UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

13NOV 1992

MEMORANDUM

SUBJECT: Denver PM-10 State Implementation Plan (SIP) Modeling Issues
FOR John S Davis

FROM: Joseph A. Tikvart, Chief
Source Receptor Analysis Branch (MD-14)

TO: Kevin Golden, Regional Meteorologist
Region VIII (8ART-TO)

Larry Svoboda, Chief
Assessment, Modeling and Emissions Section, Region VIII
(8ART-TO)

In response to your request to Dean Wilson, the Model Clearinghouse has reviewed your position with respect to the appropriate emissions for input to air quality simulation models used in the Denver PM-10 attainment demonstration. Based on a number of discussions we had with you, and internally within the Office of Air Quality Planning and Standards, we conclude that your position is supportable since it lies within the flexibility afforded by the guidance. The only difference is in interpretation of the Guideline on Air Quality Models (Revised). Specifically, Table 9.1 applies in principle to secondary pollutants as well as primary pollutants. The following summarizes our viewpoints in that respect.

A basic feature of Table 9.1 is that all stationary point sources that are to be explicitly modeled should be modeled at their emission limit. This is independent of whether they are sources undergoing a review of their emissions limits or are "background" sources. This position is reinforced by the material in the document "Procedures for Preparing Emissions Projections," referenced in your memorandum. While modeling at emissions limits is clearly required, the second and third columns of Table 9.1 offer some flexibility on what operating level and operating factor should be used in calculating the model emissions input, depending on the "classification" of the source and on averaging time. By source "classification" we mean whether the source(s) are undergoing emissions limit review or whether they are "nearby" or "other" background sources. The distinction between "nearby" and "other" is only useful when

dealing with a single source or a few sources undergoing emissions limit review, but are in the midst of other sources whose limits are not up for review.

Clearly for area wide SIP's, emissions limits for all modeled sources are reviewable, and the guidance in Section 9.1 seems to indicate that the top portion of Table 9.1 is applicable for such SIP's. The top portion of Table 9.1 essentially says that, for short-term standards, sources should be modeled at maximum operating levels and the modeling should reflect continuous operation, 24 hours per day, 365 days per year, unless restricted to a lesser operating rate by a permit condition.

As you have noted, this guidance seems to be at variance with the recommendations on model input emissions for ozone precursors described in the Procedures for Preparing Emissions Projections. However, the attached memorandum demonstrates that the Procedures and the Guideline are really consistent. The memorandum rationalizes that ozone is not a source-specific emission but is formed by the combination of precursors of nitrogen oxides, volatile organic compounds and to some degree, carbon monoxide, through photochemical reactions. The attachment reasons that Table 9.1 really is applicable to ozone, in that it is appropriate to view ozone precursors as the other background sources, in the bottom portion of Table 9.1.

The only slight difference between the guidance at the bottom of Table 9.1 and the ozone procedures is that for ozone an expected operating level and operating factor are used in calculating the emissions input to the model. In Table 9.1 an annual average operating level and continuous operation are recommended for modeling other background sources for the short term concentrations. In order to maintain consistency with procedures for modeling ozone precursors, judgments need to be allowed on both the operating level and the operating factor. We conclude that the bottom portion of Table 9.1 is applicable to ozone modeling with allowances for judgment on operating rates, consistent with guidance contained in the Procedures for Preparing Emissions Projections.

Since secondary particulate precursors can be viewed in a similar fashion to ozone precursors, an analogous logic to the above would apply to secondary particulate precursors. Thus we conclude that the "other background sources" portion of Table 9.1 applies to precursors of secondary particulate. Again, for the 24-hour PM-10 standard, flexibility should be allowed in both the expected operating level and the operating factor.

You have noted that sources of primary particulate can cause hot spots whereas sources of secondary particulate, because of the atmospheric residence time of the precursors, do not result in such hot spots. As you point out, secondary particulate would

be expected to behave more like ozone, exhibiting a concentration pattern with relatively flat localized gradients. Following this rationale you have concluded that sources of primary particulate larger than 100 tons per year of potential emissions should be modeled according to the top portion of Table 9.1 in order to ensure that the hot spots are identified. For secondary particulate you indicate that in principle they should be modeled like ozone, i.e., at expected operating rates. Your logic is consistent with the above rationale on the applicability of Table 9.1. Thus, it is supportable.

You also note that many of the large sources of particulate precursors in Denver are currently operating at well below their design level and operating schedule. In order to ensure protection of the PM-10 standards, there is a need to model some of them, i.e., the 14 largest sources, with input emissions calculated at maximum operating rates. This is also consistent with the flexibility afforded for emissions calculations for other background sources in Table 9.1. In this case, you have exercised judgment in order to ensure that the expected potential high-second-high concentration is estimated, and that judgment is that the 14 sources should be modeled at maximum operating level and for continuous operation. Thus, we can support your position. However, the rationale used to select the 14 sources should be documented.

If you have any questions, please contact Dean Wilson at 919-541-5683.

Attachment

cc: T. Helms
D. Mobley
J. Paisie
M. Payne
D. Skie

bcc: K. Baugues
G. Blais
S. Holman
E. Meyer
R. Scheffe
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Regional Modeling Contact, Regions I-VII, IX-X (with copy of incoming memorandum and list of FY-93 Clearinghouse memoranda)