

This draft report was made available for review by the panel and chartered CASAC at the October 22, 2008
Teleconference.

This Draft does not represent EPA policy.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460**

**OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD**

[Date to be inserted]

The Honorable Stephen L. Johnson
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Subject: Clean Air Scientific Advisory Committee's (CASAC) Peer Review of
Draft Chapter 8 of EPA's *Risk and Exposure Assessment to Support the
Review of the NO₂ Primary National Ambient Air Quality Standard*

Dear Administrator Johnson:

The Clean Air Scientific Advisory Committee (CASAC), augmented by subject-matter-experts to form the CASAC Oxides of Nitrogen Primary National Ambient Air Quality Standards (NAAQS) Review Panel (hereafter referred to as the panel, roster provided in Enclosure A) held a public teleconference on October 22, 2008 to review draft chapter 8 of EPA's *Risk and Exposure Assessment (REA) to Support the Review of the NO₂ Primary National Ambient Air Quality Standard*. Chapter 8 is entitled "Exposure Assessment and Health Risk Characterization."

Chapter 8 is critical because it provides a characterization of health risk from NO₂ exposure based on the estimated number of exceedances obtained from a comprehensive personal exposure model for asthmatics in Atlanta. The CASAC panel was generally impressed with the careful work done over a short time with available tools and resources, but it has concerns about the implications of certain model inputs and assumptions. The panel asks for changes in two main areas, specifically in the interpretive presentation and in characterization of potential biases. The CASAC plans to review the completed REA at its December 5, 2008 public teleconference and will provide recommendations for EPA's consideration in developing the Advance Notice of Proposed Rulemaking for NO_x during and immediately after that teleconference.

EPA requested CASAC comments on four charge questions related to its exposure assessment and health risk characterization of the draft chapter 8 provided for review. The charge questions and responses follow immediately below.

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1. *To what extent is the assessment, interpretation, and presentation of the results of the exposure analysis technically sound, clearly communicated, and appropriately characterized?*

Staff have produced a solid application of the APEX model. While recognizing that there have been significant improvements since the first draft of the REA and the update at the September CASAC meeting, the panel has concerns about the application of AERMOD. There are many factors that influence the AERMOD predictions and the panel is concerned that the overall uncertainty is not appropriately characterized. In particular, the tails of the exposure distribution could be strongly biased, notably with respect to on-road and near-road exposures. These exposures are particularly important since they are the major contributors to the benchmark exceedances. On-road exposures may be biased high because receptors are in the middle of the road; the exhaust is not diluted much; and observed data suggest that the on-road vs. background ratios are much more narrowly distributed than the AERMOD predictions. Near-road exposures may similarly be affected by biases in the on-road estimates. In addition, near-road exposures may not be appropriately weighted to the Atlanta population because a greater proportion of residents may live closer to major roads than is represented by the locations of model receptors (census block centroids).

2. *The draft risk and exposure assessment document evaluates exposures in Atlanta. What are the views of the Panel on the approach taken and on the interpretation of the results of this analysis?*

Three aspects of the focus on Atlanta should be addressed more carefully. First, the selection of Atlanta should be reviewed from the perspective of its ability to provide an adequate representation of exposures for assessing national air quality standards. What are typical features of the population behaviors and residential patterns that suggest similarities and differences from other major cities, particularly with respect to anticipated high-end exposures to NO₂? Second, is the model applied to Atlanta reasonably reflecting the local population? In particular, in assigning model receptors to census tract centroids, is the model systematically missing the fraction of the population who live closest to roads and are consequently regularly exposed to high near-road exposures? There could be a much higher fraction of the Atlanta population that live within 50 meters of a major roadway than the 1% that is represented by the census tract centroids. We encourage EPA to seek an independent estimate of this important quantity. Finally, the application of AERMOD to Atlanta suggests a significant potential to predict concentrations that are biased high at the high end of the distribution. This tendency should be more thoroughly discussed, along with likely ramifications.

3. *What are the views of the Panel regarding the adequacy of the assessment of uncertainty and variability with respect to characterization of exposures and health risks associated with those exposures?*

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A fair analysis of uncertainty is an essential component of a thorough exposure and risk assessment. The panel is concerned that there is the potential for much more bias and uncertainty in the results than has been characterized in the uncertainty and variability assessment. In addition, previous suggestions made by individual panel members on this topic have not been explicitly addressed; this should be remedied in the final version. Most notably, the on-road and near-road exposures are important determinants of the number of exceedances of specified concentration levels experienced by the population. More thorough characterization of the assumptions and model features that most strongly influence the estimated number of exceedances is needed. In addition to on- and near- road characterization, and location of receptors, assumptions about penetration into various microenvironments, particularly transit, should be discussed. The implications of the significant biases discussed in the application of AERMOD need to be discussed in this section. Value-laden statements in Section 8.4.8 about the acceptability of AERMOD over-predictions should be relocated to Section 8.10 and discussed in the context of variability and uncertainty.

4. *To what extent is the assessment, interpretation, and presentation of health risk characterization included in Chapter 8 technically sound, clearly communicated, and appropriately characterized?*

The overall presentation of the chapter needs to be improved in order to help readers to understand the broad framework of the modeling and to give a context for the health risk characterization. In addition to expanding the overview section, several figures and tables should be added to show the relationships among the various models and to summarize the data inputs. A concluding section should be added that summarizes the primary results and implications from the large number of models and analyses presented in the chapter.

In closing, the panel noted the substantial progress in the development of this chapter of the *Risk and Exposure Assessment*. We look forward to reviewing the final version of the entire document later this year.

Sincerely,

Dr. Jonathan M. Samet, Chair
Clean Air Scientific Advisory Committee

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NOTICE

This report has been written as part of the activities of the EPA's Clean Air Scientific Advisory Committee (CASAC), a Federal advisory committee independently chartered to provide extramural scientific information and advice to the Administrator and other officials of the EPA. The CASAC provides balanced, expert assessment of scientific matters related to issues and 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 EPA, nor of other agencies within the Executive Branch of the Federal government. In addition, any mention of trade names or commercial products does not constitute a recommendation for use. CASAC reports are posted on the EPA Web site at: <http://www.epa.gov/casac>.

Enclosure A
U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee
Oxides of Nitrogen Primary NAAQS Review Panel

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