Environmental Consultants

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SCS ENGINEERS

March 26, 2009
File No. 02200016.04

Mr. Steve Krajcsik
Anne Arundel County Dept. of Public Works
389 Burns Crossing Road
Severn, Maryland 21144-3411

Subject: 2008 Emission Certification Report and Air Toxics Certification
Millersville Landfill, Anne Arundel County, Maryland

Dear Steve:

SCS Engineers (SCS) has prepared the attached 2008 Emission Certification Report (ECR) and Air Toxics Certification (ATC) for the Millersville Landfill. Emissions from the landfill for many pollutants are based on the collection efficiency of the LFG system at the landfill, the pollutant destruction efficiency of the LFG flare, and the results of the flare emissions test.

Based on actual site measurements, a total of 98.1 percent of the estimated LFG generated at the landfill in 2008 was collected by the LFG system and delivered to the flare for combustion. Based on the results of stack testing of the flare in 1997, the destruction efficiency of the flare was measured to be 99.91 percent, greater than the 98 percent destruction efficiency required by the EPA's NSPS regulations.

The air pollutants to be certified are: filterable particulate matter with an aerodynamic diameters less than 10 micrometers (PM10) and less than 2.5 micrometers (PM2.5), filterable and condensable particulate matter, sulfur oxides (SOX), nitrogen oxides (NOX), carbon monoxide (CO), volatile organic compounds (VOCs), and hazardous air pollutants (HAPs). Additionally, greenhouse gas (GHG) air pollutants are to be reported. These include methane (CH4), carbon dioxide (CO2), nitrous oxide (N2), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF6); of these GHGs, only methane and carbon dioxide are typically found in LFG.

The following briefly describes the approach SCS used to estimate emissions of each of these pollutants from the Millersville Landfill.

- **PM** - Particulate matter is emitted from the combustion of LFG in the flare. Emission factors contained in U.S. EPA's Compilation of Air Pollutant Emission Factors (AP-42), as revised in November 1998, were used to estimate PM10 emissions from the flare.

  Particulate matter is also emitted from the operation of equipment associated with landfill operations. For estimating these emissions, SCS utilized emission factors and guidelines provided in the U.S. EPA's Compilation of Air Pollutant Emission Factors (AP-42).

- **SO_X** - Sulfur oxides are formed when fuel that contains sulfur-bearing compounds (e.g., LFG) is combusted. The SO_X emissions were estimated from stack test results (for enclosed flare operation) and the actual records of LFG flow to the flare.

- **NO_X -** Nitrogen oxides are also a product of fuel combustion. NO_X emissions were estimated from stack test results (for enclosed flare operation) and the actual records of LFG flow to the flare.

- **CO -** Carbon monoxide results from incomplete combustion of LFG in the flare. As with SOX and NOX, CO emissions were estimated from stack test results (for enclosed flare operation) and the actual records of LFG flow to the flare.

- **VOCs -** VOCs are present in LFG, and they are emitted via passive release from the landfill surface and, in smaller quantities, as uncombusted VOCs from the flare. Total VOC emissions are a function of the total LFG generated at the site, the collection efficiency of the LFG collection system, and the flare destruction efficiency, 99.91 percent for the enclosed flare (stack test results).

  VOCs are a subset (39 percent by volume according to the EPA's AP-42 Section 2-4) of non-methane organic compounds (NMOCs). The site NMOC concentration was updated during testing conducted in April 2004.

- **HAPs -** Some HAPs are present in LFG. SCS used results from laboratory analysis conducted in April 2004 and measured LFG collection and destruction efficiencies to estimate the emissions of HAPs other than hydrochloric acid (HCl) from landfill and the flare. SCS used stack test results and actual records of LFG flow to the flare to calculate emission of HCl, a HAP which is a product of combustion.

- **CO_2** – Carbon dioxide is emitted both as a component of raw LFG and as a result of the combustion of methane in the flare. The CO_2 emissions are a function of the total LFG generated at the site and the rate of methane capture and combustion in the flare.

- **CH_4** – Methane is emitted both as a component of raw LFG and as a result of uncombusted methane being exhausted by the flare (this fraction is typically very small). Methane emissions are a function of the total LFG generated at the site, the methane capture rate, and the destruction efficiency of the flare (99.91 percent).

In addition to the above-listed pollutants, the MDE requires the emission certification of 192 compounds considered to be air toxics. A number of the compounds considered by MDE to be air toxics are found in LFG and are emitted via passive release from the landfill surface and, in smaller quantities, as uncombusted compounds from the flare. SCS generally used results from laboratory analysis conducted in April 2004 and LFG collection and destruction efficiencies to estimate the emission of the various air toxic compounds present in LFG.

Table 1 presents a summary of the annual emissions for the landfill in 2008, given in both tons per year and pounds per day. Supporting calculations are included in the certification report.

Table 1. Millersville Landfill Emission Summary

Pollutant	2008 Emission (ton/yr)	2008 Emissions (lb/day)
VOCs	0.2	1.1
PM Condensable	1.4	7.4
PM Filterable	9.7	52.9
Sulfur Oxides	5.4	29.5
Oxides of Nitrogen	6.6	36.5
Carbon Monoxide	0.2	1.0
[1]Billable Air Toxics	0.1	0.5
[1]Total Air Toxics	0.1	0.7
Methane	134.1	734.4
Carbon Dioxide	36,815	201,726

1 Emission statement includes emission for individual HAPs and air toxic compounds.

Two copies of the Emission Certification package should be sent by April 1 to MDE at the following address:

Attn: Laramie Daniel
Air Quality Compliance Program
Air and Radiation Management Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 715
Baltimore, Maryland 21230-1720

In the transmittal to MDE, a statement should be included certifying the Landfill is in compliance with Maryland's Air Toxic Regulations (COMAR 26.11.15) for 2008.

If you have any questions regarding the report, please do not hesitate to contact any of the undersigned.

Very truly yours,

Justina M. Demko
Associate Staff Professional
SCS ENGINEERS

Joshua G. Roth, P.E.
Project Manager
SCS ENGINEERS

Enclosures

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 715 • Baltimore Maryland 21230-1720
(410) 537-3000 • 1-800-633-6101 • http://www.mde.state.md.us
Air and radiation Management Administration
Air Quality Compliance Program
(410) 537-3220

FORM 1

GENERAL FACILITY INFORMATION
EMISSION CERTIFICATION REPORT

Report for Calendar Year: 2008

A. FACILITY IDENTIFICATION Facility Name: **MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY**	--Do Not Write in This Space-- Date Received Local
Address **389 BURNS CROSSING ROAD**	Date Received State
City: **SEVERN** County: **ANNE ARUNDEL** Zip: **21144**	AIRS Code
B. Briefly describe the Major Function of the Premises	FINDS Code
MUNICIPAL SOLID WASTE LANDFILL	SIC Code
	Premise Number
	Source Latitude and Longitude
C. SEASONAL PRODUCTION (if applicable) Winter (Dec.-Feb.) __ Spring (Mar.-May)____ Summer (June-Aug.)____ Fall (Sept-Nov.)____	Reviewed Name / Date

D. Explain any Increase/Decrease From Previous Calendar Year for Each Registration at this premises.

E. CONTROL DEVICE INFORMATION (for NOx and VOC sources only)

Control Device	Capture Efficiency	Removal Efficiency
LANDFILL GAS CONTROL SYSTEM	98.11%	-
ENCLOSED GROUND FLARE	-	99.91%

I am familiar with the premises and the installation and sources for which this report is submitted. I have personally examined the information in this report, which consists of **26** pages (including attachments), and certify that the information is correct to the best of my knowledge.

Name(Print/Type)	Title	Date
Stephen J. Kracjsick PE.	**Disposal Maintenance** Manager	3/24/2009

Signature: .

Telephone Number: 410-222-6108 .

FORM 2

CRITERIA AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Calendar Year: 2008

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY Facility ID#. 003-0086 Pollutant: VOCs

Equipment Description/ Registration No	SCC Number	Fuel		Actual Emissions		Operating Schedule (Actual)				TOSD	Operating Schedule			Emissions Methods
				Tons/yr	Lbs/day	Hrs/ day	Days/ week	Week/ yr	Days/ yr	Lbs/day	Hrs/ day	Start	End	
Landfill 16-1862		N/A	S	-	-	24	7	52	366	-	24			
			F	0.2	1.0					1.0				C2
Landfill Gas Flare System16-0658		N/A	S	0.0	0.0	24	7	52	366	0	24			C1
			F	-	-					-				
Grinder		Diesel	S	0.0	0.1	1	6	52	312	0.1	1			C3
			F	-	-					-				
Total				**0.2**	**1.1**					**1.1**				

S-Stack Emissions F-Fugitive Daily emissions (lbs/day) are lbs/operating day of the source

TOSD-Typical Ozone Season Day means a typical day of that period of the year during which conditions for photochemical conditions are most favorable, which is generally during sustained periods of direct sunlight and warm temperatures (April-September). This section needs to be completed only for VOC and NOx sources.

Fuel: Include emissions for each fuel used. If more than one fuel is used, calculate and list emissions separately for each fuel.

Emission Estimation Method
A1-U.S. EPA Reference Method
A2-Other Particulate Sampling Train
A3-Liquid Absorption Technique
A4-Solid Absorption Technique
A5-Frezing Out Technique
A9-Other, Specify

C1-User calculated based on source test or other measurement
C2-User calculated based on material balance using engineering knowledge of the process
C3-User calculated based on AP-42
C4-User calculated by best guess/engineering judgment

C5-User calculated based on a State or local agency emission factor
C6-New construction, not operational
C7-Source closed, operation ceased
C8-Computer calculated based on standard

FORM 2

CRITERIA AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Calendar Year: 2008

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY   Facility ID#. 003-0086   Pollutant: NO_X

Equipment Description/ Registration No	SCC Number	Fuel		Actual Emissions		Operating Schedule (Actual)				TOSD	Operating Schedule			Emissions Methods
				Tons/yr	Lbs/day	Hrs/ day	Days/ week	Week/ yr	Days/ yr	Lbs/day	Hrs/ day	Start	End	
Landfill 16-1862		N/A	S	0.00	0.00	24	7	52	366	0.00	24			C2
			F	-	-					-				
Landfill Gas Flare System16-0658		N/A	S	3.0	16.6	24	7	52	366	16.6	24			C1
			F	-	-					-				
Grinder		Diesel	S	3.6	19.9	1	6	52	312	19.9	1			C1
			F											
Total				**6.6**	**36.5**					**36.5**				

S-Stack Emissions   F-Fugitive   Daily emissions (lbs/day) are lbs/operating day of the source

TOSD-Typical Ozone Season Day means a typical day of that period of the year during which conditions for photochemical conditions are most favorable, which is generally during sustained periods of direct sunlight and warm temperatures (April-September). This section needs to be completed only for VOC and NOx sources.

<u>Fuel:</u> Include emissions for each fuel used. If more than one fuel is used, calculate and list emissions separately for each fuel.

Emission Estimation Method
A1-U.S. EPA Reference Method
A2-Other Particulate Sampling Train
A3-Liquid Absorption Technique
A4-Solid Absorption Technique
A5-Frezing Out Technique
A9-Other, Specify

C1-User calculated based on source test or other measurement
C2-User calculated based on material balance using engineering knowledge of the process
C3-User calculated based on AP-42
C4-User calculated by best guess/engineering judgment

C5-User calculated based on a State or local agency emission factor
C6-New construction, not operational
C7-Source closed, operation ceased
C8-Computer calculated based on standard

FORM 2

CRITERIA AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Calendar Year: 2008

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY   Facility ID#. 003-0086   Pollutant: SO_X

Equipment Description/ Registration No	SCC Number	Fuel		Actual Emissions		Operating Schedule (Actual)				TOSD	Operating Schedule			Emissions Methods
				Tons/yr	Lbs/day	Hrs/ day	Days/ week	Week/ yr	Days/ yr	Lbs/day	Hrs/ day	Start	End	
Landfill 16-1862		N/A	S	N/A	N/A	24	7	52	366	N/A	24			
			F	-	-									C2
Landfill Gas Flare System16-0658		N/A	S	5.3	28.8	24	7	52	366	28.8	24			C1
			F	-	-					-				
Grinder		Diesel	S	0.1	0.7	1	6	52	312	0.7	1			C3
			F	-	-									
Total				**5.4**	**29.5**					**29.5**				

S-Stack Emissions   F-Fugitive   Daily emissions (lbs/day) are lbs/operating day of the source

TOSD-Typical Ozone Season Day means a typical day of that period of the year during which conditions for photochemical conditions are most favorable, which is generally during sustained periods of direct sunlight and warm temperatures (April-September). This section needs to be completed only for VOC and NOx sources.

Fuel: Include emissions for each fuel used. If more than one fuel is used, calculate and list emissions separately for each fuel.

Emission Estimation Method
A1-U.S. EPA Reference Method
A2-Other Particulate Sampling Train
A3-Liquid Absorption Technique
A4-Solid Absorption Technique
A5-Frezing Out Technique
A9-Other, Specify

C1-User calculated based on source test or other measurement
C2-User calculated based on material balance using engineering knowledge of the process
C3-User calculated based on AP-42
C4-User calculated by best guess/engineering judgment

C5-User calculated based on a State or local agency emission factor
C6-New construction, not operational
C7-Source closed, operation ceased
C8-Computer calculated based on standard

FORM 2

CRITERIA AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Calendar Year: 2008

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY Facility ID#. 003-0086 Pollutant: CO

Equipment Description/ Registration No	SCC Number	Fuel		Actual Emissions		Operating Schedule (Actual)				TOSD	Operating Schedule			Emissions Methods
				Tons/yr	Lbs/day	Hrs/ day	Days/ week	Week/ yr	Days/ yr	Lbs/day	Hrs/ day	Start	End	
Landfill 16-1862		N/A	S	N/A	N/A	24	7	52	366	N/A	24			
			F	-	-					-				C2
Landfill Gas Flare System16-0658		N/A	S	0	0.2	24	7	52	366	0.2	24			C1
			F	-	-					-				
Grinder		Diesel	S	0.2	1.0	1	6	52	312	1.0	1			C1
			F	-	-					-				
Total				**0.2**	**1.2**					**1.2**				

S-Stack Emissions F-Fugitive Daily emissions (lbs/day) are lbs/operating day of the source

TOSD-Typical Ozone Season Day means a typical day of that period of the year during which conditions for photochemical conditions are most favorable, which is generally during sustained periods of direct sunlight and warm temperatures (April-September). This section needs to be completed only for VOC and NOx sources.

Fuel: Include emissions for each fuel used. If more than one fuel is used, calculate and list emissions separately for each fuel.

Emission Estimation Method

A1-U.S. EPA Reference Method
A2-Other Particulate Sampling Train
A3-Liquid Absorption Technique
A4-Solid Absorption Technique
A5-Frezing Out Technique
A9-Other, Specify

C1-User calculated based on source test or other measurement
C2-User calculated based on material balance using engineering knowledge of the process
C3-User calculated based on AP-42
C4-User calculated by best guess/engineering judgment

C5-User calculated based on a State or local agency emission factor
C6-New construction, not operational
C7-Source closed, operation ceased
C8-Computer calculated based on standard

FORM 3: PM_{total}

EMISSIONS CERTIFICATION REPORT
Particulate Matter – Total

Calendar Year: 2008

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY Facility ID#. 003-0086 Pollutant: PM_{total} *

Equipment Description/ Registration No	SCC Number	Fuel		**PM – Filterable**		**PM_{10} – Filterable**		**$PM_{2.5}$ – Filterable**		**PM – Condensable**		**Operation** (days/yr)	**Emissions Methods**
				Tons/yr	Lbs/day	Tons/y	Lbs/day	Tons/yr	Lbs/day	Tons/yr	Lbs/day		
Landfill 16-1862			S	-	-	-	-	-	-	-	-	366	
			F	8.3	45.5	8.3	45.5	2.8	15.3	0.0	0.0		C2,C3
Landfill Gas Flare System16-0658		Landfill gas	S	1.4	7.4	1.4	7.4	1.4	7.4	1.4	7.4	366	C2, C3
			F	-	-	-	-	-	-	-	-		
Grinder		Diesel	S	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.0	312	C1
			F	-	-	-	-	-	-	-	-		
Total				**9.7**	**52.9**	**9.7**	**52.9**	**4.2**	**22.7**	**1.4**	**7.4**		

S-Stack Emissions F-Fugitive Daily emissions (lbs/day) are lbs/operating day of the source

Fuel: Include emissions for each fuel used. If more than one fuel is used, calculate and list emissions separately for each fuel.

Emission Estimation Method
A1-U.S. EPA Reference Method
A2-Other Particulate Sampling Train
A3-Liquid Absorption Technique
A4-Solid Absorption Technique
A5-Frezing Out Technique
A9-Other, Specify

C1-User calculated based on source test or other measurement
C2-User calculated based on material balance using engineering knowledge of the process
C3-User calculated based on AP-42
C4-User calculated by best guess/engineering judgment

FORM 4 **Calendar Year: 2008**

TOXIC AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY Facility ID#. 003-0086
Pollutant: Hydrochloric acid *:

Equipment Description / Registration Number		Actual Emissions		Control Device**	% Efficiency
		Lbs/hr	Tons/yr		
MSW Landfill (16-1862)	Stack				
	Fugitive			O	
LFG Flare System (16-0658)	Stack	0.0	0.1		
	Fugitive				
	Stack				
	Fugitive				
	Stack				
	Fugitive				
	Stack				
	Fugitive				
	Stack				
	Fugitive				
	Stack				
	Fugitive				
Total		**0.0**	**0.1**		

* Please attach all calculations.

* See Attachment 1 for the minimum reporting values.

**Control Device:
- S = Scrubber
- B = Baghouse
- ESP = Electrostatic Precipitator
- A = Afterburner
- C = Condenser
- AD = Adsorbtion
- O = Other

[1] Emissions must be broken down by equipment registration number (ex. 9-0076, 9-0077)

FORM 5

BILLABLE TOXIC AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Calendar Year: 2008

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY

Facility ID#. 003-0086

Chemical Name	CAS Number		Actual Emissions Tons/yr	Actual Emissions Lbs/day		Estimation Method
Methyl Chloroform	71-55-6	S	0	0.00		C2
		F	0	0.00		C2
Carbon Disulfide	75-15-0	S	0	0.00		C2
		F	0	0.00		C2
Carbonyl Sulfide	463-58-1	S	0	0.00		C2
		F	0	0.00		C2
Methylene Chloride	75-09-2	S	0	0.00		C2
		F	0	0.00		C2
Perchloroethylene	127-18-4	S	0	0.00		C2
		F	0	0.00		C1
Hydrochloric Acid	7647-01-0	S	0.1	0.7		C1
		F	0.0	0.0		C2
Chlorine	7782-50-5	S	0.0	0.00		C2
		F	0.0	0.00		C2
Cyanide Compounds	57-12-5	S	0.0	0.00		C3
		F	0.0	0.00		C3
Hydrogen Fluoride	7664-39-3	S	0.0	0.00		C3
		F	0.0	0.00		C3
Phosphine	7803-51-2	S	0.00	0.00		C3
		F	0.00	0.00		C3
Titanium Tetrachloride	7550-45-0	S	0.0	0.00		C3
		F	0.0	0.00		C3
TOTALS			**0.1**	**0.7**		

S - Stack Emissions F - Fugitive Emissions Daily emissions (lbs/day) are lbs/operating day of the source

Emission Estimation Method

A1-U.S. EPA Reference Method
A2-Other Particulate Sampling Train
A3-Liquid Absorption Technique
A4-Solid Absorption Technique
A5-Frezing Out Technique
A9-Other, Specify

C1-User calculated based on source test or other measurement
C2-User calculated based on material balance using engineering knowledge of the process
C3-User calculated based on AP-42
C4-User calculated by best guess/engineering judgment
C5-User calculated based on a State or local agency emission factor
C6-New construction, not operational
C7-Source closed, operation ceased
C8-Computer calculated based on standard

This form to include only the eleven chemicals identified

n/a - not applicable

PLEASE NOTE: Be sure to attach all data and calculations necessary to support the emissions figures shown above.

Actual Emissions reported to the minimum reporting values specified by the MDE Attachment 1

FORM 6:Greenhouse Gases Calendar Year: 2008

GREENHOUSE GAS AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY Facility ID#. 003-0086
Pollutant: Carbon dioxide (CO_2) *

Equipment Description / Registration Number		Actual Emissions		
		Tons/yr	Lbs/day	Lbs/hr
MSW Landfill (16-1862)	Stack	-	-	-
	Fugitive	18,583	101,824	4,242
LFG Flare System (16-0658)	Stack	18,232	99,901	4,162
	Fugitive	-	-	-
	Stack			
	Fugitive			
	Stack			
	Fugitive			
	Stack			
	Fugitive			
	Stack			
	Fugitive			
	Stack			
	Fugitive			
Total		**36,815**	**201,725**	**8,404**

[1] Emissions must be broken down by equipment registration number (ex. 9-0076, 9-0077)

This form must be used to report Greenhouse gas emissions:
- carbon dioxide (CO_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- hydrofluorocarbons (HFCs)
- perfluorocarbons (PFCs)
- sulfur hexafluoride (SF6)

* Use a separate form for each pollutant.

* Please attach all calculations.

FORM 6:Greenhouse Gases Calendar Year: 2008

GREENHOUSE GAS AIR POLLUTANTS
EMISSIONS CERTIFICATION REPORT

Facility Name: MILLERSVILLE LANDFILL & RESOURCE RECOVERY FACILITY Facility ID#. 003-0086
Pollutant: Methane (CH_4) *

Equipment Description / Registration Number		Actual Emissions		
		Tons/yr	Lbs/day	Lbs/hr
MSW Landfill (16-1862)	Stack	-	-	-
	Fugitive	128	701	29.2
LFG Flare System (16-0658)	Stack	6.0	32.7	1.4
	Fugitive	-	-	-
	Stack			
	Fugitive			
	Stack			
	Fugitive			
	Stack			
	Fugitive			
	Stack			
	Fugitive			
	Stack			
	Fugitive			
Total		**134.1**	**734.4**	**30.6**

[1] Emissions must be broken down by equipment registration number (ex. 9-0076, 9-0077)

This form must be used to report Greenhouse gas emissions:
- carbon dioxide (CO_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- hydrofluorocarbons (HFCs)
- perfluorocarbons (PFCs)
- sulfur hexafluoride (SF6)

* Use a separate form for each pollutant.

* Please attach all calculations.

ATTACHMENT

(EMISSION CALCULATIONS)

2008 Emissions Calculations
Millersville Landfill and
Resource Recovery Facility

Calculated by: J. M. Demko
Checked by: J.G. Roth

PART 1 - LANDFILL GAS EMISSIONS

The following parameters and values are utilized in these computations:

1. Site specific methane content =	52.2%	[AACo personnel provided data]
2. Site specific LFG flow rate =	1,185.0	cfm [AACo personnel provided data]
3. Site specific methane flow rate =	618.6	cfm
4. Normalized LFG flow rate =	1,237.1	cfm (@ 50 percent methane)
5. Methane generation rate =	630.5	cfm
6. Methane generattion rate (metric)	9,384,987.5	m^3/yr
6. LFG generation rate (@ 50 % CH4)=	1,261	cfm [see Table 2]
7. VOC generation rate =	9.9	tons [see Table 2]
8. Flare control efficiency =	99.91%	[1997 Source Test]
9. Site specific NMOC conc. =	343.3	ppmv (site specific testing in July 2003)
10. VOC concentration =	39%	of NMOC concentration (per AP-42)

Step 1. Calculate Average Site-Specific LFG Heat (BTU) Content

Using the standard heating value for LFG of 500 BTU/ft3 (at 50 percent methane content) and the HHV of methane the site-specific LFG heating value is:

= (site specific methane content / 50% methane) * (500 BTU/ft3)

= **522.0 BTU/ft^3 LFG**

where:
methane content = 52.2%

Step 2. Compute the Site-Specific NOx Emissions

The emission of NOx from the enclosed ground flare is estimated using the site-specific emissions testing results from the "Source Emissions Test Report" by Kilkelly Environmental Associates (Sept. 1997).

Using the emissions testing result of 0.69 lb NOx per hour of operation, the emission from the enclosed flare is:

= [(0.69 lb NOx per hour operation) * (8,760 hours operation) * (1 ton/2,000 lbs)]

= **3.0 tons NOx from enclosed flare operation**
= 16.6 lbs/day NOx from enclosed flare operation

Step 3. Compute the Site-Specific CO Emissions

The emission of CO from the enclosed ground flare is estimated using the site-specific emissions testing results from the "Source Emissions Test Report" by Kilkelly Environmental Associates (Sept. 1997).

Using the emissions testing result of 0.01 lb CO per hour of operation, the emission from the enclosed flare is:

= [(0.01 lb CO per hour operation) * (8,760 hours operation) * (1 ton/2,000 lbs)]

= **0.0 tons CO from enclosed flare operation**
= 0.2 lbs/day CO from enclosed flare operation

Step 4. PM10 Emissions

Site-specific data for the emisison of PM10 and PM2.5 from the enclosed ground flare is not available. Therefore, the emission of PM10 and PM2.5 is estimated using the EPA AP-42 emission factor for PM10 of 17 lb PM10 per 1,000,000 cubic feet of methane combusted.

*EPA does not distinguish between PM10 and PM2.5 emissions, though EPA does suggest that, for LFG particulate flare emissions, PM10 and PM2.5 are equivalent.

*EPA does not provide emisssion factors for condensable and filterable PM fractions. Thus, for purpoases of this estimate, assume that 50 percent of the PM is filterable and 50 percent is condensable.

Using the total methane flow rate for Jan-Dec, the PM10 (and PM2.5) emissions are:

LFG Throughput for 2008 = 614,316,670 cf [AACo personnel provided data]

= (17 lb PM10 per 10^6 cubic feet methane) * (total LFG flow (Jan-Dec), cf) * (1 ton/2,000 lbs)*(Site-specific methane content, %)

= 2.7 tons PM (filterable and condensible) total flare emissions

PM10 and PM2.5 Filterable = (2.7 tons PM10 and PM2.5 total flare emissions)*(50% estimated filterable)

= **1.35 tons PM10 and PM2.5 Filterable Emissions**
7.39 lbs/day PM10 and PM2.5 Filterable Emissions

PM Condensable = (2.7 tons total PM flare emissions) *(50% estimated condensable)

= **1.35 tons PM Condensable Emissions**
7.39 lbs/day PM Condensable Emissions

Step 5. SOx Emissions

The emission of SOx from the enclosed ground flare is estimated using the site-specific emissions testing results from the "Source Emissions Test Report" by Kilkelly Environmental Associates (Sept. 1997).

Using the emissions testing result of 1.2 lb SOx per hour of operation, the emission from the enclosed flare is:

= [(1.2 lb SOx per hour operation) * (8,760 hours operation) * (1 ton/2,000 lbs)]

= **5.3 tons SOx from enclosed flare operation**
= 28.8 lbs/day SOx from enclosed flare operation

Step 6. VOC Emissions

The emission of VOCs from the flare and from the landfill (as a fugitive emission) is estimated using the LFG collection efficiency and the landfill's VOC generation rate (see attached Table 2 with LFG Modeling Results).

First, estimate the collection efficiency of the LFG collection system using the methane flow to the flare and the methane generation rate

= (site specific methane flow, cfm)/(methane generation rate, cfm) * 100

= 98.11% collection efficiency

where:
methane generation rate = 630.5
site specific methane flow = 618.6

Next, calculate the uncombusted flare emission of VOCs (to the nearest 0.1 ton)

= (VOC generation rate, tons) * (collection efficiency) * (1-flare control efficiency)

= 0.0 tons VOC total flare emissions
= 0.0 lbs/day VOC total flare emissions

where:
VOC generation rate (tons) = 9.9
collection efficiency = 98.1%
flare control efficiency = 99.9%

Next, calculate the uncollected landfill emission of VOCs (fugitive emissions)

= (VOC generation rate, tons) * (1-collection efficiency)

= 0.2 tons VOC fugitive landfill emissions
= 1.0 lbs/day VOC fugitive landfill emissions

where:
VOC generation rate = 9.9
collection efficiency = 98.1%

2008 Emissions Calculations
Millersville Landfill and
Resource Recovery Facility

Step 7. Toxic Air Pollutant (TAP) and Hazardous Air Pollutant (HAP) Emissions

The emission of toxic air pollutants (TAPs) from the flare and from the landfill (as a fugitive emission) is estimated using the LFG collection efficiency, the LFG generation rate, and the concentration of the pollutants, which are based upon site-specific test data.

The attached Table 3 present a summary of the landfill and flare emissions for the TAPs and HAPs respectivel
The following is a sample calculation for the emission of Toluene - the emission of the other TAPs was completed in a similar manner, unless otherwise noted.

First, calculate the toluene volumetric flow rate using AP-42 equation 2.4(3)

* The site-specific concentration for toluene is 31.6 ppm (31,600 ppb).

= (LFG generation rate) * (31.6 ppm) / (1,000,000) * (1 m^3/35.3 ft^3) * (525,600 min/yr)

= 593.3 m^3 toluene/yr

where:
LFG generation rate is converted from cfm to cubic meters per year
LFG generation rate (cfm) = 1,261

Next, calculate the mass flow of toluene generated using AP-42 equation 2.4(4)

= [(toluene volume flow)*(92.13 g/mol)]/[(8.205x10^-5)*(1000g/kg)*(298 K)]

= 2,235.6 kg toluene/yr

where:
92.13 g/gmol is the molecular weight of toluene
8.205x10^-5 is the ideal gas conversion factor
298 K is the assumed temperature of the LFG (equivalent to 25 deg C)
toluene volume flow (m3/yr) = 593.3

Next, calculate the uncombusted flare emission of toluene

= (toluene mass generation rate, kg) * (collection efficiency) * (1-flare control efficiency) * (1 ton/909 kg)

= 0.0 tons toluene flare emissions

where:
toluene mass generation (kg) = 2,235.6
normalized collection efficiency = 98.1%
flare control efficiency = 99.9%

Finally, calculate the uncollected landfill emission of toluene (fugitive emissions)

= (toluene mass generation rate, kg) * (1-normalized collection efficiency) * (1 ton/909 kg)

= 0.0 tons toluene fugitive landfill emissions

where:
toluene mass generation (kg) = 2,235.6
normalized collection efficiency = 98.1%

<u>Step 8. Calculate the Site-Specific CH4 Emissions</u>

First, estimate the collection efficiency of the LFG collection system using the methane flow to the flare and the methane generation rate

= (site specific methane flow, cfm)/(methane generation rate, cfm) * 100

= 98.11% collection efficiency

where:
methane generation rate = 630.5
site specific methane flow = 618.6

Then using the metric methane generation rate and the Ideal Gas Law,
(LFG generation rate, cubic meter/yr) * (MW of CH4, g/mol) * (Pressure, Pa) / (R, m3-Pa/gmol-K)*
= (1000g/1kg) * (273 +T, K)

= 6,139,554.2 kg/year CH4

where:

Pressure =	101,300	Pa
Molecular Weight of CH4 =	16	grams/mol
Temperature =	25	Celsius
Ideal gas conversion factor, R =	8.314	m^3-Pa/gmol-K

Next, multiply mass flow rate of methane by normalized collection efficiency

= (Mass flow rate, kg/yr) * (1- Collection efficiency, %) * (1000g/1kg) * (1 lbs/453.6g) * (1 ton/2000lbs)

= 128.1 tons CH4 fugitive emissions from the Landfill
701.7 lbs/day
29.2 lbs/hr

Finally, calculate the uncombusted flare emission of methane

= (Mass flow rate, kg/yr) * (collection efficiency) * (1-flare control efficiency) * (1 ton/909 kg)

= 6.0 tons CH4 flare emissions
32.7 lbs/day
1.4 lbs/hr

where:
mass flow rate (kg) = 6,139,554.2
normalized collection efficiency = 98.1%
flare control efficiency = 99.9%

Step 9. Calculate the Site-Specific CO2 Emissions

The CO2 emissions from the landfill gas are from the following:

a) CO2 comprises approximately 50 percent of LFG generated. This CO2 is emitted to the atmosphere either as a fugitive (uncollected LFG) emission, or through the stack (as CO2 in LFG is "passed through" and uncombusted).
b) CO2 is formed by the combustion of methane. All methane combusted in the flare is assumed to be converted to, and emitted as, CO2.

CO2 emission are, thus, estimated as follows:

CO2 contained in raw LFG

CO2 generation rate = (LFG Generation Rate)*(0.5, assumed 50% CO2 content of raw LFG)

= 630.5 cfm

CO2 in raw LFG = (CO2 gen rate)*(CO2 molecular wt)/(universal gas constant)*(gas temperature)(525,600min/1yr)*(1kg/1000g)*(2.2lb/1kg)*(1ton/2000lb)*(35.31ft^3/1m^3)

= 18,583 tons of CO2 from raw LFG

CO2 formed in the flare by the combustion of methane

Combustion of CH4 in Flare = (Site Specific CH4 Flow Rate)*(CO2 molecular mass)/(universal gas constant)*(gas temperature)(525,600min/1yr)*(1kg/1000g)*(2.2lb/1kg)*(1ton/2000lb)*(35.31ft^3/1m^3)

= 18,232 tons of CO2 from methane combustion

Total CO2 Emissions:

CO2 in raw LFG emissions + CO2 from methane combustion emissions

= **36,815 tons of CO2 landfill emissions (combined flare and fugitive)**
201,726 lbs/day
8,405 lbs/hr

where:
CO2 Molecular Mass = 44.01 g/mol
Universal Gas Constant = 0.00008205 cm-atm/gmol-k
Landfill Gas Temperature = 298K

2008 Emission Calculations
Millersville Landfill and Resource Recovery Facility

Calculated by: J. M. Demko
Checked by: J. G. Roth

PART 2 - 1,000-HP HORIZONTAL GRINDER ENGINE EMISSIONS

Given

Compound	Emission Factor		Source
NOx	15	lb/hr	Manufacturer
CO	0.79	lb/hr	Manufacturer
SOx	0.303	lb/MMBtu	AP-42, Section 3.4[2]
PM10 Filterable	0.15	lb/hr	Manufacturer[3]
VOC	0.08	lb/hr	Manufacturer[4]
CO2	1,273.3	lb/hr	Manufacturer
PM2.5 Filterable	0.15	lb/hr	Manufacturer[3]

Fuel Consumption	5,602.70	gal/yr	[data provided by landfill]
Fuel Heating value	142,000	Btu/gal	
Hours of operation	485.00	hrs/yr	[data provided by landfill]

Notes:

1) Where available, manufacturer emission factors were used. To be conservative, it was assumed that the engine operated at 100 percent load.
2) SOx emission rate based on a maximum sulfur content of diesel of 0.3 (as limited in permit).
3) The manufacturer provides an estimate for PM only. Assume this is equal to both PM10 and PM2.5, and that this represents the filterable PM10 and PM2.5 emission rate.
4) VOC is assumed to be equal to total Total Hydrocarbons provided by manufacturer.
5) Hazardous air pollutant emissions for the engine are provided in the attached Table 4.
6) Lb/day and Lb/hour emission rates are based on the whole year (365 days, and 8,760 hours per year).

Sample calculation

Tons/year

= (Emission factor, lb/hr) * (Hours of operation during the year) * (1 ton/2000lbs)

Results	**Emission**		
	[tpy]	[lbs/day]	[lbs/hr]
NOx	3.6	19.9	0.8
CO	0.2	1.0	0.0
SOx	0.1	0.7	0.0
PM10 Filterable	0.0	0.2	0.0
VOC	0.0	0.1	0.0
CO2	308.8	1691.9	70.5
PM2.5 Filterable	0.0	0.2	0.0

PART 3 - LANDFILL OPERATION PM EMISSIONS

A. Estimate of PM10 (dust) emissions from active working face filling operations equipment.

The amount of PM10 and PM2.5 emission is calculated using the equation for bulldozing of overburden material provided in Table 11.9-1 of the EPA's AP-42. This equation estimates PM10 and PM 2.5 emissions in pounds per hour per vehicle, as follows:

$$= \frac{0.75*1.0\,(s)^{1.5}}{(M)^{1.4}}$$

Where:

s = material silt content (%)
M = material moisture content (%)
1.4 and 1.5 = empiricle constants
0.75 = scaling factor to 10 um sized particles (PM10)
0.105 = scaling factor to 2.5 um sized particles (PM2.5)

Site-specific data:

material silt content, % =	9.2	[AP-42, Table 13.2.4-1, clay/dirt soil type]
material moisture content, % =	14.0	[AP-42, Table 13.2.4-1, clay/dirt soil type]
operation hours per year =	4,545	[client data]
number of dozers =	2	[client data]
number of compactors =	2	[client data]
number of loaders=	1	[client data]

Using the site-specific data as shown above, the PM10

= [(0.75 * 1.0*(silt content, %)$^{1.5}$) / (moisture content, %)$^{1.4}$] * (operation hours/year) * (pieces of equipment, total)* (1 ton/ 2,000 lb)

$$= \frac{0.75 * 1.0 * (9.2)^{1.5}}{(14.0)^{1.4}} \quad x \quad \frac{(4,545 * 5)}{2000}$$

= 5.9 tons filterable PM10 from working face filling operations equipment

Using the site-specific data as shown above, the PM2.5

= [(0.105 * 1.0*(silt content, %)$^{1.5}$) / (moisture content, %)$^{1.4}$] * (operation hours/year) * (pieces of equipment, total)* (1 ton/ 2,000 lb)

$$= \frac{0.105 * 1.0 * (9.2)^{1.5}}{(14.0)^{1.4}} \quad x \quad \frac{(4,545 * 5)}{2000}$$

= 0.8 tons filterable PM2.5 from working face filling operations equipment

B. Estimate of PM10 (dust) emissions from loading and unloading daily cover material.

The amount of PM10 emission is calculated using the emission factors for topsoil removal by scraper and scraper unloading, 0.058 lb. and 0.04 lb. dust per ton cover material respectively, as provided in Table 11.9-4 of the EPA's AP-42. Assume these factors represent both PM10 and PM 2.5 emissions.

These factors estimate dust emissions in pounds per the total amount of cover material used during the year, as follows:

$$= (0.058*W) + (0.04*W)$$

Where:
W = tons of cover material used

Site-specific data:
volume of cover material used, c.y. = 24,600 [client data]

The volume is converted to tons of cover material using an assumed density of 120 pound per cubic foot for soil as follows:

Tons = volume (c.y.) * (120 lb/ft3) * (27 ft^3/c.y.) * (1 ton/2,000 lb)

= 39,852 tons

Using the site-specific data shown above, the PM10 and PM2.5 emissions are

= ([0.04 lb PM/ton + 0.058 lb PM/ton] * tons cover material) * [1 ton/2,000 lb]

$$= \frac{(0.058 + 0.04) * 131,798}{(2000)}$$

= 2.0 tons filterable PM10 from unloading cover material
2.0 tons filterable PM2.5 from unloading cover material

C. Estimate of PM10 (dust) emissions from hauling daily cover material.

The amount of PM10 emission is calculated using Equation 2 in Section 13.2.2 of the EPA's AP-42 (updated November 2006).
The equation estimates dust emissions in pounds per vehicle mile traveled (lb/VMT), with further calculation of total vehicle miles travelled and conversion from pounds to tons, as follows:

$$= k * (s/12)^a * (W/3)^b \quad x \quad \frac{(365-p)* (1-R)}{365} \quad x \quad \frac{(Dist*Trips*Days)}{2,000lb/ton}$$

Where:

k, a, and b = Empiricle constants given by AP-42 (Table 13.2.2-2)
s = silt content (%)
W = vehicle weight, tons
p = number of days with at least 0.01 in. of precipitation per year
R = percent of time while operating water application vehicle (%)
Dist = distance (miles) from borrow area to working face
Trips = estimated number of loads (one way) per day x 2 (due to return trip to borrow area)
Days = number of working days per year

Site-specific data:

k, (lb/VMT) PM2.5 =	0.15	[AP-42, Table 13.2.2-2]
k, (lb/VMT) PM10 =	1.5	[AP-42, Table 13.2.2-2]
a =	0.9	[AP-42, Table 13.2.2-2]
b =	0.45	[AP-42, Table 13.2.2-2]
material silt content, % =	6.4	[AP-42, Table 13.2.2-1, Landfills]]
mean vehicle weight, tons =	60.0	[estimated weight, manufacturer's info]
days per yr w/ 0.01 in. precipitation =	130	[per AP-42 Figure 13.2.2-1]
R (%) =	25	[client data, 2 hours per day operation of water truck]
driving distance, mi =	0.25	[client data]
trips per day =	3	[client data]
number of working days per year =	365	

Using the site-specific data as shown above, the filterable PM10

= $k*(s/12)^a * (W/3)^b$ * (((365-p*(1-percent watered))/365) * (1 ton/2,000lb)
* driving distance from borrow area to working face * number of loads * 2 (for return to borrow area) * working days

$$= 1.5 * (6.4/12)^{0.9} * (60/3)^{0.45} \quad x \quad \frac{(365-130)(1-0.25)}{365} \quad x \quad \frac{(0.25 * 4 * 2 * 365)}{(2000)}$$

= 0.4 tons filterable PM10 from hauling cover material

Using the site-specific data as shown above, the filterable PM 2.5

= $k*(s/12)^a * (W/3)^b$ * (((365-p*(1-percent watered))/365) * (1 ton/2,000lb)
* driving distance from borrow area to working face * number of loads * 2 (for return to borrow

$$= 0.15 * (6.4/12)^{0.9} * (60/3)^{0.45} \quad x \quad \frac{(365-130)(1-0.25)}{365} \quad x \quad \frac{(0.25 * 4 * 2 * 365)}{(2000)}$$

= 0.0 tons filterable PM2.5 from hauling cover material

D. Totals

The total estimated filterable PM10 (dust) emission from landfiing activities is thus:

= (total from working face operations) + (total from loading/unloading daily cover material)
+ (total from hauling daily cover material)
= (5.9 + 2.0+0.4)

= 8.3 Total tons filterable PM10 from landfilling activities
= 45.5 lbs/day PM10 from landfill activities

The total estimated filterable PM2.5 (dust) emission from landfiing activities is thus:

= (total from working face operations) + (total from loading/unloading daily cover material)
+ (total from hauling daily cover material)
= 0.8+2.0+0.0

= 2.8 Total tons filterable PM2.5 from landfilling activities
= 15.3 lbs/day PM10 from landfill activities

Table 3
2008 Air Toxic Emissions
Millersville Landfill and Resource Recovery Facility

User Inputs:

LFG generation flowrate (cfm) from LandGEM =	**1,261**
Flare operational hours during year =	**8,760**
LFG flowate (cfm) collected, measured at flare =	**1,185**
Average methane content of LFG collected, measured at flare =	**52.2%**
Flare Destruction Efficiency =	**99.91%**

Calculations:

Annual methane generation (m3/yr) =	**9.385E+06**
Annual LFG generation (m^3/yr)	
assuming 50% methane content =	**1.88E+07**
LFG Collection Efficiency =	**98.11%**

Pollutant	Mol. Wt. (g/gmol)	Concentration (ppmv)	Source (AP-42, Site Data)	Air Toxic Generation (m^3/yr)	Air Toxic Generation (kg/yr)	Air Toxic Emissions: Fugitive Emissions (lb/yr)	Flare Emissions (lb/yr)	Fugitive Emissions (tpy)	Flare Emissions (tpy)	Fugitive Emissions (lb/hr)	Flare Emissions (lb/hr)	Fugitive Emissions (lb/day)	Flare Emissions (lb/day)	Total Air Toxic Emissions: tpy	lbs/day	lbs/hr
Acrylonitrile	53.06	0.036	WIAC	0.6	1.3	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.00
Benzene	78.11	0.818	site data	14.0	44.6	1.9	0.1	0.001	0.000	0.0002	0.0000	0.0	0.0	0.0	0.0	0.00
Benzyl chloride	126.6	0.04	site data	0.7	3.5	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.0	0.0	0.00
Bromoform	252.73	1.9	site data	32.5	335.4	13.9	0.7	0.007	0.000	0.0016	0.0001	0.0	0.0	0.0	0.0	0.00
Carbon disulfide	76.13	0.05	site data	0.9	2.7	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0	0.0	0.0
Carbon tetrachloride	153.84	0.03	site data	0.5	3.2	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.0	0.0	0.00
Carbonyl sulfide	60.07	0.08504	site data	1.5	3.6	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0	0.0	0.0
Chlorine	35.45	9.43	WIAC	161.1	233.5	9.7	0.0	0.005	0.000	0.0011	0.0000	0.0	0.0	0.0	0.0	0.0
Chlorobenzene	112.56	0.049	site data	0.8	3.9	0.2	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0	0.0	0.0
Chloroform	119.38	0.02	site data	0.3	1.7	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.0	0.0	0.0
1,4-Dichlorobenzene(P)	147	0.03	site data	0.5	3.1	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0	0.0	0.0
1,2-Dichloropropane (propylene dichloride)	112.99	0.03	site data	0.5	2.4	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0	0.0	0.0
Ethyl benzene	106.17	4.28	site data	73.1	317.4	13.2	0.6	0.007	0.000	0.0015	0.0001	0.0	0.0	0.0	0.0	0.0
Ethyl chloride (chloroethane)	64.52	0.464	site data	7.9	20.9	0.9	0.0	0.000	0.000	0.0001	0.0000	0.0	0.0	0.00	0.0	0.000
Ethylene dibromide (1,2-dibromoethane)	187.88	0.03	site data	0.5	3.9	0.2	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.000	0.0	0
Ethylene dichloride (1,2-dichloroethane)	98.96	0.032	site data	0.5	2.2	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0	0.0	0
Ethylidene dichloride (1,1 Dichloroethane)	98.97	0.808	site data	13.8	55.9	2.3	0.1	0.001	0.000	0.0003	0.0000	0.0	0.0	0.0	0.0	0.0
Hexachlorobutadiene	260.76	0.05	site data	0.9	9.1	0.4	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.000
n-Hexane	86.18	2.324	WIAC	39.7	139.9	5.8	0.3	0.003	0.000	0.0007	0.0000	0.0	0.0	0.0	0.0	0.0
Hydrochloric acid	---	---	site data	---	---	---	245.3	---	0.120	---	0.0280	---	0.7	0.1	0.7	0.0
Hydrogen sulfide	34.06	7.8	site data	133.2	185.6	7.7	---	0.004	---	0.0009	---	0.0	---	0.00	0.0	0.0
Mercury & compounds	200.61	0.000292	AP-42	0.0	0.0	0.0	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.000	0.0	0.0000
Methyl chloride (Chloromethane)	50.49	0.05	site data	0.9	1.8	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.0
Methyl chloroform (1,1,1 Trichloroethane)	133.41	0.025	site data	0.4	2.3	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.0
Methyl isobutyl ketone (MIBK)	100.16	0.75	WIAC	12.8	52.5	2.2	0.1	0.001	0.000	0.0002	0.0000	0.0	0.0	0.00	0.0	0.0
Methylene chloride (Dichloromethane)	84.94	2.82	site data	48.2	167.3	7.0	0.3	0.003	0.000	0.0008	0.0000	0.0	0.0	0.00	0.0	0.0
Styrene	104.2	0.243	site data	4.2	17.7	0.7	0.0	0.000	0.000	0.0001	0.0000	0.0	0.0	0.00	0.0	0.0
1,1,2,2-Tetrachloroethane	167.85	0.03	site data	0.5	3.5	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.0
Tetrachloroethylene (Perchloroethylene)	165.83	1.17	site data	20.0	135.5	5.6	0.3	0.003	0.000	0.0006	0.0000	0.0	0.0	0.00	0.0	0.0
Toluene	92.14	31.6	site data	593.3	2,235.8	93.0	4.3	0.046	0.002	0.0106	0.0005	0.3	0.0	0	0	0
1,2,4-Trichlorobenzene	181.45	0.06	site data	1.0	7.6	0.3	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.0
1,1,2-Trichloroethane	133.4	0.03	site data	0.5	2.8	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.0
Trichloroethylene (Trichloroethene)	131.38	0.499	site data	8.5	45.8	1.9	0.1	0.001	0.000	0.0002	0.0000	0.0	0.0	0.00	0.0	0.0
Vinyl chloride	62.5	1.52	site data	26.0	66.4	2.8	0.1	0.001	0.000	0.0003	0.0000	0.0	0.0	0.00	0.0	0.0
Vinylidene chloride (1,1-Dichloroethene)	96.94	0.03	site data	0.5	2.0	0.1	0.0	0.000	0.000	0.0000	0.0000	0.0	0.0	0.00	0.0	0.0
Xylenes	106.17	16.582	WIAC	283.2	1,229.8	51.1	2.4	0.026	0.001	0.0058	0.0003	0.1	0.0	0.0	0	0
o-Xylene	106.17	1.28	site data	21.9	94.9	3.9	0.2	0.002	0.000	0.0005	0.0000	0.0	0.0	0.0	0	0
m,p-Xylene	106.17	11.1	site data	189.6	823.3	34.2	1.6	0.017	0.001	0.0039	0.0002	0.1	0.0	0.0	0	0

Notes:
1. Hydrochloric acid emissions are estimated using stack test results from Kilkelly Environmental Associates, which showed HCL emissions of 0.028 lb/hr.
2. There are no chlorine flare emissions, as chlorine is converted to HCL during combustion.
3. Site specific data was from laboratory testing completed April 2004.
4. Default values are based on values from "Waste Industry Application Coalition Comparison of Recent Landfill Gas Analyses with Historic AP-42 Values" dated January 2001

Table 4
2008 Air Toxic Emissions
Millersville Landfill and Resource Recovery Facility
Anne Arundel County, Maryland

User Inputs for Horizontal Grinder Engine:

Gallons used [gal/yr]	**5,602.7**
Heating value of diesel [Btu/gal]	**142,000**
Hours of operation [hrs/yr]	**485**
Days of operation [days/yr]	**312**

Pollutant	Emission Factor lb/MMBtu	Source (AP-42, Site Data)	Total Air Toxic Emissions (lb/day)	(lb/hr)	(tpy)
Acetaldehyde	2.52E-05	AP-42	0.0	0.000	0.00
Acrolein	7.88E-06	AP-42	0.0	0.000	0.00
Benzene	7.76E-04	AP-42	0.0	0.00	0.00
Formaldehyde	7.89E-05	AP-42	0.0	0.000	0.00
Naphthalene	1.30E-04	AP-42	0.0	0.000	0.00
Toluene	2.81E-04	AP-42	0.0	0.000	0.00
Xylenes	1.93E-04	AP-42	0.0	0.000	0.00

Table 5 - 2008
Annual Emissions
Millersville Landfill
Billable Toxic Air Pollutants

Total Methane Generation (m3/yr) =	**9,384,987**
LFG Collection Efficiency (%) =	**98.11%**
Flare Destruction Efficiency =	**99.91%**
Hours operation =	**8,760**

			Billable TAP Emissions							
HAP	MW	*Conc. (ppbv)	Fugitive Emissions (lb/yr)	Flare Emissions (lb/yr)	Fugitive Emissions (lb/day)	Flare Emissions (lb/day)	Fugitive Emissions (lb/hr)	Flare Emissions (lb/hr)	Fugitive Emissions (tons/yr)	Flare Emissions (tons/yr)
carbon disulfide (1)	76.13	50	0.1	0.01	0.00	0.00	0.00	0.00	0.00	0.00
carbonyl sulfide (2)	60.07	85.04	0.1	0.01	0.00	0.00	0.00	0.00	0.00	0.00
chlorine (2)	35.45	9430	9.7	0.00	0.03	0.00	0.00	0.00	0.00	0.00
hydrochloric acid (2)	n/a	n/a	0	245.3	0.00	0.67	0.00	0.03	0.00	0.12
methyl chloroform (1)	133.41	25	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
methylene chloride (1)	84.94	2820	7.0	0.33	0.02	0.00	0.00	0.00	0.00	0.00
perchloroethylene (1)	165.83	1170	5.6	0.26	0.02	0.00	0.00	0.00	0.00	0.00

1. Concentration, in parts per billion by volume, from the results of site LFG testing, conducted in April 22, 2004
2. Concentration, in parts per billion by volume, from AP-42.
3. There are no chlorine emissions from flaring, as chlorine is converted to HCL during combustion.
4. Hydrochloric acid emissions are estimated using stack test results from Kilkelly Environmental Associates, which showed HCL emissions of 0.028 lb/hr.