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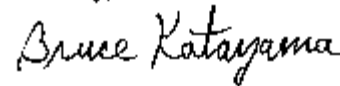
Jean,

The Sacramento Metropolitan Air Quality Management District (SMAQMD) appreciates the opportunity to comment on the Bay Area modeling protocol and related documents.

As you probably already know, the SMAQMD has recently hired Desert Research Institute to provide their technical services to assist in the development of an update to our region's federal ozone State Implementation Plan. As part of their tasks, we have asked DRI to prepare comments on our behalf. Please find attached their comments.

If you have any questions, do not hesitate to contact me at (916) 874-4832. Thank you.

Sincerely,



for Brigitte Tollstrup
Manager, Program Coordination Division

cc: Greg Tholen, SMAQMD
Tom Perardi, BAAQMD
Eric Fujita, DRI
Chris Emery, ENVIRON
Dave Souten, ENVIRON

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Attachment on Bay Area Modeling Protocol Comments

We offer the following comments on the Bay Area modeling protocol and associated memoranda and documentation.

On Memo from Chris Emery to Bay Area MAC, September 6, 2002, "Response to comments received on draft modeling protocol."

1. Pg 2, 3rd para. we agree with the inclusion of the July 11-12, 1999 episode. The meteorology is characterized by a Northern California/Pacific Northwest high (>592 dm geopotential height at Medford, OR) that is so broad as to include the Four Corners and Great Basin region, and out to 140° West latitude in the Eastern Pacific. Surface pressure gradients are slack, 0.8 mb SFO-FAT on July 11th and 1.2 mb on July 12, but still slightly onshore. Afternoon winds in the Carquinez Strait are relatively low (<10 mph on July 11), but still westerly and capable of transport, particularly overnight transport.
2. Pg 2, 3rd para. The modeling period should include 48 hours before and 48 hours after the days of interest, in this case July 9-10, and July 13-14. This is true of all the runs, June 15 and July 31, 2000.
3. Pg 3, 2nd para. We would like to see a cited reference for discussion of testing of the one-way and two-way nesting methods.
4. Pg 3, 4th para. While we have certainly seen wave phenomenon reflected by boundaries in meteorological models, we have not seen or experienced this in a chemical model.
5. Pg 4, 1st para. We want to emphasize that 2-km and 4-km resolution should be used to the maximum extent possible, particularly for important but hard to resolve features like Altamont Pass and Carquinez Straits.
6. Pg 4, 3rd para. We concur with the addition of greater vertical domain depth from 3-4 km to 7-8 km.
7. Pg 5, 2nd para. The good-faith effort should attempt to explain the failure of the model to approximate the observations. Otherwise, exclusion of an episode, that has otherwise been deemed representative, could bias the study.
8. Pg 5, last para. The ARB is currently devoting significant effort to develop an updated weekend emissions inventory for the South Coast Air Basin in recognition that existing inventories may not accurately reflect actual spatial and diurnal variations in the patterns of emissions. Some attention should be given to this issue since the July 1999 episode includes the weekend period. At the very least, findings from the SoCAB work that can be generalized to other areas in California should be acknowledged.
9. Pg 6, 3rd para. We suspect that the difference between the CAMx/SAPRC99 and the CB4 runs may be due to differences in the VOC speciation key used to disaggregate emissions into the model species.

On Report "Modeling Protocol" by ENVIRON, Aug 2002.

1. Pg 1-4, 1st and 2nd para. It is not clear that any model in existence contains "all of the technical features necessary to simulate ozone air quality in the SFBA," let alone the EMS95/RAMS/CAMx model. In selecting RAMS over MMS, one potential advantage of

- RAMS is given, but there is no performance basis cited. The relative merits of candidate models should be further discussed and empirically compared (e.g., Willmott et al. 1985). For example, in our experience MM5 has performed better in past air quality studies, e.g., Project MOHAVE.
2. Pg 1-5, last sentence started. The results of MM5 and RAMS modeling should definitely be compared.
 3. Pg 2-2, 1st para. Are three modeling episodes adequate?
 4. Pg 2-3, "Exceedances by day of week" section and Figure 2-1. We do not recommend a statistical search for WD/WE effects using only small numbers of exceedance days. SFBA federal exceedances are sufficiently rare that meteorological effects dominate the distribution of ozone exceedances by day of week. Nonetheless, in keeping with the spirit of the report, DRI used a binomial probability distribution as discussed in our comment #1 to the revised Episode Representativeness section.
 5. Pg 2-26. There are several routine meteorological measurements supporting the July 11-12, 1999 ozone modeling effort, but the supplemental aircraft and chemistry measurements provided by the CCOS study in 2000 are not present. This hinders model validation for this period.
 6. Pg 3-2, 2nd bullet. The plan calls for CB4 to be the main mechanism for the chemical modeling. The SAPRC99 mechanism will be run as sensitivity test only. This may not be a reliable comparison because of the VOC speciation key questions discussed in DRI Comment #8 on the 9/6/02 memo from Chris Emory.
 7. Pg 3-3, Photochemical Grid Model, Item 2. Is it true that CMAQ supports only one-way nesting? The best performance is observed at typical 3:1 ratio, but any ratio can be used.
 8. Pg 4-1, Description of RAMS, a-c. MM5 has the same capabilities as RAMS. We recommend further consideration of this choice.

On the revised "Episode Representativeness" Section

1. DRI does not recommend using such a small number of exceedance days for examining the WD/WE effect. However, in keeping with the spirit of the revised section a binomial probability distribution yields 5.14 ± 4.40 exceedances/day-of-week, DRI agrees that no one day of the week has a statistically significant number of higher or lower exceedances at the 95% confidence level. Furthermore, no statistical significance is found for a 2-day Sat-Sun grouping. However, the link between ozone and the preceding day's ozone is well-established (e.g. SJVAQMD multiregression model), and the 3-day grouping Sat-Sun-Mon has a statistically significant higher number of exceedances at the 95% confidence level.
2. Why is the Oakland 850 mb temperature and 500 mb height missing from table 4? Even if there was no statistical difference between clusters, this can be a valuable tool for comparing ozone events. Similarly, Bethel Island winds and the SFO-FAT surface pressure gradient would be helpful in linking this analysis to previous work from the CCOS planning effort (Fujita et al. 1999)

On the revised "Meteorological Conditions" Section

1. First page. The ARB is investigating the July 9-10, 2002 with high ozone levels, statewide exceedances, and high surface temperatures. We recommend investigating the

possibility that all four episodes could be modeled with in-kind services provided by ARB in a cost effective manner.

2. Second page, item 2. We add the caution that the resolution on the HYSPLIT backtrajectory model run with EDAS meteorology cannot resolve several important geographic features between air basins as well, such as Altamont Pass and the Carquinez Straits. Given higher resolution meteorology, HYSPLIT has the potential of making this distinction.
3. Third page, item 4. See Ludwig et al. 1985 for some guidance on the issue of wind direction and exceedances in the Santa Clara Valley on out to Pinnacles National Monument, although the source region is still an issue.

References:

Fujita et al. (1999) CCOS Field Study Plan, Version 3, Nov 24, 1999.

Ludwig, F. L.; Jiang, J.; and Chen, J. 1995. Classification of Ozone and Weather Patterns Associated with High Ozone Concentrations in the San Francisco and Monterey Bay Areas. Atmospheric Environment: Special Issues for the Regional Photochemical Measurement and Modeling Studies Specialty Conference, 29(21):2915-2928.

Willmott, C.J., S.G. Ackleson, R.E. Davis, J.F Feddema, K.M Klink, D.R. Legates, J. O'Donnell, and C.M. Rowe (1985) Statistics for the Evaluation and Comparison of Models. *J. Geophys. Res.* 90:8995-9005.