BENEFITING FROM THE PROPOSED EPA LANDFILL GAS EMISSION CONTROL REGULATIONS

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AUTHOR'S CLOSURE

As of this writing, the Federal regulations entitled "Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills," are still proposed and are now scheduled to be promulgated in December 1994. Since publication of my paper, there has been an "informal" update of the regulations. Mark Najarian, project manager for the regulations, has released a one-page table indicating "changes to the proposed New Source Performance Standards and Emission Guidelines that the United States Environmental Protection Agency will submit to the Office of Management and Budget as a final rule." However, the text further states that "These recommendations should by no means be considered as final decisions."

The predominant change to the originally proposed regulations that the EPA has recommended is the increase in the size (or design capacity) of the landfills which are exempt from the proposed regulations from 100,000 Mg (111,000 tons) to 1.0 million Mg (1.1 million tons). This change alone would result in the regulations only affecting very large landfills. The other major change which the EPA recommended is in the nonmethane organic compound (NMOC) emission limit over which a landfill gas collection and treatment system must be installed at the landfill.The EPA recommends that this limit be reduced from 150 Mg NMOC/yr (167 tons NMOC/yr) to 50 Mg NMOC/yr (56 tons NMOC/yr). The other EPA-recommended changes include revisions to the default parameters used in the EPA computer gas emission model (Tier 1), and some additional clarifications and gas monitoring requirements. All of the recommended changes/additions presented by the EPA are shown in Table 1a.

Decreasing the concentration of NMOCs, C_{NMOC} acts to decrease the NMOC emissions produced in a specific year from the landfill. Increasing the gas generation rate, k, acts to increase the rate of gas and NMOC emission generation from the landfill — more gas is produced quicker. Decreasing the gas generation potential, L_o, acts to decrease the total quantity of gas and NMOC emissions that the landfill will produce during its gas production lifetime. All of these parameters combined result in a lower yearly net NMOC emission rate.

The addition of a default radius of influence to the regulations allows the landfill owner/operator to use the default value to locate the landfill gas collection wells on the landfill without conducting on-site gas emission studies (Method 2E). Finally, the EPA recommendation to require surface monitoring requires the landfill owner/operators to measure gas emissions from the surface of the landfill on a monthly basis.

These changes affected some tables in the paper. However, the general conclusions of the paper remained unchanged. As a result, I have updated the affected tables and summarized the pertinent sections of each table as follows.

In Table 2a, the EPA gas emission computer model would not have to be run for the 10 and 25 acre landfills, since neither landfill exceeds a design capacity of 1.0 million Mg (1.1 million tons). These two landfills, therefore, are exempt from the regulations due to their design capacity. The revised NMOC emission values for the 50 and 100 acre sites are summarized in Table 2a, along with the emission results obtained when utilizing the EPA computer model with the originally proposed default parameters for comparison.

As shown in the table, both of these landfills easily exceed the newly revised 50 Mg NMOC/yr (56 tons NMOC/yr) emission rates. Thus a landfill gas collection and treatment system would be required to be installed at these landfills. The table also verifies the earlier prediction that when utilizing the revised EPA computer model default parameters, for the same landfill, the NMOC emission rate estimated by the EPA computer model is lower.

TABLE 1A
EPA RECOMMENDED CHANGES/ADDITIONS

	Proposed Regulations	Recommended Promulgation
Regulatory Criteria Changes		
Design capacity exemption (MSW)	100,000 Mg (111,000 tons)	1.0 million Mg (1.1 million tons)
NMOC emission rate cutoff	150 Mg/yr (167 tons/yr)	50 Mg/yr (56 tons/yr)
Computer Model (Tier 1) Default Changes		
Concentration of NMOCs, C_{NMOC}	8000 ppm_v	4000 ppm_v
Gas generation Rate, k	0.02 yr^{-1}	0.05 yr^{-1}
Gas generation potential, L_o	230 m^3/Mg	170 m^3/Mg
Regulatory Criteria Additions		
Default radius of Influence as an alternative to method 2E	None	30 m (200 ft)
Surface monitoring	None	Monthly monitoring for surface concentrations not to exceed 500 ppm methane

TABLE 2A
NONMETHANE ORGANIC COMPOUND EMISSION RATES

Landfill Size (acres)	NMOC EMISSION RATE			
	Proposed Regulations		Recommended Promulgation	
	(tons/yr)	(Mg/yr)	(tons/yr)	(Mg/yr)
50	590	530	425	381
100	1715	1540	1234	1108

TABLE 3A
PEAK LANDFILL GAS RECOVERY RATES

Landfill Size (acres)	Peak Landfill Gas Recovery Size (cfm)*		
	Proposed Regulations	Recommended Promulgation	Rule-of-Thumb Method (range)
50	497	1429	409–227
100	1444	4152	1189–3566

* Assumes 80% recovery of landfill gas generated.

Table 3a shows the revised peak landfill gas recovery rates (assuming an 80% landfill gas recovery), estimated for each of the landfills utilizing the EPA computer model. Contrary to the NMOC emission results, the landfill gas emission rates estimated by the EPA model with the new default parameters (recommended promulgation) are higher than those default parameters originally proposed by the EPA. In fact, the estimated landfill gas emission rates predicted with the new default parameters are almost three times higher than with those parameters originally proposed by the EPA. These results may be overly conservative, especially since the EPA model emission results utilizing the original default parameters were thought to be conservative. As a result, a rule-of-thumb landfill gas estimation method was utilized as a means of comparison.

The rule-of-thumb method used has been presented by Robert K. Ham of the University of Wisconsin in the University of Wisconsin "Sanitary Landfill Gas and Leachate Management" courses. This method is based on the assumption that 0.05–0.15 ft^3 of landfill gas is produced each year for each pound of refuse buried in a landfill.

The range of landfill gas generation by utilizing the rule-of-thumb lower and upper landfill gas generation rates is shown in the table. The rule-of-thumb method is another conservative method of estimating landfill gas generation. As shown in the table, the "recommended promulgation" landfill gas recovery rates (as estimated by utilizing the new default parameters in the EPA model) are higher than the rule-of-thumb estimation rates. As a result of these varying numbers, and since landfill gas generation estimation is very difficult due to the heterogeneity of landfills, it was concluded not to change the original landfill gas estimation rates (utilizing the originally proposed default parameters).

Consequently, all of the capital, operation, maintenance, and net present value analysis costs estimated in the paper for the landfill gas collection and treatment systems for the 50- and 100-acre sites remain unchanged. However, as previously mentioned, the 25-acre site of dimensions as described in the paper would be exempt from the regulations as per the revised parameters presented herein. Thus, no economic analysis need be done for the 25-acre hypothetical landfill site.