Preliminary Comments on the Integrated Science Assessment (2nd External Review Draft) from Dr. Donna Kenski

Comments on ISA for NOX, SOX, and PM
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Charge: *(a) comment on whether the revised Executive Summary and Integrated Synthesis convey the main findings of the ISA; (b) comment on how effectively the revisions to the ISA reflect the recommendations and comments received from CASAC and public comments; (c) identify any additional revisions to the ISA that will substantively strengthen the identification, evaluation, and communication of the main scientific findings.*

Executive Summary and Chapter 1.2, Integrated Synthesis and Connections, Concepts, and Changes: In general, this is another great job by EPA staff tackling a tremendously complex subject. The Executive Summary and Integrated Synthesis are generally accurate and concise condensations of the much more comprehensive Appendixes. I especially appreciate the addition of Sec. 1.13 summarizing key uncertainties—it is helpful to have this discussion pulling together the varied aspects of uncertainty in one place.

The 'Connections, Concepts, and Changes' is a useful addition, since the scope of this ISA is so broad. It serves as a nice review of the basics, as well as an introduction for readers who may not be well versed in every aspect of deposition science. All efforts to bring order to this very complex topic and convey a sense of the bigger picture that arises from the multiplicity of N/S/PM deposition effects are much appreciated. Toward that end, Figure ES-2, ES-3, and 1-4 are excellent visual summaries.

The inclusion and discussion around NHx have improved since previous reviews, but sometimes its treatment is still spotty. For example, on page 3, the top bulleted list should have a bullet for reduced nitrogen and the text should specifically mention NHx (like on p. lxvi, lines 7-8). The third bullet in this list (PM) should elaborate a little more, in parallel with the previous 2 bullets, to call out the components of PM.

Section 1.2.2.6 is titled Scientific Advancements of the Aquatic Acidification Index (AAI). It is a nice summary of the AAI and its history, but doesn't describe any new application or advancement of AAI since the 2011 PA. I suggest retitling the section 'Aquatic Acidification Index'.

Appendix 2: Thanks for the careful attention and responsiveness to our comments on the last draft ISA. I found the revised discussion of the monitoring network strengths and weaknesses for estimating deposition much improved. Similarly, the additional information on transference ratios, bidirectional exchange of NHx, and model uncertainty adds valuable and relevant detail that was previously lacking. Figures 2-18, 2-26, and 2-32 (2001 county-level emissions) are hopelessly outdated and apparently there just as placeholders for more current data. Please replace with gridded emissions, not county-level, as the variation in county size makes meaningful spatial comparisons next to impossible. With those

exceptions, the maps are great and having emissions, concentration, and deposition closer together makes the spatial connections easier to see.

Chapter 1.3: Emissions and Atmospheric Chemistry: This chapter was a model of brevity, given that it condenses 130 pages of Appendix 2 into 6. I am tempted to ask for more information to be included here on transference ratios and modeling methodology and uncertainty, but probably the document as a whole is better served by keeping this summary short. One minor revision is needed: Section 1.3.2, paragraph 2 (p. 29 lines 4-6) says that "unmeasured component species of NOy and concentrations of all NOy species in data-sparse regions must be provided by regional models in conjunction with satellite data." So far, NO2 is the only component species detected by satellites, and the only one described in Appendix 2.4.2. This paragraph should be reworded to be more precise about the abilities of satellite data to detect NO2 vs. NOY and more accurately convey the information from App. 2.4.2.

Chapter 1.10: Ecological Effects of Particulate Matter other than N and S Deposition: I concur with the addition of the 'likely causal' statement that was added to this section. The studies cited and summarized in Appendix 15 provide sufficient evidence to support this determination.

Chapter 1.13 Key Scientific Uncertainties: Thanks for adding this section and also Sec. 2.2.3 on Emissions Evaluation and Uncertainty. I found it quite helpful to have this information gathered together in one place. It highlights the varying quality and quantity of uncertainty information in different disciplines. In Section 1.13.1.1, please note that activity estimates are also a large source of uncertainty in mobile source emissions.

Minor comments, typos:

What are the weird little dots after some words in the Executive Summary (p. lxiii, line 2 and footnotes, for example, but many other places as well)?

p.13, lines 2-7: the Nilsson-Grennfelt definition of CL was defined in the previous paragraph, doesn't need to be repeated here. It is also repeated on p. 15, lines 30-31; probably not needed here either.

p. 15, line 9: values -> value

p. 17, line 1: is it -> it is

p. 18, line 19: DON and DIN have not been previously defined

p. 20, line 34: delete 'in'

p. 22, first subheading in Table, phototoxic -> phytotoxic

p. 28, line 28: the network is typically abbreviated AMoN, not AmoN. Also, it should appear in the list of abbreviations but does not.

p. 103, line 32: delete 'for'

p. 103, line 35: delete second 'of'

p. 104, line 11: 'cloud top pressure' or 'cloud height' would be better than 'cloud pressure'

p. 2-34, line 13: should this be 'direct measurements of NOy' ?

pp. 2-77, 2-78, 2-84, 2-85, 2-90, figure captions: Clear -> Clean

p. 2-56, line 23: add a period after NHx

p. 2-104, line 20: Add 'background concentrations' after 'Estimated PM2.5'

p. 2-104, line 34: Adjoint