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

May 29, 1987

MEMORANDUM

SUBJECT: UNAMAP 6 Dispersion Modeling with Building Wake Effects

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

TO: Bruce P. Miller, Chief
Air Programs Branch, Region IV

In response to your request, the Model Clearinghouse has reviewed Region IV's position with respect to modeling downwash for primary and background sources. We also discussed this issue as part of the broader problem of modeling background sources at the Regional/State Modelers Workshop, May 12-15, 1987. The position of the Regional/State Modelers was that all sources which are explicitly modeled should be modeled according to current guidance, e.g. model for downwash if the stack is lower than GEP. The Clearinghouse concurs with this consensus.

Considerable discussion took place at the Workshop on how to decide which background (off-site) sources should be explicitly modeled in a regulatory analysis. We found that it was difficult to establish any more specific criteria for deciding which sources to model beyond those general criteria already in the Guideline on Air Quality Models. The Guideline (Section 9.2.3) essentially recommends limiting the number of explicitly Modeled background sources to those sources expected to cause a "significant concentration gradient" in the vicinity of the primary source(s). Thus it is left up to the Regional Offices to exercise good defensible judgment on a case-by-case basis in making such choices; the number of such sources is expected to be small except in unusual situations.

However,if PSD increment consumption is involved then all increment consuming sources, including non-PSD sources and growth emissions, must be explicitly modeled to calculate increment consumption in any area where the baseline date has been established. This analysis may require the calculation of increment consumption within the baseline area from sources located outside of the area.

Specific answers to your four questions are as follows:

1. Should all such sources which may experience downwash be modeled utilizing the downwash algorithm?

We agree with your position that primary sources should be modeled for downwash if their stack(s) are below GEP.

2. Is it necessary to perform downwash analyses on off-site sources when evaluating the impact of another source?

Based on the Workshop discussion we also agree with your position that off-site sources, selected for modeling based on Regional Office judgment, should be modeled for downwash. However, if an off-site source is located

outside of the receptor area selected by Regional Office judgment for consideration, then only concentrations for the receptor area need to be calculated.

3. If downwash is required, how should the States address the expected region-wide impact?

It is our position, for SIP analyses, that all "incidental" problems should be corrected as part of the SIP or SIP revision. This is because the SIP is the basic tool defined by the Clean Air Act for ensuring that standards/PSD increments are attained/maintained everywhere. The "region-wide" problem you speak of may not be as serious as you envision if the modeling guideline is followed in selecting the background sources and the receptor area, as discussed above.

4. What experience with this problem has been noted by EPA during PSD reviews?

Although we have not been made aware of any specific cases, we understand that Region V has had some issues where incidental problems from background sources were uncovered during a PSD analysis. Given the PSD regulations and requirements we see no other alternative than to deal with these problems when they come up. When an incidental problem is uncovered during the analysis to which the PSD source contributes significantly, the problem should be corrected before the permit is issued.

If you have any questions please contact me. If further discussion is needed on Questions 3 or 4 it is best that you contact the Control Programs Operation Branch (Tom Helms or Sharon Reinders).

cc: T. Helms
G. McCutchen
S. Reinders
R. Rhoads
D. Tyler

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DATE: APR 28 1987

SUBJECT: UNAMAP VI Dispersion Modeling With Building Wake Effects

FROM: Bruce P. Miller, Chief
Air Programs Branch

TO: Joseph Tikvart, Chief
Source Receptor Analysis Branch

SUMMARY

The North Carolina Department of Natural Resources and Community Development, Division of Environmental Management (DEM), has provided us with an analysis that shows that the version of the Industrial Source Complex Model when used with the building wake effects option calculates exceedances of the NAAQS for most small sources. The problem is compounded because UNAMAP VI models now allow for source to receptor combinations of less than 100 meters.

The North Carolina DEM has asked that we respond to four questions dealing with EPA modeling requirements. These questions are:

1. Should all such sources which may experience downwash be modeled utilizing the downwash algorithm?

2. Is it necessary to perform downwash analysis on off-site sources when evaluating the impact of another source?

3. If downwash is required, how should the States address the expected region-wide impact?

4. What experience with this problem has been noted by EPA during PSD reviews?

The Region IV position to question No. 1 is that any source with a stack less than GEP is required to utilize the downwash algorithm if it is the primary source undergoing review. Our position on question No. 2 is that those off-site sources should also be modeled with the downwash algorithm if their stacks are less than GEP and these sources are included in the refined analysis. Our position on question No. 3 has been that when these off-site sources are modeled with or without downwash and an exceedance of the NAAQS is found, then the permitting agency must revise the SIP to bring those sources into compliance. If the primary source is a PSD source and the

impact at the receptor with the modeled exceedance is less than the significant impact value, then the primary source can still be permitted and the SIP revised independently of the permitting action. In the case where the primary source is a SIP source, the SIP revision is placed on hold until the modeled exceedance(s) are corrected.

In regard to question No. 4, have not noted any problems to date in Region IV where the PSD permit has been held up due to the impact of the other sources with respect to the NAAQS. However, we expect that there will be numerous problems with respect to both the NAAQS portion of the PSD process and with the SIP review process if we routinely require a downwash analysis for all off-site sources. The problem as we see it is twofold. One, these smaller sources have never been modeled in the past; and two, the modeling must be done at maximum allowable rates.

Most of these smaller sources operate at only 30-50 percent of the SIP allowables, and in some cases the state permit is more stringent than the SIP allowables. However, the permitting procedures to make the necessary change in the SIP allowable emission rate can take up to two years to change, thus placing an economic burden on the source requesting the SIP change.

As you can see, we are faced with some serious problems that cannot be resolved without a fundamental change in our modeling and permitting procedures. Please provide us with your responses to our positions on the four North Carolina questions and your recommendation on how to proceed with a SIP approval where the source requesting the SIP change has little or no impact on modeled exceedances created by other sources.

We understand that the issue of off-site sources will be addressed at the May Regional Meteorologist meeting. However, we need to resolve as soon as possible the issue of how to process a SIP change which uncovers modeled violations unrelated to but within the impact area of sources whose emission limitations would be relaxed by the SIP change.

Please provide us with a response to the modeling issues identified by May 22, 1987, if possible.

Enclosures: North Carolina letter and modeling printout

cc: Air Branch Chiefs, Regions I-III and V-X, w/letter