



February 27, 2009

MEMORANDUM

SUBJECT: CASAC Consultation on *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Health Risk and Exposure Assessment* and *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Urban Visibility Impact Assessment*

FROM: Lydia N. Wegman, Director
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TO: Holly Stallworth
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Attached are two planning documents, (1) *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Health Risk and Exposure Assessment* (Health Assessment Plan), and (2) *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Urban Visibility Impact Assessment* (Welfare Assessment Plan), prepared by the Environmental Protection Agency's (EPA) Office of Air Quality Planning and Standards (OAQPS) staff as part of EPA's ongoing review of the primary (health-based) and secondary (welfare-based) national ambient air quality standards (NAAQS) for particulate matter (PM). These plans will be the focus of a consultation by the Clean Air Scientific Advisory Committee (CASAC) PM NAAQS Review Panel (the CASAC PM Panel), scheduled for a public meeting to be held in Chapel Hill, NC, on April 2, 2009. I am requesting that you forward these planning documents to the CASAC PM Panel to prepare for that consultation.

The purpose of the Health Assessment Plan is to outline the scope and approaches that staff is planning or considering to use to conduct a human health risk assessment and an exposure assessment for fine particles and a health risk assessment for thoracic coarse particles. The purpose of the Welfare Assessment Plan is to outline the scope and approaches that staff is planning to use to conduct a quantitative assessment of urban visibility impairment and qualitative assessments of other welfare-related effects. In addition, the plans highlight key issues involved in these assessments. These plans are intended to provide enough specificity to facilitate consultation with CASAC, as well as for public review, in order to obtain advice on the overall scope, approaches, and key issues in advance of the conduct of the risk and exposure

analyses and presentation of results in the first draft Risk and Exposure Assessment (REA). The plans draw upon information presented in *Integrated Science Assessment for Particulate Matter: First External Review Draft* (PM ISA, December 2008) prepared by EPA's National Center for Environmental Assessment, Research Triangle Park, NC (NCEA-RTP). CASAC consultation on these plans coincides with their review of the first draft PM ISA. CASAC and public comments on the plans will be taken into consideration in the development of the first draft REA, the preparation of which will coincide with and draw from the second draft ISA. The second draft REA will draw on the final ISA and will reflect consideration of CASAC and public comments on the first draft REA. The final REA will reflect consideration of CASAC and public comments on the second draft REA.

EPA's overall plan and schedule for this PM NAAQS review was presented in the *Integrated Review for the National Ambient Air Quality Standards for Particulate Matter*, which was the subject of a consultation by the CASAC PM Panel on November 30, 2007 (see http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_pd.html). That plan outlines the Clean Air Act (CAA) requirements related to the establishment and reviews of the NAAQS, the process and schedule for conducting the current PM NAAQS review, and plans for the key components in the NAAQS review process including the ISA, REA, and policy assessment and rulemaking documents. It also lays out key policy-relevant issues to be addressed in this review as a series of policy-relevant questions that frame our approach to determining whether the current primary and secondary NAAQS for PM should be retained or revised. An updated schedule for completing the REA is outlined in the attached plans. Currently, our schedule calls for completion of the PM ISA by December 2009, completion of the REA by July 2010, and proposed and final rules to be issued in 2011.

Documents for Consultation

The following documents are being made available to the CASAC PM Panel in the form of an attached electronic file. The documents are also available from the EPA website at http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_pd.html. Printed copies of this document will be sent to Panel members via Federal Express.

- ◆ Attachment: *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Health Risk and Exposure Assessment* (Health Assessment Plan, February 2009)

Following an introductory section, this document discusses air quality considerations that are relevant to both the planned human health risk and exposure assessments. The next two sections present the planned scope and approach for the health risk assessment and exposure analysis, respectively. Throughout these sections, key issues are discussed and staff's plans for addressing these issues are noted. The final section summarizes the schedule and interim milestones related to these assessments.

- ◆ Attachment: *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Urban Visibility Impact Assessment* (Welfare Assessment Plan, February 2009)

Following an introductory section, two sections of this document discuss the planned scope and approach for assessing visibility impairments in urban areas. The final section summarizes the schedule and interim milestones related to these assessments. Attachment A outlines issues related to planned qualitative assessments of other welfare effects.

Charge to the CASAC PM Review Panel

We ask the CASAC PM Panel to focus on the charge questions listed below in their consultation on these planning documents.

A. Health Assessment Plan

Chapter 1 – Introduction/Overarching Questions

The introductory section presents an overview of the goals and planned approaches for conducting the health risk and exposure assessments.

1. What are the Panel members' views on the general structure and overall design of the planned analyses?
2. Is the plan clear and transparent in its description of the proposed approaches? Are the various assumptions and judgments that must be made in carrying out the planned risk analyses clear and transparent?
3. What are the Panel members' views on the goals identified for the risk and exposure assessments?
4. Given the goals set forth for the planned analyses, has the plan appropriately drawn from the existing scientific and technical information in developing the overall approach? Are there relevant features that should be added or modified in the planned approach?

Chapter 2 - Air Quality Considerations:

1. Do Panel members generally agree with the planned approach for obtaining and analyzing the air quality data that will be used in the risk and assessments?
2. With regard to approaches for simulating air quality that just meets the current or alternative standards under consideration:
 - a. What are the Panel members' views on the planned use of a proportional (i.e., linear) approach to adjusting air quality (proportional rollback)?
 - b. What are the Panel member's views on also considering the alternative rollback approach being considered for PM_{2.5} (model-based rollback)?

3. What are the Panel members' views on the planned approach for estimating and using policy-relevant background concentrations?

Chapter 3 – Scope and Approach for the Health Risk Assessment

1. Regarding selection of health effects endpoints to model in the risk assessment:
 - a. To what extent are the Panel members supportive of EPA's planned approach to focus on selected health effects endpoints (e.g, emergency department visits and hospitalizations for ischemic heart disease) within broader health effect categories (e.g, cardiovascular morbidity) initially classified in the first draft ISA as having a causal or likely-causal association with ambient PM_{2.5}?
 - b. What are the Panel members' views regarding EPA's plans to consider for inclusion additional health effects endpoints (e.g, birth outcomes) for PM_{2.5} that are within broader health effect categories (e.g, reproductive, developmental, prenatal and neonatal outcomes) that have been initially classified in the first draft ISA as having suggestive evidence of a causal association? What are the Panel members' views with respect to addressing the challenges in designing a quantitative risk assessment to appropriately consider birth outcome endpoints?
 - c. Are the Panel members generally supportive of EPA's planned approach to conduct a risk assessment for PM_{10-2.5} considering health effect endpoints within broader health effect categories that have been initially classified in the first draft ISA as having suggestive evidence of a causal association?
2. Regarding specification of concentration-response functions for use in the risk assessment:
 - a. In modeling health impacts associated with short-term ambient PM, to what extent are Panel members supportive of EPA's planned approach to place emphasis on distributed lags, where they are available, with additional lags (e.g., 0, 1 day lags) being included as part of sensitivity analyses, based on consideration of the degree of biological support for these lags?
 - b. What are the Panel members' views on EPA's planned approach to place emphasis on multi-city studies which provide city-specific effect estimates, particularly Empirical Bayes adjusted effect estimates which consider both the regional signal as well as the local (city-specific) signal in deriving adjusted city-specific effect estimates?
 - c. What are the Panel members' views regarding EPA's planned approach to place equal weight on single and multi-pollutant models in recognition of the competing advantages and disadvantages provided by both types of models?

- d. Based on information provided in the first draft ISA regarding potential population thresholds, EPA is planning to place primary emphasis on modeling risk down to policy-relevant background or the lowest reported measured level in the epidemiological studies. In contrast to the prior review, EPA is planning to place less emphasis on consideration of hypothetical population thresholds. What are the Panel members' views on this approach or alternative approaches that could be considered?
3. Regarding selection of urban study areas:
 - a. EPA plans to include 15 to 20 urban study areas in the PM_{2.5} health risk assessment, with areas selected based on application of the criteria presented in the plan. What are the Panel members' views on the planned criteria for selecting urban study areas?
 - b. The scope of the planned assessment for PM_{10-2.5} is much more limited. What are the Panel members' views regarding the overall approach and, specifically, on the criteria for selecting study areas for evaluating the health impacts associated with ambient thoracic coarse particles?
 4. Regarding the approach for addressing uncertainty and variability:
 - a. In the plan, EPA describes an uncertainty analysis approach based on the application of single and multi-element sensitivity analysis. What are the Panel members' views on this planned approach for addressing uncertainty in the risk assessment?
 - b. Do Panel members generally agree that the planned approach sufficiently captures key sources of variability related to PM-related risk? Are there any important sources of variability which are not captured by the proposed risk assessment approach and, if so, what are the Panel members' views regarding how these sources of variability could be incorporated into the analyses?
 5. Regarding analyses being considered to place the urban study area risk results in a broader context with regard to national patterns of risk and risk-related indices:
 - a. EPA is considering conducting a national-scale health impact assessment of the mortality impacts in the U.S. population associated with long-term exposure to ambient PM_{2.5} under recent air quality conditions to support interpretation of the risk estimates generated for the urban study areas. What are the Panel members' views related to including such a national-scale analysis in the risk assessment? What are the Panel members' views regarding the general structure and overall design of this analysis?
 - b. EPA's planned approach also includes analyses to compare the information for the selected urban study areas with national statistics for a set of key PM risk-

related indices (e.g., baseline incidence rates for health effects modeled in the risk assessment, rates of air conditioner use, housing stock). What are the Panel members' views on this planned comparison?

Chapter 4 – Scope and Approach for Population Exposure Analysis

1. What are the Panel members' views on the general structure and overall design of the exposure assessment to provide insight on population exposures with respect to informing the interpretation of available epidemiologic studies?
2. What are the Panel members' views regarding the planned measures of exposure?
3. EPA is planning to focus the exposure assessment on a subset of the urban study areas evaluated in the risk assessment. What are the Panel members' views regarding the selection of these study areas and the planned time periods to be modeled?
4. Regarding the approach for addressing uncertainty and variability, are Panel members generally supportive of the planned approach?

B. Welfare Assessment Plan

Chapter 1 – Introduction

The introductory section presents an overview of the goals and planned approaches for conducting urban visibility assessments.

1. What are the Panel members' views on the general structure and overall design of the planned analyses?
2. Is the plan clear and transparent in its description of the planned approaches? Are the various assumptions and judgments that must be made in carrying out the planned assessments clear and transparent?
3. Given the goals set forth for the planned analyses, has the plan appropriately drawn from the existing scientific and technical information in developing the overall approach? Are there relevant features that should be added or modified in the planned approach?
4. In addition to the sub-daily PM_{2.5} alternative standard considered in the last PM NAAQS review and summarized in this chapter, an alternative standard structure is being considered in this review. This alternative structure would use daylight hourly PM light extinction, which can be measured either by a combination of instruments (nephelometer – PM light scattering and aethalometer – PM light absorption) or calculated from PM speciation and concurrent relative humidity data using a linear algorithm.

- a. What are the Panel members' views regarding this alternative structure and its utility in the context of this PM NAAQS review?
 - b. What are the Panel members' views regarding advantages and disadvantages of this alternate structure compared to the sub-daily PM mass concentration approach?
5. The public's preferences for urban visual air quality (VAQ) levels were assessed in the last review in part by considering results from past western U.S. urban preference studies that used scenes with distant mountain backdrops.
- a. What are the Panel members' views on the usefulness of the planned approach to conduct a focus group study in different regions of the country with different scene types to enhance our understanding of the applicability of this earlier body of work to U.S. urban areas in general?
 - b. What are the Panel members' views regarding the scope and approach envisioned for this effort, given the time available in this review?

Chapter 2 – Assessment of Urban Visibility Conditions

1. Visibility impairment is caused by both PM_{2.5} and PM_{10-2.5}, though the latter is less effective on a per unit concentration basis and there is less available PM_{10-2.5} data available in urban areas with which to conduct an assessment. PM in the atmosphere includes liquid water which contributes to light extinction but is removed when filter samples are desiccated prior to mass and composition analysis.
 - c. What are the Panel members' views regarding to what degree and using what approaches EPA should assess the role of PM_{10-2.5} in urban light extinction?
 - d. What are the Panel members' views regarding the advantages and disadvantages of using direct measurements of ambient PM light extinction (e.g., nephelometer plus aethalometer, or transmissometer) compared to using a linear algorithm that includes particle composition and concurrent relative humidity to calculate (reconstitute) PM light extinction?
 - e. What are the Panel members' views regarding the importance of refining the IMPROVE algorithm so that it is optimized for urban areas in order to estimate PM light extinction for use in this assessment?
2. This plan anticipates using the same approach to estimate policy-relevant background PM levels as in the health risk assessment. What are the Panel members' views on this planned approach and its use in the context of the urban visibility conditions assessment?
3. The planned approach includes consideration of high time resolution PM mass and component concentrations as well as PM light extinction data, together with relative

humidity values, to assess recent air quality as well as air quality simulated to just meet current and alternative standards under consideration. However, such high time resolution data are not broadly available.

- a. What are the Panel members' views on this planned approach or on other approaches or data sources that might be explored?
- b. What are the Panel members' views regarding useful approaches for characterizing the uncertainties associated with the urban visibility conditions assessment?

Chapter 3 – Quantitative Visual Air Quality Impact Assessment

1. EPA plans to conduct public preference studies to supplement the information from past studies concerning VAQ levels that impact public welfare. The planned approach is to conduct an investigative focus group in one location to develop the approach that will then be used in group interviews in four urban areas. The proposed approach would ask participants to view an urban-specific iconic scene and a generic scene in each study location, all selected to be sensitive to changes in PM light extinction using WinHaze superimposed haze levels.
 - a. What are the Panel members' views regarding the appropriateness of EPA's preference study approach and its adequacy to accomplish the goals outlined in the plan?
 - b. What are the Panel members' views with respect to alternative approaches that could be considered in this review to acquire this and/or additional relevant information?
2. EPA is not planning to include monetary valuation study questions (e.g. willingness to pay, conjoint analysis) in the studies conducted for this review.
 - a. What are the Panel members' views regarding the usefulness of adding valuation questions to the proposed four urban-areas group interview surveys and the adequacy of such limited information to inform estimate of the value of improved visibility in the broader nationwide context?
 - b. What are the Panel members' views with respect to possible approaches for estimating monetary values associated with improved visibility that should be considered?

We look forward to discussing these issues with the CASAC PM Panel at our upcoming meeting. Should you have any questions regarding these planning documents, please contact Dr. Karen Martin (919-541-5274; email martin.karen@epa.gov) or Ms. Beth Hassett-Sipple (919 541-4605; email hassett-sipple.beth@epa.gov) regarding the Health Assessment Plan or Ms.

Vicki Sandiford (919-541-2629; email sandiford.vicki@epa.gov) regarding the Welfare Assessment Plan.

Attachments

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