AIR EMISSION TEST RESULTS FROM THE DUTCHESS COUNTY RESOURCE RECOVERY FACILITY

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The Dutchess County Resource Recovery Facility is designed to process 510 TPD. It is however, limited by permit to process only 400 TPD. Prior to considering a permit change allowing the Facility to operate closer to its design throughput, the agency having jurisdiction, NYSDEC, has requested the operator provide at least 3 months of actual operating emissions data. To comply, Westinghouse has installed, certified, and are operating CEMs for CO, O\textsubscript{2}, NO\textsubscript{x}, SO\textsubscript{2} and Opacity.

The initial air emission test results, as reported in this paper, indicate mass emission rates for particulates are controllable to 65\% of permit limits, SO\textsubscript{2} can be removed to within 70\% of permit limits, NO\textsubscript{x} is produced at 60\% of permit levels, and CO is formed in concentrations approximately 75\% of that allowable. These results indicate a permit modification increasing throughput 25\% is fathomable with, without regard to metals, CO being the most limiting emission.

To enhance CO control, two physical modifications were made to the combustors as so noted in the paper. These were improvements of axial seals which divide underfire from overfire air and addition of a deflector/distribution plate which provides for an even bed depth in the final burnout stage. Subsequent testing confirms a noticeable CO production improvement, to 60\% of allowable range, per the November 1989 Daily Average as presented in Fig. 3. Not credited however, were any improvements in combustion control.

The basic O'Conner Rotary combustor combustion control logic involves MSW feed rate expressed as Ram Speed, combustor residence time expressed as Rotation Speed, and Combustion Air Volume. For the Dutchess Facility, combustion air is split into underfire and overfire air and is regulated into drying, steam production, and combustion completion zones. CO production is inversely related to combustion completion. In the Control System, these parameters are not integrated, but are individually controlled semi-automatically. Therefore, improvements in CO production may be as equally attributed to increases in operator proficiency in combustion control as to the noted physical modifications.

Despite both the physical modifications and improved operator proficiency, wide swings in daily CO averages occur as may be discerned from the November 1989 recent operations data as displayed in Fig. 3. On an 8 hr basis, as required by the permit, these swings can be even wider. This may be due to differences in operator proficiency between shifts and variations in the waste stream between newly delivered and aged waste, which will differ as to wetness.
Figure 3 indicates these swings can be held within an acceptable range below the permit limits to allow the desired increase in permitted throughput. The variations, however, remain detrimental to the plant. Periods of high CO production are indicative of air starvation and reducing combustion conditions. Reducing combustion conditions lead to \( \text{H}_2\text{S} \) formation rather than \( \text{SO}_2 \). \( \text{H}_2\text{S} \) reacts with the mild steel fire-side boiler components, forming loosely adhered FeS. Abrasion and cleaning will readily remove this corrosion product, resulting in gradual wastage of the mild steel pressure retaining components.

It would, therefore, appear beneficial to continue to improve operator proficiency including integration and automation of the combustion control system.

**AUTHORS' REPLY**

We would like to thank the discusser for his interest and stimulating comments to the paper. We would like to make the following minor rebuttal comments to the discussion paper.

The emission results presented in the paper show the emission levels from the Dutchess Facility on a short term basis. As shown in the paper, the reported levels were less than the permitted levels.

The discusser points out that the Facility is limited to burn only 400 TPD of MSW. The NYSDEC recently issued a permit change to allow the Facility to burn 400 TPD averaged over a calendar year. The major emission parameter that currently dictates the possibility of changing the permit to a higher processing level is the annual \( \text{SO}_2 \) emission level. The current \( \text{SO}_2 \) emission limit for the Facility is 210 ton/year.

The discussion paper pointed out some of the more recent improvements made to the Facility to improve combustion control, and subsequently CO emission levels. In addition, the Facility has modified the combustors (June 1990) by providing “over combustor air” into the third zone. The purpose of the over combustor air is to provide additional air for combustion control that is necessary to achieve low CO emissions on a continuous basis. The CO levels are typically between 70 and 100 ppm averaged over an 8 hr period.

The discusser also pointed out that high CO levels are indicative of air starvation and reducing conditions in the furnace. The discussion of how corrosion occurs is somewhat simplified in nature. Corrosion reactions are much more complicated and involve other parameters including \( \text{HCl} \) concentration, amount and nature of particulate deposit on the boiler tubes, flue gas temperatures, and steam conditions (temperature and pressure) in addition to those mentioned in the discussion paper.