

provide some control of PM, but will not reduce emissions of acid gases (HCl and SO₂), NO_x, or metals (Pb, Cd, and Hg).

The 2-sec combustion level includes a minimum secondary chamber temperature of 1800°F and residence time of 2-sec. These combustion conditions will provide additional control of CDD/CDF, CO, and PM, but will not reduce emissions of acid gases (HCl and SO₂), NO_x, or metals (Pb, Cd, and Hg). The 2-sec combustion conditions are considered to be the best level of combustion control that is applied to MWI's.

2. Add-On Control

Add-on control refers to various add-on air pollution control systems used in addition to 2-sec combustion to capture pollutants as they leave the incinerator. Add-on controls include wet systems, fabric filter systems without activated carbon injection, and fabric filter systems with activated carbon injection. Because Pb and Cd are associated with PM in the flue gas and are removed by PM control devices, these three pollutants are considered as a group when evaluating MACT. Similarly, SO₂ and HCl are considered together because generally, they are both reduced using acid gas controls.

a. *Wet systems.* Wet systems include scrubbing systems such as a venturi scrubber (VS) or a venturi scrubber followed by a packed-bed absorber (VS/PB). Compared to combustion control, wet systems achieve substantial reductions in HCl emissions, provide some control of Pb and Cd, and further reduce PM and CDD/CDF emissions, but do not add to the control of NO_x, CO, or Hg. However, at the low SO₂ levels associated with MWI's, wet systems are not, in EPA's experience, effective in reducing SO₂ emissions. As discussed in section VI, EPA requests comment on the performance and costs of wet scrubber systems.

b. *Fabric filter systems without carbon injection.* Fabric filter systems include a fabric filter followed by a packed bed absorber (FF/PB), dry sorbent injection followed by a fabric filter (DI/FF), or a spray dryer followed by a fabric filter (SD/FF). The SD/FF and the DI/FF systems have the same performance based on EPA MWI test data. The fabric filter alone was not examined because wet systems achieve greater overall emission reduction at a lower cost.

Compared to wet systems, fabric filter systems generally provide additional control of PM, Pb, and Cd, but do not add to the control of acid gases, NO_x, CO, or Hg. The performance of the three fabric filter systems in reducing CDD/

CDF emissions varies significantly. Compared to combustion control, the DI/FF and SD/FF systems provide no additional control of CDD/CDF, while formation of CDD/CDF is a potential problem with the FF/PB system.

Formation of CDD/CDF occurs when there is intimate contact between a gas stream containing CDD/CDF precursors and fly ash, which acts as a catalyst for CDD/CDF formation. The optimum temperature window for fly ash catalyzed CDD/CDF formation is between 300° and 600°F. The formation of CDD/CDF is minimized when using combustion control or wet systems because these options provide: (1) rapid cooling of the gas stream through the temperature window; and/or (2) quick dispersion (or removal in the case of wet systems) of CDD/CDF precursors and fly ash. In DI/FF and SD/FF systems, the presence of an acid gas sorbent (lime, for example) also limits the formation of CDD/CDF. The fabric filter in a FF/PB system, on the other hand, can provide those conditions conducive to CDD/CDF formation. In fact, test data have shown CDD/CDF formation in the FF/PB system.

c. *Fabric filter systems with carbon injection.* Data from a DI/FF system and a SD/FF system show that the injection of activated carbon upstream of the fabric filter results in significant reductions in CDD/CDF and Hg emissions, compared to wet systems and FF systems without carbon. Because no data are available from a FF/PB system with carbon injection, and because CDD/CDF formation occurred in a FF/PB system, it is not known exactly what CDD/CDF emission reductions can be achieved with this system. However, it is expected that the injection of carbon will improve the performance of a FF/PB system in reducing CDD/CDF emissions.

d. *Nitrogen oxides control.* During combustion, NO_x is formed through oxidation of fuel-bound nitrogen (N₂) contained in the medical waste and oxidation of atmospheric N₂ (from the combustion air). Selective noncatalytic reduction (SNCR) add-on technology has been used to control NO_x emissions from municipal waste combustors (MWC's) by reducing NO_x to N₂ without the use of catalysts. Techniques include Thermal DeNO_xTM, which injects ammonia into the combustor as a reducing agent; the NO_xOUTTM process, which injects urea with chemical additives; and a two-stage urea/methanol injection process. Maximum emissions reduction occurs when the reducing agents are injected into a gas stream within a narrow temperature

range and the gas is maintained in that range for a sufficient length of time.

A discussion of SNCR NO_x control was presented in the recent proposal preamble for the MWC NSPS (59 FR 181 page 48228). The use of SNCR at MWC's results in NO_x emission reductions of about 45 percent.

There are some concerns about the applicability of SNCR to MWI's. The SNCR technology has never been applied to MWI's, and several factors may complicate the use of SNCR and may reduce its performance level. The periodic charging of waste may cause corresponding temperature fluctuations, and the varying moisture and nonhomogeneous nature of the waste burned. When the temperature rises above the required injection temperature window, the reducing agent is oxidized to NO_x, and NO_x emissions can increase. In the event of low temperatures, unreacted ammonia (NH₃) emissions can occur.

Furthermore, uncertainties exist regarding the injection pattern necessary to achieve adequate mixing and residence time in the operating temperature window and in the design and engineering work necessary to develop equipment that could be used in applications with much smaller gas flow rates than those for MWC's. Consequently, SNCR is not considered a demonstrated control technology for MWI's.

Although SNCR is not considered a demonstrated control technology for MWI's, the EPA specifically solicits comments on the technical feasibility of applying NO_x control to MWI's. Specifically, the EPA solicits information on the performance, including control device inlet and outlet emissions data, costs, applicability, and operating experience associated with specific NO_x control technologies for MWI's.

3. *Waste segregation.* One area that has been suggested for consideration is waste segregation. It has been suggested that removal of batteries would reduce Hg emissions and that removal of chlorinated plastics would result in reductions in HCl and CDD/CDF. The EPA data indicate that these emissions vary from facility to facility which could be a result of differences in the amount of Hg and chlorine found in the waste stream. The types of materials that are sent to the incinerator will vary from facility to facility depending on facility operating practices, which are defined by purchasing decisions, waste handling procedures, and other practices that affect the types of materials incinerated. The EPA has no data on the effect of waste handling practices on emissions