

## CONTROL OF AIR POLLUTION EMISSIONS FROM MUNICIPAL WASTE COMBUSTORS

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### ABSTRACT

The November 1990 Clear Air Act Amendments (CAAA) directed EPA to establish municipal waste combustor (MWC) emission limits for particulate matter, opacity, hydrogen chloride, sulfur dioxide, nitrogen oxides, carbon monoxide, dioxins, dibenzofurans, cadmium, lead, and mercury. Revised MWC air pollution regulations were subsequently proposed by EPA on September 20, 1994, and promulgated on December 19, 1995. The MWC emission limits were based on the application of maximum achievable control technology (MACT). This paper provides a brief overview of MWC technologies, a summary of EPA's revised air pollution rules for MWCs, a review of current knowledge concerning formation and control of polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans, and a discussion of the behavior and control of mercury in MWC flue gases.\*

### INTRODUCTION

In June 1987, EPA announced its intention to develop new air pollution rules for MWCs.<sup>1</sup> This decision was based, in part, on a study of the potential environmental risk associated with MWCs.<sup>2</sup> Pollutants posing the highest risks included polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and hazardous trace metals. On December 20, 1989, EPA proposed New Source Performance Standards (NSPS) for new MWCs and Emission Guidelines (EGs) for existing MWCs.<sup>3</sup> NSPS and EGs for MWCs larger than 225 Mg/day in capacity were promulgated in February 1991.<sup>4</sup>

The November 1990 CAAAs directed EPA to establish MWC emission limits for particulate matter (PM), opacity, hydrogen chloride (HCl), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), PCDDs/PCDFs, cadmium (Cd), lead (Pb), and mercury (Hg).<sup>5</sup> Revised MWC air pollution regulations were subsequently proposed by EPA on September 20, 1994, and promulgated on December 19, 1995.<sup>6-9</sup> These emission limits were based on the application of MACT. For existing units, MACT is defined as the best emission limit achieved by 12 percent of the operating units in a category such as large or small units. For new units, MACT is defined as the best emission limit achieved by the best single unit in a category of units.<sup>5</sup>

This paper provides a brief overview of MWC technologies, a summary of EPA's revised air pollution rules for MWCs, a review of current knowledge concerning formation and control of PCDDs/PCDFs, and a discussion of the behavior and control of Hg in MWC flue gases. The focus of the paper is on the performance of combustion and flue gas cleaning technologies used at MWC facilities in controlling emissions of PCDDs/PCDFs and Hg.

### MWC TECHNOLOGIES

Three major types of MWCs are commonly used in the U.S.: field-erected mass burn incinerators, refuse-derived fuel (RDF) combustors, and factory-constructed modular mass burn incinerators.<sup>10</sup> The best combustion technologies ensure adequate waste burnout and produce minimal products of incomplete combustion (PICs) in the flue gas.

In the U.S., dry flue gas cleaning technologies are generally used to control air pollution emissions.<sup>11</sup> Wet scrubbing systems are seldom used. PM is typically collected in

\* This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative policies and has been approved for publication.