From:	Linero, Alvaro
To:	jshrock@ectinc.com
Cc:	tdavis@ectinc.com; Read, David
Subject:	NO2/NOx
Date:	Monday, July 29, 2013 4:10:50 PM
Attachments:	Peischl 2010 topdown power plant emissions TEXAQS.pdf

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John:

I think the local power plants can be presumed to emit <10% NO2 within their NOx.

Please see the enclosed, starting on page 12.

The results are presented in Figure 15. NO2/NOx ratios calculated using NO2 data from the P-CL NO2 instrument average 6.1% (±3.9%).Ratios calculated using NO2 data from the CaRDS NO2 instrument average 6.7% (±2.7%). For comparison, an ODR slope calculation of [DO3 + DNO2 (CaRDS)]/DNOy yielded an average ratio of 6.8% (±3.8%).

Aside from this document (of EPRI origin), it is well known from combustion references that NO is by far the prominent species created by coal combustion, and in particular, coal-fueled power plants.

Refer to the following link for the description:

http://www.babcock.com/library/pdf/BR-1834.pdf

NOx formation mechanism
NOx in the flue gas is a result of oxidizing either nitrogen in fuel (fuel NOx) or nitrogen in combustion air (thermal NOx). Generally for coal-firing, influenced by the type of fuel, less than 25 percent of the NOx produced is thermal NOx and the balance is fuel NOx. Nitrogen oxides consist of 90 to 95 percent nitric oxide (NO) with the balance occurring as nitrogen dioxide (NO2). Once the flue gas leaves the stack, the bulk of the NO is oxidized in the atmosphere
forming NO2.

Thermal NOx refers to the NOx formed through high temperature oxidization of the nitrogen found in combustion air. The mechanism of thermal NOx formation was first
described by Zel'dovich (1946) and later modified to what is referred to as the extended Zel'dovich mechanism (Sarofim and Pohl, 1972) as shown in the following equations:

$N2 + O \rightarrow \mathbf{NO} + N$
$N + O2 \rightarrow \mathbf{NO} + O$
$N + OH \rightarrow \mathbf{NO} + H$

I think you can make the assumption of Tier 3 for coal units in the PSD application to us and at the same time submit rationale for approval by EPA with a request that they get back to you promptly.

Best to go for Tier 3 on the JEA units because they are not actually running the SCR systems on the two large units at St. Johns River Power Park.

So your assumption of something like 0.6 lb/mmBtu of NOx (i.e. NO2 + NO) is probably not off as an hourly max.

Eventually, and by the time we are ready to take initial action on the application, I think they will concur on Tier 3 for the coal units and maybe for the kiln.

David and I will be in your area this Friday morning.

If you or Tom are available, we can discuss this matter in greater details.

Thanks.

Al Linero.

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