UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

APR 1 8 2008

MEMORANDUM

SUBJECT: Proposed Screening Technique for Class I Increment Analysis

FROM: Adina Wiley, Environmental Engineer (6PD-R)

Erik Snyder, Lead Regional Modeler (6PD-L)

Jeff Robinson, Chief
Air Permits Section (6PD-R)

TO: Dennis Atkinson, Model Clearinghouse Coordinator
Air Quality Modeling Group

This memo seeks your concurrence with Region 6's intent to accept a screening technique (with the inclusion of emissions from screened-out sources included in the modeling as a few pseudo sources) for the Class I increment analysis associated specifically with the proposed Prevention of Significant Deterioration (PSD) permit for AEP SWEPCO John W. Turk, Jr. power plant in Hempstead, AR. This screening technique will be used to augment the existing modeled Class I increment inventory submitted in January 2007.

BACKGROUND

The original Class I increment analysis submitted by AEP SWEPCO indicated numerous increment exceedances for 24-hour SO_2 at the Caney Creek Class I Wilderness Area, but the proposed source was less than the EPA proposed Class I significant impact level (SIL) for SO_2 on the high, second high (H2H) day at each violating receptor. EPA Region 6 commented in April 2007 and again in July 2007 that the applicant had inappropriately excluded increment-contributing sources and that the modeled impacts from the original increment inventory did not provide sufficient information to conclude

that the applicant did not cause or contribute to exceedances of the SO_2 increment in Caney Creek already identified in their previous modeling submittal, or potential exceedances on additional days due to cumulative impacts from excluded sources. Our regulatory interpretation is that removal of increment consuming sources without consideration of their potential contribution to an increment impact analysis is prohibited under Section 7.2.1.1(a) of 40 CFR Part 51, Appendix W (*Guideline on Air Quality Models ("Guideline")*).

To develop a more comprehensive understanding of the modeled increment exceedances in Caney Creek, we conducted an air mass history analysis of the CALPUFF modeling results for days when the modeled SO_2 levels were within 10% and greater of the 24-hour SO_2 increment. Using NOAA's HYSPLIT model, backward trajectories relative to the Caney Creek Class I area were run four times a day for all days at or above 90% of the 24-hour SO_2 increment. Air mass history maps were generated using a computer program developed by EPA Region 7. The maps indicate the probability of an air mass passing over a particular region prior to arrival. Used in this context, the air mass history maps provide an indication of potential source regions on days when the modeled SO_2 increment is near or exceeds allowable levels. The air mass history maps indicate two significant areas of potential influence on the high days in Caney Creek. The area of highest probability extends predominantly south from Caney Creek towards eastern Texas and Western Louisiana. This area is in the same general area as the proposed AEP source upwind of the Class I area. Previous PSD modeling for the Western Farmers Hugo Unit 2 in Oklahoma also identified this area as an area of concern for days near or above the 24-hour SO_2 increment, reinforcing the necessity to adequately capture potential increment impacts from sources that lie within that region.

After reviewing the increment inventory data files provided by the applicant, it was apparent that the applicant had eliminated several hundred sources from Arkansas, Louisiana, Oklahoma, and Texas. Subsequent discussions with the applicant revealed that they had used an emissions over distance (Q/D) approach to eliminate increment consuming sources from their final modeled inventory (a Q/D value of less than 20 was used as a threshold to exclude sources, with Q in tons per year (TPY) and D in kilometers). We were aware of additional large SO_2 sources that should have been included in the modeled inventory. These sources are in the same upwind air mass as the proposed source. Cursory review of the emissions total of the sources eliminated from the original modeled inventory indicates that a majority of the emissions reside in the same general area upwind of the Class I area as the source currently under permit review. Since there were a number of additional modeled impacts that were within 5%-10% of the 24-hour SO_2 increment level, we believed that this created the potential that the applicant could contribute significantly to additional increment exceedance periods that would not have been identified due to the elimination of those sources from the increment inventory. We requested that the applicant resubmit the Class I increment modeling including all sources, pursuant to Appendix W, section 7.2.1.1(a).

In response to our request to include all increment-contributing sources, the applicant proposed the use of an alternative approach to identify sources to be eliminated

from the modeled increment inventory. We continue to believe that it is inappropriate to use screening techniques to eliminate sources from the modeled increment inventory. However, we also recognize the unique computational challenge this may create with explicitly modeling several hundred sources for the three simulation years using the CALPUFF modeling system. Therefore, while we continue to believe it inappropriate to eliminate sources from the model increment inventory, we believe that screening techniques can be used in this case to provide a preliminary and conservative estimate of the impact of more distant sources in a cumulative increment analysis without the necessity of explicit characterization of such sources in a refined modeling application.

EPA Region 6 Evaluation

The most correct method from both a technical and regulatory perspective should have been to include impacts from all increment affecting sources (both consuming and expanding sources), rather than using screening techniques to eliminate the impacts of some sources from an inventory. However, recognizing the potential computational challenge of modeling several hundreds sources for three simulation years with the CALPUFF modeling system, we believe it should be possible to utilize a combination of screening and refined modeling techniques to estimate the cumulative contribution to increment. Exceedances of the 24-hour SO_2 increment have already been identified by previous modeling; therefore, EPA Region 6 seeks to implement a method to account for the potential impacts of increment consuming sources, but to focus the inclusion of the additional increment affecting sources to areas that our analysis indicates a higher potential for cumulative impact with the current source under review.

Region 6 evaluated the following options:

1. An emissions over distance (Q/D) screening methodology developed by the United States Forest Service (USFS) and National Park Service (NPS). According to applicant, the USFS/NPS screening methodology has been used in PSD permitting actions in EPA Regions 3 and 9. In the FLM screening methodology, the source emission rate is divided by the distance to the Class I area. If the ratio is greater than 0.8 for SO_2, then the source is included in the cumulative increment analysis.

2. A Chi-Over-Q technique developed by the applicant using the existing increment inventory to establish a basis for determining impact from non-modeled sources. Chi, the predicted concentration for the existing source, is divided by the emission rate Q for the existing source. This analysis is completed for all sources in the inventory; 69 sources in this instance. The χ/Q values are then plotted as a function of distance from Caney Creek and best-fit linear and power law equations are generated. These equations can be used to estimate the emission rates that generate an impact above the proposed Class I SIL for 24-hour SO_2.

3. All major and minor sources within a 50 km radius of the Class I area would be included if facility emissions were greater than 2 lb/hr. Outside of the 50 km radius, a 90° degree sector can be established to bracket the geographic area identified in our

air mass history analysis. All identified sources within the area encompassed by the 90° sector would then be added into the existing increment inventory for further analysis when the facility (all sources at one facility) exceeded a 2 lb/hr emission level. The proposed AEP facility is located near the middle of this sector, so this analysis would likely assess if the proposed source could significantly contribute to an increment violation.

SUMMARY OF ISSUE AND PROPOSED RESOLUTION

Region 6 recognizes that Appendix W requires all increment consuming and expanding sources be included in an increment analysis. The proposed approach is a tiered process related to distance and wind sector that will be used in addition to the existing SO_2 increment inventory of 44 sources. The focus will be to augment the inventory with emissions for additional sources with a greater probability of contributing to a cumulative impact with the current source under review.

Region 6 proposes that all sources within a 50 km radius of the Class I area, regardless of size, are to be explicitly modeled (including one large minor source 57 km north of the Class I area). Explicitly modeling all sources within 50 km accounts for the potential influence of recirculating wind patterns on cumulative impacts.

Outside of the 50 km radius, but within the 90-degree sector (centered south of the Class I area), a Q/D threshold of 0.8 will be used to identify the additional sources on a facility-wide basis that will be explicitly modeled (with Q expressed in TPY and D in km). The total facility SO_2 emission rate will be used in the Q/D analysis; facilities with a Q/D ratio greater than 0.8 will be explicitly modeled. Facilities less than or equal to 0.8 will be grouped and modeled as pseudo-point source(s) to generate a conservative screening-level estimate. The pseudo-point source location(s) will be determined after examining the locations and characteristics of the facilities below the Q/D threshold. Sources below the threshold will be grouped first based on their location from the Class I area; initial groups will be based on discrete distance bands from the Class I area. Within these distance bands, the pseudo source characteristics will be determined from the facility-wide SO_2 emission rates from the screened sources. A facility-wide SO_2 emission rate of 40 TPY or less will characterized as a low-level (height above ground) source; an emission rate of 40-250 TPY SO_2 will be a mid-level source; and an emission rate greater than 250 TPY will be a high-level source.

Once the additional sources are included in the increment inventory as described above, either explicitly or as pseudo-sources, the permit applicant will need to reassess increment consumption at the Caney Creek Class I Wilderness Area. For each predicted increment violation, the applicant must demonstrate that the proposed source is below the proposed 24-hour SO_2 Class I significant impact level for the permitting process to proceed.

Requested Action Items:

Please review our interpretation of Section 7.2.2.1 (a) of the *Guideline* as it relates to this project. Please also clarify if our proposed procedures are technically justified and consistent with guidance.

Region 6 believes that the 90-degree sector analysis as described above is the most technically defensible compromise option in this situation as it is most consistent with Appendix W requirements to account for impacts from all sources, but will target the additional modeling effort on the area of potential contribution of the proposed source, which also coincides with the main area of concern identified by the previous Hugo, OK Class I analysis.

Please call either Erik Snyder at 214-665-7305 or Adina Wiley at 214-665-2115 if you have any questions or need further information on this issue.

cc: Tyler Fox, OAQPS AQMG

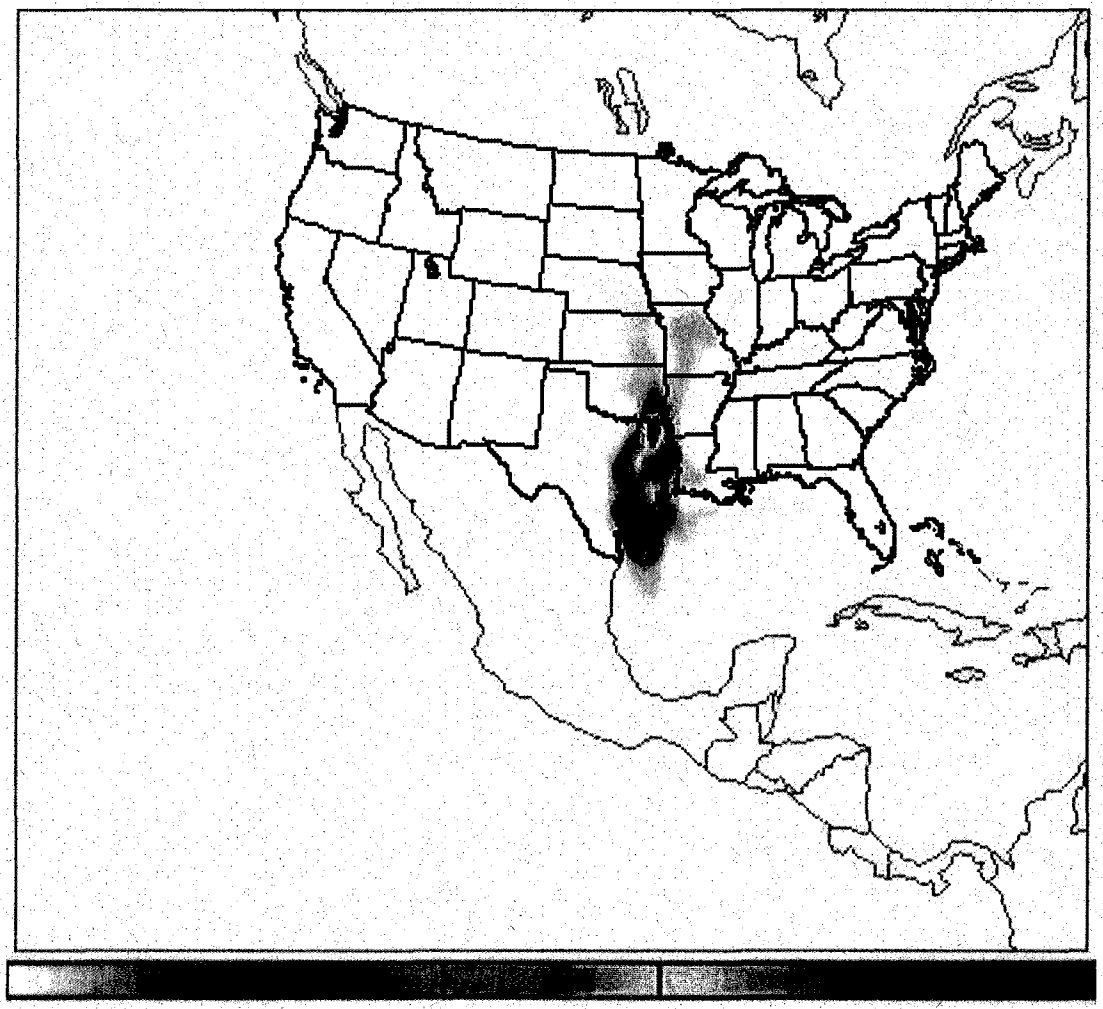

Figure 1 - 48-hour air mass history map for Caney Creek Wilderness Area during periods when modeled SO_2 is greater than or equal to 90% of the 24-hour SO_2 increments. Due to map projection differences, the air mass history is shifted to the West compared to the actual location of the Caney Creek Wilderness.