



**U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee (CASAC)
NO_x & SO_x Secondary NAAQS Review Panel**

Public Meeting: April 2-3, 2008

Marriott at Research Triangle Park, 4700 Guardian Drive, Durham, NC, 27703

Purpose: To conduct a peer review of EPA's Integrated Science Assessment (ISA) for Oxides of Nitrogen and Sulfur--Environmental Criteria (First External Review Draft) (EPA/600/R-07/145, December 2007) and a consultation on the EPA's draft Scope and Methods Plan for Risk/Exposure Assessment: Secondary NAAQS Review for Oxides of Nitrogen and Oxides of Sulfur (March 2008 Draft).

Wednesday, 2 April 2008

8:30 a.m.	Welcome	Ms. Kyndall Barry, EPA SAB Staff Office, Designated Federal Officer Dr. Anthony Maciorowski, Deputy Director, EPA SAB Staff Office
8:40 a.m.	Introduction of Members, Review Agenda	Dr. Ted Russell, Chair
8:50 a.m.	Background and History of the NAAQS	Dr. Ila Cote EPA's National Center for Environmental Assessment Ms. Lydia Wegman Dr. Karen Martin EPA's Office of Air Quality Planning and Standards
9:05 a.m.	Highlights of Draft ISA and Agency Charge Questions (Attachment A)	Dr. Jeffrey R. Arnold Dr. Tara Greaver Dr. Paul F. Wagner EPA's National Center for Environmental Assessment
9:35 a.m.	Public Comment Period	To be announced
9:45 a.m.	Response to Charge Questions 1 – 3	<u>Dr. Praveen Amar</u> Dr. Rudolf Husar Dr. Naresh Kumar Dr. Donna Kenski Dr. David Shaw
11:00 a.m.	Break	

11:15 a.m.	Response to Charge Questions 4 – 6	<u>Dr. Dale Johnson (by phone)</u> Dr. Kathleen Weathers
12:15 p.m.	Lunch	
1:30 p.m.	Charge Questions 7 – 9	<u>Dr. Ellis Cowling</u> Dr. Andrzej Bytnerowicz
3:00 p.m.	Break	
3:15 p.m.	Response to Charge Question 10	<u>Dr. Paul Hanson</u> Dr. Myron Mitchell
3:45 p.m.	Response to Charge Questions 11 – 12	<u>Dr. Douglas Crawford-Brown</u> Ms. Lauraine Chestnut Mr. Rich Poirot
4:45 p.m.	Summary of Major Review Comments	Dr. Ted Russell
5:30 p.m.	Adjourn Meeting	Ms. Kyndall Barry

Thursday, 3 April 2008

8:30 a.m.	Reconvene the Panel Meeting	Ms. Kyndall Barry
8:35 a.m.	Public Comment Period	To be announced
8:50 a.m.	Discussion of Draft Responses to ISA Charge Questions	Dr. Russell and Panel
10:15 a.m.	Break	
10:30 a.m.	Highlights of the Draft Scope and Methods Document and Agency Charge Questions (Attachment B)	Dr. Dave Guinnup Dr. Anne Rea EPA's Office of Air Quality Planning and Standards
11:00 a.m.	Response to Charge Questions 1 – 2	<u>Dr. Douglas Crawford-Brown</u> Dr. Paul Hanson Dr. Rudolf Husar Dr. Naresh Kumar
11:30 p.m.	Response to Charge Questions 3 – 7	<u>Dr. Ellis Cowling</u> Dr. Myron Mitchell Dr. David Shaw
12:15 p.m.	Lunch	
1:00 p.m.	Charge Questions 3 – 7 continued	
1:30 p.m.	Response to Charge Questions 8 – 10	<u>Mr. Rich Poirot</u> Dr. Andrzej Bytnerowicz Dr. Dale Johnson (by phone) Dr. Kathleen Weathers

2:30 p.m. Response to Charge Question 11

Dr. Donna Kenski
Dr. Praveen Amar
Ms. Lauraine Chestnut

3:00 p.m. Summary and Next Steps

Dr. Ted Russell

3:30 p.m. Adjournment

Ms. Kyndall Barry

Attachment A: Agency ISA Charge Questions

1. To what extent is the evidence on atmospheric chemistry and physics, air quality, and deposition and exposure sufficiently and correctly described, clearly communicated, and relevant to the review of the secondary NAAQS for NO₂ and SO₂?
2. How well characterized are the relevant properties of the ambient air concentrations and deposition of NO_x and SO_x, including policy-relevant background concentrations, spatial and temporal patterns, and the relationships between ambient air concentrations and ecological exposures?
3. How sufficient is the information on atmospheric sciences and exposures for the purposes of evaluating and interpreting the ecological effects presented in Chapter 4 of the draft ISA?
4. How well are the major effects of NO_x and SO_x on ecological acidification identified and characterized? To what extent do the discussions and integration of evidence across scales (e.g. species, communities, ecosystems, and regions) correctly represent and clearly communicate the state of the science?
5. How well has the ISA characterized the relationship between acidifying deposition levels of NO_x and SO_x and environmental effects?
6. How well characterized is the relative importance of the oxidized and the reduced forms of nitrogen on ecosystem acidification?
7. How well are the major effects of NO_x as it contributes to nitrogen enrichment of the ecosystems appropriately identified and characterized? To what extent do the discussions and integration of evidence across scales (e.g. various species, communities, ecosystems, and regions) correctly represent and clearly communicate the state of the science?
8. How well characterized are the relationships between ambient atmospheric nitrogen concentrations, nitrogen deposition and total nitrogen loads, and environmental effects?
9. To what extent has the draft ISA adequately characterized the contribution of oxidized and reduced forms of nitrogen to ecological effects related to nutrient enrichment?
10. Several additional effects are discussed, including mercury methylation, direct gas-phase effects on foliage, and N₂O as a greenhouse gas. How well does the draft ISA characterize the evidence on these topics?
11. What are the views of the Panel on the appropriateness and comprehensiveness of the conclusions drawn in Chapter 5?
12. How adequate is the draft ISA for providing information and guidance to future exposure, risk and policy assessments that may be prepared in support of this NAAQS review?

Attachment B: Agency Scope & Methods Plan Charge Questions

1. In outlining the scope of this risk/exposure assessment, we have created a flow diagram that represents how nitrogen and sulfur compounds move from 'source to dose' in the environment (see Figure 2-1). How adequately does this conceptual model for evaluating risks due to deposition-related ecological effects characterize what should be covered in the scope of this assessment?
2. The main ecosystem effects areas we anticipate evaluating in this risk/exposure assessment are (1) risks to terrestrial ecosystems from nitrogen enrichment effects, (2) risks to aquatic ecosystems from nitrogen enrichment effects (eutrophication), (3) risks to terrestrial ecosystems from acidification effects (nitrogen and sulfur), and (4) risks to aquatic ecosystems from acidification effects (nitrogen and sulfur). We also plan to qualitatively discuss the role of sulfur enrichment on methylmercury production and the role of nitrous oxide in climate change. What key effects areas, if any, have been overlooked by this approach? Should the assessment plan be modified to include other effects?
3. Due to the complexity of conducting a nationwide risk/exposure assessment for welfare effects due to NO_x and SO_x, we have outlined a strategy designed to identify sensitive ecosystems and a range of harmful/adverse effects (see Figure 3-1). The seven steps are to (1) identify documented biological, chemical and ecological effects and potential ecosystem services, (2) define sensitive areas using GIS mapping, (3) select risk/exposure case study assessment areas, (4) evaluate current loads and effects in case study assessment areas, (5) scale up the case study assessment areas to larger sensitive areas where feasible, (6) assess current ecological conditions in those areas, and (7) assess alternative levels of protection under different ambient scenarios. Does the Panel agree with this general approach? Should it be improved or modified?
4. In the seven-step approach to the current conditions risk/exposure assessment, Step 1 (Section 3.1) describes an approach to identify the documented effects, biological, chemical and ecological indicators, and potential ecosystem services related to acidification and nutrient enrichment. Does the Panel agree with this approach or can they suggest alternative approaches we should consider?
5. In the seven-step approach to the current conditions risk/exposure assessment, Step 2 (Section 3.2) outlines a path to define areas sensitive to total reactive nitrogen and sulfur inputs. Do the Panel members agree with this approach or are there better alternatives that should be considered?
 - a. We are attempting to characterize the risks to ecosystems from sulfur and nitrogen deposition nationwide by clustering sensitive ecosystems where possible and by using the linkages between these areas at different scales. Please comment on the adequacy of this approach.
 - b. How appropriate are the datasets and GIS maps listed in Table 3-4 for identifying ecosystems sensitive to nitrogen and sulfur and/or are there others that have been overlooked?
6. In the seven-step approach to the current conditions risk/exposure assessment, Step 3 (Section 3.3) outlines a path to identifying risk/exposure case study assessment areas.
 - a. Table 3-5 provides an initial list of indicators, mapping layers and multimedia models that may be used to assess ecosystem risk and exposure. Please comment on the appropriateness of these and suggest alternatives that may be better suited for this analysis.
 - b. Please comment on the list of potential case study assessment areas in Table 3-6 and Table 3-7 and make recommendations or suggest any alternatives.

7. In the seven-step approach to the current conditions risk/exposure assessment, Step 4 (Section 3.4) outlines a path to assess current nitrogen and sulfur loads and their effects on case study assessment areas. Does the Panel agree with how we have described our approach to identifying datasets, gaps, and uncertainties?
 - a. We have initially identified the primary chemical indicator that is most suitable for assessing ecosystem acidification effects as acid neutralizing capacity (ANC), with alternatives depending on data availability (see section 3.4.1 and Appendix B). Does the Panel agree with this selection, or can they suggest alternative/additional key indicators?
 - b. We have described the models being considered for this analysis (see section 3.4.2 and Appendix C). Does the Panel agree with the choice of these models, and can they help prioritize them for modeling the responses of the indicators recommended in Step 1 (Section 3.1)?
8. In the seven-step approach to the current conditions risk/exposure assessment, Step 5 (Section 3.5) discusses how to scale up case study areas to more spatially extensive sensitive areas, where appropriate. Does the Panel agree with this approach or can they suggest alternatives?
9. In the seven-step approach to the current conditions risk/exposure assessment, Step 6 (Section 3.6) outlines a path to assess the current conditions of sensitive ecosystems. How well does the Panel agree with the approach outlined for calculating response curves and utilizing mapping and ecosystem services to characterize current conditions or can the Panel recommend alternative approaches?
 - a. How well does the Panel agree with using ecosystem services to provide a common metric for comparing ecological risks due to nitrogen and sulfur deposition effects?
 - b. How well does the Panel agree with collecting current valuation studies to understand the value of bundled ecosystem services? Can the Panel recommend additional or alternative approaches?
10. In the seven-step approach to the current conditions risk/exposure assessment, Step 7 (Section 3.7) describes an approach to assess degrees of protection/levels of effects under alternative forms and levels of ambient NO_x and SO_x standards. This approach attempts to describe how the methods, models, and results of the current conditions risk/exposure assessment can inform our evaluation of the appropriate form(s) and level(s) of a national standard. How well does the Panel agree with the approach outlined in this section, the issues presented, and the 9 steps outlined to assess potential forms and levels of the standard? Please suggest any additional or alternative steps we should take into consideration.
11. Additional ecological/welfare effects due to NO_x and SO_x emissions that we do not currently anticipate evaluating in detail in this review include the following:
 - Nitrogen saturation,
 - Maple decline,
 - Ammonia air deposition and toxicity to native mussels,
 - Relationships between acidity/nutrient enrichment and mercury methylation,
 - Sensitive areas for acidity/nutrient enrichment impacts, identified from biogeochemical characteristics, and
 - Climate change effects due to N₂O.

Does the Panel agree that these represent lower priority effects for the current assessment? If not, what does the Panel recommend?