January 28, 1999

EPA-SAB-CASAC-ADV-99-002

Honorable Carol M. Browner
Administrator
U.S. Environmental Protection Agency
401 M Street SW
Washington, DC 20460

Subject: Clean Air Scientific Advisory Committee (CASAC) Advisory on the $PM_{2.5}$ Monitoring Program

Dear Ms. Browner:

The Clean Air Scientific Advisory Committee (CASAC) of EPA's Science Advisory Board reconstituted its Technical Subcommittee on Fine Particle Monitoring (the "Subcommittee"), at the Agency's request, to provide advice and commentary on the Agency's fine particulate matter ($PM_{2.5}$) monitoring program. The Subcommittee, chaired by Dr. Phil Hopke of CASAC, met with Agency staff on November 30, 1998 for the first of what is envisioned as a continuing series of discussions as the monitoring program is designed and implemented. The attached Subcommittee report has been reviewed and approved by the full CASAC.

The Subcommittee report conveys CASAC's view that the most appropriate role for the Subcommittee is to respond to questions posed by the Agency and provide additional advice and commentary in a continuing, participatory, and pro-active manner. It also describes the working relationship between CASAC and the NAS/NRC Committee on Research Priorities for Airborne Particulate Matter. The optimal nature of this relationship has been discussed thoroughly among and between the two groups, and relationship portrayed in the Subcommittee report represents a consensus view.

The attached report summarizes the Subcommittee's technical advice regarding two specific issues posed by the Agency, and provides additional comments on related issues.

The CASAC is pleased to establish an interactive advisory relationship with the Agency through this Subcommittee, and looks forward to assisting the Agency in optimizing the design and implementation of its fine particle monitoring system and the utility of the information that system will provide.

Sincerely,

/signed/
Dr. Joe L. Mauderly, Chair
Clean Air Scientific Advisory Committee

U.S. Environmental Protection Agency
Science Advisory Board
Clean Air Scientific Advisory Committee (CASAC)

Chair

Dr. Joe Mauderly, Director of External Affairs, Lovelace Respiratory Research Institute, Albuquerque, NM

Members

Mr. John Elston, Administrator, Office of Air Quality Management, State of New Jersey, Department of Environmental Protection and Energy, Trenton, NJ

Dr. Philip K. Hopke, Dean of the graduate School, and R.A. Plane Professor of Chemistry, Clarkson University, Potsdam, NY

Dr. Eva J. Pell,, Steimer Professor of Agricultural Sciences, Pennsylvania State University, University Park, PA

Dr. Arthur C. Upton, M.D., Director, Independent Peer Review, CRESP, Environmental and Occupational Health Sciences Institute, Piscataway, NJ

Dr. Sverre Vedal, **M.D.**, Professor of Medicine, University of British Columbia, Vancouver, BC, Canada

Dr. Warren White, Senior Research Associate, Washington University, Chemistry Department, St. Louis, MO

Science Advisory Board Staff

Mr. Robert Flaak, Designated Federal Officer (DFO) and Team Leader, Committee Operations Staff, US Environmental Protection Agency, Science Advisory Board, Washington, DC

Ms. Diana Pozun, Management Assistant, US Environmental Protection Agency, Science Advisory Board, Washington, DC

NOTICE

This report has been written as a part of the activities of the Science Advisory Board, a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The Board is structured to provide balanced expert assessment of scientific matters related to problems faced by the Agency. This report has not been reviewed for approval by the Agency; and hence, the contents of this report do not necessarily represent the views and policies of the Environmental Protection Agency or other agencies in the Federal government. Mention of trade names or commercial products does not constitute a recommendation for use.

Report of the

Clean Air Scientific Advisory Committee (CASAC)

Technical Subcommittee on Fine Particle Monitoring

January 27, 1999

Dr. Joe Mauderly, Chair
Clean Air Scientific Advisory Committee
U.S. Environmental Protection Agency
Washington, DC 20460

Subject: Advisory on the Agency's $PM_{2.5}$ Monitoring Program

Dear Dr. Mauderly:

The Technical Subcommittee on Fine Particle Monitoring (hereafter, the "Subcommittee") of the Clean Air Scientific Advisory Committee (CASAC) met in Research Triangle Park, NC on November 30, 1998 at the request of the Agency's Office of Air Quality Planning and Standards (OAQPS). OAQPS requested that the Subcommittee provide advice and commentary on two major components of the Agency's $PM_{2.5}$ Monitoring Program, namely, the chemical speciation program, and the "supersites" program. The materials provided to the Subcommittee for review are listed in Appendix A.

1. Background and Development of the Charge

In April 1996, this Subcommittee (with different membership) reviewed and commented on the Agency's Federal Reference Method (FRM) and guidance to the States on the location and number of monitors (CASAC, 1996). Among the recommendations presented by the Subcommittee were that national networks include measurements that go beyond the FRM, to include chemical composition and continuous instruments. These measurements are embodied in the two major components of the $PM_{2.5}$ measurement program mentioned above.

In January 1998, the National Research Council (NRC) established its Committee on Research Priorities for Airborne Particulate Matter. This Committee was established in response to a request from Congress in the Fiscal 1998 appropriation to EPA, and is charged to identify the most important research priorities relevant to setting particulate matter standards, to develop a conceptual plan for particulate matter research, and, over five years, to monitor research progress toward improved understanding of the relationship between particulate matter and public health. The Committee has issued one report to date (NRC, 1998) with a second due shortly. Three members of the NRC Committee serve on the CASAC Subcommittee.

In May 1998, OAQPS obtained the advice of a Speciation Network Expert Panel on EPA's $PM_{2.5}$ Chemical Speciation Network (item A-7 listed in Appendix A). The Chair of that expert panel also serves on the CASAC Subcommittee to provide continuity and to convey recommendations of the expert panel.

In the FY1999 VA-HUD and independent agencies appropriation bill that addresses the roles of the National Academy of Sciences (NAS) and the CASAC in reviewing the PM monitoring program (Cong. Record - House, H9428, October 5, 1998), Congress stated the following:

> *...with respect to the speciation component of the Agency's PM monitoring plan, the conferees request that the NAS assist the EPA's Clean Air Scientific Advisory Committee (CASAC) by providing recommendations regarding the number and location of monitors and specific objectives and operating conditions for the various types of speciation monitors in EPA's plan. Also, NAS should evaluate the adequacy of the speciation component of the monitoring plan to characterize those constituents of PM that are biologically active. The NAS is expected to facilitate a thorough peer review of the speciation component of EPA's monitoring plan by CASAC.*

During its November 1998 public meeting (held under the provisions of the Federal Advisory Committee Act), the Subcommittee was briefed by OAQPS staff on various aspects of the monitoring program including regulatory time lines, components and objectives of the program, implementation of the chemical speciation program, supersite concept plan, and $PM_{2.5}$ data analysis plans. The Subcommittee also was briefed by the Office of Research and Development (ORD) on the Agency's PM research program and linkages with monitoring. The Subcommittee also received public comments from the American Petroleum Institute (API) and the National Stone Association (NSA).

The first area of discussion at the meeting was the development and refinement of the charge to the Subcommittee. The highlights of that discussion are captured below. A formal charge will be prepared based on these discussions and be available by the time of the next Subcommittee meeting in the Spring of 1999.

2. General Discussion

a) **Role of the Subcommittee** - In order to facilitate communications between CASAC and the NRC Committee on Research Priorities for Airborne Particulate Matter, three of the NRC committee members are members of the Subcommittee. Discussions within the NRC committee have made it clear that they do not want responsibility for providing advice or oversight of the PM monitoring program. Given the Congressional mandate to CASAC with respect to the speciation network, it seems that CASAC will be the body with the major responsibility for reviewing the science going into the PM monitoring networks. Thus, the discussion focused on how the Subcommittee could facilitate this review.

Among the materials presented to the Subcommittee, the *Draft Supersites Conceptual Plan* outlined a management scheme proposed by the Agency for the supersites program (see Figure 1). This scheme stimulated discussion in two areas.

First, there was concern that although there was a clearly defined management scheme for the supersites program, there are no comparable schemes for the speciation and mass monitoring programs and no overall scheme that coordinates the entire monitoring program. Although much of the speciation and mass monitoring network will be implemented and operated by State and Local air quality management organizations, there is still a need for coordination and management at the national level. There are important interrelationships among the three parts of the monitoring program. A management scheme that provides for communications and coordination throughout the program is essential if the maximum information is to be derived. The Subcommittee thus suggests that the Project Organization outlined in Figure 1 be expanded to become the Fine PM Monitoring Program Organization.

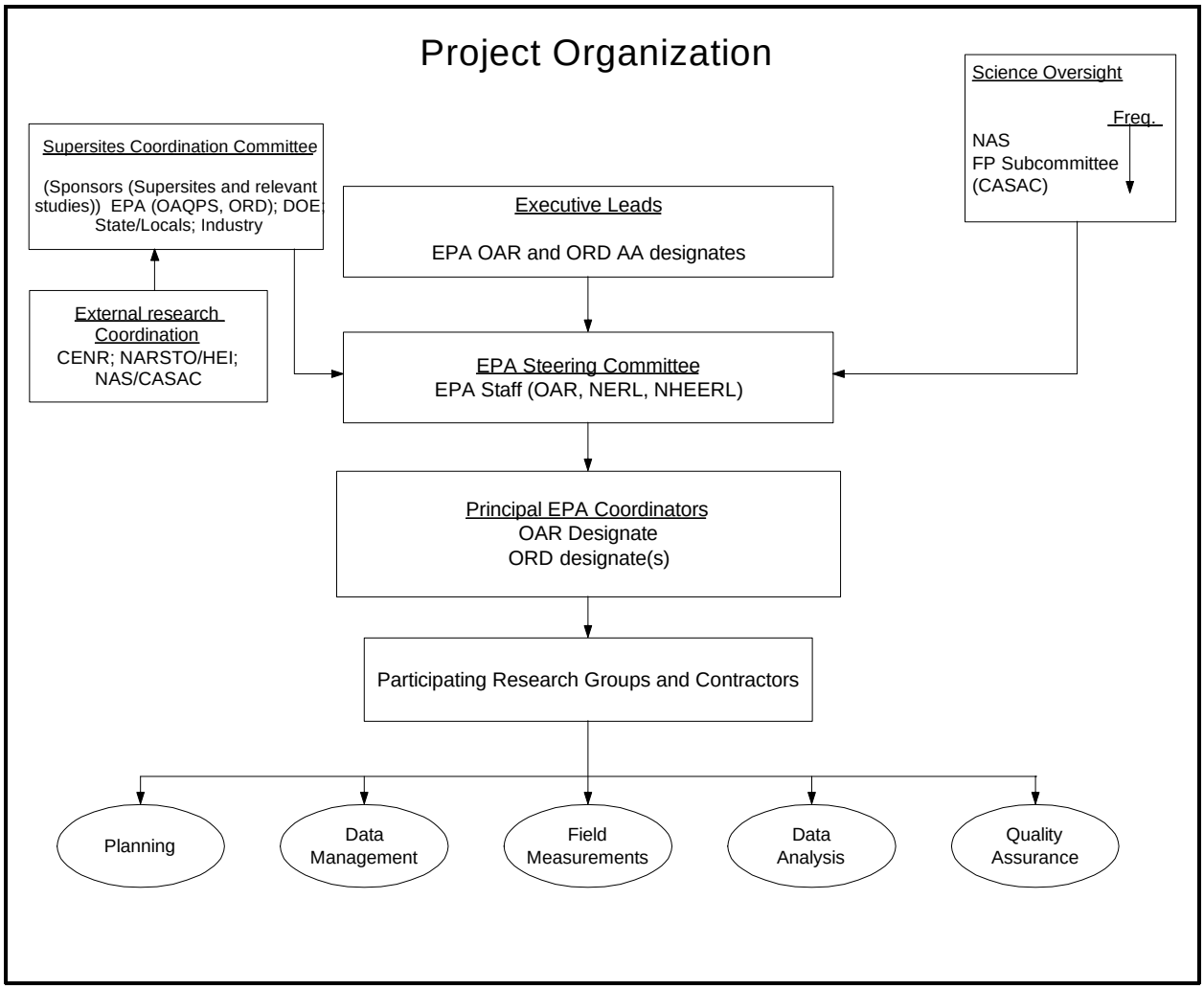

Figure 1 - Project Management Overview (Taken from Figure 3 of the *Draft Supersites Conceptual Plan* Nov. 9, 1998, pg. 7, November 9, 1998)

The second concern was the need for continuing scientific input into the design and implementation of the monitoring program. There are provisions in Figure 1 for Science Oversight and Research Coordination. However, the nature of the group that will provide those functions is not yet defined. The NRC committee has indicated that they do not envision their committee taking on this responsibility. After discussion, it was unanimously agreed that the Subcommittee would be willing to serve as the scientific advisory body to the PM monitoring program. This role would require the Subcommittee to both react to materials prepared by EPA as CASAC has traditionally done and to provide input to the EPA management team as scientific information relevant to the monitoring program becomes available. Thus, a more proactive role is envisioned for the Subcommittee as the monitoring program evolves.

b) Responses to Specific Questions - There were two specific questions on which EPA desired more immediate comments:

(1) Speciation network - One question concerned the proposed plan for the initial establishment of 53 sites in the speciation network that would serve as the trends network sites. The same type of sampler would be deployed at each of these sites and all of the samples would be analyzed by a single laboratory. The specific choice of sampler will be made at the end of the intercomparison study that will be initiated over December 1998 and January 1999 in 4 cities across the United States. The Subcommittee expressed concern about problems with the intercomparison study being conducted only during the winter when the full effect of temperature on semivolatile components of PM may not be observable. It is highly recommended that additional studies be conducted during the summer, particularly in the Eastern United States, although there is also concern about loss of nitrate in California. In addition, it is not clear what criteria will be used to judge the results of the intercomparison study and how they will result in the selection of the sampler to be deployed at the Trends Network sites. It is likely that differences will be observed in performance among the proposed speciation samplers and substantial differences in some cases with the FRM. Because there is no absolute "gold" standard for the true value of the concentration of condensed material in the atmosphere, the Subcommittee recommends development of a set of evaluation criteria before any of the results of the intercomparison study are obtained. An objective evaluation with well defined criteria performed on the results can lead to a choice of sampler that can be accepted by all involved in the process. The Subcommittee agrees that the plans for the initial deployment of the trends network samplers are as scientifically sound as possible given the time constraint that precludes summer tests of proposed samplers, and that it is reasonable for the Agency to move ahead to implement the plans as outlined although there remain concerns that the samplers will not have been fully tested.

(2) Supersite Network - The second question involved the revised plans for deployment of the supersite network. The plans now call for an initial deployment at two sites, Fresno and Atlanta, with a subsequent phase-in of other sites at locations to be determined as the plans for the PM research program develop. One of the major uncertainties in locating additional sites is their possible relationship to the new PM research centers that will be awarded during the first half of 1999. Thus, the limited deployment of two sites permits testing of systems, assessing of the operational problems and costs of these systems, and developing better plans for the remaining sites to produce the maximal information from these limited number of supersites. The Subcommittee again expressed the view that the plans were very reasonable and presented good opportunities to learn the operational difficulties of these systems and to be in the best position to utilize the resources that are being provided to obtain detailed data characterizing urban fine PM.

c) **Monitoring** - Additional minor concerns were raised regarding the monitoring activities:

(1) Availability of Data - First, while considerable work has been done in the Agency to characterize the FRM monitor, the results have not yet been presented in the peer-reviewed journal literature. The data that will come from the mass monitoring network will be more useful to health and other studies if the conditions by which particles are sampled and measured are well characterized and reported to the broader research community. It will be easier to have an appropriate scientific discussion of the strengths and weaknesses of the current method compared to alternatives if the calibration and intercomparison data on the methods have been published in the peer-reviewed literature. Although some detailed information on the sampler performance is appropriate for EPA reports, the Subcommittee strongly urges the Agency to make publication of results a high priority activity of its research staff.

(2) Utilization of Data - The second concern is the provision for sufficient time and resources to fully utilize the extensive quantity of data that will be collected as a result of the Fine PM Monitoring Program. The Agency has often put far more resources into obtaining high quality data to characterize environmental systems than it has put into the extraction from the data of the information that would really provide the depth of understanding needed to solve the complex health-related issues associated with PM. Thus, although the initial plans for developing a significant program of data analysis were encouraging, the Subcommittee will certainly will be watching carefully to see that appropriate opportunities are being provided to analyze and interpret the results of the monitoring data.

3. Next Steps for the Subcommittee

The Subcommittee plans to hold several meetings over the next few years to respond to its developing charge and to ensure that appropriate coordination is maintained with the NRC Committee. The next Subcommittee meeting is planned for May 1999. One of the tasks will be the development of a plan with respect to how often the Subcommittee should be providing advice and what kind of reports would be most useful to the Agency and to the Congress.

The Subcommittee would like to complement Agency personnel for their positive response to advice with respect to the speciation network and supersite plans from external scientific advisory groups such as the NRC Committee, the Speciation Network Expert Panel, and the North American Research Strategy for Tropospheric Ozone (NARSTO) Supersite Workshop. They have listened to the concerns, proposed changes, and made appropriate revisions to their plans. These changes will result in the networks providing better data for research purposes while still meeting the implementation-related objectives for which the networks were originally designed. We hope that the input of the CASAC Technical Subcommittee on Fine PM Monitoring will provide a continuing interaction that will permit the most effective use of the monitoring network and the resulting data to help to resolve some of the uncertainties that remain regarding airborne particulate matter and adverse health effects.

Sincerely,

Dr. Philip Hopke, Chair
Technical Subcommittee on Fine Particle Monitoring
Clean Air Scientific Advisory Committee

REFERENCES CITED

CASAC. 1996. Report of CASAC Technical Subcommittee for Fine Particle Monitoring. EPA-SAB-CASAC-LTR-96-009, Clean Air Scientific Advisory Committee, Science Advisory Board, USEPA, Washington, DC

NRC. 1998. Research Priorities for Airborne Particulate Matter. I - Immediate Priorities and a Long-Range Research Portfolio. National Research Council. National Academy Press, Washington, DC. 195p.

APPENDIX A

Review Documents provided to the Subcommittee

Attachment 1 - *Overview of National $PM_{2.5}$ Monitoring Networks*

Attachment 2 - *Chemical Speciation Guidance (July 1998 draft)*

Attachment 3 - Supersites Workshop Report: *Report of the PM Measurements research Workshop*

Attachment 4 - EPA Supersites concept paper reflecting inputs from workshop Report and September 24 NAS meeting: *Draft Supersites Conceptual Paper*

Attachment 5 - EPA Letter to 1996 CASAC Technical Subcommittee for Fine Particle Monitoring

Attachment 6 - CASAC Summary letter report of 1996 CASAC Technical Subcommittee for Fine Particle Monitoring

Attachment 7 - *Recommendations of the Expert Panel on the EPA Speciation Network*

Attachment 8 - Field program Plan for the $PM_{2.5}$ Chemical Speciation Sampler Evaluation Study

Attachment 9 - *Grant Guidance for Fine Particulate Ambient Air Monitoring Program*

Attachment 10 - *$PM_{2.5}$ Monitoring Implementation Plan Executive Summary*

Attachment 11 - July 1997 Federal Register Notice containing the Monitoring Regulation

Attachment 12 - EPA's PM Research Overview

Information on many of these documents can be found at:

http://www.epa.gov/ttn/amtic/amticpm.html
or
http://www.epa.gov/ttn/amtic/pmspec.html

U.S. Environmental Protection Agency
Science Advisory Board
Clean Air Scientific Advisory Committee
CASAC Technical Subcommittee on
Fine Particle Monitoring

Chair

Dr. Phil Hopke, Clarkson University, Potsdam, NY (Member of CASAC)

Members of CASAC

Dr. John Elston, State of New Jersey, Dept. Of Environmental Protection & Energy, Trenton, NJ (Member of CASAC)

Dr. Warren White, Washington University, St. Louis, MO (Member of CASAC)

Members of Other SAB Committees

Dr. JoAnn Lighty, University of Utah, College of Engineering, Salt Lake City, UT (Member and Liaison from SAB Environmental Engineering Committee)

Dr. Morton Lippmann, Nelson Institute of Environmental Medicine, New York University, Tuxedo, NY (Member of the SAB Executive Committee)

Consultants to CASAC

Dr. Petros Koutrakis, Harvard University, Boston, MA

Dr. Debra Laskin, Environmental & Occupational Health Sciences Institute, Rutgers University, Piscataway, NJ

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

Dr. Kimberly A. Prather, Department of Chemistry, University of California-Riverside, Riverside, CA

Dr. Carl M. Shy, Department of Epidemiology, University of North Carolina at Chapel Hill, School of Public Health, Chapel Hill, NC

Dr. George T. Wolff, General Motors, Public Policy Center, Detroit, MI 48202

Mr. Mel Zeldin, Monitoring and Analysis Division, South Coast Air Quality Management District (SCAQMD), Diamond Bar, CA

Science Advisory Board Staff

Mr. A. Robert Flaak, Designated Federal Officer, US EPA, Science Advisory Board, Washington, DC

Ms. Diana Pozun, Management Assistant, US EPA, Science Advisory Board, Washington, DC

DISTRIBUTION LIST

Administrator
Deputy Administrator
Assistant Administrators
EPA Regional Administrators
EPA Laboratory Directors
EPA Headquarters Library
EPA Regional Libraries
EPA Laboratory Libraries
Library of Congress
National Technical Information Service
Office of Technology Assessment
Congressional Research Service