+07	1.130E+03	8.036E+01	2.242E+04	1.506E+00
2126	3.017E+04	1.648E+07	1.107E+03	7.877E+01	2.198E+04	1.477E+00
2127	2.957E+04	1.616E+07	1.086E+03	7.721E+01	2.154E+04	1.447E+00
2128	2.899E+04	1.584E+07	1.064E+03	7.568E+01	2.111E+04	1.419E+00
2129	2.841E+04	1.552E+07	1.043E+03	7.419E+01	2.070E+04	1.391E+00
2130	2.785E+04	1.521E+07	1.022E+03	7.272E+01	2.029E+04	1.363E+00
2131	2.730E+04	1.491E+07	1.002E+03	7.128E+01	1.988E+04	1.336E+00
2132	2.676E+04	1.462E+07	9.822E+02	6.987E+01	1.949E+04	1.310E+00
2133	2.623E+04	1.433E+07	9.628E+02	6.848E+01	1.911E+04	1.284E+00
2134	2.571E+04	1.405E+07	9.437E+02	6.713E+01	1.873E+04	1.258E+00
2135	2.520E+04	1.377E+07	9.250E+02	6.580E+01	1.836E+04	1.233E+00
2136	2.470E+04	1.349E+07	9.067E+02	6.449E+01	1.799E+04	1.209E+00
2137	2.421E+04	1.323E+07	8.887E+02	6.322E+01	1.764E+04	1.185E+00
2138	2.373E+04	1.297E+07	8.711E+02	6.197E+01	1.729E+04	1.162E+00
2139	2.326E+04	1.271E+07	8.539E+02	6.074E+01	1.694E+04	1.139E+00
2140	2.280E+04	1.246E+07	8.370E+02	5.954E+01	1.661E+04	1.116E+00
2141	2.235E+04	1.221E+07	8.204E+02	5.836E+01	1.628E+04	1.094E+00
2142	2.191E+04	1.197E+07	8.042E+02	5.720E+01	1.596E+04	1.072E+00
2143	2.147E+04	1.173E+07	7.882E+02	5.607E+01	1.564E+04	1.051E+00
2144	2.105E+04	1.150E+07	7.726E+02	5.496E+01	1.533E+04	1.030E+00
2145	2.063E+04	1.127E+07	7.573E+02	5.387E+01	1.503E+04	1.010E+00
2146	2.022E+04	1.105E+07	7.423E+02	5.280E+01	1.473E+04	9.898E-01
2147	1.982E+04	1.083E+07	7.276E+02	5.176E+01	1.444E+04	9.702E-01
2148	1.943E+04	1.062E+07	7.132E+02	5.073E+01	1.415E+04	9.510E-01
2149	1.905E+04	1.040E+07	6.991E+02	4.973E+01	1.387E+04	9.321E-01
2150	1.867E+04	1.020E+07	6.853E+02	4.874E+01	1.360E+04	9.137E-01
2151	1.830E+04	9.997E+06	6.717E+02	4.778E+01	1.333E+04	8.956E-01
2152	1.794E+04	9.799E+06	6.584E+02	4.683E+01	1.307E+04	8.779E-01