UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

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FROM: Kevin Golden, Regional Meteorologist

Larry Svoboda, Chief
Assessment, Modeling, and Emissions Section

TO: Dean Wilson, Model Clearinghouse Coordinator
Source Receptor Analysis Branch

SUBJECT: Denver PM10 SIP Modeling Issues

This memo seeks your concurrence with Region 8's intent to accept the Colorado Air Pollution Control Division's (APCD's) and Regional Air Quality Council's (RAQC's) proposed modeling approach in the Denver PM10 SIP attainment demonstration. I would appreciate it if you could review the approach discussed below for any inconsistencies with EPA policy.

BACKGROUND

The Denver Metropolitan area is classified as a moderate PM10 non-attainment area with a 24-hour average "design value" of approximately 160 ug/m3. The Clean Air Act required the state to submit a PM10 SIP attainment demonstration to EPA last November, and the APCD is under great pressure to complete the SIP as soon as possible. No measured exceedences of the PM10 standard have occurred since 1989. The modeling protocol, which was approved by Region 8 in 1991, specifies the use of urban RAM for area sources (road dust, woodburning, mobile sources, etc.) and ISCST for large point sources of PM10. In the ISC runs, major industrial facilities that may be affected by downwash were also evaluated. The total concentration of primary PM10 was derived by simply adding the concentrations predicted by the two models, matched in space and time. The APCD has completed the initial modeling runs for the 1989 base case and 1995 "attainment year" scenarios. A comparison of the RAM/ISC predictions with receptor modeling results from a number of historical PM10 episodes showed that the dispersion models were performing satisfactorily. The 1989 base year modeling indicates total PM10 concentrations of 140 ug/m3, which is in general agreement with receptor modeling results.

Secondary PM10, formed by SOx and NOx precursors, contributes 25-30 ug/m3 of the total PM10, based on chemical analysis of the filters. There are insufficient atmospheric chemistry data in the Denver area to perform refined modeling of secondary PM10 formation. In this analysis the 25-30 ug/m3 base year concentration was simply "rolled forward" based upon

expected increases in total precursor emissions, from all source categories, between 1989 and 1995. Preliminary results from the 1995 runs show that even with controls on woodburning and street sanding, primary PM10 concentrations are still in the 120 ug/m3 range. The APCD's recent focus on PM10 precursor issues is due to the difficulty in showing NAAQS attainment if secondary PM10 levels are increased significantly over base case levels.

SUMMARY OF ISSUE AND PROPOSED RESOLUTION

The issue is whether SOx and NOx point sources must be modeled at actual or allowable emissions for PM10 SIP attainment and maintenance demonstrations.

For primary PM10 sources, both Region 8 and APCD agree that the Guideline on Air Quality Models, Table 9-1, requires that stationary point sources subject to SIP limits be modeled at allowable emissions (i.e. operating at design capacity and assuming continuous hours of operation, unless limited by permit condition). In the Denver attainment modeling, "sources subject to SIP limits" was interpreted to mean all stationary sources with a potential to emit over 100 tons per year of primary PM10. The rationale for this handling of primary PM10 sources is the need to evaluate localized hot spots that may occur near these sources and, in combination with other background and area sources, threaten the NAAQS. An individual point source would have a high probability of operating at allowable rates for the 24-hour averaging time of the PM10 standard, unless limited by a permit condition. Thus, the only way to ensure that all potential NAAQS violations have been addressed is to model these sources at allowable emission rates.

For SOx and NOx precursors to PM10, Region 8 and APCD feel that it would be more appropriate to treat PM10 precursors in the same manner as ozone precursors, using anticipated operating rates, rather than maximum worst case operating rates. Table 9-1 of the Guideline on Air Quality Models seems to apply only to primary pollutants. Individual point sources of precursor pollutants do not create localized hot spots of ozone, or PM10, in the vicinity of the source, because of the time necessary for secondary pollutant formation. For this reason, we feel that the guidance contained in "Procedures for Preparing Emissions Projections" (EPA 450/4-91-019, July 1991) should be followed for all but the largest point sources. This guidance requires that stationary sources be modeled at maximum emission limits and at anticipated seasonal operating rates. In Denver, there are a number of large point sources that individually could significantly increase basinwide emissions of PM10 precursors. A major concern with these sources is the inability to enforce limitations on operational levels, unless explicitly considered in the SIP modeling. These large sources of precursors would be modeled in the same fashion as a primary source of PM10, at maximum operating rate.

There is apparently no EPA guidance on how to determine which major point sources of precursor emissions (for either O3 or PM10) are to be modeled at maximum operating rate. In negotiations with APCD, Region 8 tentatively agreed to model point sources with current actual NOx or SOx emissions above 100 tons/year, at continuous operational levels. In the Denver SIP modeling, only the 14 largest SOx and NOx point sources would be modeled in this fashion. For the remaining 50 sources with current allowable emissions above 100 tons per year, but actual emissions below this level, the methodology for modeling ozone precursors would be followed (i.e. anticipated 24-hour average wintertime emission levels at maximum design emission limit). Sources that have alternative sources of fuel for emergency use would be evaluated based on emissions related to use of the primary fuel.

APCD has made projections of total 1995 secondary PM10 concentrations using the "roll forward" technique described above. If the growth in SOx and NOx emissions were projected to 1995 using winter season average actual operating levels, the predicted 1995 secondary PM10 concentration would increase to 34 ug/m3. The proposed agreement with APCD would project a total of 42 ug/m3. If emissions for all 64 stationary sources were scaled up to full operating load, the secondary component would increase to 58 ug/m3.

Given the current information about the secondary PM10 levels, we believe that our proposed approach provides a technically defensible solution to this issue. If you have any questions or need further information on this issue please call either Kevin Golden at 293-0955 or Larry Svoboda at 293-0962.

cc: Marshall Payne, 8ART-TO
Doug Skie, 8ART-TO