



July 1, 2008

MEMORANDUM

SUBJECT: CASAC Review of the First Draft Risk and Exposure Assessment to Support the Review of the SO₂ Primary National Ambient Air Quality Standards

FROM: Lydia Wegman, Director
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TO: Holly Stallworth
Designated Federal Officer
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Attached is the document, *Risk and Exposure Assessment to Support the Review of the SO₂ Primary National Ambient Air Quality Standards: First Draft* (henceforth referred to as the draft Risk and Exposure Assessment document). This document and its associated Appendices have been 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 national ambient air quality standards (NAAQS) for sulfur dioxide (SO₂). The draft Risk and Exposure Assessment document will be the focus of a review by the Clean Air Scientific Advisory Committee (CASAC) NO_x/SO_x Primary NAAQS Review Panel (the Panel), scheduled for a public meeting to be held in Research Triangle Park, NC on July 30-31, 2008. I am requesting that you forward this memo and the attached electronic file that contains this draft document to the Panel to prepare for that review.

The purpose of the draft Risk and Exposure Assessment document is to convey the approach taken by staff to assess exposures to ambient SO₂ and to characterize associated health risks, as well as to present the results of those assessments. OAQPS staff intends to take into consideration the Panel's advice and public comments in conducting further assessments of SO₂ exposures and risks and in preparing the second draft of the Risk and Exposure Assessment document. As noted in the draft Risk and Exposure Assessment document, the assessment draws upon information presented in the *Integrated Science Assessment for Oxides of Sulfur-Health Criteria (Second External Review Draft)*, which has been prepared by EPA's National Center for Environmental Assessment and which is also undergoing review by the Panel and the public.

Following CASAC and public review, we will produce a second draft Risk and Exposure Assessment document. This second draft document will also be made available for review by the Panel and the public prior to a meeting being scheduled by the SAB Staff Office for December 2008. The final Risk and Exposure Assessment document is

scheduled for completion in January 2009. Completion of this assessment document will be followed by the next phase in the review process, the Agency's policy assessment and rulemaking, which is scheduled to begin with the issuance in the Federal Register of an advance notice of proposed rulemaking (ANPR) by February 2009. The ANPR will present the Agency's policy assessment which will be based on the evaluation of scientific evidence presented in the final Integrated Science Assessment as well as the information presented in the final Risk and Exposure Assessment document. Additional rulemaking steps include issuance of a proposed rule by July 30, 2009, and a final rule by March 2, 2010, consistent with the schedule in the consent decree that governs the completion of this review.

Document for Review

We will send printed copies of the following document to members of the Panel who have not expressed a preference for electronic copies only. In addition, we request that you forward to the Panel the attached electronic file containing this document. This document is also available on the EPA website:

http://www.epa.gov/ttn/naaqs/standards/so2/s_so2_cr_rea.html

- **Attachment:** *Risk and Exposure Assessment to Support the Review of the SO₂ Primary National Ambient Air Quality Standards: First Draft*

The draft Risk and Exposure Assessment document is the focus of the scheduled review with the CASAC Panel, to be guided by the charge questions listed below. Chapter 1 includes information on the background, history, and scope for the assessment. Chapter 2 provides information on human exposures to SO₂. Chapter 3 provides information on at-risk populations. Chapter 4 provides information on key health effects associated with SO₂ exposures. Chapter 5 presents an overview of the goals and approach to assessing exposures and characterizing health risks. Chapter 6 presents the approach and initial results of the air quality analysis, as well as the approach and initial results of the risk characterization that is based on the air quality analysis. Chapter 7 presents the approach and initial results of the exposure assessment as well as the approach and initial results of the risk characterization that is based on the exposure assessment. Chapter 8 includes a brief description of the approach that will be used in a quantitative assessment of risk associated with 5-minute peak SO₂ concentrations. This assessment is not complete and a more detailed description of the methods used and results of this assessment will be included in the second draft of this document. Chapter 9 of this document provides a brief description of the approach that will be used to qualitatively assess the relationship between SO₂ air quality levels at the time key U.S. and Canadian epidemiological studies were conducted and SO₂-related respiratory symptoms, and hospital admissions and emergency department visits for all respiratory causes or asthma. The results of this assessment are not yet complete and will be included in the second draft of this document.

Charge to the CASAC NO_x/SO_x Primary Review Panel

Within each of the main sections of the draft risk and exposure assessment document, we ask the panel to address the following:

Air Quality Information and Analyses (Chapter 6):

1. We have evaluated SO₂ air quality throughout the United States, using all available 5-minute and 1-hour ambient monitoring data for years 1997 through 2007. To what extent are the air quality characterizations and analyses technically sound, clearly communicated, appropriately characterized, and relevant to the review of the primary SO₂ NAAQS?
2. To what extent are the properties of ambient SO₂ appropriately characterized, including ambient levels, spatial and temporal patterns, relationships between various averaging times, and the relationship between ambient SO₂ and human exposure?
3. Twenty locations were selected for detailed analyses, using ambient SO₂ monitoring data for years 2002-2006. What are the views of the panel regarding the appropriateness of these locations, the time period of analysis, and the approach used to select them?
4. In order to simulate just meeting either the current 24-hour or annual standards, staff adjusted SO₂ air quality levels for the years 2002-2006 upwards in all but one location. Ambient monitoring data in North Hampton County PA were above the 24-hour standard in the year 2006 and were therefore adjusted downward. To what extent is the approach taken technically sound, clearly communicated, and appropriately characterized?
5. What are the views of the Panel regarding the adequacy of the assessment of uncertainty and variability?

Exposure Analysis (Chapters 2, 7):

1. To what extent is the assessment, interpretation, and presentation of the initial results of the exposure analysis technically sound, clearly communicated, and appropriately characterized?
2. The draft risk and exposure assessment evaluates exposures in selected locations encompassing a variety of SO₂ emission source types in the state of Missouri; these areas were chosen as an initial case study since 1) air quality measurements indicated numerous exceedances of 5-minute benchmark values, 2) there are multiple stationary source emissions above 1,000 tons per year, and 3) there are numerous ambient monitors measuring 5-minute and 1-hour SO₂ concentrations.

The second draft may also evaluate exposures in the remainder of Missouri and also include areas of Pennsylvania, West Virginia, and other locations with large SO₂ emission sources. What are the views of the panel regarding the appropriateness of these proposed additional locations and on the approach used to select them?

3. Do Panel members have comments on the appropriateness and/or relevance of the populations evaluated in the exposure assessment?
4. To what extent are the approaches taken to model SO₂ emission sources technically sound and clearly communicated?
5. Human exposures were modeled using APEX to simulate the movement of individuals through different microenvironments. Do Panel members have comments on the microenvironments modeled?

Characterization of Health Risks (Chapters 3, 4, 5, 6, 7, 8, 9):

1. What are the views of the Panel on the overall characterization of the health evidence for SO₂? Is this presentation clear and appropriately balanced?
2. The characterization of health risks focuses on potential health benchmark values identified from the experimental SO₂ human exposure literature on lung function with accompanying respiratory symptoms. What are the views of the Panel on using potential health benchmarks from this literature to characterize health risks?
3. Do panel members have comments on the range of potential health effects benchmark values chosen to characterize risks associated with 5-minute SO₂ exposures?
4. To what extent is the assessment, interpretation, and presentation of initial risk characterization results technically sound, clearly communicated, and appropriately characterized?
5. The epidemiology literature will be used to qualitatively characterize SO₂-related health risks for health outcomes such as respiratory symptoms and emergency department visits and hospital admissions for respiratory-related causes. However, staff has judged that it is not appropriate to use the available SO₂ epidemiological studies as the basis for a quantitative risk assessment in this review. Do panel members have comments on this judgment and/or on the rationale presented to support it?

We look forward to discussing these issues with the Panel at our upcoming meeting. Should you have any questions regarding the draft risk and exposure assessment documents, please contact Dr. Karen Martin (919-541-5274; email martin.karen@epa.gov), Dr. Stephen E. Graham (919-541-4344; email

graham.stephen@epa.gov), or Dr. Michael J. Stewart (919-541-7524; email stewart.michael@epa.gov).

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