UPGRADING EXISTING MWCS WITH ESPS: THE CONTRIBUTIONS OF COMBUSTION IMPROVEMENT VERSUS APC TEMPERATURE REDUCTION

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ABSTRACT

Existing municipal waste combustors (MWCs) will have to comply with more stringent stack emissions limits as the recently published guidelines come into effect, and the States respond with the same or stricter regulations. Those with state-of-the-art emissions controls, such as scrubber/baghouses, may have to reduce dioxin and mercury emissions further. Existing facilities lacking acid gas controls will have to add them, and also meet stringent dioxin and metals emissions limits. Many remedies are available, including improving combustion efficiency by providing computer control and improved methods of supplying combustion air, reduction of emission control device temperature, and injection of alkaline reagents and activated carbon. This paper investigates the contributions of both improved combustion and reduction in emission control temperature in reducing dioxin emissions to EPA guideline limits.. The potential use of real-time surrogates for dioxins, including not only CO but chlorobenzenes, for diagnostic testing and monitoring of performance, is discussed.

INTRODUCTION

The technologies employed by municipal waste combustors (MWCs) have evolved from trash heap combustion to modern computer-controlled systems having reciprocating stokers, highly effective computer-control of combustion air, highly effective emission controls, and continuous flue gas analysis, control and monitoring devices. This evolution has progressed under pressure from the public and regulators, and the desire of vendors to offer more effective equipment and facility operation.

Emissions guidelines for existing MWCs

The Final Draft Emission Guidelines for existing facilities, published by the U.S. Environmental Protection Agency (EPA) in October, 1995 are shown in Table 1. These will severely affect MWCs which employ electrostatic precipitators (ESPs) and are not presently equipped with acid gas controls. The affected facilities include six large waste-to-energy facilities containing 16 MWC lines and an additional 19 small plants consisting of 38 combustion lines. These facilities represent about 22,000 tons per day (TPD) of municipal solid waste (MSW) disposal capacity.

Most of the MWCs which have been built in the last ten years have been equipped with dry- injection or spray-dry scrubbers with ESPs or baghouses, which are classed as Best Available Control Technology (BACT). Retrofitting the older MWCs which do not have acid gas controls with these technologies could easily cost $15,000 per ton of acid gas removed, compared with the EPA cost effectiveness guideline of $2,000 per ton removed, and could add $20 per ton to the cost of MSW combusted. In view of present costs of waste disposal, this penalty could make the facility economically uncompetitive, resulting in its abandonment, while the community would be obliged to continue to pay off the bonds which financed the facility.

More efficient ESPs and fabric filters have succeeded in reducing particulate matter emissions from early regulatory levels of 0.08 grains per dry standard cubic foot (gr/dscf), corrected to 7% oxygen, to under 0.010 gr/dscf, hence this has become the new federal standard for new sources (NSPS). This limit allows some leeway for normal variations in emissions from test to test. The new emission guidelines (EGs) for existing facilities require that 0.030 gr/dscf or small plants and 0.012 gr/dscf for large plants, as seen in Table 1. Acid gas controls for existing facilities will have to meet sulfur dioxide (SO_2) limits of 80 ppm or 50% reduction for small facilities, and 31 ppm or 75% reduction for large facilities. For small facilities, HCl must be reduced by 50% or to 250 ppm, and by 95% or to 31 ppm for large facilities. Control of NOx emissions is not required for small plants and refractory-walled combustors, but