ANATOMY OF A WTE RETROFIT: START TO FINISH

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Discussion by

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I was interested to see the particulate emissions being reported after retrofit as less than 0.00070 gr/dsft^3 @ 7% O_2. This is 1.6 mg/dsm^3 @ 7% O_2 which is roughly one third the level of quantification [LOQ] I usually find associated with Method 5. I have recently done a number of method blanks and found that filters lose weight—even weightings that comply with EPA weight stability criteria. When train blanks are considered and loss of filter matter to the support substrate is considered, the problem becomes worse.

The authors should provide the individual run results (and method blanks and blank train results if they did them) so that everyone can determine if such a low concentration is more likely to be data noise or actual performance of the unit. The concern is not that the authors improperly reported their results. Rather, there is a great potential for use of such findings to further lower emissions standards. Once standards are reduced to, much less forced below, the LOQ, compliance becomes a statistical game of chance.

AUTHORS' REPLY

With regard to H. Gregor Rigo's comments on the subject paper, we have the following response:

1. The individual run results are provided in the table below for reference, as requested.

2. We concur that the Method 5 results at the very low catch weights associated with these emission results are subject to considerable variability.

SPSA Waste-to-Energy Plant APC Retrofit Project Particulate Emissions Test Results
(Stack Concentration, gr/dsef @ 7% O2)

	Run 1	Run 2	Run 3	Average
Unit 3	0.00074	0.00007	0.000105	0.000305
Unit 4	0.000956	0.0011	0.0012	0.001085

We are not aware of any EPA approved method for reporting such low concentration (i.e., as reporting results "below detection limits" or less that Method 5 "level of quantification"). Accordingly, we simply reported results from the Method 5 tests as reported to us by the testing firm.

We concur that the results reported in our paper should not be used as a basis for establishing or revising emission limits, nor do we expect that these emission results can be repeated n subsequent tests as the baghouse "ages".

Discussion by

Anthony Licata
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I am pleased to have been asked to discuss this paper since I was involved in the start-up and acceptance testing of the Norfolk Naval Shipyard Steam Plant. I have a first-hand knowledge of the facility and I am familiar with the site construction limitations and problems which impacted the retrofit of the MWC. We need to thank the authors for sharing with the industry their costs, schedule, and most importantly, some of the roadblocks that occur on retrofits.

I would like to caution the authors that when they refer to dioxin emissions that they specify what toxic equivalent they used as their reference and identify if the data is based on a TEQ or mass balance.

I would ask that the authors provide additional information on the following:

1. You stated that the CO optimization work at times can adversely impact dioxin emissions. Can you provide more details and test data?

2. When you started your water injection, what was the starting temperature; you only reported a 100°F drop. More data on these tests would benefit the industry.

3. Can you provide a drawing of the locations and type of the water injection used.

4. Please provide more discussion on the problems in ash plugging when injecting water.

AUTHORS' REPLY

A portion of the CO optimization work involved adjustments of undergrate/overfire air ratios. During one set of diagnostic runs with readjusted ratios, CO was minimized compared to previous runs. It would appear that the elevated (25 percent higher) dioxin results produced during this test were a result of higher particulate carryover created by the increase in underfire air.

Economizer outlet gas temperatures on these units are in the 600°F range, prior to quenching with water sprays.

Four nozzles per unit were installed at the top of a horizontal duct at the economizer outlet. The gas velocity in the region of the nozzles was 45 fpm at a maximum load, and the nozzles were selected to produce 90 percent less than 50 micron droplet size. This size droplet, if uniformly produced, would be capable of fully evaporating within 1/4 second, which would preclude any wet droplets from impinging upon the duct walls.

The nozzles were fed from an existing plant hotwell condensate water source, at 1-5 gpm each. Steam at 150 psig was used in the two fluid nozzle as an atomization medium.

The problems with ash pluggage appear to have been related to less than perfect nozzle performance over time. Variations in water supply pressure, steam pressure, unit load, and flyash impingement all may have contributed to operation with less than ideal droplet sizes. The larger size droplets would then impinge on ductwork before being evaporated, and create, when combined with flyash, a hard crusty deposit. Over time these deposits had to be removed by manual scraping.