NMOC EMISSION RATE REPORT

Manager, Air Permitting Programs
New Mexico Environment Department
Air Quality Bureau
2048 Galisteo Street
Santa Fe, New Mexico 87505

RE: NMOC Emission Rate Report as required by the MSW Landfill NSPS

Dear Manager, Air Permitting Programs:

Facility A is currently regulated according to the MSW Landfill NSPS. Under the requirements of the regulations, Landfill A must submit an estimate of the NMOC emissions. The estimated NMOC emission rate is _____ Mg/yr. This estimate was calculated based on the Tier 1 procedures in the regulations. A copy of the calculations is enclosed.

Sincerely,

Enclosure

TIER 1 CALCULATION FORM

This calculation form presents the equations and default values used in the Tier 1 NMOC emission rate analysis. Completing this form will yield the annual NMOC emission rate, which should be entered in the space provided in the cover letter.

Note that Equation 1 is for landfills where the annual MSW acceptance rate is not known. Equation 2 is to be used if the annual acceptance rate is known. The equations are to be used together if the annual acceptance rate is known for only part of the life of the landfill. For example, a 30-year old landfill with an unknown annual acceptance rate during the first 10 years would require Equation 1 for that time period, and would require Equation 2 for the subsequent 20 years when the annual acceptance rate was known.

Equation 1. *(For landfills where the annual acceptance rate is **not** known)*

$$M_{NMOC} = 2L_oR(e^{-kc} - e^{-kt})(C_{NMOC})(3.6 \times 10^{-9})$$

where, M_{NMOC} = mass emission rate of NMOC, (Mg/yr)

L_o = Refuse methane generation potential: 170* (m^3/Mg)

R = Average annual acceptance rate: _____(Mg/yr)

k = Methane generation rate constant: 0.05* (l/yr)

c = Years since closure (c = 0 for active and/or new landfills): _____(yrs)

t = Age of landfill (i.e., years since landfill first opened) : _____(yrs)

CNMOC = Concentration of NMOC: 4.000* (ppm as hexane)

Conversion factor: 3.6×10^{-9}

MNMOC = 2 (170) ( ) ($e^{-(0.05)(\ )} - e^{-(0.05)(\ )}$) (4,000) (3.6 x 10-9)

MNMoc = _____ Mg/yr

*Default values. An alternative methane generation rate constant (k) of 0.02 can be used for landfills located in geographical areas with a 30-year annual average precipitation of less than 25

inches. The average annual precipitation must be indicated by the nearest representative meteorological site.

Equation 2. *(For landfills where the annual acceptance rate is known)*

$$M_{NMOC} = Q_l + Q_2 + Q_3 + \text{etc.}$$

and,

$$Qi = 2\ k\ L_o\ M_i\ (e^{-kt_i})\ (C_{NMOC})\ (3.6 \times 10^{-9})$$

where,

M_{NMOC} = total mass emission rate of NMOC from all sections of the landfill (Mg/yr)

Q_i = mass emission rate of NMOC from the ith section of the landfill (Mg/yr)

Example Values for Calculations

Variables	**Ql**	**Q2**	**Q3**	
k = methane generation rate constant *(l/yr)*	0.05	0.05	0.05	(default*)
Lo = refuse methane generation potential (m3/Mg)	170	170	170	(default)
M_i = mass of waste in the ith section of the landfill (Mg)	500	600	800	(landfill specific)
t_i = age of the ith section of the landfill	20	19	18	(landfill specific)
C_{NMOC} = concentration of NMOC in landfill gas (ppm as Hexane)	4,000	4,000	4,000	(default)
conversion factor	3.6×10^{-9}	3.6×10^{-9}	3.6×10^{-9}	(fixed factor)

* As described above, an alternative default k of 0.02 can be used in arid areas.

Calculate the mass emission rate (Q_i= for each segment of the landfill:

$$Q_i = 2\ (0.05)\ (170)\ (\underline{\quad})\ (e^{-(0.os\ (\underline{\quad}))}\ (4,000)\ (3.6 \times 10^{-9})$$

Add the emission rate of the various landfill segments to calculate total mass emission rate (M_{NMOC}):

$$M_{NMOC} = Q_l + Q_2 + Q_3 + \text{etc}$$
$$= \_\_\_ + \_\_\_ + \_\_\_ + \_\_\_ \text{, etc.}$$

If annual waste acceptance rates are known as Q_i, Q_i would be emissions from the ith year, and Q_l would be emissions from the first year, Q_2 for the second year, etc.

If a landfill was in operation for 3 years then:

$$M_{NMOC} = Q_l + Q_2 + Q_3$$

If the first year of operation was 20 years ago and waste acceptance was 500 then:

$$Q_l = 2\ (.05)\ (170)\ (500)\ (e^{-(.05)(20)})\ (4{,}000)\ (3.6 \times 10^{-9})$$

the 2nd year of operation was 19 years ago and acceptance was 600:

$$Q_2 = 2\ (.05)\ (170)\ (600)\ (e^{-(.05)(19)})\ (4{,}000)\ (3.6 \times 10^{-9})$$

the 3rd year of operation was 18 years ago and acceptance was 800:

$$Q_3 = 2\ (.05)\ (170)\ (800)\ (e^{-(.05)(18)})\ (4{,}000)\ (3.6 \times 10^{-9})$$