

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

Summary Meeting Minutes of the CASAC's Public Advisory Meeting

**Wednesday, September 21, 2005 – 9:00 a.m. to 5:30 p.m. Eastern Time, and
Thursday, September 22, 2005 – 8:30 a.m. to 3:00 p.m. Eastern Time**

*Marriott Durham Civic Center Hotel
210 Foster Street, Durham NC 27701*

Meeting to Conduct: (1) a Peer Review of PM_{10-2.5} Federal Reference Method (FRM); and (2) a Consultation on: Field Evaluation of PM_{10-2.5} Methods; Optimization of the PM_{2.5} FRM; Equivalency Criteria for PM_{2.5} Continuous Methods; Monitoring Data Quality Objectives for PM_{10-2.5}; and Equivalency Criteria for PM_{10-2.5} Continuous Methods

Panel Members: See CASAC AAMM Subcommittee Roster – Appendix A

Agenda: See Meeting Agenda – Appendix B

Purpose: The purpose of this public meeting was for the CASAC Ambient Air Monitoring & Methods (AAMM) Subcommittee to conduct a peer review of the Agency's proposed Federal Reference Method (FRM) for coarse particulate matter (PM_{10-2.5}); and a consultation on: the field evaluation of PM_{10-2.5} methods; optimization of the PM_{2.5} FRM; equivalency criteria for PM_{2.5} continuous methods; monitoring data quality objectives for PM_{10-2.5}, and equivalency criteria for PM_{10-2.5} continuous methods.

Attendees:

Chairs:	Mr. Richard Poirot Dr. Barbara Zielinska
CASAC Members:	Dr. Ellis Cowling
AAMMS Members:	Mr. George Allen Dr. Judith Chow Mr. Bart Croes Dr. Kenneth Demerjian Dr. Delbert Eatough Mr. Eric Edgerton Mr. Henry (Dirk) Felton Dr. Philip Hopke Dr. Kazuhiko Ito Dr. Donna Kenski Dr. Thomas Lumley Dr. Peter McMurry Dr. Kimberly Prather

AAMMS Members (cont.): Dr. Armistead (Ted) Russell [via telephone]
Dr. Jay Turner
Dr. Warren H. White
Dr. Yousheng Zeng

EPA SAB Staff: Mr. Fred Butterfield, CASAC Designated Federal Officer (DFO)
Mr. Richard Albores, Deputy Director, SAB Staff Office

Other EPA Staff: Mr. Fred Dimmick, OAR, OAQPS
Mr. Neil Frank, OAR, OAQPS
Mr. Tim Hanley, OAR, OAQPS
Ms. Jacqueline Lewis, EPA Region 4
Mr. Phil Lorang, OAR, OAQPS
Mr. Mike Papp, OAR, OAQPS
Ms. Joann Rice, OAR, OAQPS
Mr. Tom Rosendahl, OAR, OAQPS
Dr. Mary Ross, OAR, OAQPS
Ms. Susan Stone, OAR, OAQPS
Dr. Robert Vanderpool, ORD, NERL
Mr. Timothy Watkins, ORD, NERL
Mr. Lewis Weinstock, OAR, OAQPS
Dr. William Wilson, ORD, NCEA-RTP

Meeting Summary

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

WEDNESDAY, SEPTEMBER 21, 2005

Convene Meeting, Call Attendance, Introduction and Administration

Mr. Fred Butterfield, Designated Federal Officer (DFO) for the Clean Air Scientific Advisory Committee, opened this meeting, called attendance, and welcomed all attendees. He noted the CASAC is a Federal Advisory Committee chartered under the Federal Advisory Committee Act (FACA) to provide advice and recommendations to the EPA Administrator, and that the Ambient Air Monitoring & Methods (AAMM) Subcommittee is a standing CASAC subcommittee that provides its formal advice and recommendations to the Administrator via the CASAC. Consistent with FACA regulations, the deliberations of CASAC 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. He mentioned that there four (4) individuals who had registered with him in advance to provide oral public comments during this meeting. Mr. Butterfield said a transcript of this meeting is not being taken. However, summary minutes were taken (by the DFO) for this meeting. These minutes will be certified by the AAMM Subcommittee Chairs and posted on the SAB Web Site (<http://www.epa.gov/sab>) after this meeting. Mr. Butterfield

noted that all participating Subcommittee members had submitted documentation with respect to possible financial conflicts-of-interest or appearances of a lack of impartiality, which was reviewed by the SAB staff prior to the meeting and found to be satisfactory.

Mr. Rich Albores, Deputy Director, SAB Staff Office, thanked the members of the CASAC AAMM Subcommittee for taking part in this review and consultation. He also thanked the managers and staff from the EPA's Office of Air Quality Planning and Standards (OAQPS), within the Agency's Office of Air and Radiation (OAR).

Purpose of Meeting and Welcome by EPA's Office of Air Quality Planning and Standards

Dr. Zielinska and Mr. Poirot, CASAC AAMM Subcommittee Chairs for Methods and Monitoring, respectively, welcomed the members of the Subcommittee and briefly stated the purpose of the meeting, which was to conduct a peer review of the draft Federal Reference Method (FRM) for thoracic coarse particulate matter ($PM_{10-2.5}$) and a consultation on various PM monitoring-related issues.

Mr. Phil Lorang, Acting Leader of OAQPS' Ambient Air Monitoring Group (AAMG), also welcomed the members of the AAMM Subcommittee and noted that the proposed rule for the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM) that is expected to be released in December 2005 will propose an FRM for thoracic coarse PM (also known as PM coarse or simply PMc). He also noted that Dr. Robert (Bob) Vanderpool of ORD's National Exposure Research Laboratory (NERL) (who will also be addressing the subcommittee this morning) has been working on this draft FRM.

Presentations by EPA's Office of Air Quality Planning and Standards and National Exposure Research Laboratory Concerning the Draft FRM for Thoracic Coarse Particulate Matter ($PM_{10-2.5}$)

Mr. Tim Hanley of OAQPS' Ambient Air Monitoring Group provided an overview presentation on the development of the Agency's PM monitoring program, to include $PM_{10-2.5}$ FRM and other PM monitoring-related issues. Subcommittee members engaged Mr. Hanley and other OAPQS AAMG staff with questions and answers during this summary presentation. (A hard-copy of the OAQPS presentation is located in the FACA file for this meeting.)

Next, Dr. Bob Vanderpool of NERL gave a presentation entitled, *PM_{10-2.5} Methods Evaluation Study: August 2005 Updated Report*, which is an update on EPA's PMc multi-site, field study evaluation of candidate methodologies for determining $PM_{10-2.5}$ concentrations. As before, AAMM Subcommittee members engaged Dr. Vanderpool with questions during this summary presentation. (A hard-copy of the ORD-NERL presentation is found in the FACA file for this meeting.)

Immediately after lunch, there was an additional, extensive (50-minute) question-and-answer session between EPA staff — particularly Dr. Vanderpool and Mr. Hanley — and AAMM Subcommittee members concerning the Agency's review documents and overview presentations for this advisory activity.

Public Comment Period

Mr. Butterfield, CASAC DFO, facilitated the formal public comment period. There were four (4) individuals who presented oral public comments: Dr. David Leith of the University of North Carolina (UNC), speaking on behalf of BGI Incorporated; Ms. Tamara Thies, Esq., speaking on behalf of the National Cattlemen’s Beef Association (NCBA); Dr. Calvin Parnell of Texas A&M University, also speaking on behalf of the NCBA; and Dr. John Richards of Air Control Techniques, P.C., speaking on behalf of the “Coarse Particulate Matter Coalition. (See Appendix C for a summary listing of all public speakers; copies of public commenters’ oral statements are located in the FACA file for this meeting.) AAMM Subcommittee members were permitted to ask follow-up questions after each public speaker had finished delivering his or her oral public statement.

Summary of CASAC AAMM Subcommittee Members’ Discussions and Deliberations Concerning its Peer Review of the Draft FRM for Thoracic Coarse Particulate Matter (PM_{10-2.5})

CASAC AAMM Subcommittee Chairs Dr. Zielinska and Mr. Poirot led the Subcommittee through a discussion of the two charge questions from Agency staff for this peer review of the draft FRM for PM_{10-2.5}. (The background for this review and the associated charge questions are found in the August 19, 2005 memo from Phil Lorang of OAQPS, attached as Appendix D.)

With respect to the first question — *“What are the scientific and operational strengths and weaknesses of the PM_{10-2.5} difference method relative to other options for a proposed FRM, especially when used as the basis for approval of other methods?”* — AAMM Subcommittee members discussed both the important scientific or operational strengths and weaknesses of the proposed difference-method PM_{10-2.5} FRM. Significant points that members of the Subcommittee raised during their discussion of this charge question included:

- One member remarked that he was disappointed by the Agency’s efforts to continue advancing the difference method as a FRM. The difference method mixes the fine and coarse; given that it is known that much of the coarse PM is alkaline and the fine PM is acidic, there is potential for a chemical reaction — while acknowledging that a dichotomous sampler will collect a smaller quantity of fine PM. He added that, as a minimum, the modern dichotomous sampler be approved as a second FRM. Another member commented that, while he somewhat reluctantly supported the difference method as a FRM, he didn’t need to see it deployed by States and localities, noting also that he views this only as a benchmark to be employed until the Agency develops other methods. Still another member commented that his major objection with the difference method is the physical mixing of the coarse particle sample.
- The Agency has the option of moving toward a continuous sampler, with one member remarking that the difference method is going to be “the gold standard.” Another member commented that, if a continuous method is used, you do not have much information about the composition of coarse PM; thus, an intermediate monitoring method is needed. It was noted in the discussion that the Agency needs to develop a monitoring method — or develop a new sampler — that accurately measures PM_c, *e.g.*, either a dichotomous monitor or something that gives even cleaner coarse parti-

cle samples. One member expressed concern that, if the Agency defines a particular method as an FRM, we will have “boxed ourselves in” with respect to bringing any new methods coming on-line.

- There was also some discussion concerning the benefits of understanding the composition of coarse PM; and, ultimately, the goal of moving away from mass-based standards. Subcommittee members also felt that more thought should be given to comparing the responses of alternative samplers with the FRM using laboratory-generated aerosols of known composition and size or size distribution (e.g., to include the calibrated generation and sampling of known semi-volatile compounds, such as ammonium nitrate and selected organic compounds).
- One of the AAMM Subcommittee Chairs noted that there are three basic directions in which the Subcommittee could head in terms of general recommendations to EPA: (1) support the Agency’s proposed FRM by difference; (2) indicate that the Subcommittee is opposed because members do that believe that there should be a FRM; or (3) note that the Subcommittee members do not particularly care for OAQPS’ FRM proposal, while also recommending particular performance standards, e.g., continuous method, concentrators, and tight specifications to meet the established data quality objectives (DQOs).
- After much discussion, Subcommittee members were leaning toward accepting the Agency’s proposal of the difference method for the PM_{10-2.5} FRM, noting that, while the difference method has many flaws, no other superior, currently-available candidate FRM method has been identified. While one member grudgingly noted that, while the recommended choice is pragmatic and precise, its accuracy is unknown, it was also acknowledged that no single instrument can meet all objectives. However, Subcommittee members also commented that, in addition to the proposed PM_{10-2.5} difference method, the Agency should propose a monitoring method that actually provides a coarse particle sample (e.g., the dichotomous sampler) as a second FRM.

As to the second question — “Based on the field study report as well as any other available data, e.g., data from State and local agencies, how does the demonstrated data quality of the PM_{10-2.5} difference method support or detract from it being proposed as a FRM?” — one of the AAMM Subcommittee members commented that the FRM for PM_{10-2.5} has good data quality, noting that the problems with the monitoring method are “more philosophical.” During the brief discussion on his question, another member remarked that some users have suggested that the relationship with fine particulate matter (PM_{2.5}) was important because of the consistency of the data over past six years.

Mr. Butterfield, DFO, adjourned the meeting for the day at approximately 5:35 p.m. on September 21, 2005.

THURSDAY, SEPTEMBER 22, 2005

Reconvene Meeting, Call Attendance

Mr. Butterfield reopened the meeting and the teleconference at 8:35 a.m., called attendance, and welcomed all attendees back to the second day of the meeting.

Re-cap of Previous Day's Meeting

CASAC AAMM Subcommittee Chairs Dr. Zielinska and Mr. Poirot had no additional comments.

Additional Public Comment Period

There were no public commenters on the second day of the AAMM Subcommittee's meeting.

Presentations by EPA's Office of Air Quality Planning and Standards and National Exposure Research Laboratory on Various Particulate Matter Monitoring-Related Issues

Mr. Tim Hanley of OAQPS' Ambient Air Monitoring Group and Dr. Bob Vanderpool of NERL then introduced the other PM monitoring-related issues concerning which the Agency was seeking the Subcommittee's consultative advice. Specifically, Mr. Haney and Dr. Vanderpool briefed the Subcommittee on the following five (5) documents that had also been provided as supporting-material attachments to the AAMM Subcommittee for this meeting:

- *EPA's Multi-Site Evaluations of Candidate Methodologies for Determining Coarse Particulate Matter (PM_{10-2.5}) Concentrations: August 2005 Updated Report Regarding Second-Generation and New PM_{10-2.5} Samplers*
- *Memo to PM NAAQS Review Docket (OAR-2001-0017) – Potential changes being evaluated for the PM_{2.5} Federal Reference Method*
- *Criteria for Designation of Equivalence Methods for Continuous Surveillance of PM_{2.5} Ambient Air Quality*
- *Sensitivity of the PM_{10-2.5} Data Quality Objectives to Spatially Related Uncertainties*
- *PM_{10-2.5} Method Equivalency Development*

(A description of each of these attachments is contained in OAQPS' August 19, 2005 background and charge memo for this review and consultation, attached as Appendix D. In addition, hard-copies of each of these attachments are found in the FACA file for this meeting.) As before, AAMM Subcommittee members engaged Mr. Hanley and Dr. Vanderpool with questions and answers during their presentations.

Summary of CASAC AAMM Subcommittee Members' Consultation with Agency Staff on Various Particulate Matter Monitoring-Related Issues

During the course of the ensuing discussion, AAMM Subcommittee members generally presented their individual written comments that were prepared in advance of this consultation. These individual comments will be included in an appendix to the CASAC's letter to the EPA Administrator concerning the Subcommittee's peer review of the draft FRM for coarse particulate matter (PM_{10-2.5}). Several of the more significant, general points that members of the Subcommittee raised during their discussion of the associated charge questions included:

- One Subcommittee member commented that determining compliance with NAAQS is not the only goal of PM-coarse measurements; rather, to be useful to the health-effects community for future PM-health studies and for modeling purposes, a PM-coarse method must produce reasonably accurate data over the entire range of ambient values, and do this ideally on a time-frame much shorter than 24 hours. While this is not the goal of the currently-proposed Federal Equivalent Method (FEM) evaluation process, this additional data-use objective must be kept in mind when determining how to characterize what level of performance is adequate for designation of a method as a PMc FEM.
- There was some discussion regarding how the Agency might define “urban” coarse particulate matter for regulatory purposes. Some members questioned EPA’s claim that a difference method FRM would provide a sound basis for chemical analysis (*i.e.*, coarse chemical composition by subtraction). One member remarked that this is an important issue in that the “urban” focus of EPA’s proposed “UPM_{10-2.5}” indicator is based on assumed (though not routinely measured) differences in the chemical and/or biological composition of coarse particles in urban versus rural locations.
- Another AAMM Subcommittee member noted that the reality of sampler exposure in urban settings can include strong diurnal cycles that mix particles from one source (*e.g.*, road dust, which has very high spatial and temporal variation) with those from entirely different ones such as aged secondary aerosol (a more regionally-distributed pollutant) within a time-integrated sample. This member added that the spatial and temporal structure of ambient concentrations, size distributions, volatility, hygroscopicity, and other factors can all influence sampler performance and how well sample values represent the ambient environment’s real variability. In summary, most of the AAMM Subcommittee accepted EPA’s designation of “urban” PM_{10-2.5} as the “indicator species” as a surrogate for an as-yet-undefined composition.
- Still another AAMM Subcommittee member offered that the Agency needs to give more thought to comparing the responses of alternative samplers with the FRM using laboratory generated-aerosols of known composition and size or size distribution. Such work could include sampling of known semi-volatile compounds, such as ammonium sulfate and selected organic compounds. He noted that, because the atmospheric aerosol is so complex, there are many processes that could lead to discrepancies when samplers are used for atmospheric sampling, even though the samplers operate with identical inlet characteristics — adding that laboratory tests would enable unambiguous testing of sampler performance to particles having known physical and chemical properties, which in turn would help improve our understanding of measurement accuracy and lead to the design of improved samplers in the future.
- Another member of the Subcommittee remarked that the techniques that the Agency has applied to address the effects of spatial variability and multi-modal distributions on PM_{10-2.5} process are reasonable. He also noted that the effect of multi-modal distributions was observed to be very small, as was the effect of the spatial variability, adding that the question remains as to whether or not PM volatility and spatial gradients issues have been adequately address in the subject sensitivity issues. Another member commented that the evaluation of equivalency through dedicated inter-comparison of instruments is a sound beginning. That having been said, in addition

to the statistical inter-comparison measures given in the report, he added that it would be helpful to incorporate and weigh qualitative differences between the methods such as the unattended operation/operating cost; the availability of filters for subsequent speciation analysis, *etc.*, so as to make the inter-comparison of methods as complete as possible.

- Another AAMM Subcommittee member remarked that EPA's revision of the DQO model seems to have adequately addressed the Subcommittee's concerns about multimodal distributions of PM_{2.5} that was raised at a previous (July 2004) meeting. Still, another member commented that the DQO tool for examining the performance of continuous monitors as FEMs for both fine and coarse PM should be modified to include an asymmetric multiplicative "bias" factor, noting that it is unfortunate to call the slope above zero to be "bias" since it implies that the current (and in his opinion, flawed) FRMs are accurate which has been clearly demonstrated to be untrue. However, to permit more accurate measurements to be included that will produce larger mass concentration values, an asymmetric interval would permit better measurement tools to qualify as FEMs. Given the past performance, it would probably be wise to couple the wider range of positive multiplicative factors with a narrower range of additive factors.

Summary, Wrap-up, Next Steps and Closing Remarks

The Chairs thanked all members of the AAMM Subcommittee for their participation in this meeting. They asked that all Subcommittee members provide their written inputs for the draft letter from the CASAC to the EPA Administrator concerning the Subcommittee's peer review of the draft FRM for coarse particulate matter (PM_{10-2.5}) to the Chairs (with copy to Mr. Butterfield, as the DFO) by no later than next Friday, September 30. In addition, Subcommittee members are also requested to provide their initial or updated individual review comments to the Chairs and the DFO by that date.

The Chairs and the DFO will work to develop an initial draft letter for the Subcommittee's review and concurrence comments by no later than Friday, October 7. The goal is that all Subcommittee members are able to concur on this letter by the following Friday (October 14) so that the letter may be posted on the SAB Web site for public review on that date, in preparation for the CASAC's public advisory teleconference to review and approve the draft letter to the Administrator concerning the Subcommittee's peer review of the FRM for PM_{10-2.5}. That teleconference meeting will be scheduled to take place between October 24 and November 9, 2005, so that the SAB Staff Office might be able to transmit a final letter/report to the Administrator on this topic by the end of that month.

Mr. Butterfield, DFO, also thanked all Subcommittee members and Agency staff for their participation in this two-day meeting, following which he adjourned the meeting at approximately 2:15 p.m. on September 22, 2005.

Respectfully Submitted:

/s/

Fred A. Butterfield, III

Fred A. Butterfield, III
CASAC DFO

Certified as True:

/s/

Richard L. Poirot

Richard L. Poirot
CASAC AAMMS Chair – Monitoring

/s/

Barbara Zielinska, Ph.D.

Barbara Zielinska, Ph.D.
CASAC AAMMS Chair – Methods

NOTE AND DISCLAIMER: The minutes of this public advisory meeting reflect diverse ideas and suggestions offered by CASAC AAMM Subcommittee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the members of this panel. The reader is cautioned to not rely on the minutes 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.

Appendix A – Roster of the CASAC AAMM Subcommittee

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

CHAIRS

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

Dr. Barbara Zielinska* (Chair – Methods), Research Professor, Division of Atmospheric Science, Desert Research Institute, Reno, NV

SUBCOMMITTEE MEMBERS

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

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. 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. Philip Hopke, Bayard D. Clarkson Distinguished Professor, Department of Chemical Engineering, Clarkson University, Potsdam, 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, Visiting Professor, Crocker Nuclear Laboratory, University of California - Davis, Davis, CA

Dr. Warren H. White, Research 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) [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 the statutory Clean Air Scientific Advisory Committee (CASAC) appointed by the EPA Administrator

Appendix B – Meeting Agenda

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

Public Meeting & Teleconference

**Wednesday, September 21, 2005 – 9:00 a.m. to 5:30 p.m. Eastern Time, and
Thursday, September 22, 2005 – 8:30 a.m. to 3:00 p.m. Eastern Time**

**Marriott Durham Civic Center Hotel
210 Foster Street, Durham NC 27701**

**Peer Review of PM_{10-2.5} Federal Reference Method (FRM); and (2) a Consultation on:
Field Evaluation of PM_{10-2.5} Methods; Optimization of the PM_{2.5} FRM; Equivalency Crite-
ria for PM_{2.5} Continuous Methods; Monitoring Data Quality Objectives for PM_{10-2.5}; and
Equivalency Criteria for PM_{10-2.5} Continuous Methods**

Final Meeting Agenda

Wednesday, September 21, 2005

9:00 a.m.	Convene Meeting; Call Attendance; Introductions and Administration	Mr. Fred Butterfield, CASAC DFO
9:10 a.m.	Welcome & Opening Remarks	Mr. Richard Albores, SAB Staff Office Deputy Director
9:15 a.m.	Welcome; Purpose of Meeting	Dr. Barbara Zielinska, Co-Chair, Methods; Mr. Rich Poirot, Co-Chair, Monitoring
9:20 a.m.	Overview Presentation on Development of PM_{10-2.5} FRM, PM Monitoring-Related Issues	Mr. Tim Hanley, Office of Air Quality Planning & Standards (OAQPS) Ambient Air Monitoring Group
10:30 a.m.	Break*	
10:45 a.m.	Update on EPA's PMc Field Study, <i>Multi-Site Evaluation of Candidate Methodologies for Determining PMc Concentrations</i>	Dr. Robert Vanderpool, ORD's National Exposure Research Laboratory (NERL)
11:45 a.m.	Lunch	
1:00 p.m.	CASAC AAMM Subcommittee Question-&-Answer Session and Discussions with Agency Staff re: EPA Review Documents & Presentations	Co-Chairs, CASAC AAMM Subcommittee Members

*Note: Periodic breaks will be taken as necessary and at the call of the Co-Chairs.

Wednesday, September 21, 2005 (continued)

2:00 p.m.	Public Comment Period	Mr. Butterfield (Moderator)
2:30 p.m.	Break	
2:45 p.m.	CASAC AAMM Subcommittee Discussion in Response to Charge Questions	Co-Chairs, CASAC AAMM Subcommittee Members
5:30 p.m.	Adjourn meeting for the day	Co-Chairs

Thursday, September 22, 2005

8:30 a.m.	Reconvene Meeting; Call Attendance	Mr. Butterfield
8:35 a.m.	Re-cap of Previous Day's Meeting	Dr. Zielinska, Mr. Poirot
8:45 a.m.	Public Comment Period*	Mr. Butterfield (Moderator)
9:00 a.m.	Additional OAQPS or NERL Comments and Introduction to Other PM Monitoring-Related Issues for Consultation with Subcommittee	Mr. Hanley, Dr. Vanderpool;
9:10 a.m.	CASAC AAMM Subcommittee Consultation in Response to Charge Questions	Co-Chairs, CASAC AAMM Subcommittee Members
10:15 a.m.	Break**	
10:30 a.m.	Continue AAMM Subcommittee Consultation in Response to Charge Questions	Co-Chairs, CASAC AAMM Subcommittee Members
11:45 a.m.	Lunch	
1:00 p.m.	Complete AAMM Subcommittee Consultation on PM Monitoring-Related Issues	Co-Chairs, CASAC AAMM Subcommittee Members
2:15 p.m.	Summary, Wrap-Up and Next Steps	Dr. Zielinska, Mr. Poirot
3:00 p.m.	Adjourn Meeting	Mr. Butterfield

Notes:

*The purpose of the public comment period on the second day of the meeting is to permit any members of the public who were unable to provide their oral comments on the first day with an opportunity to do so.

**Periodic breaks will be taken as necessary and at the call of the Co-Chairs.

Appendix C – List of Public Speakers

List of Public Speakers

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

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Marriott Durham Civic Center Hotel, 210 Foster Street, Durham NC 27701

#	Speaker's Name	Organizational Affiliation	Organization(s) Represented [or Funding Organization(s)]
1	Dr. David Leith	University of North Carolina (UNC)	BGI Incorporated
2	Ms. Tamara Thies, Esq.*	National Cattlemen's Beef Association (NCBA)	same
3	Dr. Calvin Parnell*	Texas A&M University	NCBA
4	Dr. John Richards	Air Control Techniques, P.C.	Coarse Particulate Matter (PM) Coalition**

*Note: Will present oral comments via teleconference (phone) line

**Note: The Coarse PM Coalition consists of the following organizations: National Mining Association; National Stone, Sand and Gravel Association; Industrial Minerals Association – North America; American Forest and Paper Association; Portland Cement Association; and the Cotton Council.

Appendix D – Agency Charge to CASAC AAMM Subcommittee



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711**

August 19, 2005

MEMORANDUM

SUBJECT: CASAC Review of Particle Methods and Data Quality Objectives

FROM: Phil Lorang */s/ Phil Lorang*
Acting Group Leader
Ambient Air Monitoring Group
Office of Air Quality Planning and Standards (D243-02)

TO: Fred Butterfield
Designated Federal Officer
Clean Air Scientific Advisory Committee
EPA Science Advisory Board Staff Office (1400F)

Attached are materials for information and review by the Clean Air Scientific Advisory Committee's (CASAC) Ambient Air Monitoring and Methods (AAMM) Subcommittee. These materials will be the subject of a peer review and consultation by the AAMM Subcommittee, scheduled for a public meeting to be held in Durham, NC on September 21-22, 2005. The peer review will focus on a PM_{10-2.5} federal reference method (FRM), while the consultation will cover field evaluation of PM_{10-2.5} methods, optimization of the PM_{2.5} FRM, equivalency criteria for PM_{2.5} continuous methods, monitoring data quality objectives for PM_{10-2.5}, and equivalency criteria for PM_{10-2.5} continuous methods. I am requesting that you forward these materials to the AAMM Subcommittee to prepare for the consultation.

This project, entitled *Particle Methods and Data Quality Objectives*, has been requested by EPA's Office of Air Quality Planning and Standards (OAQPS), within EPA's Office of Air and Radiation, in anticipation of potential revisions to the particulate matter (PM) National Ambient Air Quality Standards (NAAQS). Consistent with the approach described in the PM Staff Paper, the measurement of coarse particles is intended to focus on those particles in the ambient air with a nominal diameter in the range of 2.5 to 10 micrometers (*i.e.*, PM_{10-2.5}, or the thoracic coarse particle fraction of PM₁₀).

The peer review of a PM_{10-2.5} FRM will provide scientific advice for the EPA prior to proposing a monitoring method for a potential PM_{10-2.5} standard. Charge questions associated with this peer review are provided below.

The consultation on the field evaluation of PM_{10-2.5} methods will solicit Subcommittee comment on field studies associated with the testing and development of PM_{10-2.5} monitoring technologies. The consultation on the optimization of the PM_{2.5} FRM will assist EPA in considering whether to propose improvements to this method that would reduce the burden on State, local, and Tribal monitoring agencies in operating the PM_{2.5} monitoring network while maintaining designed data quality. The consultation on the equivalency criteria for PM_{2.5} continuous methods will provide the first CASAC review of a new approach being considered for defining the metrics and tolerances for approval of candidate equivalent PM_{2.5} continuous methods and approved regional methods. The consultation on the PM_{10-2.5} monitoring data quality objectives (DQOs) includes an update on additional analysis performed on the advice of the CASAC AAMM Subcommittee provided during OAQPS's July 2004 consultation with the Subcommittee. The consultation on the equivalency criteria for PM_{10-2.5} will focus on our initial thoughts on how these criteria can be developed, building on the new PM_{2.5} equivalency criteria and the PM_{10-2.5} monitoring DQOs. Charge questions associated with each part of the consultation are provided below.

The upcoming peer review and consultation will support the EPA by providing scientific advice as the EPA Administrator considers potential revisions to the PM NAAQS; a notice of proposed rulemaking is to be signed by December 20, 2005. To meet this date, which is governed by a consent decree, we are requesting that CASAC expedite its peer review of the PM_{10-2.5} FRM. Although the consultation part of this review does not call for a consensus statement, we are requesting each of the members to provide his or her individual written comments as soon on an expedited schedule as well.

Following peer review and consultation, the Agency will issue a proposed rulemaking with regard to our review of the PM NAAQS, together with a proposed rulemaking on an FRM for PM_{10-2.5}, should the EPA Administrator propose new coarse particle standards. Further review of PM_{10-2.5} measurement methods and associated monitoring activities by the AAMM Subcommittee may be appropriate for future consideration, taking into account the outcome of the upcoming peer review and consultation and decisions by the EPA Administrator to propose new or revised PM standards.

Document Associated with Subcommittee's Peer Review of a PM_{10-2.5} FRM:

- **Attachment 1** – *Summary and Rationale for PM_{10-2.5} FRM*

Background and Summary: At multiple locations covering a variety of aerosols and climates EPA researchers have conducted field studies of commercially available PM_{10-2.5} methods. These field studies have demonstrated the utility of various PM_{10-2.5} methods to support multiple monitoring objectives for a potential PM_{10-2.5} standard. Although there are many monitoring objectives to consider, one or more PM_{10-2.5} methods must be capa-

ble of supporting three overall objectives: (1) being used as the basis of comparison for all $PM_{10-2.5}$ methods approved in the network — typically defined as the FRM; (2) characterizing chemical composition of $PM_{10-2.5}$; and (3) providing highly time-resolved $PM_{10-2.5}$ data necessary to support a $PM_{10-2.5}$ standard that may only include a daily component and for use in characterizing short-term episodes of PM. The field studies conducted have demonstrated that the filter-based difference method (operation of separate low-volume FRMs for PM_{10} and $PM_{2.5}$ and calculating $PM_{10-2.5}$ by difference) has better data quality compared to other commercially available methods. Considering that this method utilizes well-established reference method samplers, whose designs accurately provide upper and lower size fractionation curves, using the numerical difference between PM_{10} concentrations and $PM_{2.5}$ measured by collocated concurrent reference method samplers, the difference method is a fundamentally sound method for measuring 24-hour $PM_{10-2.5}$ concentrations. The filter-based difference method is also capable of supporting chemical characterization of collected samples. Despite these advantages, the Agency does not envision widely deploying the difference method since continuous $PM_{10-2.5}$ methods are expected to be the most useful monitoring technologies in support of a potential daily $PM_{10-2.5}$ standard. The difference method is expected to be useful in approving those continuous $PM_{10-2.5}$ methods and in on-going quality assurance of continuous methods.

Documents Associated with Subcommittee's Consultation:

- **Attachment 2** – *Multi-Site Evaluations of Candidate Methodologies for Determining Coarse Particulate Matter ($PM_{10-2.5}$) Concentrations: August 2005 Updated Report Regarding Second-Generation and New $PM_{10-2.5}$ Samplers*

Background and Summary: Since the AAMM Subcommittee last consulted with EPA on $PM_{10-2.5}$ methods in July of 2004, modifications have been made to a few of the methods tested and new monitors have been added to EPA's PM methods development testing. Since the modifications to the methods took several months to complete, only one additional 30-day field study has been completed. This study was performed in April and May of 2005 at the same Phoenix site as previous field studies with the $PM_{10-2.5}$ methods. This study included an evaluation of several methods for the mass measurement of $PM_{10-2.5}$ in the ambient air, including filter-based and continuous monitoring technologies. As the primary basis of comparison, a discrete difference method was used (operation of separate low-volume FRMs for PM_{10} and $PM_{2.5}$ and calculating $PM_{10-2.5}$ by difference). A second filter-based, time-integrated method was tested that involved the use of a sequential dichotomous sampler. Five continuous $PM_{10-2.5}$ monitoring methods with a time resolution of one hour or less were also tested. Three of these technologies have been tested in previous EPA-ORD study's on $PM_{10-2.5}$ methods: a commercially available system based on beta attenuation; a sampler using tapered element oscillating microbalance (TEOM) technology; and an aerodynamic particle sizer (APS). Two new continuous technologies were tested in this study: a sampler employing the Filter Dynamic Measurement System (FDMS) technology with use of a virtual impactor for the concurrent measurement of $PM_{2.5}$ and $PM_{10-2.5}$ and a Grimm optical aerosol spectrometer. In addi-

tion, a limited set of PM_{10-2.5} speciation samples were collected for diagnostic purposes using PM₁₀ FRMs, PM_{2.5} FRMs, and dichotomous samplers. The report provides an examination of these methods under one general set of conditions and should therefore be carefully interpreted. However, the results of this study combined with notes on how samplers were modified and the data from earlier studies can lead to broader interpretation of the applicability of these methods to support a potential PM_{10-2.5} monitoring network.

- **Attachment 3** – *Memo to PM NAAQS Review Docket (OAR-2001-0017) – Potential changes being evaluated for the PM_{2.5} Federal Reference Method*

Background and Summary: Since the deployment of the PM_{2.5} monitoring network EPA has been working with State and local agencies on issues regarding implementation of the FRM method. While much of the PM_{2.5} FRM is working well, some aspects of the method may need to be updated to reflect what the EPA and State and local agencies have learned since its implementation. With the PM standards being reviewed, it is appropriate to consider modifications to the PM_{2.5} FRM that would be neutral with respect to bias, but improve the operation and maintenance aspects of on-going operation. The EPA staff identified four potential changes to the FRM for consideration. These include: (1) adopting the Very Sharp Cut Cyclone (VSCC) as an approved second-stage impactor, given that the VSCC is already approved as an *equivalent* method second-stage impactor; (2) utilizing an alternative oil identified as dioctyl sebacate (DOS) for use in the Well Impactor Ninety-Six (WINS), should this impactor be retained as a part of the FRM; (3) extending the maximum allowed time to recover filters from samplers; and (4) modifying the filter transport temperature and post-sampling time requirements for final laboratory analysis.

- **Attachment 4** – *Criteria for Designation of Equivalence Methods for Continuous Surveillance of PM_{2.5} Ambient Air Quality*

Background and Summary: As a follow-up to previous interactions with the CASAC's subcommittee on particle monitoring (EPA-SAB-CASAC-LTR-02-01, March 1, 2002), the Subcommittee recommended "...EPA undertake a thorough DQO process to determine the needs for monitors so that FEM requirements can be defined based on a clearly defined set of data quality needs." EPA staff has been working on this over the last few years and has developed new draft criteria that could be used to approve candidate federal equivalent PM_{2.5} continuous methods. These criteria have been developed following a DQO process that ties potential new criteria with existing DQO's for the PM_{2.5} monitoring network. Initial work on this project is described in the document *Data Quality Objectives for PM Continuous Methods*, TR-4423-03-08, June 2003. Additional work on this project is described in the document *Data Quality Objectives for PM Continuous Methods II*, TR-CAN-04-02, June 2004. Both of these documents were used in the development of attachment 4 - *Criteria for Designation of Equivalence Methods for Continuous Surveillance of PM_{2.5} Ambient Air Quality*, September 2004. All of these documents are available on EPA's web site at: <http://www.epa.gov/ttn/amtic/casacinf.html>.

- **Attachment 5 - Sensitivity of the $PM_{10-2.5}$ Data Quality Objectives to Spatially Related Uncertainties**

Background and Summary: At the CASAC AAMM Subcommittee's July 22, 2004, consultative meeting, the use of a DQO approach was presented as it related to developing the appropriate measurement quality objectives for $PM_{10-2.5}$. DQOs are qualitative and quantitative statements that help define the appropriate type of data, and specify the tolerable levels of data uncertainty. In general, EPA received positive feedback on the DQO approach. Some specific comments were implemented; others required a more detailed assessment. In addition to the submissions from a number of Subcommittee members, it was also suggested at the meeting to look at the effects of spatial variability and multi-modal distributions. This report presents the techniques that were used to address these two issues, how they were incorporated into the DQO tool, and how these components of variability might affect the performance curves. Preliminary performance curves were assessed for their sensitivity to the input parameters. The assessment found that for a daily standard the performance curves were most sensitive to sampling frequency, followed by the completeness, the population coefficient of variation (CV) of the coarse fraction of particulate matter, and the ratio of the mean concentrations between the coarse and fine fractions of particulate matter. The effect of multi-modal distributions was very small. The effect of spatial variability is small compared to the parameters mentioned above, but EPA suggests including this parameter in the DQO evaluation. Appendix A to the attachment provides more detail on the models used.

- **Attachment 6 – $PM_{10-2.5}$ Method Equivalency Development**

Background and Summary: This document ties the work performed in developing equivalency criteria for $PM_{2.5}$ continuous methods together with the network DQOs being developed for $PM_{10-2.5}$. This work presents a first look at potential $PM_{10-2.5}$ equivalency criteria. The document does not attempt to repeat all the information presented in the development of the $PM_{2.5}$ equivalency criteria. The results demonstrate that reasonable criteria for approval of candidate continuous methods can be developed to support a daily standard for $PM_{10-2.5}$. Although these criteria provide an option for equivalency criteria that could meet potential DQOs, EPA expects to further refine the equivalency criteria based upon final decisions on a $PM_{10-2.5}$ standard, including: level and form; final decisions on the $PM_{10-2.5}$ DQOs; and the capabilities of commercially-available monitoring technologies for $PM_{10-2.5}$.

Charge to the AAMM Subcommittee

The purpose of the upcoming CASAC AAMM Subcommittee meeting is to provide a peer review of the filter-based difference method for the $PM_{10-2.5}$ FRM and consultation on several aspects of the PM methods that will help inform the Agency's selection of PM measurement methods as part of its ongoing review of the PM NAAQS. Accordingly, the Agency requests

that the Subcommittee focus on the following questions in its review:

Peer Review Questions:

Questions associated with Attachment 1 – Selection and technical summary of PM_{10-2.5} FRM:

1. What are the scientific and operational strengths and weaknesses of the PM_{10-2.5} difference method relative to other options for a proposed FRM, especially when used as the basis for approval of other methods?
2. Based on the field study report as well as any other available data, *e.g.*, data from State and local agencies, how does the demonstrated data quality of the PM_{10-2.5} difference method support or detract from it being proposed as a FRM?

Consultation Questions:

Question associated with Attachment 2 – EPA’s Multi-Site Evaluations of Candidate Methodologies for Determining Coarse Particulate Matter (PM_{10-2.5}) Concentrations: August 2005 Updated Report Regarding Second-Generation and New PM_{10-2.5} Samplers:

1. Based upon the latest available field study data, which PM_{10-2.5} methods have both sufficient utility to meet one or more important monitoring objectives and appropriate data quality to be considered for deployment as Federal Equivalent Methods (FEMs) or specification samplers in a potential PM_{10-2.5} monitoring network?

Questions associated with Attachment 3 – Memo to PM NAAQS Review Docket (OAR-2001-0017) – Potential changes being evaluated for the PM_{2.5} Federal Reference Method

2. What are the Subcommittee’s views on the Very Sharp Cut Cyclone (VSCC) being approved as an alternative second-stage impactor to the Well Impactor Ninety-Six (WINS) for use on a PM_{2.5} FRM?
3. To what extent are the stated advantages of relaxing existing requirements identified for the PM_{2.5} FRM supported by the information cited in Attachment 3, available literature, or good field and laboratory practices? Does the Subcommittee have additional recommendations for the PM_{2.5} FRM that would be neutral with respect to bias, but would improve the performance and minimize the burden on agencies conducting the sampling?

Questions associated with Attachment 4 – Criteria for Designation of Equivalence Methods for Continuous Surveillance of PM_{2.5} Ambient Air Quality

4. Considering the statistical measures of precision, correlation, multiplicative bias, and additive bias identified for approval of PM_{2.5} continuous methods, what are the Subcommittee’s views on the usefulness of each measure to ensure that approved or equivalent methods meet the monitoring network data quality objectives?

5. What are the advantages and disadvantages of using sampler precision and sample population to help determine the minimum correlation requirement for the approval of PM_{2.5} continuous methods?
6. What are the Subcommittee's views on using a PM_{2.5} continuous monitor approved as a FEM, being applicable for use as part of a potential PM_{2.5} secondary standard for visibility?

Question associated with Attachment 5 – Sensitivity of the PM_{10-2.5} Data Quality Objectives to Spatially Related Uncertainties

7. To what extent have the assessments of spatial variability and the sensitivity of the DQO process to a variety of population distributions been appropriately addressed?

Question associated with Attachment 6 – PM_{10-2.5} Method Equivalency Development

8. What are the Subcommittee's views on the approach identified for the development of criteria to approve continuous PM_{10-2.5} equivalent methods?

We appreciate the efforts of you and the Subcommittee to prepare for the upcoming meeting and look forward to discussing this project in detail on September 21-22. General questions regarding the enclosed materials should be directed to Mr. Tim Hanley, EPA-OAQPS (phone: 919-541-4417; e-mail: hanley.tim@epa.gov); specific questions regarding the PM_{10-2.5} measurement methods evaluation study should be directed to Dr. Robert Vanderpool, National Exposure Research Laboratory (NERL), within EPA's Office of Research and Development (ORD) (phone: 919-541-7877; e-mail: vanderpool.robert@epa.gov).

Attachments

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