

September 9, 1997

EPA-SAB-COUNCIL-LTR-97-012

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

RE: Air Quality Models Subcommittee (AQMS) of the Advisory Council on Clean Air Compliance Analysis (ACCACA) ("The Council") Review of the Clean Air Act Amendments (CAAA) of 1990, Section 812 Prospective Study Emissions Modeling and Associated Air Quality Modeling Issues

Dear Ms. Browner:

Pursuant to requirements of the Clean Air Act Amendments (CAAA of 1990, Section 812 (CAAA-1990, Pub. Law 101-549, November 15, 1990, 104 Stat. 2399), the Air Quality Models Subcommittee (AQMS, or "the Subcommittee) of the Advisory Council on Clean Air Compliance Analysis ("the Council") has reviewed the Prospective Study emissions modeling and associated air quality modeling issues. Most recently, the AQMS held a public teleconference on May 5, 1997 in which the Agency staff presented their findings.

In this letter report, the AQMS provides advice to you on several important issues concerning the development of the EPA's Prospective Study. The AQMS believes that the Prospective Study is an important step toward demonstrating the value of EPA regulations. Because of the importance of this effort, we feel it is most important to take special care in the design, development and presentation of the Prospective Study. It is in that spirit that we provide our comments on the Prospective Study. Our general comments are intended to help put our specific suggestions regarding the emissions modeling effort in the context of the overall study. They are also intended to help make the overall assessment more credible and useful to the decision makers and others interested in the assessment of the costs and benefits of regulatory decisions in the future.

## 1. Background

The emissions modeling portions of the Prospective Study, along with background materials on the planned modeling activities, were provided by the Agency for review by the AQMS and the Council. The charge to the AQMS was to review the draft documents pertaining to the emissions modeling assumptions, methodology, results and documentation components of the Clean Air Act (CAA) Section 812 Prospective Study, and provide advice to the Council to transmit to the Administrator regarding the reasonableness, technical merits, and appropriate interpretations of the modeling results. Specifically, the following six questions were asked:

- a) Are the regulatory assumptions and other design features of the Pre-Clean Air Act Amendments (CAAA) and Post-CAAA scenarios reasonable and appropriate, given the purposes of the present study?
- b) Are the input data used to configure the emissions models sufficiently valid and reliable for the intended analytical purpose?
- c) Are the emissions models, and the methodologies they employ, sufficiently valid and reliable for the intended analytical purpose?
- d) If the answers to any of the three questions above is negative, what specific alternative assumptions, data or methodologies does the Council recommend the Agency consider using for the prospective analysis?
- e) If the answers to questions (a), (b), and (c) are positive, are the emissions inventories for the Pre-CAAA and Post-CAAA scenarios developed by this modeling exercise sufficiently valid and reliable for the intended purpose?
- f) If the answer to question (e) is negative, what specific improvements does the Council recommend the Agency consider?

As part of the review, a public teleconference meeting was held on May 5, 1997. Several members provided written materials before and after the teleconference. The discussions were summarized and presented to the Council during its teleconference on May 15, 1997. Some additional written comments were provided by Subcommittee members and consultants (M/C) after that teleconference. The following summarizes the findings and recommendations of the AQMS to date.

## 2. AQMS Findings and Recommendations

The AQMS appreciates the immense amount of effort that has already gone into the development of the Prospective Study. However, in examining the draft documents

available, the AQMS, in general, is concerned over the quality, representativeness and comprehensiveness of the information on the emissions and the air quality modeling as presented. Many of our concerns, which it should be noted are likely to be shared by the broader scientific and assessment community, could be put to rest by providing a very clear up-front summary of the overall Prospective Study. Such a summary needs to explicitly address the study design, the rationale for selecting particular data sets and models and the expected implications for the study results based on the design and these selections. The AQMS realizes that many difficult tradeoffs among levels of effort and levels of resources must be made when doing assessments as complex as the Prospective Study. These tradeoffs and their implications must be clearly and explicitly acknowledged up front in the study in order to insure that the study will be judged and used in the proper context.

With respect to the Prospective Study emissions development effort in particular, the AQMS finds that while the effort brings together many models and data bases and makes many assumptions to produce estimates for current and future emissions, clear justification for many of the steps is yet to be provided. In addition, it appears that the inventories do not adequately take into account the possible impact of the potential new regulations on ozone and particulate matter.

It was the understanding of the Subcommittee in its public teleconference review meeting of May 5, 1997 that the Prospective study, at that time, had not adequately acknowledged other ongoing major assessments in the US. Particularly relevant are the assessment efforts in the Ozone Transport Assessment Group (OTAG) and the National Acid Precipitation Assessment Program (NAPAP) focused on the eastern US and the work that has gone on in the west as part of the Grand Canyon Visibility Transport study. We understand that this issue is being addressed by the Agency, as it was discussed in the Council public teleconference meetings of May 15 and June 30, 1997.

The particulate matter (PM) emission trends provided in the Prospective Study increase regardless of assumptions of growth, while recent PM concentration trends are apparently going down. This important discrepancy still needs to be examined and explained. Subsequent discussions occurred in the Council's public teleconference meetings of May 15 and June 30, 1997, which emphasized the need for the Agency to have clear text discussions on PM trends in the Prospective Study Report to Congress.

These concerns could be addressed by a commentary by the Agency in the emissions section of the draft document that accomplishes the following:

- a) provides the overall emissions study design and rationale for models, data and assumptions;

- b) acknowledges the shortcomings of the current inventory process;
- c) recommends how the entire inventory process could be improved in the future;
- d) comments on the resource limitations; and
- e) outlines how the current study emissions projections should be interpreted given the inventory limitations and uncertainties.

In addition, throughout the document there needs to be the following:

- a) clear acknowledgment of assumptions;
- b) reference to differences in other major scenario development activities in the US; and
- c) an explanation of discrepancies in emissions and observed concentration trends.

Since the CAAA of 1990 has required the Agency to periodically update the study, the AQMS also suggests that an appendix could be provided that outlines how future improvements could be made to this exercise in the following areas, namely how:

- a) an ideal inventory development would be designed;
- b) multiple scenarios could be developed to better reflect the full realm of possible futures; and
- c) an emissions evaluation process could be developed and implemented.

### **3. Modeling Issues**

The AQMS focused on the emissions inventory during our conference call. However, in written comments, it was observed that the models being used in the Prospective Study are not as "state-of-the-art" as they need to be in order to properly address the challenge before us -- to understand the benefits of air pollution control, not only retrospectively but also prospectively, not only in urban areas but also within a regional and national context, not only for primary pollutants but also for secondary species including fine PM. Current major reviews of both source and receptor models should and will be referenced in this regard as the Subcommittee continues with its review of the Prospective Study. In presenting the air quality modeling, as with every other aspect of the Prospective Study, it will be most important to carefully outline the design, rationale for model selection and implications for the overall Prospective Study

results. It will also be important to demonstrate through formal evaluation procedures, to the extent possible, how well the models can be expected to perform in providing the analysis needed for the Prospective Study.

#### **4. Next Steps**

As an important step toward addressing the AQMS issues and suggestions, several action items that need attention by the Agency staff were identified during our May 5, 1997 teleconference, namely:

- a) clearly discuss that the analysis is being made on the best available information at the time of the study;
- b) re-examine the reliability of estimates based on speciation factors;
- c) discuss bio-genic and geo-genic emissions inventories;
- d) discuss the road and non-road emissions and why they change or do not change;
- e) revise the PM<sub>10</sub> presentation by source categories;
- f) investigate and re-write growth assumptions on primary particle emissions for 1990 to 1995;
- g) clarify changes in highway speeds and other assumptions; and
- h) clarify the utility assumptions in the emissions inventory.

During the teleconference with the Council on May 15, we all discussed the need to have a summary of the overall Prospective Study design to assist in further reviews. This material was recently provided by the Agency staff to the Council and the AQMS and is currently being studied.

The AQMS will continue to strongly recommend the addition of clear, concise descriptions of the overall design, rationale for model selection and implications of these choices for the overall study results and usefulness. We believe that these additions will greatly strengthen the study.

We thank the Agency for the opportunity to have participated in this portion of the Prospective Study Report to Congress, and look forward to additional dialogue on this topic.

Sincerely,

/signed/

Dr. Maureen L. Cropper, Chair  
Advisory Council on Clean Air  
Compliance Analysis

/signed/

Dr. Paulette Middleton, Chair  
Air Quality Models Subcommittee,  
Advisory Council on Clean Air  
Compliance Analysis

## **NOTICE**

This letter report has been written as a part 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 a balanced, expert assessment of scientific matters related to problems facing 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, nor of other agencies in the Executive Branch of the federal government, nor does mention of trade names or commercial products constitute a recommendation for use.

## **ABSTRACT (EPA-SAB-COUNCIL-LTR-97-012)**

The Air Quality Models Subcommittee (AQMS) of the Advisory Council on Clean Air Compliance Analysis ("the Council") has reviewed the Agency's Prospective Study emissions estimates, modeling assumptions, methodology, results and documentation components of the Prospective Study. The AQMS is concerned with the quality, representativeness and comprehensiveness of the emissions information and modeling as presented, and observed that the inventories do not adequately take into account the possible impact of the potential new regulations on ozone and particulate matter (PM). The AQMS also recommended that the Agency incorporate the assessment efforts in the Ozone Transport Assessment Group (OTAG) and the National Acid Precipitation Assessment Program (NAPAP).

The AQMS recommends that the Agency provide an explicit rationale for the models, data and assumptions, acknowledge the shortcomings in the current inventory process, and make recommendations how the entire inventory process could be improved in the future. Additionally, the AQMS recommends that the Agency clearly state the assumptions, reference the differences in other major scenario development activities in the US, and explain the discrepancies in emissions and concentration trends.

The AQMS recommended further refinements in the emissions estimates, namely that the Agency re-examine the reliability of estimates based on speciation factors, discuss bio-genic and geo-genic inventories, discuss the road and non-road emissions and why they do or do not change, revise the PM<sub>10</sub> presentation by categories, investigate and re-write growth assumptions on primary particle emissions for 1990 to 1995, clarify changes in highway speeds and other assumptions, and clarify the utility assumptions in the emissions inventory.

Key Words: Air Quality Modeling, Clean Air Act Amendments, Cost-Benefit Analysis, Economic Valuation, Emissions Estimates, Modeling Methodologies



**U.S. ENVIRONMENTAL PROTECTION AGENCY  
SCIENCE ADVISORY BOARD  
AIR QUALITY MODELS SUBCOMMITTEE  
OF THE  
ADVISORY COUNCIL ON CLEAN AIR COMPLIANCE ANALYSIS**

**CHAIR**

**Dr. Paulette Middleton**, Principal, Science & Policy Associates, Inc., Boulder, CO

**MEMBERS AND CONSULTANTS**

**Dr. Phillip Hopke**, Professor, Department of Chemistry, Clarkson University,  
Department of Chemistry, Potsdam, NY

**Dr. Harvey Jeffries**, Professor, Department of Environmental Sciences & Engineering,  
University of North Carolina, School of Public Health, Chapel Hill, NC

**Dr. Timothy V. Larson**, Professor, Environmental Engineering & Science, Department  
of Civil Engineering, University of Washington, Seattle, WA

**Dr. Peter K. Mueller**, Technical Manager, Electric Power Research Institute, Palo Alto,  
CA

**Dr. James H. Price, Jr.**, Senior Scientist, Texas Natural Resource Commission, Austin,  
TX

**Dr. George T. Wolff**, Principal Scientist, Environmental and Energy Staff, General  
Motors, Environmental & Energy Staff, Detroit, MI(Past Chair, Clean Air Scientific  
Advisory Committee & Past Chair of the AQMS)

**SCIENCE ADVISORY BOARD STAFF**

**Dr. K. Jack Kooyoomjian**, Designated Federal Official, Science Advisory Board,  
(1400), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC  
20460

**Mrs. Diana L. Pozun**, Staff Secretary, Science Advisory Board (1400), U.S.  
Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460

## DISTRIBUTION LIST

Administrator

Deputy Administrator

Assistant Administrators

Regional Administrators

Office of the Administrator

Office of Cooperative Environmental Management

Deputy Assistant Administrator for Air and Radiation:

Director, Office of Policy Analysis and Review (OPAR)

Director, Office of Air Quality Planning and Standards (OAQPS)

Deputy Assistant Administrator for Policy, Planning and Evaluation (OPPE):

Director, Office of Policy Analysis (OPA)

Director, Office of Regulatory Management and Evaluation (ORME)

Director, Office of Strategic Planning and Environmental Data (OSPED)

Deputy Assistant Administrator of Research and Development:

Deputy Assistant Administrator for Science - ORD

Deputy Assistant Administrator for Management - ORD

Director, Office of Science Policy

Director, Mega Laboratories and Centers

Director, Research Laboratories

EPA Headquarters Library

EPA Regional Libraries

National Technical Information System (NTIS)

Library of Congress

(F:\USER\JKOOYOOM\AQMSLR8.97)