

**Preliminary Comments from Members of the Clean Air Scientific
Advisory Committee (CASAC) Air Monitoring and Methods
Subcommittee (AMMS)**

Preliminary Comments received on 2/16/11

In Preparation for Public Meeting, February 16, 2011

Carolina Inn, 211 Pittsboro Street, Chapel Hill, NC, 27516 (919-933-2001)

Purpose: To review and provide advice on the scientific adequacy and appropriateness of EPA draft documents on monitoring and methods for Oxides of Nitrogen (NO_x) and Sulfur (SO_x).

Preliminary Comments from Mr. Eric Edgerton

1. What are the Panel's views on using the CASTNET filter pack (FP) to measure particulate sulfate for the purpose of providing annual average values as an indicator for the NO_x/SO_x standard? Given EPA plans primarily to document the capability of the CASTNET FP and develop the FRM for particulate sulfate based on the existing information and procedures, what are the Panel's views of this approach for setting the FRM?

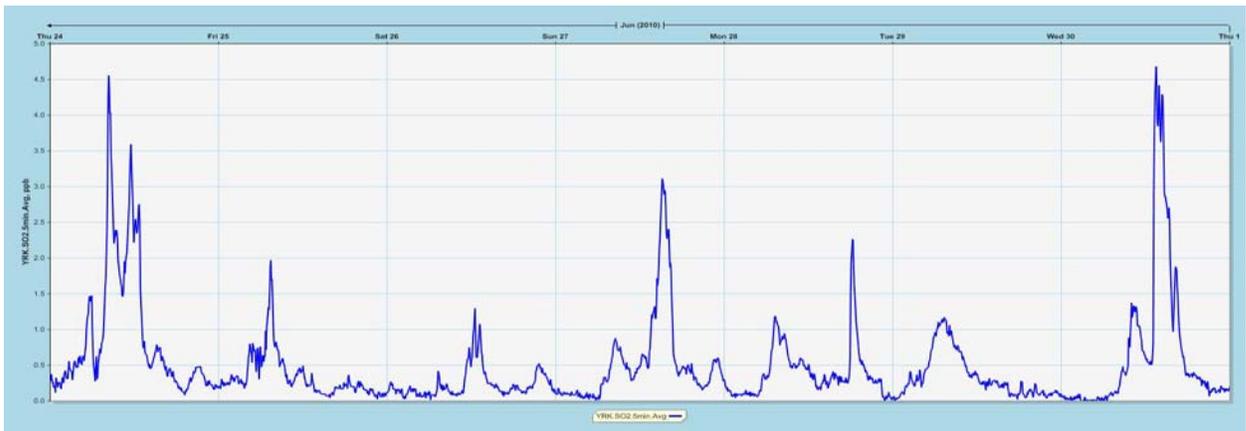
Other than the size-cut issue, the CASTNet FP should be suitable as an indicator for the standard. That said, I would be more comfortable if SO₄ were measured with a defined size cut (PM_{2.5} or PM₁₀) and with SO₂ removal up front (lessons learned from the CSN).

2. What are the Panel's views on using the CASTNET filter pack (FP) to measure sulfur dioxide gas for the purpose of providing annual average values as an indicator for the NO_x/SO_x standard? If EPA would document the capability of the CASTNET FP and develops an FRM for sulfur dioxide gas based on the existing information and procedures, what are the Panel's view of this approach for setting the FRM?

I support the use of the CASTNet FP for measuring annual average SO₂ concentrations. Characterization by EPA will likely show this approach has the sensitivity and specificity to support the NO_x/SO_x standard.

3. What are the Panel's views on using the current primary FRM (high time resolution UVF) to measure sulfur dioxide gas for the purpose of providing annual average values as an indicator for the NO_x/SO_x standard?

Continuous data are the way to go for challenging models, looking at short-term effects and research purposes. Detection limits for current technology are on the order of 50-100 parts per trillion (ppt) or 0.13 ug/m³. My main concern with continuous measurements is that ambient concentrations are very low already and likely to drop even further in the next 5 years. As an example, average SO₂ in 2010 at the Yorkville, GA SEARCH site was 986 ppt. Hourly SO₂ concentrations were <100 ppt 15% of the time, <200 ppt 28% of the time, <500 ppt 50% of the time and <1000 ppt 68% of the time. Other rural sites in the SE (and maybe the NE) have even lower concentrations. To obtain meaningful data (short-term AND long-term averages) will require very careful management of instrument baseline. The figure below shows typical summertime SO₂ at YRK.



4. What are the panel's views on using existing NO_y methods that are deployed, for example, in NCore as the measurement approach for NO_y for the purpose of providing annual average values as an indicator for the NO_x/SO_x standard? What are the panel's views on EPA's assessment that additional study is needed before establishing an FRM based on the existing NO_y methods? That is, are the methods already adequately demonstrated as a reference method to determine compliance with a NAAQS? What are the panel's views on the research plan for establishing existing NO_y methods as an FRM?

Additional study is needed to establish an FRM for NO_y. Like SO₂, current NO_x analyzers are very sensitive, but it is not clear they are seeing or quantifying all NO_y components or to what extent there is interference from non-NO_y components (e.g., ammonia or particulate-NH₄). Extreme care is needed to ensure transmission of the more reactive components of NO_y into the catalytic converter and to monitor the efficiency of the converter. NCore will be a very good test bed for NO_y measurements. Careful review of NCore data will yield valuable insights into operational issues and resource requirements (e.g., what is the expected lifetime of a converter and is it possible to

regenerate a converter?). Also, does it make sense to use NO for calibration purposes when the majority of NO_y in rural environments is NO₂ and higher?

5. What are the panel's views on using the emerging AMoN ammonia monitoring network that uses passive sampling technology as a tool for evaluating air quality model behavior with respect to characterizing ambient air patterns of ammonia?

Passive samplers can be used for 1-week or 2-week comparisons, but the model really needs to be tested on much shorter time scales (hourly or daily) to ensure the model has the processes right and to make source attribution inferences. The NO_y sites in Q8 should be equipped with NH₃ samplers or analyzers for higher time resolution measurements.

6. What are the panel's views on co-locating ammonia measurements at each location where the indicators are measured?

I strongly support this idea.

7. What are the Panel's views on using the CASTNET filter pack (FP) to measure ammonium ion as a tool for evaluating air quality model behavior with respect to characterizing ambient air patterns of ammonia?

The CASTNet filter pack should be modified to collect both ammonia and ammonium. This can be done by introducing a denuder (annular or honeycomb) upstream of the filter pack and an acid impregnated filter (citric or phosphorous) to the back of the FP.

8. What are the panel's views on establishing a suite of NO_y species measurements at 2- 5 locations in different atmospheric and ecological regions for the purpose of evaluating air quality model and NO_y instrument behavior?

I strongly support this idea. The more sites the better. Target components should be NO, photolytic NO₂, HNO₃ and PANs. Solid techniques for NO₂ and HNO₃ are in use by researchers in numerous part of the country. These can be adapted to more routine monitoring applications. Thermal-photolytic-chemiluminescent approaches to PANs should be explored.

9. What are the panel's views on utilizing the existing CASTNET and rural NCore networks as a starting infrastructure for the purpose of supporting the NO_x/SO_x standard?

This is a good starting point. However, I have some concerns that site locations and density will not adequately address variability in terrain, vegetation or source strength in areas of highest sensitivity. Reactive gases exhibit strong gradients between low elevation (valley) and high elevation (ridge) depending, in part, on sources within the

valley. I am not sure these gradients can be represented by widely spaced CASTNet or NCORE sites.

10. What are the panel's views on using CASTNET filter pack (FP) to measure total nitrate (particulate nitrate plus nitric acid) as the measurement approach for the purpose of providing annual average values to support the NO_x/SO_x standard in diagnosing NO_y instrument behavior and assist in delineating the relative fractions of contributing oxidized nitrogen species to total ambient oxidized nitrogen.

Simple modification of the CASTNet FP would greatly enhance its utility for the above purposes. As for ammonia, a KCl denuder ahead of the FP would capture HNO₃ while the downstream filters would collect particulate NO₃. There will still be confounding effects of coarse particulate NO₃, but at least this separates the gas phase from the particulate phase.

11. What are the panel's view of the broader consideration of using CASTNET, complemented by rural NCore, to serve as a framework for the nation's rural monitoring of important gases and aerosols in support of secondary standards and evaluating the behavior of regional air quality models?

As stated above, I think this is a reasonable start in a resource-constrained environment, but we need to take a hard look at techniques and siting. As noted by others, there are concerns about separation of monitoring responsibilities in CASTNet, which has traditionally been the bailiwick of the state and local agencies. The latter might be mitigated to some extent by enhanced auditing of CASTNet sites.