SOx ISA- 2nd Draft Comments -- Dr. Lianne Sheppard – 8-11-08

Overall assessment: This document is much improved from the previous version. Generally it flows better and more closely attains its goal of presenting an integrated science assessment of SO2 and its effect on health.

Charge question 1: The Chapter 1 framework is reasonable for this document, but is still a work in progress with respect to the cross-document goal of providing a structural foundation for all ISAs.

Charge question 2: Chapter 2 is better. Some retooling is needed however. I want this chapter to cover exposure in the context of understanding human exposure, and progress has been made since the last draft. I need better understanding of what is happening in the atmosphere, when and where ambient concentrations are high, and how these relate to human exposure (where most individuals are indoors).

- I suggest reorganizing the environmental concentrations section (2.4) around a few framing questions that target understanding SO2 concentration. Sections 2.4.3 and 2.4.4 need better focus. I think Section 2.4.3 should discuss the proximity of monitors to sources and the effect of this siting on measured concentration. Another important concept in monitor location is the idea of "geographic" vs. "design" space. Section 2.4.4 should summarize the levels and the variation of SO2, both across the U.S. and within local areas. While there is better characterization of the spatial distribution of SO2 monitors, the discussion is still lacking in the sense that there is no stratification of analyses by siting criteria, e.g. scale of monitors. This is an important feature to take into account in the interpretation of epidemiological studies. What fraction of monitors in each area falls in these categories? How many areas with SO2 monitors lack any neighborhood or community scale monitors? How does siting affect the results reported, e.g. the monitor to monitor correlations in Table 2-5?
- Section 2.5 is a good addition and a good effort was made in 2.5.4 to discuss important features of exposure assessment for epidemiological studies. The availability of neighborhood scale monitors should be brought into this discussion, as well as the reactivity of SO2.

Charge question 3: Chapter 3 is much more readable and well organized. Echoing the discussion, clarification of the meaning of the term "peak exposures" is needed.

Charge question 4: There are 3 parts to this chapter: the concentration-response, the vulnerable and susceptible populations, and the public health risks. The revision to the concentration-response modeling discussion is reasonable. Discussion of vulnerable and susceptible groups is reasonable, but could possibly still benefit from a catalogue (e.g. in a table) of all potential vulnerabilities and susceptibilities that warrant consideration. Some refinement of the text is needed to ensure consistency in use of the terms throughout the section. The public health impacts section appears to be incomplete. While the gradation of responses and the prevalence of respiratory disorders tables are useful, these are not linked to provide any inference about degree of public health importance of high enough exposures in the population. It would also be useful to see estimates of the size (and percentage) of the vulnerable population based on proximity to SO2 sources.

Charge question 5: There is good integration in Chapter 5.

Specific comments:

- 2-9 lines 10-17: Note the monitoring objectives in choosing where to site individual monitors. This information must be integrated into analyses in the ISA and REA.
- 2.4.2: Another important concept in monitor location is the idea of "geographic" vs. "design" space. Geographic space is covered reasonably in this section. Design space addresses how the monitoring sites vary with respect to important covariates such as proximity to sources (e.g. power plants, ports, roads).
- 2-11 l 9-11: Say why this focus on co-location is important. This fact is not used later in the document. (In the presentation it was noted the limitations in evaluating correlations between pollutants.)
- P 2-14 l 1-3, 2-18 l 1-7: There should be supporting information regarding the reduction in SO2 over time. The REA suggests some part of these trends is due to changing composition of the monitoring network.
- Figure 2-10: Change the display to show a smooth surface and overlay points for the sites.
- Section 2.4.4: What should the main points of this section be? I suggest it is describing how SO2 varies, and when and where are the large concentrations. The "where" should include design space, not just geographic space. I don't understand the focus on inside vs. outside CMSAs in this section.
- P 2-21 line 7: Why "hence"?
- P 2-21 l 10: "diel"? Doesn't this figure display hourly average SO2?
- Table 2-3: Include additional statistics in this table, particularly if it is to be advertised that this is summarizing the distribution of concentrations. The quantities in this table need better labeling.
- Table 2-4: Include units for the data.
- P 2-22 l 4: Insert "of the daily 1-hour" before "maximum".
- P 2-24 line 5+: The analysis starting on this line needs revision. The presentation does not lead to deeper understanding. Revise the analyses to allow a unified understanding. The apparent differences between locations may be a function of the data rather than the areas. For instance, the distinction between the LA and Riverside results suggest to me the analysis is reflecting a feature of monitors in relation to power plants in LA and not SO2. LA has a predominant wind direction in some seasons. If monitors aren't all downwind, this could have large implications for the cross-city comparisons. Also, is the SO2 vs SO4 scatterplot restricted to co-located monitors?
- Table 2-5: Stratify by siting criteria and concentration. For instance, what are the ranges of correlations for monitor pairs where both are near sources, not near sources, or there is one of each. Do these ranges change if there is additional stratification by annual mean concentration?
- 2-26 l 10: Why is it important to highlight monitors that report both all 12 5-minute values in an hour and the hourly maximum since the hourly maximum is easily calculated from all 12 5-minute values. This strikes me as a QC issue rather than a scientific one.

- Figures 2-12 through 2-16: Include number of monitors at the bottom of figures a and b.
- 2-39 l 20-22: What is the purpose of this statement? In what contexts does it hold?
- 2-41 last paragraph: Much of this discussion is about exposure simulation which isn't really relevant to exposure assessment in the context of epidemiological studies.
- 2-42 5-6: In the context of epidemiological studies, it is not the fact of spatial variability alone, but spatial variability of ambient SO2 concentration data as they relate to human exposure that is important. This aspect of spatial variability, specifically addressing how spatial variability of the data affects human exposure as assessed in epidemiological studies, has not been covered.
- 2-47 5 and tables: Present units when presenting a slope.
- 2-48, 2-50: I appreciate these footnotes. Add the names of the correlations defined in formulas in the footnotes, e.g., "Longitudinal:"
- 2-50 10: I suggest dropping "and long-term cohort epidemiologic studies" since the relevant pairing in the correlation calculation is different.
- 2-50 15: Replace "it" with specific wording, e.g. "the type of correlation calculation".
- 2-51 25, 26: Statistical significance aside, does it make sense that these correlations are negative? Please add a comment. Also, here and in other parts of the chapter, reword where possible to reduce the focus on statistical significance.
- 2-54 8-9 and rest of page: Here is a place where an analysis of monitor siting could be brought in to show which monitors more likely reflect the regional nature of SO2 and which don't (by virtue of their siting near sources). The huge variation in correlations in Table 2-5 (note correct table number) suggests that unstratified summarization of the range of correlations is inadequate.
- 2-56 9: I suggest replacing "time series" with "acute effect" or just dropping the words. Line 12: Note: there are panel studies that use measured personal exposure. This is the design where it is feasible to include personal exposure data.
- 2-56 20: Replace "cause error" with "affect".
- 2-56 2.5.4.3: Say these studies focus on spatial variation in concentration.
- 2-57 12: The wording seems to imply that ambient attenuation does not affect the parameter estimate, which is misleading.
- 3-23 Figure 3-5: Schildcrout et al looks at asthma symptoms, not prevalence of cough
- 3-41: There is a caveat in Sheppard et al (1999) about the meaning of the SO2 results because the monitor is sited next to a cement plant. I'm sure monitor siting plays into the results of many of the studies summarized in this table. Anything that can be done to provide insight into this issue will be helpful.
- 3-112 l 19: the wording "chosen carefully for epidemiological purposes" is not terribly informative.
- 4-10 line 10: People living near roadways are vulnerable, not sensitive, according to the definition at the top of the page.
- 5-9 line 17: Add (unaccounted or not acknowledged) siting of monitors as a source of uncertainty.