

04-17-18 Preliminary Draft Comments from Clean Air Scientific Advisory Committee (CASAC) Sulfur Oxides Panel. These preliminary pre-meeting comments are from individual members of the Panel and do not represent CASAC consensus comments nor EPA policy. Do not cite or quote.

**Preliminary Comments from Dr. James Boylan on the
03-29-18 Draft CASAC Review of the EPA’s *Risk and Exposure Assessment for the Review of the
Primary National Ambient Air Quality Standard for Sulfur Oxides*
(*External Review Draft - August 2017*)**

1. On page 2 of the Letter to the Administrator, lines 4-7:

“To evaluate AERMOD model performance, scatter plots paired in time and space, hourly time series plots, seasonal average diurnal time series plots, and model statistics paired in time and space should be developed for each year at each monitor. Model performance criteria should be discussed, as well as temporal and spatial biases in the modeling results.”

Based on updated information provided in CASAC’s Consensus Responses to Charge Questions (below) and updated information provided in Dr. James Boylan’s Individual Comments (below), I recommend lines 4-7 be replaced with:

“To evaluate AERMOD model performance paired in time and space, QQ-plots should be developed to compare measured 1-hour SO₂ concentrations vs. modeled 1-hour SO₂ concentrations by time-of-day, day-of-week (weekday/weekend), and season-of-year for all SO₂ monitors located in the study areas. Model biases should be discussed and accounted for in the final REA.”

2. On page 3 of the Consensus Responses to Charge Questions, lines 22-29:

“The CASAC recommends generating scatter plots paired in time and space and hourly time series plots for each year at each monitor. In addition, seasonal average diurnal time series plots should be developed. Finally, model statistics should be calculated for each monitor paired in time and space across all hours in a year (8,760) as well as broken down by hour-of-day (24) and season-of-the-year (4). These plots and statistics can be used to evaluate temporal and spatial biases in the SO₂ concentrations generated by the air quality model. The Draft REA needs to discuss “acceptable” model performance criteria as well as biases in the modeling results.”

Based on updated information provided in Dr. James Boylan’s Individual Comments (below), I recommend lines 22-29 be replaced with:

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“To evaluate AERMOD model performance paired in time and space, QQ-plots should be developed to compare measured 1-hour SO₂ concentrations vs. modeled 1-hour SO₂ concentrations by time-of-day, day-of-week (weekday/weekend), and season-of-year for all SO₂ monitors located in the study areas. Model biases should be discussed and accounted for in the final REA. In addition, the REA needs to discuss “acceptable” model performance criteria for the statistics presented in the tables.”

3. On page A-6 of the Individual Comments, lines 26-31:

“To examine model performance paired in time and space, EPA should generate scatter plots paired in time and space and hourly time series plots for each year at each monitor. In addition, seasonal average diurnal time series plots should be developed. Finally, model statistics should be calculated for each monitor paired in time and space across all hours (8760) as well as broken down by hour-of-day (24) and season-of-the-year (4). These plots and statistics can be used to evaluate spatial and temporal biases in the SO₂ concentrations generated by the air quality model.”

Please replace lines 26-31 with:

“To evaluate AERMOD model performance paired in time and space, QQ-plots should be developed to compare measured 1-hour SO₂ concentrations vs. modeled 1-hour SO₂ concentrations by time-of-day, day-of-week (weekday/weekend), and season-of-year for all SO₂ monitors located in the study areas. Since the draft REA did not include any analyses to look at whether predicted high values are occurring at the right time-of-day, day-of-week, or season-of-year, I performed a time-of-day model performance evaluation comparing 1-hour SO₂ model concentrations against measurements at one monitor in Fall River, MA (250051004); three monitors in Indianapolis, IN (180970057, 180970073, and 180970078); and three monitors in Tulsa, OK (401430175, 401430235, and 401431127). The model performance varies by monitoring site and time-of-day. For Fall River (250051004), the early morning and late evening 1-hour SO₂ observations are ~4x higher than the modeled values. For one Indianapolis monitor (180970057), the early morning and late evening 1-hour SO₂ modeled values are ~2x higher than the observations. For the other two Indianapolis monitors (180970073 and 180970078), the late morning, afternoon, and early evening 1-hour SO₂ observations are ~2-3x higher than the modeled values. For one Tulsa monitor (401430175), the late morning, afternoon, and early evening 1-hour SO₂ observations are ~2-3x higher than the modeled values. For the other two Tulsa monitors (401430235 and 401431127), early morning and late evening 1-hour SO₂ modeled values are ~1.5-2x higher than the observations. These model biases will have a

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direct impact on the APEX results, possibly calling into question the percent of children and adults experiencing 5-minute exposures at or above 200 ppb. In addition, EPA should examine the day-of-week (weekday/weekend) and season-of-year model performance. Finally, the time-of-day, day-of-week (weekday/weekend), and season-of-year model biases should be discussed and accounted for in the final REA.”

4. On page A-7 of the Individual Comments, lines 1-9:

“Next, options for adjusting the model results if there are significant biases should be discussed. The types of adjustments (spatial vs. temporal) will be determined by examining the performance of the model at SO₂ monitoring locations paired in time and space. Since this simple analysis has not been performed by EPA, it is hard to say what types of adjustments need to be made to the model results. EPA should do this analysis and provide CASAC and the public an Excel file containing the 2011-2013 1-hour model and monitor data paired in time and space for each monitor in the three study areas. Finally, a series of sensitivity runs should be performed with the adjusted REA model results to see if the model under- and over-predictions significantly impact the exposure results and conclusions in the Planning Assessment.”

Please replace lines 1-9 with:

“Next, options for adjusting the model results if there are significant biases should be discussed. The types of adjustments (spatial vs. temporal) will be determined by examining the time-of-day, day-of-week (weekday/weekend), and season-of-year performance of the model at SO₂ monitoring locations. Finally, a series of sensitivity runs should be performed with the adjusted REA model results to see if the model under- and over-predictions significantly impact the exposure results and conclusions in the Planning Assessment.”