Preliminary Comments on the ISA from Dr. James Boylan

Chapter #2 - Atmospheric Chemistry and Ambient Concentrations of Sulfur Dioxide and other Sulfur Oxides

Please comment on the extent to which these revisions improve the characterization of sources, chemistry, and concentrations of ambient sulfur oxides and hence provide a scientific foundation for subsequent technical and policy analyses during the review of the SO_2 NAAQS.

The revisions to Chapter 2 have significantly improved the discussions on the characterization of sources, chemistry, and concentrations of ambient sulfur oxides.

Section 2.2 – Anthropogenic and Natural Sources of Sulfur Dioxide

This section does a good job of describing the main anthropogenic and natural sources of SO_2 emissions. Figure 2-5 should be updated to include 2102-2015 or 2012-2016 emissions by sector.

Section 2.5 – Environmental Concentrations

Table 2-6 includes "5-min hourly max" and "1-h avg" for 2013, 2014, and 2015. In the second to last column, the 2013 "1-h avg" Max (2,071.0 ppb) is greater than the 2013 "5-min hourly max" Max (1,441.4 ppb) and the 2015 "1-h avg" Max (1,779.0 ppb) is greater than the 2015 "5-min hourly max" Max (1,678 ppb). Please explain how the "1-h avg" Max can be greater than the "5-min hourly max" Max.

Figures 2-13 to 2-18. The SO_2 concentration scale (ppb) in the legend should make the first break point at 75 ppb (3 to 75 ppb) rather than 100 ppb since the current level of the SO_2 NAAQS is 75 ppb. The second break point should be 150 ppb (double the level of the NAAQS), the third break point should be 225 ppb (triple the level of the NAAQS), and the forth break point should be 300 ppb (quadruple the level of the NAAQS). Also, these break point will allow the figures to show more variability across the maps.

Page 2-54. CAIR has been vacated by the courts and replaced with EPA's Cross-State Air Pollution Rule (CSAPR).

Section 2.5.4 discusses the relationship between hourly mean and peak concentrations. This section states "PMRs were used extensively in the previous SO_2 NAAQS review to evaluate the distribution of 5-minute hourly max concentrations corresponding to a given 1-h avg SO_2 concentration". However, this section only includes 1.5 pages of text and 2 figures on this topic.

Although it not clearly stated, I assume the same number of "5-min hourly max" and "1-h avg" data points used in Table 2-6 (9,149,724 data points from 2013-2015) are plotted in Figure 2-26. However, very little statistical analysis was presented in this section: "Median PMRs obtained from comparing the 5-minute hourly max with the 1-h avg AQS data at sites where both measures were available simultaneously, and neglecting concentrations below 0 ppb, had a range of 1 to 5.5 with a median of 1.3, in reasonable agreement with the predicted range of 1 to 5.4 for the PMR." In addition, this section should look PMR values associated with various percentiles (e.g., 50%, 75%, 90%, 95%, 98%, 99%). Also, the percentage of data points above/below a PMR = 2.67 should be presented since this is the value associated with converting 200 ppb (5-min average) to 75 ppb (1-hour average).

Section 2.6 – Atmospheric Modeling

This section does a much better job of describing the available models and their strengths, weaknesses, and latest updates (especially AERMOD) compared to the previous version of the document. I was pleased to see that the document discussed the differences between models used for regulatory compliance assessments (e.g., related to the 1-h daily max SO_2 standard) and dispersion modeling used in support of health studies where the model must capture concentrations at specified locations and time periods.

Model performance was discussed for a number of historical modeling exercises. It seems that modeling results within a factor of 2 is considered "good". However, biases in the models can have significant impacts on health studies. Whenever possible, model results should be compared to observations and the biases documents. In addition, the modeling results can be adjusted up/down based on model biases identified by comparison to observations to give more realistic spatial and temporal estimations of ambient concentrations.