

**Summary Minutes of the Clean Air Scientific Advisory Committee (CASAC)  
Ambient Air Monitoring and Method (AAMM) Subcommittee Public Meeting**

**July 22, 2004, 8:30 AM – 4:00 PM Eastern Time**

**EPA campus – Main Auditorium (Room C111)  
Research Triangle Park (RTP) North Carolina**

Panel Members: See Panel Roster – Appendix A

Date and Time: Thursday, July 22, 2004, 8:30 AM – 4:00 PM Eastern Time

Location: EPA Campus, Main Auditorium (C111), RTP, NC

Purpose: The purpose of this meeting was for the CASAC Ambient Air Monitoring and Methods (AAMM) Subcommittee (Subcommittee) to conduct a consultation on methods for measuring coarse-fraction particulate matter (PM<sub>c</sub>) in ambient air, based upon performance evaluation field studies conducted by EPA.

Attendees: Chair: Dr. Philip Hopke

CASAC Members: Dr. Ellis Cowling  
Mr. Richard Poirot

Consultants: Mr. George Allen  
Dr. Judith Chow  
Mr. Bart Croes  
Dr. Kenneth Demerjian  
Dr. Delbert Eatough  
Mr. Eric Edgerton  
Mr. Henry (Dirk) Felton  
Dr. Rudolf Husar  
Dr. Kazuhiko Ito  
Dr. Donna Kenski  
Dr. Thomas Lumley  
Dr. Peter McMurry  
Dr. Kimberly Prather  
Dr. Armistead (Ted) Russell  
Dr. Jay Turner  
Dr. Warren H. White  
Dr. Yousheng Zeng

EPA SAB Staff: Mr. Fred Butterfield, CASAC Designated Federal  
Officer (DFO)  
Dr. Vanessa Vu, SAB Staff Office Director

Other EPA Staff: John Bachmann, OAR, OAQPS  
Louise Camalier, OAR, OAQPS  
Fred Dimmick, OAR, OAQPS

Shelly Eberly, ORD, NERL  
Neil Frank, OAR, OAQPS  
Tim Hanley, OAR, OAQPS  
Anna Kelley, OAR, OAQPS  
David Kryak, ORD, NERL  
John Langstaff, OAR, OAQPS  
Karen Martin, OAR, OAQPS  
Steve Page, OAR, OAQPS  
Mike Papp, OAR, OAQPS  
Solomon Ricks, OAR, OAQPS  
Tom Rosendahl, OAR, OAQPS  
Mary Ross, OAR, OAQPS  
Robert Vanderpool, ORD, NERL  
William Wilson, ORD, NCEA-RTP

Others participating: Kurt Blase, O'Connor and Hannan  
Robert Connery, Holland & Hart, LLP (on behalf of  
the National Cattlemen's Beef Association)  
Michael Corvese, Thermo Electron Corp.  
Todd Johnston, National Mining Association (NMA)  
Alex Karafilidis, Thermo Electron Corp.  
Virgil Marple, University of Minnesota  
Tom Merrifield, BGI Inc.  
Mike Meyer, Rupprecht & Patashnick Co., Inc. (R&P)  
Bob Murdoch, RTI International  
Sanjay Natarajan, RTI International  
Will Ollison, American Petroleum Institute (API)  
John Richards, Air Control Techniques (on behalf of  
the Coalition for Coarse Particle Regulation)  
Greg Shaefer, Arch Coal (on behalf of the Coalition for  
Coarse Particle Regulation)  
Jeff West, NARSTO

### Meeting Summary

The discussion followed the issues and general timing as presented in the meeting agenda (Appendix B).

### **THURSDAY, JULY 22, 2004**

#### Convene Meeting, Call Attendance, Introduction and Administration

Mr. Fred Butterfield, Designated Federal Officer (DFO) for the CASAC, opened the teleconference, called attendance, and welcomed all attendees. He noted that the CASAC is a Federal advisory committee chartered under the Federal Advisory Committee Act (FACA) to

provide advice and recommendations to the EPA Administrator. Consistent with FACA regulations, its deliberations are held as public meetings and teleconferences for which advance notice is given in the *Federal Register*. The DFO is present at all such meetings to assure compliance with FACA requirements. Meeting minutes were taken (by the DFO) for this teleconference. The minutes will be certified by the CASAC (and Subcommittee) Chair and made available on the SAB Web site ([www.epa.gov/sab](http://www.epa.gov/sab)). All Subcommittee members have submitted documentation with respect to possible financial conflicts-of-interest, which was reviewed by a SAB staff member prior to the meeting and found to be satisfactory.

Dr. Vanessa Vu, SAB Staff Office Director, thanked the Chair and members of the CASAC AAMM Subcommittee for their willingness to participate in this effort. Mr. Steve Page, Director of EPA's Office of Air Quality Planning and Standards (OAQPS), also welcomed and thanked the Subcommittee members.

### Purpose of Meeting

Dr. Phil Hopke, CASAC and Subcommittee Chair, gave a brief background on this project, stating that the purpose of this consultation was for the Subcommittee members to provide their individual and corporate (*i.e.*, through the day's deliberations) expert advice on EPA's evaluation of five PMc sampling and monitoring methods. Dr. Hopke mentioned the CASAC's previous, related work in this subject area by means of the former Technical Subcommittee on Particle Monitoring (previously known as the Technical Subcommittee on Fine Particle Monitoring), which last met in April 2000 to provide advice and commentary on EPA's PM<sub>2.5</sub> Monitoring program; and the CASAC National Ambient Air Monitoring Strategy (NAAMS) Subcommittee, which met in July 2003.

With regard to this current project, the Subcommittee is charged with providing individual expert advice on EPA's evaluation of PMc sampling and monitoring methods that will help inform the Agency's possible selection of PMc measurement methods as part of its ongoing review of the National Ambient Air Quality Standards (NAAQS) for particulate matter. This consultation will include an assessment of the relative strengths and weaknesses of each of the PMc methods tested, with consideration of the Agency's need for methods that can meet multiple monitoring objectives. Dr. Hopke noted that, as this Subcommittee was conducting a "consultation," there would not be a formal report from the CASAC. Nevertheless, all individual review comments from Subcommittee members would be compiled and provided to the Agency.<sup>1</sup>

### EPA Program Office Presentations

Dr. Karen Martin, group leader of OAQPS' Health & Ecosystems Effects Group, briefly informed the Subcommittee on the relationship between the Agency's PMc measurement methods study and the NAAQS for PM. Specifically, Dr. Martin noted that the Subcommittee's consultative advice will help inform EPA's possible selection of PMc measurement methods

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<sup>1</sup>All written materials for this meeting are posted on EPA's Ambient Monitoring Technology Information Center (AMTIC) Web site at: <http://www.epa.gov/ttn/amtic/casac.html>.

should the Agency decide to propose PMc standards as part of its ongoing review of the PM NAAQS. She mentioned that the Agency was moving in the direction of continuous monitoring/monitors, and that this direction was important with respect to the coarse-mode fraction of particulate matter (*i.e.*, PM<sub>10</sub> - PM<sub>2.5</sub>). In Dr. Martin's view, it is important to move toward significantly improving the measurement and characterization of ambient PMc to support further research examining associations between ambient PMc and effects on public health, and to provide input into the evaluation of possible PMc standards and potential future implementation of any such standard.

Mr. Tim Hanley, of OAQPS' Monitoring & Quality Assurance Group, gave a program overview of the objectives and issues surrounding the PMc measurement methods study, which included: a restatement of the charge questions for the Subcommittee to address; identification of key components of the methods being considered such as the method being gravimetric based or comparable to gravimetric based methods, operating on local conditions, and operating to provide a measure of particles in the range of PM<sub>10</sub> to PM<sub>2.5</sub>; a summary of the CASAC's past interactions with the Agency on coarse particulate matter; an overview of the relevant portions of the Federal regulations which define reference and equivalent methods; a summary of EPA's network monitoring objectives; an inventory of the PMc methods used in health studies; and tabular representations of qualitative selection and implementation issues for each of the five methods tested.

Mr. Mike Papp, also of OAQPS' Monitoring & Quality Assurance Group, gave a presentation entitled, "Performance-Based Approach to Determine PMc Data Quality Needs." This briefing focused on the development of data quality objectives (DQOs) for PMc and their use in understanding uncertainty with respect to measurements, and also discussed: the impacts of various sources of uncertainty; continuous and gravimetric (manual) methods; two software tools (simulations programs) available; the performance curve results for potential alternative PMc standards that were identified for consideration in a preliminary staff assessment (as discussed in the first draft PM Staff Paper in 2003); and the implications of these results.

Finally, Dr. Robert Vanderpool, of EPA's National Exposure Research Laboratory (NERL) within the Office of Research and Development (ORD), gave an in-depth overview of EPA's PMc Field Study, "Multi-Site Evaluation of Candidate Methodologies for Determining PMc Concentrations," through which he: summarized the study design, objectives, test procedures, and results of the multi-site field evaluations for each of the five sampling methods; described ongoing initiatives to improve the performance of existing PMc samplers; and discussed future PMc method development activities.

There was discussion between the presenters and the members of the Subcommittee following (and, in most cases, during) each of these presentations.

### Public Comment Period

Mr. Butterfield began the public comment period on-time following an hour-long lunch break, and reminded speakers to limit their statements to no more than five minutes. (See Attachment C for a summary listing of all public speakers.)

Dr. John Richards of Air Control Techniques, P.C., representing the Coalition for Coarse Particle Regulation (CCPR), summarized PM and PMc studies from the National Stone, Sand and Gravel Association (NSSGA, a CCPR member); commented on PMc monitoring and methods and the use of PM<sub>10</sub> - PM<sub>2.5</sub>); recommended that PMc monitoring methods be evaluated under diverse conditions, vis-à-vis natural dusts, sea spray, and pollen; and expressed the Coalition's concerns that inadequate data exist with respect to: PMc ambient air quality, particulate matter speciation, and emissions to support a NAAQS for PMc; spatial and temporal variability of natural sources of PMc; and health effects studies.

Mr. Greg Shaefer, of Arch Coal, Inc., also representing the CCPR, gave a presentation on the "Southern Powder River Basin Monitoring History" which included data and analyses for six samplers, concluding that: there should not be a Federal Reference Method (FRM) for PMc; subtracting PM<sub>10</sub> from PM<sub>2.5</sub> is not a regulatory option; the quality of PMc data is not sufficient or even available to develop a new standard for PMc; and the health association for PMc is based on an urban rather than a rural environment.

Mr. Robert Connery, of Holland & Hart LLP, representing the National Cattlemen's Beef Association (NCBA), gave a presentation entitled, "Coarse PM: A Vital Policy Issue For The West." In this briefing, Mr. Connery argued that there were insufficient health-effects data to support a standard for PMc at this time, offering as a possible solution either the exclusion of coarse-fraction particulate matter from the PM NAAQS or adopting a PM standard that reflected "total dust."

Mr. Mike Meyer, of Rupperecht & Patashnick Co., Inc. (R&P), gave a presentation entitled, "Overview of New PM-Coarse Monitoring Methods," through which he summarized R&P's participation in the Agency's PMc monitoring methods study, and provided an overview of new R&P developments in sampling and monitoring technology.

Mr. Tom Merrifield, of BGI Incorporated, gave a presentation entitled, "Overview, Revisions and New Field Tests of Kimoto Continuous Dichotomous PM Monitor (SPM613-D)," which contained SPM613-D field site-specific data, operating conditions, impactor design differences, experimental efficiency curves; and revisions, additions and future field tests.

Dr. Will Ollison, of the American Petroleum Institute (API), gave a presentation on water-based PM sources, which he characterized as a missing source of particle exposures. In this briefing, Dr. Ollison gave an overview of the water-based particle generation mechanism and commonly-encountered sources. He concluded that, although these are not currently addressed either in the current revision of the revised air quality criteria document (AQCD) for PM or in reports from the National Academy of Sciences (NAS), water-based sources of particulate matter should nevertheless be considered in: monitor-placement guidelines; NAAQS compliance judgments; and source-apportionment analyses.

There was opportunity for questions-and-answers between the presenters and the Subcommittee members following each of these presentations.

### Summary of CASAC AAMM Subcommittee Discussions re: PMc Measurement Methods Evaluation Studies

Subcommittee members were generally quite pleased with both the development and the results of the Agency's multi-city evaluation studies of coarse particle monitoring methods. In turn, the Subcommittee discussed key issues related to the charge, such as:

- (1) What further studies are critical to moving forward on decisions involving regulatory issues, *i.e.*, by providing a sound scientific basis for choosing a FRM?
- (2) How can the Subcommittee provide guidance to the Agency (OAQPS) on achieving spatial *heterogeneity* with respect to siting of monitors — and should EPA or the States (or regional organizations such as NESCAUM) be conducting their own, further studies to address spatial heterogeneity issues, especially how many samplers are needed, and where should these be located?
- (3) Similarly, is there a strategy to determine the number and locations of PMc samplers in order to attain spatial *homogeneity*?

With respect to the NERL-ORD PMc field study, one member recommended that the Agency conduct additional chemical speciation follow-up work. Another member of the Subcommittee commented that selecting sites based on a ratio of fine and coarse PM was good for a first step, adding that EPA should select field sites expected to yield chemical compositions that will “challenge” the researchers.

The Subcommittee was in general agreement that another set of field evaluation studies should be conducted with second-generation instrumentation, and wanted to know the feasibility of this. In addition, it was noted that there is value in collocating PMc methods at monitoring sites with multiple measurement systems. Individual Subcommittee members also made the following comments:

- (1) It would be useful to go back to Phoenix, AZ in the summer;
- (2) The Agency should consider extending their studies to all ranges of particles sizes;
- (3) The Agency should look for pollen in a study, high/primary organic;
- (4) Filters should be analyzed for size distribution;
- (5) The tapered element oscillating microbalance (TEOM) [particulate monitor] PMc data needs to be fully-characterized, and data should be provided by difference from TEOM monitors;
- (6) It would also be beneficial to test in a geographical area which has a low PMc: PM<sub>2.5</sub> ratio;
- (7) More advanced technologies should be deployed for evaluative study in subsequent years to monitor “volatiles” (*i.e.*, volatile and semi-volatile particulate matter and aerosols); and

- (8) The Agency should look at spatial analyses of PM coarse monitoring data across individual metropolitan areas.

One Subcommittee member remarked that EPA needs to establish the relationship between spatial and temporal variability, adding that you will never get a fully-complete spatial network, but that a “rich” temporal network can nevertheless still be achieved with continuous monitors. Another member of the Subcommittee stated that he would like to see the Agency design a sampling point that did not rely on the FRM for PM<sub>2.5</sub>. He continued that he did not see a great deal of value in laboratory measurements, arguing rather for field studies at carefully-selected sites.

A question was raised with respect to the precision of the routine network for PM<sub>c</sub>. In turn, the question was also asked as to whether the Agency was deploying a compliance-based network or collecting data for human health studies — pointing-out that, at one level, these are competing objectives. One Subcommittee member commented that the “driver” for good precision will not be the NAAQS, but rather epidemiological/health-study needs.

It was also noted that there are only limited examples of PM<sub>c</sub> data, *e.g.*, from Harvard, the dichotomous sampler network in California; and New York City (NYC) and Niagara Falls, NY (NYSDEC data). One Subcommittee member made the point that the PM<sub>c</sub> data from NYC is fairly consistent. (PM<sub>c</sub> values do not change very much over time, which may be an indicator that they do not change much over space). However, in Niagara Falls, there is much more variation in the data as a result of local sources of PM<sub>c</sub>. Therefore, it will be important to not establish a monitoring network based upon population. Doing so would lead to too many monitors in areas of high population density such as NYC — with little PM<sub>c</sub> and perhaps too few monitors in an area like Niagara Falls with multiple local sources.

One member asked that EPA provide the Subcommittee with an update on PM<sub>2.5</sub> equivalency for continuous methods. An OAQPS staff member summarized the work as on-going, but nearing completion, with the plan to include equivalency changes to PM<sub>2.5</sub> continuous monitors in the regulatory package pursuant to the National Ambient Air Monitoring Strategy. It was noted that the Agency should determine what sites in State/local networks have both PM<sub>10</sub> and PM<sub>2.5</sub> low-volume samplers. The question was also posed as to whether there was a way to use high-volume PM<sub>10</sub> data with a factor to help better determine PM<sub>c</sub>.

With respect to the question on design- versus performance-based standards, one Subcommittee member commented that the Agency should not allow itself to be “boxed-in” on time and species, but rather to provide reasonable performance criteria. Another Subcommittee member offered the opinion that performance standards are preferable.

Another member cautioned the Agency against spending so much funding on measurements that there is no money remaining for analysis and implementation. This member also recognized the need for data-quality objectives — but noted that there may also be a need for “policy-quality objectives” and “science-quality objectives. Finally, Subcommittee members requested that the Agency provide them with CD-ROMs containing the complete data sets from the field studies, to which EPA representatives agreed, and one member also asked for a brief list of cataloged data.

Wrap-up, Action Items, and Next Steps:

- Agency representatives will make available CD-ROMs containing the complete data sets from the four EPA field studies to the CASAC DFO, who will in turn provide these to the members of the Subcommittee. [Expected October 2004]
- Subcommittee members who have not already done so are requested to send their initial or revised individual review comments on the consultative meeting review materials to Mr. Butterfield as soon as possible. [Completed]
- Mr. Butterfield will compile these and prepare a letter to the EPA Administrator for Dr. Hopke's signature noting that this consultation took place and that there will not be a formal report from the CASAC. This letter will contain all Subcommittee members' individual review comments as an Appendix. [Completed; the letter to the Administrator is dated August 30, 2004, and can be viewed on the SAB Web page at the following URL: [http://www.epa.gov/sab/pdf/casac\\_con\\_04\\_005.pdf](http://www.epa.gov/sab/pdf/casac_con_04_005.pdf).]

Respectfully Submitted:

Certified as True:

/s/

/s/

*Fred A. Butterfield, III*

*Philip Hopke, Ph.D.*

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Fred A. Butterfield, III  
CASAC DFO

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Philip Hopke, Ph.D.  
CASAC Chair

## **APPENDICES**

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Appendix A: Roster of the CASAC AAMM Subcommittee

Appendix B: Teleconference Agenda

Appendix C: List of Public Speakers

## Appendix A – Roster of the CASAC AAMM Subcommittee

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**U.S. Environmental Protection Agency  
Science Advisory Board (SAB) Staff Office  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Ambient Air Monitoring and Methods (AAMM) Subcommittee\***

### CHAIR

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

Also Member: SAB Board

### CASAC MEMBERS

**Dr. Ellis Cowling**, University Distinguished Professor At-Large, North Carolina State University, Colleges of Natural Resources and Agriculture and Life Sciences, North Carolina State University, Raleigh, NC

**Mr. Richard L. Poirot**, Environmental Analyst, Air Pollution Control Division, Department of Environmental Conservation, Vermont Agency of Natural Resources, Waterbury, VT

### CONSULTANTS

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

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

**Mr. Bart Croes**, Chief, Research Division, California Air Resources Board, Sacramento, CA

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

**Dr. Delbert Eatough**, Professor of Chemistry, Chemistry and Biochemistry Department, Brigham Young University, Provo, UT

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

**Dr. Kazuhiko Ito**, Assistant Professor, Environmental Medicine, School of Medicine, New York University, Tuxedo, NY

**Dr. Donna Kenski**, Data Analyst, Lake Michigan Air Directors Consortium, Des Plaines, IL

**Dr. Thomas Lumley**, Associate Professor, Biostatistics, School of Public Health and Community Medicine, University of Washington, Seattle, WA

**Dr. Peter McMurry**, Professor and Head, Department of Mechanical Engineering, Institute of Technology, University of Minnesota, Minneapolis, MN

**Dr. Kimberly Prather**, Professor, Department of Chemistry and Biochemistry, University of California, San Diego, La Jolla, CA

**Dr. Armistead (Ted) Russell**, Georgia Power Distinguished Professor of Environmental Engineering, Environmental Engineering Group, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

**Dr. Jay Turner**, Associate Professor, Chemical Engineering Department, School of Engineering, Washington University, St. Louis, MO

**Dr. Warren H. White**, Visiting Professor, Crocker Nuclear Laboratory, University of California - Davis, Davis, CA

**Dr. Yousheng Zeng**, Air Quality Services Director, Providence Engineering & Environmental Group LLC, Baton Rouge, LA

#### **SCIENCE ADVISORY BOARD STAFF**

**Mr. Fred Butterfield**, CASAC Designated Federal Officer, 1200 Pennsylvania Avenue, N.W., Washington, DC, 20460, Phone: 202-343-9994, Fax: 202-233-0643 ([butterfield.fred@epa.gov](mailto:butterfield.fred@epa.gov)) [Physical/Courier/FedEx Address: Fred A. Butterfield, III, EPA Science Advisory Board Staff Office (Mail Code 1400F), Woodies Building, 1025 F Street, N.W., Room 3604, Washington, DC 20004, Telephone: 202-343-9994]

\* Members of this CASAC Subcommittee consist of:

a. CASAC Members: Experts appointed to the statutory Clean Air Scientific Advisory Committee by the EPA Administrator; and

b. CASAC Consultants: Experts appointed by the SAB Staff Director to serve on one of the CASAC's standing subcommittees.

## Appendix B – Meeting Agenda

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U.S. Environmental Protection Agency  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Ambient Air Monitoring & Methods (AAMM) Subcommittee

**Public Meeting & Teleconference**  
**Thursday, July 22, 2004 – 8:30 a.m. to 5:30 p.m. Eastern Time**

EPA campus – Main Auditorium (Room C111)  
Research Triangle Park (RTP) North Carolina

### Consultation on Methods for Measuring Coarse-Fraction Particulate Matter (PM<sub>c</sub>) in Ambient Air, Based upon Performance Evaluation Field Studies Conducted by EPA

#### Final Meeting Agenda

#### Thursday, July 22, 2004

8:30 a.m.	<b>Convene Meeting; Call Attendance; Introductions and Administration</b>	Mr. Fred Butterfield, CASAC DFO
8:40 a.m.	<b>Welcome &amp; Opening Remarks</b>	Dr. Vanessa Vu, SAB Staff Office Director
8:45 a.m.	<b>Purpose of Meeting</b>	Dr. Phil Hopke, CASAC Chair
8:50 a.m.	<b>Welcome from EPA's Office of Air Quality Planning and Standards (OAQPS)</b>	Mr. Steve Page, Director, OAQPS
8:55 a.m.	<b>Relationship between Coarse-Fraction Particulate Matter (PM<sub>c</sub>) Measurement Methods and PM National Ambient Air Quality Standards (NAAQS)</b>	Dr. Karen Martin, OAQPS Health & Ecosystems Effects Group
9:10 a.m.	<b>Program Overview of PM<sub>c</sub> Objectives and Issues, including Data Quality Objectives (DQOs)</b>	Mr. Tim Hanley, OAQPS Monitoring & QA Group
10:10 a.m.	<b>Break*</b>	
10:25 a.m.	<b>Overview of EPA's PM<sub>c</sub> Field Study, <i>Multi-Site Evaluation of Candidate Methodologies for Determining PM<sub>c</sub> Concentrations</i></b>	Dr. Robert Vanderpool, National Exposure Re- search Laboratory (NERL)

\*Note: Periodic breaks will be taken as necessary and at the call of the Chair.

**Thursday, July 22, 2004 (continued)**

11:25 a.m.	<b>CASAC AAMM Subcommittee Question-&amp;-Answer Session and Discussion</b>	Dr. Hopke, CASAC AAMM Subcommittee Members
12:00 a.m.	<b>Lunch (Cafeteria)</b>	
1:00 p.m.	<b>Public Comment Period</b>	Mr. Butterfield (Moderator)
1:30 p.m.	<b>CASAC AAMM Subcommittee Discussion and Deliberations</b>	Dr. Hopke, CASAC AAMM Subcommittee Members
4:15 p.m.	<b>Summary, Wrap-Up and Next Steps</b>	Dr. Hopke
4:30 p.m.	<b>Adjourn Meeting</b>	Mr. Butterfield

## Appendix C – List of Public Speakers

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### List of Public Speakers

**U.S. Environmental Protection Agency  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Ambient Air Monitoring & Methods (AAMM) Subcommittee**

**Consultation on Methods for Measuring Coarse-Fraction Particulate  
Matter (PM<sub>c</sub>) in Ambient Air, Based upon Performance Evaluation  
Field Studies Conducted by EPA**

**Public Meeting & Teleconference ❖ July 22, 2004**

**EPA campus – Main Auditorium (Room C111-B)  
Research Triangle Park (RTP), NC**

#	Speaker's Name	Organizational Affiliation	Organization(s) Represented [or Funding Organization(s)]
1	Dr. John Richards	Air Control Techniques	Coalition for Coarse Particle Regulation
2	Mr. Greg Shaefer	Arch Coal	Coalition for Coarse Particle Regulation
3	Mr. Robert Connery	Holland & Hart LLP	National Cattlemen's Beef Association (NCBA)
4	Mr. Mike Meyer	Rupprecht & Patashnick Co., Inc. (R&P)	same
5	Mr. Tom Merrifield	BGI Incorporated	same
6	Dr. Will Ollison	American Petroleum Institute (API)	same