

CHARACTERISTICS OF RDF ASH

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Discussion by

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GENERAL

The intent of this paper as presented in the introduction was to develop a reliable indication of ash characteristics prior to construction of the facility. After review and evaluation it is my opinion that the paper has fallen short of the stated goal and may have presented more questions regarding the procedure than answers. The industry is currently in a major struggle with environmental groups and legislators over the characteristics of ash in general and how it should be handled. One of the major points of the controversy is the applicability of the EPA EP toxicity test which is a laboratory based procedure that the industry, in general, does not consider to be representative of actual field conditions. The procedure presented in this paper may result in a similar controversy with the opponents of waste incineration taking a similar position in claiming that the procedure does not represent actual conditions that will be encountered in a full scale facility.

PREPARATION OF RDF SAMPLE

The description of the RDF sample preparation was

very general. Table 1 lists the components of the sample by component, but should have gone further. For instance, the paper component was listed as 52.11%, but we are not told how much of that was newsprint, corrugated or mixed packaging. Similar breakdowns should be given for the plastic, wood and other organics components. How much PVC was included and how much of the wood was painted or pressure treated? The mechanics of the production process that produces the RDF should also be presented. We assume that the sample was prepared without batteries or battery fragments, but we are given no information to compare that assumption with operating conditions.

COMBUSTION DYNAMICS

The procedure calls for the prepared RDF sample to be mixed with lime at the typical stoichiometric ratio for dry scrubber operation (which is not given) and combusted in a laboratory muffle furnace. The relatively static combustion conditions of the muffle furnace does not adequately reflect that dynamic conditions that exist in an actual combustion unit. In particular the oxidation, gasification and condensation of heavy metals onto fine particulate matter cannot be duplicated in such a laboratory exercise. Without the dynamics of excess combustion air entering the combustion chamber creating turbulent conditions, the entrainment of fly ash and fine particulates will be greatly

diminished as will the mechanism for condensation/absorption of heavy metals onto the particulate matter.

Although I am not familiar with the combustion unit proposed for this particular project, most RDF facilities are operated at relatively high excess air to maintain suspension burning which is generally assumed to produce a higher particulate loading than a similar mass burn unit. Therefore, the muffle furnace ash could be expected to contain significantly less fine particulate matter than the production facility that it was intended to approximate. The bottom line is that the heavy metals in the muffle furnace ash will be associated with larger ash particles which would be less likely to leach under testing procedures, therefore producing lower results.

Similar questions arise when considering the mixing and combusting of lime with the prepared sample in static conditions versus the production mechanism of injecting dry lime into the gaseous emissions under very dynamic conditions. The efficiency of the lime in contacting and neutralizing acid will be greatly reduced.

SUMMARY

Although I can sympathize with the authors in their desire to come up with a cost-effective laboratory procedure to estimate certain ash characteristics, this procedure is far too general and needs to be expanded to better reflect actual combustion conditions.

Discussion by

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The presence of heavy metals in refuse-derived ash in quantities exceeding regulatory limits is of great concern at this time. If this ash is required to be disposed of as a hazardous waste, the overall costs of waste-to-energy facilities will be increased, along with the cost to dispose of the wastes combusted.

As the authors point out, it is difficult to correlate the results of their experiments with results at actual facilities. Nevertheless, the need for knowledge on this subject is so great that any contribution is welcome.

I would like to broaden the discussion to raise some of the issues that must be addressed if the heavy metals in ash problem is to be resolved:

(a) What materials and products in the waste stream contain heavy metals? In what form do the metals occur (e.g., pure metal, oxides, etc.)?

(b) What measures can be taken by facility operators and/or regulators to keep heavy metals out of the incoming wastes?

(c) What happens to the heavy metals in the combustion chamber? What determines whether the metals are deposited in fly ash or bottom ash?

(d) How should the ash be managed? What tests are appropriate?

I realize that most of these questions are unanswerable right now. Some research is on-going, and the ASME Solid Waste Processing Division provides a good forum for discussion.