

Minutes of the Open Meeting on February 16, 2011

**U.S. Environmental Protection Agency (EPA)
Clean Air Scientific Advisory Committee
Air Monitoring and Methods Subcommittee (AMMS)**

Summary Minutes of the Advisory on Review of EPA Draft Documents on Monitoring and Methods for Oxides of Nitrogen (NO_x) and Sulfur (SO_x)

Date and Time: Wednesday, February 16, 2011, 10:30 A.M. – 4:05 P.M. ET

Location: Carolina Inn, 211 Pittsboro Street, Chapel Hill, NC, 27516, and via Teleconference.

Purpose: The purpose of the February 16, 2011 public meeting was for the EPA Clean Air Scientific Advisory Committee Air Monitoring and Methods Subcommittee (AMMS) 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).

Participants:

AMMS: CASAC Air Monitoring and Methods Subcommittee (See Roster, Attachment A):

Dr. Armistead (Ted) Russell, Chair
Dr. David T. Allen
Mr. George A. Allen
Dr. Linda Bonanno
Dr. Doug Burns
Dr. Judith Chow
Dr. Kenneth Demerjian
Mr. Eric Edgerton
Mr. Henry (Dirk) Felton
Dr. Philip Fine
Dr. Philip Hopke
Dr. Rudolf Husar
Dr. Daniel Jacob
Dr. Peter H. McMurry
Dr. Allen Robinson
Dr. James Jay Schauer
Dr. Jay Turner
Dr. Yousheng Zeng

Dr. Linda Bonanno could not participate during the February 16, 2011 meeting.

LIAISON MEMBERS OF CASAC NO_x - SO_x SECONDARY NAAQS REVIEW
PANEL

Dr. Praveen Amar
Dr. Andrzej Bytnerowicz
Mr. Rich Poirot

EPA SAB Staff: Mr. Edward Hanlon, Designated Federal Officer

EPA Staff: Dr. Rich Scheffe, EPA Office of Air Quality Planning and Standards
Mr. Fred Dimmick, EPA Office of Research and Development

Other Participants: Mr. Lewis Weinstock, EPA Office of Air Quality Planning and Standards

Other Attendees: A list of members of the public who attended the meeting or requested information for calling into the teleconference is provided in Attachment B, Public Attendance.

Materials Available: The agenda and meeting materials were circulated to the AMMS in advance of the meeting, and were made available to the public via the CASAC website (www.epa.gov/casac) on the following CASAC AMMS February 16, 2011 NO_x-SO_x Monitoring Meeting webpage:
<http://yosemite.epa.gov/sab/sabproduct.nsf/bf498bd32a1c7fdf85257242006dd6cb/eea38cc34cc1f86f8525781d005866e6!OpenDocument&Date=2011-02-16>.

Meeting Summary

The meeting was announced in the Federal Register¹ and proceeded according to the meeting agenda². A summary of the meeting follows.

February 16, 2011

Opening Statements and Welcome

Mr. Ed Hanlon, the Designated Federal Officer (DFO), opened the meeting, and made a brief opening statement noting that the AMMS is a Federal Advisory Committee under the Federal Advisory Committee Act (FACA). He noted the meeting and teleconference was open to the public and that Agency-provided briefing materials were posted onto the meeting website. Mr. Hanlon also noted that minutes of the meeting were being taken to summarize discussions and action items in accordance with requirements under FACA. He then turned the teleconference call over to the Chair, Dr. Ted Russell.

Dr. Russell welcomed everyone and noted that this is an Advisory effort where a report seeking consensus would be prepared. He stated that lead discussants would summarize the responses to each charge question, and that the AMMS letter report will include the consensus position of the Panel and separate individual comments associated with this review. Dr. Russell further noted that preliminary Panel member comments were provided in Panel member folders and on the

meeting website, and that the preliminary comments were intended to serve as ‘discussion starters’. He also noted that public comments submitted directly to Ed Hanlon are provided on the meeting website. Dr. Russell reviewed the agenda, and requested that members of the AMMS Panel introduce themselves. Mr. George Allen noted he had a potential ethics conflict associated with his financial interest in a continuous sulfate monitoring method. Mr. Allen noted he would recuse himself from any discussion on that topic during the meeting.

EPA’s Presentation

Dr. Rich Scheffe, EPA Office of Air Quality Planning and Standards, made a brief opening statement and presented and discussed his PowerPoint slides³ that were projected onto the meeting screen and provided on the meeting website. Mr. Fred Dimmick, EPA Office of Research and Development, also made a brief opening statement and presented and discussed his PowerPoint slides⁴ that were projected onto the meeting screen and provided on the meeting website.

One AMMS member asked whether EPA was required to develop a Federal Reference Method (FRM) to identify measurement requirements and indicators for NO_x and SO_x. Dr. Scheffe responded that all primary or secondary air quality standards have FRMs or Federal Equivalent Methods (FEMs). He noted that an FRM for SO₂ exists, but not for NO_y or SO₄, and that while EPA was not required to develop an FRM for these constituents, OAQPS considers it necessary to develop such FRMs. An AMMS member asked EPA to clarify how it would set calibration requirements for the FRM. Mr. Dimmick responded that EPA would utilize extensive ambient measurements gathered over at least a year, and noted that laboratory work will assess potential interferences (e.g., from ammonia). Another member asked whether state agencies would need to develop calibration requirements. Mr. Dimmick responded that the FRM will identify how to calibrate instruments. Another AMMS member asked whether the FRM was to be for canopy height or ground level, and Mr. Dimmick responded that it would be for ground level.

Another AMMS member asked whether EPA was seeking to develop National Ambient Air Quality Standards (NAAQS) based on two week, 24 hour, or one hour sampling design frequency. Mr. Dimmick responded that EPA did not yet know the frequency it would be seeking but noted that EPA was seeking the highest resolution data that could feasibly be gathered. Dr. Scheffe responded that EPA was seeking to develop average annual averages for NO_x and SO_x data.

Discussion of Charge Questions

Charge Question 1 – Use of CASTNET Filter Pack to Measure Particulate Sulfate

An AMMS member noted that use of a CASTNET filter pack (CFP) for measuring Particulate Sulfate (PS) would be acceptable. Several AMMS members commented that the CFP was generally well documented, was easy to implement, and has stood the test of time. One member commented that while CFP does not have high resolution, that issue can be assessed further through research. An AMMS member commented that EPA should define the CFP and other monitoring techniques and methods for measuring NO_x and SO_x.

Several AMMS members commented that additional documentation and data on particle size and spatial distribution for sulfate in the western portion of the nation would help further assess CFP usefulness and applicability. An AMMS member asked whether there is a national deposition

network available that EPA used to gather and assess CFP usefulness. Dr. Scheffe responded that EPA did have a national deposition framework which also reported nitrogen information, but noted that this network only collected wet measurements. He also noted that members of the public could not easily access dry deposition estimates and information off of the CASTNET website.

Charge Question 2 – Use of CASTNET Filter Pack to Measure Sulfur Dioxide Gas

Several AMMS members noted that use of a CFP for measuring SO₂ was well established but costly. One member noted that use of CFP to measure SO₂ at rural monitoring sites was potentially not viable. Another member noted a few potential issues to consider regarding measuring SO₂ with CFP, including: a) how soil alkalinity may affect results; b) retention of SO₂ on nylon filters; c) effect of variability in size of CFP packing material on results; and d) differences between wet and dry sampling results.

An AMMS member noted that use of CFP to measure SO₂ could be affected by the strong gradient in SO₂ results over a 24 hour period, and commented that daytime sampling results differed significantly from nighttime sampling results. Dr. Scheffe responded that EPA was aware of these issues, and noted that to address the varying daytime/nighttime sampling results, EPA was considering use of weekly average data results.

Another AMMS member noted that since there were significant differences between model predictions and field results using CFP to measure SO₂, EPA should use continuous measurements wherever possible. Dr. Scheffe agreed with this comment. Another AMMS member asked whether EPA conducted a side by side comparison of continuous CFP monitors, and Mr. Dimmick responded that EPA would consider doing such a comparison.

Charge Question 3 - Use of Current Primary FRM (High Time Resolution UVF) to Measure Sulfur Dioxide Gas

One AMMS member noted there were two primary factors that affected the appropriate use of High Time Resolution UVF to Measure SO₂ gas: setting data quality objectives (DQO), and available financial resources. To address the DQO issue, the member suggested that EPA use continuous measurements wherever possible. Another member noted that EPA should set stricter performance requirements for the High Time Resolution UVF in order to reach part per billion (ppb) detection. Several members commented that EPA should set accuracy requirements for trying to reach into the ppb range. Mr. Weinstock responded that EPA revised FRM and FEM criteria to accommodate the more sensitive instruments that were available to reach ppb levels for SO₂ gas.

Charge Question 4 – Use of Existing NO_y Methods

One AMMS member noted that various issues have been raised related to use of NO_y methods, including converter efficiency, terrain and thatch effects, temperature (e.g., cold weather), nitrogen interferences, and other issues, and recommended that EPA carefully consider DQO requirements before setting the FRM for NO_y. The member also suggested that EPA develop an NO_y methods testing plan that considered applications in different environments and network settings. Several members suggested that EPA conduct more work on NO_y methods before setting FEM or FRM requirements, because while the NCore network is officially established, it was not well developed or demonstrated, standard operating procedures for measuring NO_y were

not well defined, and NOy calibration data was limited.

One member recommended that in addition to developing an NOy methods testing plan, EPA should also develop a parallel modeling plan for NOy in order make sure that measurements coordinate well with modeling. Dr. Scheffe requested additional AMMS feedback on how to better conduct EPA's NOy modeling efforts. Dr. Russell agreed to add suggestions on this topic within CASAC's report to EPA.

Charge Question 5 – Use of the Emerging AMoN Ammonia Monitoring Network

The Panel commented that passive sampling technology would be an acceptable tool for evaluating air quality model behavior with respect to characterizing ambient air patterns of ammonia, as long as such passive technologies would increase the amount of quality ammonia data and if the ammonia results can be utilized with major anion measurements. Several Panel members noted that there is limited ammonia data available, and any addition of quality data to the available pool of data would be highly valued and very useful in running the models and filling the emission inventories. Dr. Scheffe noted that ammonia measurements would be used for model evaluation. The Panel then discussed and identified various pros/cons and issues associated with use of passive samplers, denuder networks, mobile source impacts, adaption of CASTNET Filter Packs with denuders, and use of specific patented samplers.

Charge Question 6 – Co-Locating Ammonia Measurements

The Panel discussed and was generally in agreement with the option of co-locating ammonia measurements at each location where monitoring for oxides of nitrogen and sulfur are measured. Several Panel members noted that ammonia has a high deposition velocity, and wet deposition measurements in particular were needed. These members also noted that integrated measurement instruments were available at a reasonable price. A member noted that several months of integrated data would be adequate to test ammonia inventory data. Another member commented that it would make sense if EPA gathered measurements for evaluating the model.

Charge Question 7 – Use of CASTNET Filter Pack to Measure Ammonium Ion

Regarding the use of the CASTNET filter pack to measure ammonium ion as a tool for evaluating air quality model behavior with respect to characterizing ambient air patterns of ammonia, the Panel generally agreed that the tests could be used acceptably under neutralized conditions. A member noted it was far easier to measure NHx vs. ammonium ions using these instruments. Another member noted that Teflon and nylon filter packs provide a reasonable measure of ammonium ion, but commented that there are some biases with such data. The member noted that the filter pack be optimally used when ammonium nitrate is the source.

Charge Question 8 – Establishment of a Suite of NOy Species Measurements

The Panel discussed and agreed that it would be very beneficial if EPA required measurements for a suite of NOy species at at least a few (i.e., two to five) locations in different atmospheric and ecological regions for the purpose of evaluating air quality model and NOy instrument behavior. The Panel also agreed that concentration and size distribution measurements for particulate nitrate should also be gathered, along with information on measured NOy performance. A Panel member noted that the specific parameters to be measured are determined through modeling efforts. The Panel discussed but did not resolve which particular parameters

must be measured (e.g., gaseous phase ammonia; ammonium; NH_x; sulfate; nitrate).

Charge Question 9 - Use of CASTNET Filter Pack and Rural NCore Networks as a Starting Infrastructure

The Panel discussed possible disadvantages with EPA's use of the existing CASTNET and rural NCore networks as a starting infrastructure for the purpose of supporting the NO_x/SO_x standard, including use of the filter pack in data poor areas. Several Panel members recommended that the criteria for the new network design should consider which ecoregion the monitoring locations are in. A Panel member commented that EPA should work out who would manage the network.

Charge Question 10 - Use of CASTNET Filter Pack to Measure Total Nitrate

The panel discussed and generally agreed that it would be beneficial if EPA used the CASTNET filter pack 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. Several Panel members noted there were some outstanding issues that EPA should resolve in differentiating and in collecting unbiased total nitrate, nitric acid and particulate nitrate.

Regarding use of the CASTNET filter pack to measure for the FEM for NO_y (e.g., measuring total nitrate in ambient air and total nitrate in wet deposition), several Panel members noted it was unclear whether depositional nitrogen levels would be reliable using the filter pack, and recommended that while the filter pack could be used but should be improved to provide species-specific levels of nitric acid so that individual NO_y species could be identified. A Panel member recommended that EPA should assess whether another indicator of oxides of nitrogen is preferable over the next five years. Another Panel member recommended that EPA prioritize the need to research the development of a new NO_y method.

Charge Question 11 - Broad Consideration of Using CASTNET, Complemented by Rural NCore, as a Framework for National Rural Monitoring

The Panel discussed and generally agreed that CASTNET, complemented by rural NCore, could acceptably serve as a framework for the nation's rural monitoring of important gases and aerosols in support of secondary standards and for evaluating the behavior of regional air quality models. The Panel noted that it was unclear how many monitoring sites are needed and where are they needed, and recommended that EPA answer these questions before rearranging the network.

Several Panel members noted that EPA should be concerned that neither CASTNET nor NCore sites adequately address elevation, vegetation and deposition gradient issues. One member commented that taking accurate measurements of various forms of reduced nitrogen in mountain terrain is a huge issue. Several members recommended that the data gaps and weaknesses associated with gathering data from sensitive areas and areas that are representative and spatially diverse should be addressed in EPA's new network design. The members also noted that simple models would not answer these questions, and a member suggested that EPA consider use of surrogates to help resolve address the issues.

Upon completion of the initial discussion of the Panel's responses to the charge questions, Dr. Russell asked whether any Panel members had any other concerns to present to EPA. One member suggested that EPA should consider also measuring organic acids and organic bases using the network. Another member suggested that EPA gather water quality data as part of the analysis. A member also suggested that EPA consider developing a modeling research and evaluation plan to evaluate the CMAQ estimates of the modeled atmospheric and deposition species, and to evaluate the degree of cooperation between monitoring and modeling results.

Dr. Russell then led a discussion with the Panel that summarized the Panel's discussions and responses associated with each charge question. He then discussed next steps and action items, and asked if the Panel members had any additional questions. Hearing none, Dr. Russell thanked the Panel members and EPA staff who participated at the meeting. With the meeting business concluded, the Designated Federal Officer adjourned the meeting at 4:05 pm ET.

Respectfully Submitted:

/signed/

Mr. Edward Hanlon
Designated Federal Officer

Certified as Accurate:

/signed/

Dr. Armistead (Ted) Russell, Chair
CASAC Air Monitoring and
Methods Subcommittee

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by Panel members during the course of deliberations within the meeting. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from the Panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters or reports prepared and transmitted to the EPA Administrator following the public meetings.

Materials Cited

The following meeting materials are available on the CASAC website (www.epa.gov/casac) on or through the following CASAC AMMS NO_x-SO_x Monitoring February 16, 2011 Meeting webpage:

<http://yosemite.epa.gov/sab/sabproduct.nsf/bf498bd32a1c7fdf85257242006dd6cb/eea38cc34cc1f86f8525781d005866e6!OpenDocument&Date=2011-02-16>.

¹ Federal Register Notice Announcing the Teleconference

² Agenda for February 16, 2011 Public Meeting

³ Presentation from Dr. Rich Scheffe, USEPA

⁴ Presentation from Mr. Fred Dimmick, USEPA

ATTACHMENT A – ROSTER

U.S. Environmental Protection Agency Clean Air Scientific Advisory Committee CASAC Air Monitoring and Methods Subcommittee (AMMS)

CHAIR

Dr. Armistead (Ted) Russell, Professor, Department of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

MEMBERS OF AMMS

Dr. David T. Allen, Professor, Department of Chemical Engineering, University of Texas, Austin, TX

Mr. George A. Allen, Senior Scientist, Northeast States for Coordinated Air Use Management (NESCAUM), Boston, MA

Dr. Linda Bonanno, Research Scientist, Office of Science/Division of Air Quality, New Jersey Department of Environmental Protection, Trenton, NJ

Dr. Doug Burns, Research Hydrologist, U.S. Geological Survey

Dr. Judith Chow, Research Professor, Desert Research Institute, Air Resources Laboratory, University of Nevada, Reno, NV

Dr. Kenneth Demerjian, Professor and Director, Atmospheric Sciences Research Center, State University of New York, Albany, NY

Mr. Eric Edgerton, President, Atmospheric Research & Analysis, Inc., Cary, NC

Mr. Henry (Dirk) Felton, Research Scientist, Division of Air Resources, Bureau of Air Quality Surveillance, New York State Department of Environmental Conservation, Albany, NY

Dr. Philip Fine, Atmospheric Measurements Manager, South Coast Air Quality Management District, Diamond Bar, CA

Dr. Philip Hopke, Bayard D. Clarkson Distinguished Professor, Department of Chemical and Biomolecular Engineering, Clarkson University, Potsdam, NY

Dr. Rudolf Husar, Professor, Mechanical Engineering, Engineering and Applied Science, Washington University, St. Louis, MO

Dr. Daniel Jacob, Professor, Atmospheric Sciences, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA

Dr. Peter H. McMurry, Professor, Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN

Dr. Allen Robinson, Professor, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA

Dr. James Jay Schauer, Professor, Department of Civil and Environmental Engineering, College of Engineering, University of Wisconsin - Madison, Madison, WI

Dr. Jay Turner, Associate Professor, Environmental & Chemical Engineering, Campus Box 1180, Washington University, St Louis, MO

Dr. Yousheng Zeng, Managing Partner, Providence Engineering & Environmental Group LLC, Baton Rouge, LA

LIAISON MEMBERS OF CASAC NO_x - SO_x SECONDARY NAAQS REVIEW PANEL

Dr. Praveen Amar, Director of Science and Policy at NESCAUM (Northeast States for Coordinated Air Use Management), Boston, MA

Dr. Andrzej Bytnerowicz, Ecologist and Senior Scientist with the USDA Forest Service Pacific Southwest Research Station, Riverside, CA

Mr. Rich Poirot, Air Pollution Control Division, Vermont Department of Environmental Conservation, Waterbury, VT

SCIENCE ADVISORY BOARD STAFF

Mr. Edward Hanlon, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

ATTACHMENT B – Other Attendees

Public Meeting of the EPA Clean Air Scientific Advisory Committee Air Monitoring and Methods Subcommittee (AMMS) for the Review of EPA Draft Documents on Monitoring and Methods for Oxides of Nitrogen (NO_x) and Sulfur (SO_x)

February 16, 2011

Name	Affiliation
Dimmick, Fred	EPA
Flynn, Aaron	Hunton and Williams, Inc.
Gouze, Steve	California Air Resources Board
Harrah, Jeffrey	EPA
Lisonw, Will	APC
Mazur, Sarah	EPA
Papageorgia, Ona	New York State Department of Environmental Conservation
Riha, Kristin	EPA
Tenant, Ginger	EPA
Waite, Randy	EPA
Watkins, Neelson	EPA
Weinstock, Lewis	EPA
Williams, Larke	EPA