Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

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Subject: Estimating Emissions from Flares Combusting Landfill Gases

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Question

Should the AP-42 landfill flare factors found in Section 2.4 be used to estimate emissions from landfill flares?

Answer

The Texas Natural Resource Conservation Commission (TNRCC) flare technical guidance should be used to estimate carbon monoxide (CO), nitrogen oxides (NO_x), and volatile organic compound (VOC) emissions from landfill flares (do not use the AP-42 factors). Inorganic particulate emissions may be estimated using the AP-42 factors. Emissions of halogens and elements such as sulfur should be determined based on the concentrations of these species in the waste stream routed to the flare as described in the flare technical guidance.

Background

The AP-42 Section 2.4 provides emission calculation methods and factors for determining air emissions from landfills. In addition to emission factors derived from sampling of landfill gas, it provides control and emission factors for control devices (including flares). These factors have been accepted in the past for some landfill standard permit registrations.

Discussion

The AP-42 emission factors in this section are derived from stack testing performed on enclosed flares at a number of landfills across the country. The control efficiencies cited (98% for halogenated species and 99.7% for non-halogenated species) correspond well with the flare testing used as a basis for the TNRCC flare factors. This supports continued use of the TNRCC flare destruction efficiencies as a basis for maximum allowable emission rates (the AP-42 factors are averages, not maximum allowables).

The CO and NO_x factors are compared below (in terms of lb/MMBtu):

	AP-42	TNRCC
CO	0.75	0.55
NO_x	0.04	0.06

The AP-42 factors cited are approximate because all heating value for the waste stream is assumed to be due to methane and that the heating value of methane is approximately 1000 Btu/scf. The TNRCC factors are for low Btu flares without steam assist.

After consideration of the sample results used to generate the AP-42 landfill flare factors, there does not appear to be a basis for changing TNRCC guidance for this class of flare. The reasons for this include:

1. The factors do not differ significantly so that using current factors would maintain consistency. In addition, there was extreme variability in the sampling results used to generate the AP-42 factors. The CO samples (second lowest to second highest) used to generate the AP-42 factor encompassed a factor of 100 (i.e., about 0.075 to 7.5), while the NO_x range was a factor of 10. This variability weakens the case for unique factors.

2. Current guidance is to use the manufacturer's estimated CO and NO_x for enclosed flares (vapor combustors). These should be more accurate than the AP-42 factors.

3. The landfill flares sampled for the AP-42 factors only included enclosed flares; elevated flares were not tested.

Particulate Matter

The AP-42 landfill flare sampling also included an extensive number of particulate samples. The results showed that the vast majority of the particulate was inorganic (any organic samples were 0.001 gr/scf or less - many not detectable). This again is consistent with current guidance assuming no particulate emissions due to incomplete combustion of VOC although it indicates that the flare guidance may need to be updated to recognize that particulate may be observed if there are inorganic compounds routed to a flare.