CHARACTERIZATION AND CONTROL OF CADMIUM, LEAD, AND MERCURY FROM RDF MUNICIPAL WASTE COMBUSTORS

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INTRODUCTION AND SUMMARY

Title III of the 1990 Clean Air Amendments mandates EPA to propose maximum achievable control technology (MACT) standards for cadmium, lead and mercury air emissions from municipal waste combustors (MWC's) by November 1991. There is growing concern in this country and in Europe regarding environmental levels of lead and mercury, and a fear exists that MWC's may be a major contributor to these levels. Finally, Congress will soon be debating amendments to RCRA, the Solid Waste Act, which will likely consider disposal and reuse requirements for ash from MWC's where questions of leachability of trace metals, particularly cadmium (Cd), lead (Pb), and mercury (Hg) will be of concern.

Because of these important factors, this paper will primarily focus on air and ash emissions for these three trace metals from refuse derived fuel (RDF) type MWC's. Secondarily, the paper will attempt to point out what emission controls are being, and could be, imposed, and what future trends are likely to occur to reduce these emissions. Thirdly, the paper will put into perspective the contribution that Hg emissions from MWC's have to the global emissions of Hg.

Most of the data that will be presented comes from the Mid-Connecticut RDF facility located in Hartford, Connecticut. That facility is a 2,000 ton/day facility owned by the Connecticut Resources Recovery Authority and designed and constructed by ABB Resource Recovery Systems (ABB/RRS). The facility contains a waste processing facility that produces RDF which is operated by the Metropolitan District Commission. Slides will be presented which illustrate how this facility produces RDF (see Figure 1). Slides will also be presented showing how pre-processing MSW to produce RDF can reduce levels of Cd, Pg and Hg by 33% - 90% prior to combustion.

Next, the paper will describe the power block facility (see Figure 2) which is operated by ABB/RRS. Slides will be presented which describe the boiler, the combustion controls, the dry scrubber, and the reverse air fabric filter from this facility. Slides will also be presented which summarize the uncontrolled levels of Cd, Pb and Hg in the flue gas before the scrubber as well as the controlled levels of these same pollutants after the baghouse. These levels will be compared for different steam loads, combustion conditions and scrubber settings. Finally, data will be presented showing the high removal efficiencies for these trace metals in the flue gas (i.e. 97.6 - 100%) and the impact that varying the calcium to sulfur stoichiometric ratio has on removal efficiency.

Next, the paper will describe the facility ash handling system. Slides will be presented showing both the concentration (ug/g) and quantity rates (kg/hr) of Cd, Pb, and Hg in the RDF and the various ash fractions. These slides will illustrate the concentration buildup of these trace metals in fly ash. Slides

will also be presented which show results of leachability studies on the ash using sequential batch extraction and TCLP leach tests.

Finally, the paper will conclude with general observations on trends in control of Cd, Pb, and Hg from all types of MWC's, and what EPA may be considering in the new air regulations that must be promulgated soon. The paper will discuss general confusion that currently exists about the magnitude that MWC's may play in contributing to environmental levels of Hg. The paper will put Hg emissions from MWC's into perspective and compare them to emissions from other sources.

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Municipal Solid Waste Processing - Single Line

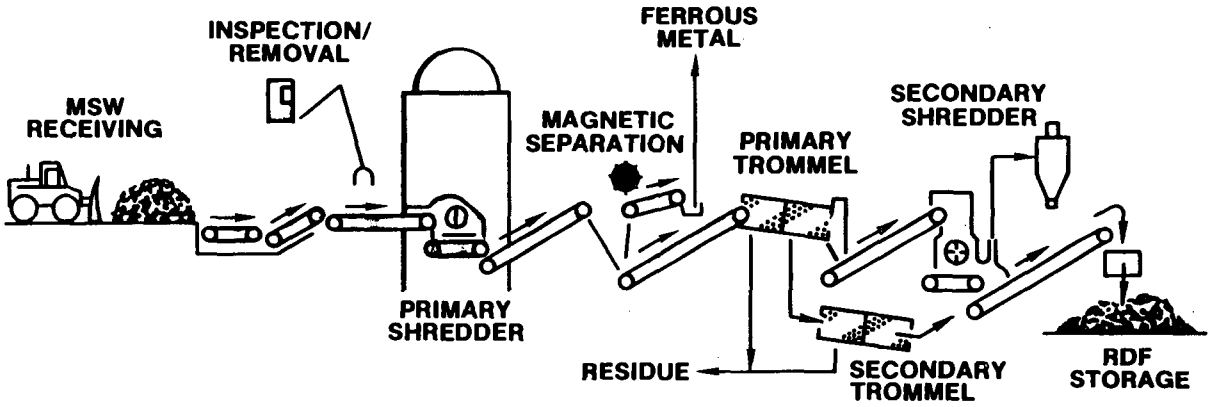

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FIGURE 1

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Prepared Fuel Steam Generation System

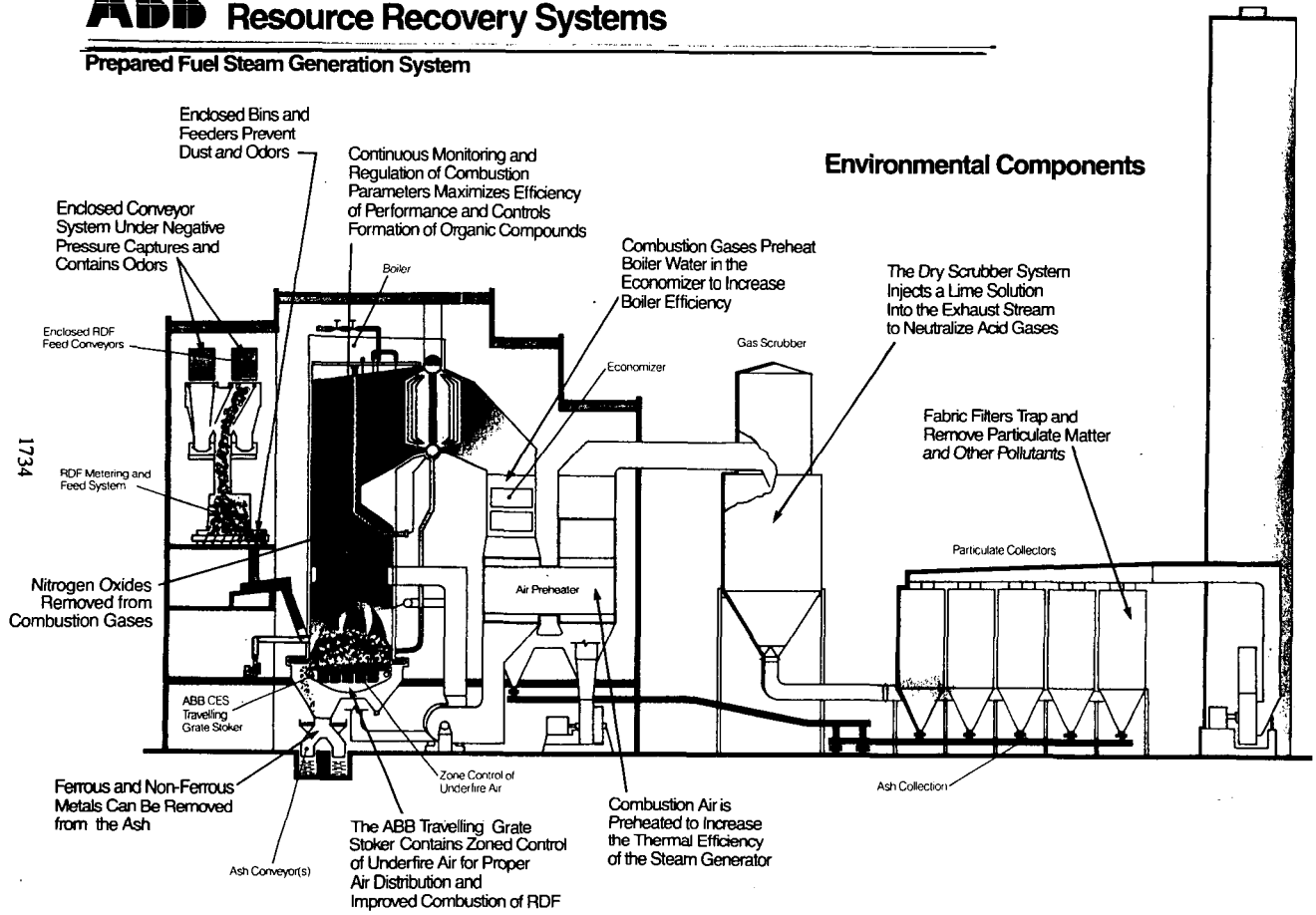

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FIGURE 2