



Charge Questions for the
NO_x & SO_x NAAQS
Scope & Methods Plan

April 3, 2008

Office of Air and Radiation
Office of Air Quality Planning and
Standards



Charge Questions

Overall Approach

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?



Charge Questions

Overall Approach

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?



Charge Questions

Ecological Effects Characterization

- 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



Charge Questions

Ecological Effects Characterization

- 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?



Charge Questions

Ecological Effects Characterization

- 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?
- 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.
 - 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?

Charge Questions

Ecological Effects Characterization

- 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.
 - 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.
 - 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.



Charge Questions

Ecological Effects Characterization

- 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?
- 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?
 - 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)?



Charge Questions

Ecological Effects Characterization

- 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?



Charge Questions

Ecological Effects Characterization

- 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?
- 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?
 - 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?



Charge Questions

Ecological Effects Characterization

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.



Charge Questions

Additional Effects:

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?