Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	1986	
Landfill Closure Year (with 80-year limit)	2064	
Actual Closure Year (without limit)	*2064*	
Have Model Calculate Closure Year?	Yes	
Waste Design Capacity	23,172,055	*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	0.040	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	100	*m^3/Mg*
NMOC Concentration	595	*ppmv as hexane*
Methane Content	50	*% by volume*

GASES / POLLUTANTS SELECTED

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

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1986	55,054	60,559	0	0
1987	121,801	133,981	55,054	60,559
1988	105,223	115,745	176,855	194,540
1989	100,062	110,068	282,077	310,285
1990	146,320	160,952	382,139	420,353
1991	179,389	197,328	528,459	581,305
1992	212,458	233,704	707,848	778,633
1993	225,371	247,908	920,306	1,012,337
1994	353,269	388,596	1,145,677	1,260,245
1995	404,277	444,705	1,498,946	1,648,841
1996	347,904	382,694	1,903,224	2,093,546
1997	369,423	406,365	2,251,127	2,476,240
1998	370,334	407,367	2,620,550	2,882,605
1999	341,817	375,999	2,990,884	3,289,972
2000	273,909	301,300	3,332,701	3,665,971
2001	262,540	288,794	3,606,610	3,967,271
2002	258,505	284,355	3,869,150	4,256,065
2003	248,873	273,760	4,127,655	4,540,420
2004	202,717	222,989	4,376,527	4,814,180
2005	199,562	219,518	4,579,245	5,037,169
2006	195,450	214,995	4,778,806	5,256,687
2007	199,113	219,024	4,974,256	5,471,682
2008	203,312	223,643	5,173,369	5,690,706
2009	193,716	213,088	5,376,681	5,914,349
2010	213,088	234,397	5,570,397	6,127,437
2011	234,397	257,836	5,783,485	6,361,833
2012	257,836	283,620	6,017,882	6,619,670
2013	283,620	311,982	6,275,718	6,903,290
2014	311,982	343,180	6,559,338	7,215,272
2015	327,581	360,339	6,871,321	7,558,453
2016	327,581	360,339	7,198,902	7,918,792
2017	327,581	360,339	7,526,483	8,279,131
2018	327,581	360,339	7,854,064	8,639,471
2019	327,581	360,339	8,181,646	8,999,810
2020	327,581	360,339	8,509,227	9,360,149
2021	327,581	360,339	8,836,808	9,720,489
2022	327,581	360,339	9,164,389	10,080,828
2023	327,581	360,339	9,491,971	10,441,168
2024	327,581	360,339	9,819,552	10,801,507
2025	327,581	360,339	10,147,133	11,161,846

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2026	327,581	360,339	10,474,714	11,522,186
2027	327,581	360,339	10,802,295	11,882,525
2028	327,581	360,339	11,129,877	12,242,864
2029	327,581	360,339	11,457,458	12,603,204
2030	327,581	360,339	11,785,039	12,963,543
2031	327,581	360,339	12,112,620	13,323,883
2032	327,581	360,339	12,440,202	13,684,222
2033	327,581	360,339	12,767,783	14,044,561
2034	327,581	360,339	13,095,364	14,404,901
2035	327,581	360,339	13,422,945	14,765,240
2036	327,581	360,339	13,750,527	15,125,579
2037	327,581	360,339	14,078,108	15,485,919
2038	327,581	360,339	14,405,689	15,846,258
2039	327,581	360,339	14,733,270	16,206,598
2040	327,581	360,339	15,060,852	16,566,937
2041	327,581	360,339	15,388,433	16,927,276
2042	327,581	360,339	15,716,014	17,287,616
2043	327,581	360,339	16,043,595	17,647,955
2044	327,581	360,339	16,371,177	18,008,294
2045	327,581	360,339	16,698,758	18,368,634
2046	327,581	360,339	17,026,339	18,728,973
2047	327,581	360,339	17,353,920	19,089,312
2048	327,581	360,339	17,681,502	19,449,652
2049	327,581	360,339	18,009,083	19,809,991
2050	327,581	360,339	18,336,664	20,170,331
2051	327,581	360,339	18,664,245	20,530,670
2052	327,581	360,339	18,991,827	20,891,009
2053	327,581	360,339	19,319,408	21,251,349
2054	327,581	360,339	19,646,989	21,611,688
2055	327,581	360,339	19,974,570	21,972,027
2056	327,581	360,339	20,302,152	22,332,367
2057	327,581	360,339	20,629,733	22,692,706
2058	327,581	360,339	20,957,314	23,053,046
2059	327,581	360,339	21,284,895	23,413,385
2060	327,581	360,339	21,612,477	23,773,724
2061	327,581	360,339	21,940,058	24,134,064
2062	327,581	360,339	22,267,639	24,494,403
2063	327,581	360,339	22,595,220	24,854,742
2064	249,253	274,179	22,922,802	25,215,082
2065	0	0	23,172,055	25,489,261

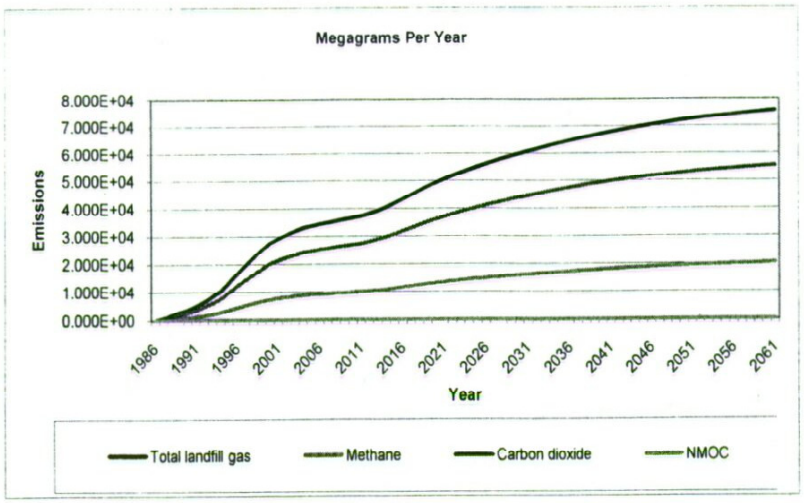
Pollutant Parameters

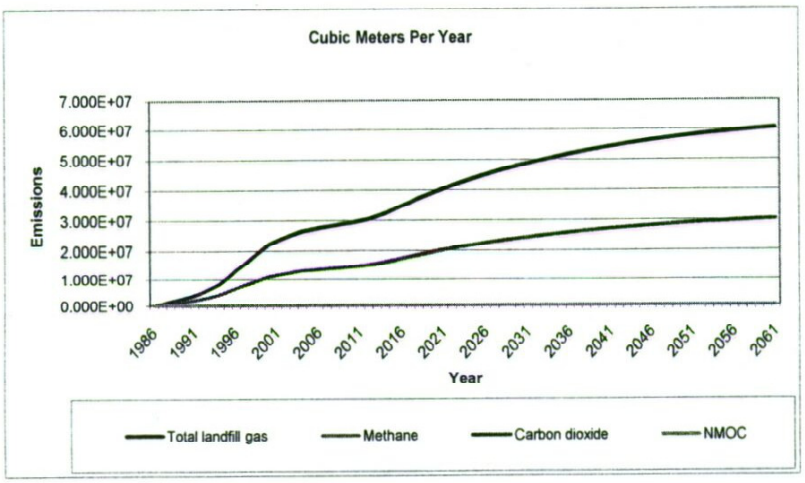
	Compound	Gas / Pollutant Default Parameters: Concentration (ppmv)	Molecular Weight	User-specified Pollutant Parameters: Concentration (ppmv)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform)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

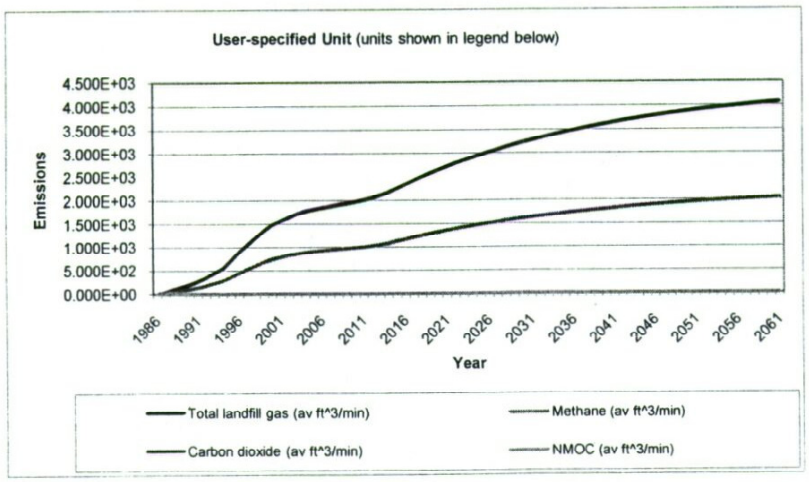
Pollutant Parameters (Continued)

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

Graphs


Megagrams Per Year
Emissions
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
1986 1991 1996 2001 2006 2011 2016 2021 2026 2031 2036 2041 2046 2051 2056 2061
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
7.000E+07
6.000E+07
5.000E+07
4.000E+07
3.000E+07
2.000E+07
1.000E+07
0.000E+00
1986 1991 1996 2001 2006 2011 2016 2021 2026 2031 2036 2041 2046 2051 2056 2061
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
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
1986 1991 1996 2001 2006 2011 2016 2021 2026 2031 2036 2041 2046 2051 2056 2061
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)
1986	0	0	0	0	0	0
1987	5.402E+02	4.326E+05	2.907E+01	1.443E+02	2.163E+05	1.453E+01
1988	1.714E+03	1.373E+06	9.223E+01	4.579E+02	6.864E+05	4.612E+01
1989	2.680E+03	2.146E+06	1.442E+02	7.158E+02	1.073E+06	7.209E+01
1990	3.556E+03	2.848E+06	1.913E+02	9.500E+02	1.424E+06	9.567E+01
1991	4.853E+03	3.886E+06	2.611E+02	1.296E+03	1.943E+06	1.305E+02
1992	6.423E+03	5.143E+06	3.456E+02	1.716E+03	2.572E+06	1.728E+02
1993	8.256E+03	6.611E+06	4.442E+02	2.205E+03	3.305E+06	2.221E+02
1994	1.014E+04	8.123E+06	5.458E+02	2.710E+03	4.061E+06	2.729E+02
1995	1.321E+04	1.058E+07	7.109E+02	3.529E+03	5.290E+06	3.554E+02
1996	1.666E+04	1.334E+07	8.964E+02	4.451E+03	6.671E+06	4.482E+02
1997	1.942E+04	1.555E+07	1.045E+03	5.188E+03	7.776E+06	5.225E+02
1998	2.229E+04	1.785E+07	1.199E+03	5.953E+03	8.923E+06	5.995E+02
1999	2.505E+04	2.006E+07	1.348E+03	6.690E+03	1.003E+07	6.738E+02
2000	2.742E+04	2.196E+07	1.475E+03	7.324E+03	1.098E+07	7.376E+02
2001	2.903E+04	2.325E+07	1.562E+03	7.755E+03	1.162E+07	7.810E+02
2002	3.047E+04	2.440E+07	1.639E+03	8.139E+03	1.220E+07	8.197E+02
2003	3.181E+04	2.547E+07	1.712E+03	8.497E+03	1.274E+07	8.558E+02
2004	3.301E+04	2.643E+07	1.776E+03	8.816E+03	1.321E+07	8.879E+02
2005	3.370E+04	2.699E+07	1.813E+03	9.002E+03	1.349E+07	9.066E+02
2006	3.434E+04	2.750E+07	1.847E+03	9.172E+03	1.375E+07	9.237E+02
2007	3.491E+04	2.795E+07	1.878E+03	9.325E+03	1.398E+07	9.391E+02
2008	3.549E+04	2.842E+07	1.910E+03	9.481E+03	1.421E+07	9.549E+02
2009	3.610E+04	2.891E+07	1.942E+03	9.642E+03	1.445E+07	9.711E+02
2010	3.658E+04	2.929E+07	1.968E+03	9.772E+03	1.465E+07	9.841E+02
2011	3.724E+04	2.982E+07	2.004E+03	9.947E+03	1.491E+07	1.002E+03
2012	3.808E+04	3.049E+07	2.049E+03	1.017E+04	1.525E+07	1.024E+03
2013	3.912E+04	3.132E+07	2.105E+03	1.045E+04	1.566E+07	1.052E+03
2014	4.037E+04	3.232E+07	2.172E+03	1.078E+04	1.616E+07	1.086E+03
2015	4.185E+04	3.351E+07	2.251E+03	1.118E+04	1.675E+07	1.126E+03
2016	4.342E+04	3.477E+07	2.336E+03	1.160E+04	1.738E+07	1.168E+03
2017	4.493E+04	3.598E+07	2.417E+03	1.200E+04	1.799E+07	1.209E+03
2018	4.638E+04	3.714E+07	2.496E+03	1.239E+04	1.857E+07	1.248E+03
2019	4.778E+04	3.826E+07	2.571E+03	1.276E+04	1.913E+07	1.285E+03
2020	4.912E+04	3.933E+07	2.643E+03	1.312E+04	1.967E+07	1.321E+03
2021	5.041E+04	4.037E+07	2.712E+03	1.346E+04	2.018E+07	1.356E+03
2022	5.165E+04	4.136E+07	2.779E+03	1.380E+04	2.068E+07	1.389E+03
2023	5.284E+04	4.231E+07	2.843E+03	1.411E+04	2.115E+07	1.421E+03
2024	5.398E+04	4.322E+07	2.904E+03	1.442E+04	2.161E+07	1.452E+03
2025	5.508E+04	4.410E+07	2.963E+03	1.471E+04	2.205E+07	1.482E+03
2026	5.613E+04	4.495E+07	3.020E+03	1.499E+04	2.247E+07	1.510E+03
2027	5.715E+04	4.576E+07	3.075E+03	1.526E+04	2.288E+07	1.537E+03
2028	5.812E+04	4.654E+07	3.127E+03	1.552E+04	2.327E+07	1.563E+03
2029	5.906E+04	4.729E+07	3.177E+03	1.577E+04	2.364E+07	1.589E+03
2030	5.995E+04	4.801E+07	3.226E+03	1.601E+04	2.400E+07	1.613E+03
2031	6.082E+04	4.870E+07	3.272E+03	1.625E+04	2.435E+07	1.638E+03
2032	6.165E+04	4.936E+07	3.317E+03	1.647E+04	2.468E+07	1.658E+03
2033	6.245E+04	5.000E+07	3.360E+03	1.668E+04	2.500E+07	1.680E+03
2034	6.321E+04	5.062E+07	3.401E+03	1.688E+04	2.531E+07	1.700E+03
2035	6.395E+04	5.121E+07	3.441E+03	1.708E+04	2.560E+07	1.720E+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)
2036	6.465E+04	5.177E+07	3.479E+03	1.727E+04	2.589E+07	1.739E+03
2037	6.533E+04	5.232E+07	3.515E+03	1.745E+04	2.616E+07	1.758E+03
2038	6.599E+04	5.284E+07	3.550E+03	1.763E+04	2.642E+07	1.775E+03
2039	6.661E+04	5.334E+07	3.584E+03	1.779E+04	2.667E+07	1.792E+03
2040	6.722E+04	5.382E+07	3.616E+03	1.795E+04	2.691E+07	1.808E+03
2041	6.780E+04	5.429E+07	3.648E+03	1.811E+04	2.714E+07	1.824E+03
2042	6.835E+04	5.473E+07	3.677E+03	1.826E+04	2.737E+07	1.839E+03
2043	6.889E+04	5.516E+07	3.706E+03	1.840E+04	2.758E+07	1.853E+03
2044	6.940E+04	5.557E+07	3.734E+03	1.854E+04	2.779E+07	1.867E+03
2045	6.989E+04	5.597E+07	3.760E+03	1.867E+04	2.798E+07	1.880E+03
2046	7.037E+04	5.635E+07	3.786E+03	1.880E+04	2.817E+07	1.893E+03
2047	7.082E+04	5.671E+07	3.810E+03	1.892E+04	2.836E+07	1.905E+03
2048	7.126E+04	5.706E+07	3.834E+03	1.903E+04	2.853E+07	1.917E+03
2049	7.168E+04	5.740E+07	3.857E+03	1.915E+04	2.870E+07	1.928E+03
2050	7.208E+04	5.772E+07	3.878E+03	1.925E+04	2.886E+07	1.939E+03
2051	7.247E+04	5.803E+07	3.899E+03	1.936E+04	2.902E+07	1.950E+03
2052	7.285E+04	5.833E+07	3.919E+03	1.946E+04	2.917E+07	1.960E+03
2053	7.320E+04	5.862E+07	3.939E+03	1.955E+04	2.931E+07	1.969E+03
2054	7.355E+04	5.889E+07	3.957E+03	1.965E+04	2.945E+07	1.979E+03
2055	7.388E+04	5.916E+07	3.975E+03	1.973E+04	2.958E+07	1.987E+03
2056	7.420E+04	5.941E+07	3.992E+03	1.982E+04	2.971E+07	1.996E+03
2057	7.450E+04	5.966E+07	4.008E+03	1.990E+04	2.983E+07	2.004E+03
2058	7.479E+04	5.989E+07	4.024E+03	1.998E+04	2.995E+07	2.012E+03
2059	7.508E+04	6.012E+07	4.039E+03	2.005E+04	3.006E+07	2.020E+03
2060	7.535E+04	6.033E+07	4.054E+03	2.013E+04	3.017E+07	2.027E+03
2061	7.561E+04	6.054E+07	4.068E+03	2.020E+04	3.027E+07	2.034E+03
2062	7.586E+04	6.074E+07	4.081E+03	2.026E+04	3.037E+07	2.041E+03
2063	7.610E+04	6.094E+07	4.094E+03	2.033E+04	3.047E+07	2.047E+03
2064	7.633E+04	6.112E+07	4.107E+03	2.039E+04	3.056E+07	2.053E+03
2065	7.578E+04	6.068E+07	4.077E+03	2.024E+04	3.034E+07	2.039E+03
2066	7.281E+04	5.830E+07	3.917E+03	1.945E+04	2.915E+07	1.959E+03
2067	6.996E+04	5.602E+07	3.764E+03	1.869E+04	2.801E+07	1.882E+03
2068	6.721E+04	5.382E+07	3.616E+03	1.795E+04	2.691E+07	1.808E+03
2069	6.458E+04	5.171E+07	3.474E+03	1.725E+04	2.585E+07	1.737E+03
2070	6.204E+04	4.968E+07	3.338E+03	1.657E+04	2.484E+07	1.669E+03
2071	5.961E+04	4.773E+07	3.207E+03	1.592E+04	2.387E+07	1.604E+03
2072	5.727E+04	4.586E+07	3.082E+03	1.530E+04	2.293E+07	1.541E+03
2073	5.503E+04	4.406E+07	2.961E+03	1.470E+04	2.203E+07	1.480E+03
2074	5.287E+04	4.234E+07	2.845E+03	1.412E+04	2.117E+07	1.422E+03
2075	5.080E+04	4.068E+07	2.733E+03	1.357E+04	2.034E+07	1.367E+03
2076	4.881E+04	3.908E+07	2.626E+03	1.304E+04	1.954E+07	1.313E+03
2077	4.689E+04	3.755E+07	2.523E+03	1.253E+04	1.877E+07	1.261E+03
2078	4.505E+04	3.608E+07	2.424E+03	1.203E+04	1.804E+07	1.212E+03
2079	4.329E+04	3.466E+07	2.329E+03	1.156E+04	1.733E+07	1.164E+03
2080	4.159E+04	3.330E+07	2.238E+03	1.111E+04	1.665E+07	1.119E+03
2081	3.996E+04	3.200E+07	2.150E+03	1.067E+04	1.600E+07	1.075E+03
2082	3.839E+04	3.074E+07	2.066E+03	1.025E+04	1.537E+07	1.033E+03
2083	3.689E+04	2.954E+07	1.985E+03	9.853E+03	1.477E+07	9.923E+02
2084	3.544E+04	2.838E+07	1.907E+03	9.467E+03	1.419E+07	9.534E+02
2085	3.405E+04	2.727E+07	1.832E+03	9.095E+03	1.363E+07	9.160E+02
2086	3.272E+04	2.620E+07	1.760E+03	8.739E+03	1.310E+07	8.801E+02

Landfill Gas Constituent Reference Concentrations

AP-42 Default Values
WIAC-2 Recommended Update of AP-42 Defaults
OSHA Permissible Exposure Limit [1][2], and
Odor Threshold Concentrations

Compound	AP-42[3] (ppmv)	WIAC-2[4] (ppmv)	OSHA PEL (8-hr TWA) (ppmv)	Odor Threshold[5] (ppm) (vol/vol)
1,1,1-Trichloroethane (methyl chloroform)	0.48	0.168	350	120
1,1,2,2-Tetrachloroethane	1.11	0.005	5	1.5
1,1-Dichloroethane (ethylidene dichloride)	2.35	0.741	100	--
1,1-Dichloroethene (vinylidene chloride)	0.2	0.092	--	190
1,2-Dichloroethane (ethylene dichloride)	0.41	0.12	50	88
1,2-Dichloropropane (propylene dichloride)	0.18	0.023	75	0.25
2-Propanol (isopropyl alcohol)	50.1	7.908	400	22
Acetone	7.01	7.075	1000	13
Acrylonitrile	6.33	<0.036	2	17
Benzene (Co-Disposal)	11.1	10.376	10	12
Benzene (No Co-Disposal)	1.91	0.972	10	12
Bromodichloromethane	3.13	<0.264	--	--
Carbon disulfide	0.58	0.221	20	0.11
Carbon tetrachloride	0.004	<0.007	10	96
Carbonyl sulfide	0.49	0.183	--	--
Chlorobenzene	0.25	0.227	75	0.68
Chlorodifluoromethane (Freon 22)	1.3	0.355	1000	--
Chloroethane (ethyl chloride)	1.25	0.448	1000	4.2
Chloroform	0.03	0.010	(C) 50	85
Chloromethane (methyl chloride)	1.21	0.136	100	--
Dichlorobenzene	0.21	1.448	(C) 50 for ortho- 75 for para-	0.30 for ortho- 0.18 for para-
Dichlorodiflouromethane (Freon 12)	15.7	0.964	1000	--
Dichloromethane (Methylene Chloride)	14.3	3.395	25	250
Dimethyl sulfide (methyl sulfide)	7.82	6.809	--	--
Ethane	889	7.943	--	120,000
Ethanol	27.2	64.425	--	--
Ethyl mercaptan (Ethanethiol)	2.28	0.226	(C) 10	0.00076
Ethylbenzene	4.61	6.789	100	2.3
Ethylene dibromide	0.001	<0.005	20	--

ZEF: Landfill Gas
Open (Candlestick) Flare System

Part 1. General

1.01 Description

A. This section describes a candlestick flare system for the combustion of landfill gases. The flare system must be of industrial quality and completely manufactured (including control system) by the flare supplier. The flare manufacturer shall have a minimum 10 years experience in the design and manufacture of this type of equipment and have a minimum of 25 candlestick flares in successful operation in the United States.

B. The flare system to be supplied must be complete and operable as specified herein:

1.02 Design Criteria

A. The landfill gas utility flare shall be designed to operate continuously at the following operation conditions:

Landfill gas flow rate:	_____ SCFM (maximum)
Composition:	30% - 50% CH_4 Remainder CO_2, air, and inert gases
Lower Heating Value (LHV):	_____ BTU/SCF (maximum)
Temperature:	100°F
LFG moisture content :	Saturated
Heat release:	_____MMBtu/Hr

B. Mechanical

Design Wind Speed:	110 mph
Seismic Zone:	4
Site Elevation:	_____ ft above sea level
Electrical Area:	Non-hazardous (unclassified)

C. Unit Design

Smokeless Capacity	100%
Pressure Drop	<5" w.c. from inlet through outlet of the flare
Turndown	>40:1

1.03 Performance Requirements

A. The candlestick flare system must be capable of achieving the following performance requirements:

1. The flare must be capable of sustaining stable combustion with 30% - 50% CH4 at the maximum required flow rate.
2. The flare must be capable of a minimum 40:1 turndown.
3. The flare exit velocity must be designed strictly in accordance with EPA 40 CFR Ch. 1 section 60.18, but shall not exceed 100 feet per second at any time.
4. The radiation on any point at grade shall not exceed 500 Btu/Hr-ft2 when the flare is firing at the maximum design heat release and with a 20 mph wind. This radiation is to be determined via the 3-point method utilizing the radiant heat fractions at each point.
5. Flame shape shall be determined and be based on the momentum flux differences between the landfill gas exiting the flare tip and the cross wind. The landfill gas should take into account the hydrocarbon concentration.
6. Flame length shall be determined and be based on the maximum design heat release with allowances for the molecular weight.
7. The pressure loss through the flare must be less than 5" w.c. from the inlet flange through the outlet of the flare.
8. Emissions from the flare shall not exceed the following:

   Nitrogen Oxide (NOx) - 0.068 lbs per MMBtu Fired
   Carbon Monoxide (CO) - 0.37 lbs per MMBtu Fired

9. The flare shall be capable of achieving a minimum destruction efficiency of >98% of total non-methane organic compounds (NMOCs).

Part 2 - Products

2.01 General

A. All equipment shall be designed and shall perform as a minimum in accordance with these specifications.
B. These specifications are intended to be specific in nature such that the flare operator will not be in danger from radiant heat emitted from the flame, and to determine the location of the flare from nearby structures, power lines, trees, etc., based on the flame shape and flame length.

INVENTORIES

AI ID: 42895 - Praxair Inc - Sulphur Hydrogen Mfg Facility
Activity Number: PER20090001
Permit Number: 0520-00170-V1
Air - Title V Regular Permit Admin Amendment

Subject Item Inventory:

ID	Description	Tank Volume	Max. Operating Rate	Normal Operating Rate	Contents	Operating Time
Praxair Inc - Sulphur Hydrogen Mfg Facility						
EQT 0001	1 - Howe-Baker Steam Methane Reformer H-101		966.15 MM BTU/hr	966.15 MM BTU/hr	PSA Offgas 490.95 MM Btu/hr; Natural Gas 475.20 MM Btu/hr	8760 hr/yr
EQT 0002	2 - Cooling Tower		10000 gallons/min	10000 gallons/min	Process Cooling Water	8760 hr/yr
EQT 0003	3 - 0.245 MM Btu/hr Flare		.245 MM BTU/hr	.245 MM BTU/hr	Natural Gas 0.245 MM Btu/hr - pilot	8760 hr/yr
EQT 0004	4 - Deaerator V-106		4500 lb/hr	4500 lb/hr		8760 hr/yr
EQT 0005	5 - 102,792 gallon Condensate Tank TK-900	102792 gallons	600 gallons/min	315 MM gallons/yr	Condensate Boiler Feed Water	8760 hr/yr
EQT 0006	6 - 800 gallon Sulfuric Acid Tank	800 gallons	3100 gallons/yr	8.4 gallons/day	Sulfuric Acid	8760 hr/yr
EQT 0007	7 - Miscellaneous Steam Vents		56691 lb/hr	102.41 MM lbs/yr	Steam	8760 hr/yr

Stack Information:

ID	Description	Velocity (ft/sec)	Flow Rate (cubic ft/min-actual)	Diameter (feet)	Discharge Area (square feet)	Height (feet)	Temperature (oF)
Praxair Inc - Sulphur Hydrogen Mfg Facility							
EQT 0001	1 - Howe-Baker Steam Methane Reformer H-101	57.3	218716	9		140	325
EQT 0002	2 - Cooling Tower	0	0	0		19	75
EQT 0003	3 - 0.245 MM Btu/hr Flare	0	0	2.5		140	1000
EQT 0004	4 - Deaerator V-106	0	0	.55		50	225
EQT 0005	5 - 102,792 gallon Condensate Tank TK-900	0	0	.33		22	200
EQT 0006	6 - 800 gallon Sulfuric Acid Tank	0	0	.17		5	75
EQT 0007	7 - Miscellaneous Steam Vents					24	200

Relationships:

Subject Item Groups:

ID	Group Type	Group Description
UNF 0001	Unit or Facility Wide	Facility - Praxair Inc - Sulphur Hydrogen Mfg Facility

Group Membership:

NOTE: The UNF group relationship is not printed in this table. Every subject item is a member of the UNF group

Annual Maintenance Fee:

Fee Number	Air Contaminant Source	Multiplier	Units Of Measure
0440	0440 Industrial Gases		

INVENTORIES

AI ID: 42895 - Praxair Inc - Sulphur Hydrogen Mfg Facility
Activity Number: PER20090001
Permit Number: 0520-00170-V1
Air - Title V Regular Permit Admin Amendment

SIC Codes:

2813	Industrial gases	AI 42895
2813	Industrial gases	UNF 001

LDEQ-EDMS Document 44582129, Page 67 of 211

PRINT DATE:	11/12/09
TITLE:	Magnolia LGS Emissions
PROJECT NAME:	TITLE V
PROJECT NUMBER:	2-149

SOURCE I.D. M-1

Emissions of landfill gas are calculated using guidance presented in AP-42 & NSPS ("Compilation of Air Pollutant Emission Factors") Section 2.4 ("Landfills"), November 1998.

EPA Landfill Emissions Model Version 3.02 was utilized to estimate methane emissions

LANDFILL GAS EMISSION MODEL PARAMETRS :

k, Methane (CH4) generation rate constant, yr^-1			
Conservative Estimate (above NSPS Default Value)			0.06
Lo, Methane generation potential, m^3 CH4/Mg refuse			
NSPS Default Value			170
Recoverable Gas			75%
Vol. % Methane			50%
Methane Flow year 2064 (See Model Output)	Cubic meter/yr		30,560,105.23
		SCFM	3,078
Average Temperature landfill Gas (°C)			25

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original to IOA
copy to MFG/Grp1/5
Pusateri

PER20080001

WASTE MANAGEMENT

MAGNOLIA LANDFILL
1000 Russell Sage Road
Monroe, LA 71203
Office (318) 343-5636
Fax (318) 345-3721

August 12, 2009

Ms. Shannon Pusateri
Air Permits Division, Office of Environmental Services
LA Department of Environmental Quality
P.O. Box 4313
Baton Rouge, LA 70821-4313

2009 AUG 13 AM 11:10

RE: Magnolia Sanitary Landfill
AI No. 12241, Activity No. PER2008001
Proposed Permit No. 2160-00075-V3
Monroe, Ouachita Parish, Louisiana

Dear Ms. Pusateri:

Waste Management of Louisiana, LLC provides the following responses for the additional technical information required in your letter dated July 16, 2009. Reponses are provided in bold following each item.

1. With regard to the applicability of 40 CFR 63 Subparts IIII and JJJJ, the June 30, 2009 response characterized the engines in question as nonroad engines and therefore the NESHAP subparts in question do not apply. However, 40 CFR 1068.31(e) states:

(e) A nonroad engine ceases to be a nonroad engine and becomes a new stationary engine if.-
(1) At any time, it meets the criteria specified in paragraph (2)(iii) in the definition of "nonroad engine" in §1068.30. For example, a portable generator engine ceases to be a nonroad engine if it is used or will be used in a single specific location for 12 months or longer. If we determine that an engine will be or has been used in a single specific location for 12 months or longer, it ceased to be a nonroad engine when it was placed in that location.

In view of this information, please provide the necessary information to demonstrate that the engines in question are nonroad engines - - i.e., that they have not been located at a single location for a period of 12 months or longer.