

WASTE SEPARATION- DOES IT INFLUENCE MUNICIPAL WASTE COMBUSTOR EMISSIONS?

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Discussion by

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The authors have done a commendable job in proving that trace emissions from a modern waste to energy plant have little to do with the trace compounds in individual components of municipal solid waste. Ogden, the leader in designing, constructing and operating waste-to-energy facilities knew there was no relationship between the trace compounds in the items in the trash and the levels of trace emissions measured in the stack, but had never been able to support that position with carefully produced scientific data until the author's study was conducted. Early stack and municipal solid waste (MSW) tests conducted by the US Environmental Protection Agency in the 1970's showed that uncontrolled emissions from the combustion of MSW contained many trace compounds, but could never find a definitive link between "fuel" and trace emission.

The study conducted by the authors at the facility in Canada was the first well thought out and executed program to define if a scientifically robust correlation exists. Their work has, in the opinion of this discussor, laid to rest the notion that removal of a component of the MSW stream is an effective air pollution control technique.

AUTHORS' INTRODUCTION

The authors wish to thank those who provided discussions for their complimentary remarks on the work undertaken not only for this study but during The WASTE Program study in Vancouver in 1991. We hope that this work has pointed out the need to design experiments that challenge the popular hypotheses and determine if things are always what they seem.

AUTHORS' REPLY

Mr. Sussman's comments served to elaborate on the data presented in this study and point out how these results integrate with the findings of the 1991 WASTE Program study. It is our opinion that there are still areas that need further study to determine the exact mechanisms that can lead to increased or reduced emissions from MWC facilities, however, waste separation is not a universally effective measure of accomplishing this end.

Question by

Jerry P. Bauer, P.E.
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Did you look at carbon emissions?

AUTHORS' REPLY

A specific review of carbon emissions was not part of this study, but it should be pointed out that a full complement of organic

species are routinely monitored at this facility and the results are generally consistent with no variations that can be associated with identifiable changes in the waste feed or season. In addition, total hydrocarbons as measured by FID are routinely monitored during the test campaigns and results are consistently below 5 ppm. Carbon monoxide is monitored in 5 locations in the system, boiler exits and stack, and consistently reads in the 1-5 ppm range with no significant long duration excursions.

Question by

William Wilson

What would the effect be if the test plant had a scrubber/baghouse rather than an ESP?

AUTHORS' REPLY

This question really asks us to speculate on the partitioning of trace metals in the stack gas stream and the inherent performance differences between ESP's and scrubber/baghouse situations. It is our opinion, not a definitive scientific result, that given the potentially lower removal efficiency of ESP systems for particulates in certain size ranges there might be a more identifiable trend in emissions with changes in seasons or waste stream character; however, it is difficult to predict how significant this might be. The partitioning and size of trace metals contaminants in the flue gases likely relates to the character of the waste that is being burned and we are unaware of any data that has examined the relationship in detail. Suffice it to say that the truism still exists, if it does not enter the furnace it cannot come out. As a corollary, if it enters the system, the better the control, the less released. But as noted with the lead acid battery study referenced in the paper, the form the trace metals are introduced in greatly influences the eventual disposition of the material.

Question by

Bernd Calaminus

Did you see any "Hold Up" effect (in stack emissions) during the test runs?

AUTHORS' REPLY

The issue of delayed responses noted during stack testing campaigns is very real. One has to take measures to ensure that stable operating conditions are achieved before testing commences. The QA/QC program developed for the testing at the PRRI facility requires that the plant be operating in the test mode at least 24 hours before the commencement of testing. Since testing is normally carried out under 'routine operating conditions' achieving the goal of stable operation has not been a problem. That is not to say that stability has always been achieved. As discussed in the paper, the steady decrease of cadmium emissions during the first test campaign was thought to be the result of increasing efficiency in the APCS as the baghouse filter cake reached its optimal operating state. Not mentioned in the paper is an apparent trend in PCDD/F emissions that shows, when operating conditions involved changing from one baghouse to the other, the first of the triplicate series tends to be higher than the other runs. This could reflect a lack of stability in the system or evolution of previously trapped material. The effect, while statistically significant, is not practically important since the facility still exhibits low dioxin emissions levels.

Question by

Anthony Licata

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With batteries, did you observe increased lead levels in the ash?

AUTHORS' REPLY

While the phenomena of increased lead in the residue streams has not been noted at Peel Resource Recovery Inc., likely due to lack of

detailed testing of both residues and waste, definite correlations were found during The WASTE Program testing in Vancouver in 1991. Charging the furnace with 250+ kg/hr of lead acid batteries increased the lead concentrations in the grate siftings dramatically. With the possible exception of some minor increases in lead in the first boiler pass, no other residue streams were noted to have significant changes in lead levels. In fact, during this testing the lead concentration in the stack gases prior to the APCS did not change. It was concluded that, for the most part, the lead in the batteries melted and passed through the grate prior to being volatilized into the gas stream. The increased lead in the boiler ash was thought to be the result of carryover of lead sulfate, a reaction product of lead acid batteries, from the furnace.

Question by

Ross Kennedy

Did you observe any increase in lime consumption during the tests?

AUTHORS' REPLY

Lime consumption is not measured directly at the Peel Facility. Rather, the HCl at the stack is continuously monitored and lime addition is adjusted to keep the stack concentration at a level the operator considers appropriate (normally about 60% of the emission standard). No major changes in lime addition rates were noted during any of the testing conducted at the facility, however, during one series of early tests the operating temperature in the scrubber was reduced from 160°C to 150°C. This was sufficient to cause a substantial reduction in lime addition rate. That reduction was never quantified because it was considered more appropriate to operate at higher temperatures which reduce maintenance concerns (i.e. bag blinding and wall wastage potential).