



89-VI-18
Reference 6T-AN

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

July 31, 1989

MEMORANDUM

SUBJECT: Request for Support in Evaluating Meteorological Data Bases

FROM: William G. Laxton, Director
Technical Support Division (MD-14) *Harry D. Zeller*

TO: William B. Hathaway, Director
Air, Pesticides and Toxics Division, Region VI (6T)

This memorandum responds to your questions regarding the identification and treatment of low mixing height situations. The response reflects discussions that have taken place between our staffs.

First, in regard to the attachment to your request, we agree that there appear to be some situations in the data base where mixing heights are low and perhaps should be questioned as being realistic. However, the impact of these hours of suspiciously low mixing heights on design concentrations depends on whether one is applying the EPA models or the Texas models. For the EPA models, plumes that are above the mixing height are treated as having no effect on ground level concentrations. However, the Texas models appear to contain a plume penetration factor which may result in plumes having some contribution to ground level concentrations in such situations. Also, the EPA models assume unlimited mixing for stable hours, whereas the Texas models use the hourly mixing heights with a penetration factor of 1. Because of these differences, we believe that the significance of low mixing height values in your Region, when using EPA regulatory models, may not be as great as indicated by the examples you provided.

In regard to your request to make modeling runs for several stack scenarios using the 1982 Houston meteorological data base, we do not have the resources for the remainder of FY-89 to perform these analyses. Perhaps the Region or the State could make these runs. Given the discussion above, we are not sure how one would interpret the results of this modeling when using the Texas criteria for the EPA models.

In regard to your question about whether very low mixing heights actually occur in nature, we believe that it is possible to experience near zero mixing heights (both urban and rural). However, the likelihood of such very low mixing heights varies greatly with season, climatology, and the size of the urban area. In many cases this is a transitional phenomena of short duration. There are other situations where low mixing heights have been shown to be a significant factor. For example, we are aware from some PM₁₀ studies that in interior valleys of the West in the winter season, extremely low mixing

heights are a reality and are an important phenomena contributing to high PM₁₀ levels associated with ground level and fireplace emissions. We do not know whether such low mixing heights could realistically occur in major urban areas along the Gulf Coast. In regard to information contained in the literature on the phenomena, we are not aware of any specific studies on the subject. Your staff may wish to discuss the matter with John Irwin who is working on a study that compares estimated and observed mixing heights.

In regard to your question about whether a policy change is needed, because of the considerations discussed above, we are not inclined to change our present policy of "case-by-case" determination. Also, we are unaware of other Regions who have not been able to operate under this policy. Our staffs have discussed this aspect and we believe it might be possible for you to develop a Regional policy or perhaps a policy that applies to the Gulf Coast climatology. If your staff decides to develop such a policy, the Model Clearinghouse would be willing to review it from the standpoint of technical defensibility. We are sympathetic to your desire to have more generic criteria to identify unacceptable mixing heights, in the interest of consistency.

Finally, we believe that it is equally important to define how periods of suspiciously low mixing heights will be treated in modeling, rather than to just identify such periods. We had been under the impression that Texas treated such periods as missing data for which no concentration estimates were made. However, it is now our understanding that Texas does indeed interpolate between valid data points or otherwise substitute more realistic values for the period. This is in accordance with our policy, and we support this approach; however, we urge that the procedures used be adequately documented.

If you have any questions, please contact me.

Attachment

cc: D. deRoeck (MD-15)
D. Grano (MD-15)
J. Irwin (MD-80)

FY 89 MODEL CLEARINGHOUSE MEMORANDA

<u>Date</u>	<u>Region</u>	<u>Subject</u>
10/11/88	VI	Use of ISC UNAMAP 6, Change 7
11/07/88	VI	Compilation of Most Recent, Available 5-Year Meteorological Data By Texas
11/08/88	V	State of Indiana Meteorological Preprocessor Program
11/09/88	VI	Information Regarding Refinery Tank Farms and Their Rural/Urban Designation
11/09/88	VI	Request for Use of ISC 6.2
11/21/88	VI	Request for Use of ISCST and ISCLT Version 6.2 in Twin Oak Steam Electric Station PSD Application
11/28/88	VI	Request for Use of ISCST and ISCLT Version 6.2 in Formosa Plastics PSD Application
01/30/89	VIII	E. Helena Lead SIP
02/08/89	IV	Yates Power Plant GEP SIP
02/10/89	VIII	Denver PM ₁₀ SIP
02/27/89	IV	Paradise Power Plant
02/28/89	III	Martins Creek -- Regulations for Redesignation
03/20/89	VI	Proposed Region VI Responses to Louisiana About Modeling Issues
03/20/89	III & VI	Use of Allowable Emissions for National Ambient Air Quality Standards (NAAQS) Impact Analyses Under the Requirements for Prevention of Significant Deterioration (PSD)
03/23/89	X	Model Clearinghouse Review of Outline for PM ₁₀ SIP Modeling Protocol
04/06/89	I	"Connecticut Ambient Impact Analysis Guideline"

4/25/89	I	MassPower PSD -- Urban vs Rural for Background Source
5/11/89	I - X	Issues Associated with Modeling Background Sources
6/8/89	III	Policy Interpretation - Modeling for Intermediate Terrain
6/28/89	I - X	Clarification of Stack-Structure Relationships
6/28/89	IV	Response to Region VI Position on PSD Modeling Issue
7/31/89	VI	Request for Support in Evaluating Meteorological Data bases