UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

April 12, 2011

MEMORANDUM

SUBJECT: CASAC Advisory Meeting for PAMS Re-engineering

FROM: Lewis Weinstock ***/Signed/***
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Office of Air Quality Planning and Standards (C304-06)

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

This memorandum requests the Science Advisory Board (SAB) Clean Air Science Advisory Committee's Air Monitoring and Methods Subcommittee (AMMS) to provide advice and ideas on how to improve the Photochemical Assessment Monitoring Station (PAMS) program. This memorandum contains background material and charge questions for review by the AMMS. These materials will be the subjects of an advisory meeting with the AMMS Subcommittee, scheduled for May 16 and 17, 2011. I am requesting that you forward these materials to the AMMS Subcommittee to prepare for the advisory.

This project, entitled *Photochemical Assessment Monitoring Stations (PAMS) – Network Re-engineering*, has been requested by EPA's Office of Air Quality Planning and Standards (OAQPS), within EPA's Office of Air and Radiation. The advisory will cover the various aspects of the PAMS program including network design, measurement methods, and quality assurance. 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 May 16 and 17. Questions regarding the enclosed materials should be directed to Mr. Kevin Cavender, EPA-OAQPS (phone: 919-541-2364; e-mail: cavender.kevin@epa.gov).

Regulatory Background

Section 182 (c)(1) of the 1990 Clean Air Act Amendments (CAAA) required the EPA to promulgate rules for enhanced monitoring to obtain more comprehensive and representative data on ozone air pollution:

"In order to obtain more comprehensive and representative data on ozone air pollution, not later than 18 months after November 15, 1990, the Administrator shall promulgate rules, after notice and public comment, for enhanced monitoring of ozone, oxides of nitrogen, and volatile organic compounds. The rules shall, among other things, cover the location and maintenance of monitors. …"

Section 185(b) of the CAA required EPA to work with the National Academy of Sciences (NAS) to conduct a study on the role of ozone precursors in tropospheric ozone formation and control.

"The Administrator, in conjunction with the National Academy of Sciences, shall conduct a study on the role of ozone precursors in tropospheric ozone formation and control. The study shall examine the roles of NOx and VOC emission reductions, the extent to which NOx reductions may contribute (or be counterproductive) to achievement of attainment in different nonattainment areas, the sensitivity of ozone to the control of NOx, the availability and extent of controls for NOx, the role of biogenic VOC emissions, and the basic information required for air quality models."

In 1992, the NAS finalized the report entitled "Rethinking the Ozone Problem in Urban and Regional Air Pollution" (National Academy of Sciences, 1992). The report found that "Ambient air quality measurements now being performed are inadequate to elucidate the chemistry of atmospheric VOCs or to assess the contributions of different sources to individual concentrations of these compounds." which made several recommendations for improving monitoring for precursors of ozone:

"New measurement strategies that incorporate more accurate and precise measurements of the individual trace compounds involved in ozone chemistry should be developed to advance understanding of the formation of high concentrations of ozone in the United States and to verify estimates of VOC and NOx emissions."

In response to these requirements and the recommendations of the NAS report, On February 12, 1993, the EPA revised the ambient air quality surveillance regulations in Title 40 Part 58 of the Code of Federal Regulations (40 CFR Part 58) to include provisions for enhanced monitoring of ozone (O_3), oxides of nitrogen (NOx), volatile organic compounds (VOCs), selected carbonyl compounds, and monitoring of meteorological parameters. The revisions required States and local monitoring agencies ("monitoring agencies") to establish Photochemical Assessment Monitoring Stations (PAMS) in ozone nonattainment areas classified as serious, severe, or extreme. The chief objective of the enhanced ozone monitoring revisions is to provide an air quality database that will assist air pollution control agencies in evaluating, tracking the progress of, and, if necessary, refining control strategies for attaining the ozone NAAQS. Ambient concentrations of ozone and ozone precursors will be used to make attainment/nonattainment decisions, aid in tracking VOC and NOx emission inventory reductions, better characterize the nature and extent of the ozone problem, and prepare air quality trends. In addition, data from the PAMS provide an improved database for evaluating photochemical model performance, especially for future control strategy mid-course corrections

as part of the continuing air quality management process. The data will be particularly useful to States in ensuring the implementation of the most cost-effective regulatory controls.

Twenty two areas were identified as being subject to PAMS at the time the rules were promulgated. Since then the number of areas subject to PAMS has grown to 25 areas. Each PAMS area was required to install between 2 and 5 PAMS sites depending on the population of the area.[1] Four types of PAMS sites were identified including upwind (Type 1), maximum precursor emission rate (type 2), maximum ozone (type 3), and extreme downwind (type 4) sites. The number and type of sites required was contingent on the population of the PAMS area.

In 2006, the PAMS requirements were revised to lower the minimum requirements for PAMS. The following changes were made to the PAMS requirements:

- The number of required PAMS sites was reduced; only one Type 2 site is required per area regardless of population and Type 4 sites are not required; and only one Type 1 or one Type 3 site is required per area.
- The requirements for speciated VOC measurements were reduced. Speciated VOC measurements are only required at Type 2 sites and one other site (either Type 1 or Type 3) per PAMS area. Carbonyl sampling is only required in areas classified as serious or above for the 8-hour O_3standard.
- Conventional NO_2/NOx monitors are only required at Type 2 sites.
- High sensitivity NOy monitors are required at one site per PAMS area (either Type 1 or Type 3).
- High sensitivity CO monitors are required at Type 2 sites.

The intent of these revisions were to "allow PAMS monitoring to be more customized to local data needs rather than meeting so many specific requirements common to all subject O_3 nonattainment areas; the PAMS changes would also give States the flexibility to reduce the overall size of their PAMS programs—within limits—and to use the associated resources for other types of monitoring they consider more useful" (71 FR 2714).

Documents Associated with Subcommittee's Advisory Meeting:

The purpose of the upcoming CASAC AMMS PAMS Subcommittee meeting is to provide advice and ideas on how to improve the Photochemical Assessment Monitoring Station (PAMS) program. The attached documents summarize the aspects being considered and provide various options under consideration. The Agency requests that the Subcommittee focus on the associated charge questions as part of its review.

Attachment 1: This document is a short white paper that provides added background information for each of the specific charge questions to be answered by the AMMS.

[1] Flexibility was allowed such that some sites were able to serve as more than one PAMS area. For example a site could serve as an extreme downwind site (Type 4) for one area and an upwind site (Type 1) for another.

Charge to the CASAC AMMS - PAMS Review Panel

We ask the CASAC AMMS-PAMS Panel to focus on the charge questions listed below in regard to EPA's Photochemical Assessment Monitoring Station program.

Charge Question 1: How should EPA prioritize the current PAMS objectives? What current objectives, if any, should be deemphasized or eliminated?

Charge Question2: What additional objectives should EPA consider for the PAMS program at this time?

Charge Question 3: What are the advantages and disadvantages of the current design with multiple sites per PAMS area? What changes, if any, should be made in the number and spatial distribution of required sites?

Charge Question 4: Should EPA consider requiring PAMS measurements in areas other than areas classified as serious and above for the ozone NAAQS to improve spatial coverage?

Charge Question 5: Should EPA consider requiring PAMS measurements at a new subset of ozone sites in addition to the traditional PAMS (e.g., maximum concentration sites in all non-attainment areas, all urban NCore sites)?

Charge Question 6: What role, if any, should mobile or temporary sites play in the PAMS program?

Charge Question 7: EPA has received feedback that the PAMS program needs to be as flexible as possible to help states meet specific needs. In consideration of this potential objective, what are the committee's views on the relative merits of revising PAMS to be a very flexible program with relatively few requirements versus a program that is highly specified? If the more flexible model were adopted, what minimum requirements, if any, should be included?

Charge Question 8: Should the current PAMS monitoring season framework be retained or should the period for required measurements be revised (e.g., lengthened or determined on a case-by-case basis) based on analyses of ambient data, meteorology, climatology, or other factors?

Charge Question 9: What criteria should EPA consider when re-evaluating the PAMS target VOC list?

Charge Question 10: Are there specific compounds that EPA should consider adding or subtracting from the target list?

Charge Question 11: What are the advantages and disadvantages of manual canister sampling versus field deployed auto-GCs?

Charge Question 12: Are the new commercially available auto-GCs appropriate for use at PAMS sites? What additional evaluations are necessary to determine the suitability of auto-GC's for use in the PAMS network?

Charge Question 13: What role, if any, should TNMH monitors play in the PAMS program?

Charge Question 14: Should carbonyls be required at all VOC speciation sites?

Charge Question 15: What issues have been addressed, and what issues still need to be addressed with the current TO-11A method for carbonyl sampling?

Charge Question 16: What other methods should be considered as an alternative to the manual TO-11A method for carbonyl sampling?

Charge Question 17: Are direct measurement NO_2 or photolytic NO_2 analyzers suitable for deployment in the PAMS network? What additional evaluations are necessary to determine the suitability for use in the PAMS network?

Charge Question 18: What observational approaches (surface based sondes and optical remote sensing, aircraft platforms, satellites) are best suited to assist such assessments? What routinely collected surface measurements and in what locations would complement vertical profile and total column observations?

Charge Question 19: Is it necessary to collect upper air wind speed and wind direction data at PAMS sites?

Charge Question 20: How should NOAA data be incorporated into the PAMS program?

Charge Question 21: How can PAMS data best be used? What specific data analyses should be conducted?

Charge Question 22: How should any recommended data analyses be implemented? Should these analyses be conducted at the state, regional, or national level?

Charge Question 23: Should more or less of the PAMS funding be allocated to data analysis?