



Project Summary

Municipal Waste Combustion Assessment: Combustion Control at New Facilities

P. J. Schindler

The EPA's Office of Air Quality Planning and Standards (OAQPS) is developing emission standards and guidelines for new and existing municipal waste combustors (MWCs) under the authority of Sections 111(b) and 111(d) of the Clean Air Act (CAA). The EPA's Office of Research and Development (ORD) is providing support in developing the technical basis for good combustion practice (GCP), which is included as a regulatory alternative in the standards and guidelines. This report provides the supporting data and rationale used to establish baseline emission levels for model plants that represent portions of the planned and projected population of MWCs. The baseline emissions represent performance levels that are expected to be achieved by new plants in the MWC population that incorporate GCP. The baseline emissions, which were developed using the data base from the newest units in the existing population of MWCs, establish performance levels against which the effectiveness and costs of emission control alternatives can be evaluated.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

On July 7, 1987, the U.S. EPA announced its intent to develop air

emission standards for new municipal waste combustors (MWCs) and guidelines for existing MWCs under the authority of Section 111 of the Clean Air Act. The New Source Performance Standards (NSPS) will apply to all MWCs that commence construction after the proposal date, and the guidelines will apply to all MWCs not covered by the NSPS. Following the July 1987 announcement, an extensive background information development and data gathering effort was initiated to provide the technical support for the proposed regulations. The NSPS and guidelines development includes a performance assessment of emission control alternatives that are applied to hypothetical model plants. The models represent typical classes of MWCs within the existing and projected population. Baseline emission estimates were developed for each model plant and control alternatives were applied to each model to estimate the potential for reduction of emissions from baseline levels. Costs of control alternatives were estimated to permit calculation of the cost effectiveness of control options.

Performance Data/Rationale

This report summarizes the performance data and supporting rationale that were used to establish the baseline emission estimates for 12 MWC model plants. Each model represents a group of MWCs that will be regulated by the NSPS. Descriptions of the model plants are contained in a companion report. The baseline performance levels were established using the available emissions data base for MWCs or, in cases where

little or no data existed, engineering judgment. The baseline emissions are expressed as unabated concentrations measured prior to treatment by add-on flue gas cleaning equipment. The unabated emissions represent performance levels that result from the application of good combustion practice (GCP), which is expected to be in place at all new MWCs. GCP requires that specific design, operation, control, and monitoring features be in place to optimize the combustion process, thus minimizing emission of trace organics and carbon monoxide (CO). The necessary components of GCP were originally defined in EPA's Report to Congress on MWC. The data used to establish baseline emissions are limited to data available from the newest facilities in the MWC population. This report summarizes the design and operating features of the combustors in the data base and evaluates the extent to which recommended design and operating components of GCP are in place at each plant.

Model Plants

Using projections of the future MWC population, 12 model plants were developed to represent the majority of combustor classes that would be regulated by the NSPS. The models included three mass burn waterwall MWCs, one mass burn refractory wall MWC, one rotary waterwall MWC, one modular excess air MWC, two modular

starved air MWCs, two refuse-derived-fuel (RDF) fired spreader stoker MWCs, one RDF bubbling fluidized bed MWC, and one RDF circulating fluidized bed MWC. Information provided for each model plant included unit size, number of combustors per site, annual operating hours, electric generating status (all models were assumed to produce steam), and fuel type (either unprocessed municipal solid waste, RDF, or a mixture of RDF and wood waste).

Emission Estimates

Baseline uncontrolled emissions were estimated for three air pollutants: polychlorinated dibenzo-p-dioxins and dibenzofurans (CDD/CDF), CO, and particulate matter (PM). The CDD/CDF data included in the baseline determination were limited to test results available to EPA. Six sets of data were available for mass burn waterwall MWCs and three data sets for modular excess air and modular starved air units. No CDD/CDF data were available from rotary waterwall units, and only one or two data sets for each of the other technologies. Therefore, engineering judgments were used to some extent to assign baseline CDD/CDF emissions. The baseline CDD/CDF concentrations ranged from 20 ng/dscm, corrected to 7% O₂, for the bubbling fluidized bed model plants to 1000 ng/dscm, corrected to 7% O₂, for RDF spreader stoker model plants. Mass burn waterwall and modular excess air

model plants were assigned baseline CDD/CDF emissions of 200 ng/dscm, corrected to 7% O₂. Mass burn refractory wall, mass burn rotary waterwall, and modular starved air model plants were assigned baseline CDD/CDF emissions of 300 ng/dscm, corrected to 7% O₂. Finally, RDF circulating fluidized bed model plants were assigned a baseline CDD/CDF emission level of 400 ng/dscm, corrected to 7% O₂. Baseline CO emissions ranged from 50 to 100 ppm, 4 hour average, corrected to 7% O₂ for all models. Baseline PM emissions ranged from 0.1 gr/dscf (230 mg/dscm) to 4 gr/dscf (9200 mg/dscm), corrected to 7% O₂. The lowest PM emissions were assigned to modular model plants and the highest PM emissions were from RDF spreader stokers and FBC model plants. The remaining models were assigned baseline PM emissions of 2 gr/dscf (460 mg/dscm). The different baseline PM emission rates reflect inherent performance characteristics of each model plant type (e.g., low primary chamber gas velocities result in low PM entrainment for modular MWCs, while semisuspension firing of RDF in spreader stoker boilers results in higher PM carryover).

The data presented in this report were used to establish performance estimates for model plants in the NSPS regulatory development effort, thus providing baseline for assessing emission reductions and costs of add-on control alternatives.

P. J. Schindler is with Energy and Environmental Research Corp., Durham, NC 27707.

James D. Kilgroe is the EPA Project Officer (see below)

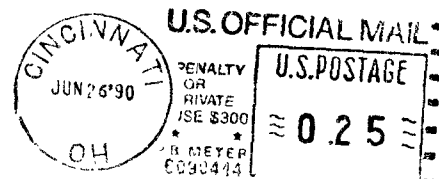
The complete report, entitled "Municipal Waste Combustion Assessment: Combustion Control at New Facilities," (Order No. PB90-154 923/AS; Cost: \$17.00, subject to change) will be available only from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650

The EPA Project Officer can be contacted at:
Air and Energy Engineering Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

United States
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Center for Environmental Research
Information
Cincinnati OH 45268



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