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

7 AUG 1992

MEMORANDUM

SUBJECT: Healy Clean Coal Visibility Analysis

FROM: Jawad S. Touma, Meteorologist JST
Techniques Evaluation Section, SRAB (MD-14)

TO: Robert B. Wilson, Regional Meteorologist
Region X

As you requested in your memorandum dated June 10, 1992, I have reviewed the report titled "Permit Application for Air Quality Program - Prevention of Significant Deterioration (PSD) and Air Quality Control - Permit to Operate, Healy Clean Coal Project," dated April 1992, and have some comments regarding the visibility analysis sections.

An analysis of the effect of a new source on the visibility in a Class I area is outlined in the document Workbook for Plume Visual Impact Screening and Analysis, EPA-450/4-88-015. If screening criteria calculated with the VISCREEN model are exceeded, a more detailed plume visual impact analysis to ascertain the magnitude, frequency, location, and timing of plume visual impacts would be required. Such detailed analysis is called level-3 analysis, and is carried out by more sophisticated plume visibility models such as the PLUVUE-II model. The Environmental Protection Agency (EPA) had funded an effort that led to the development of this model after it was determined that the predecessor model, PLUVUE or PLUVUE-I, had several technical shortcomings. Since the introduction of the PLUVUE-II model, users have brought several coding errors to EPA's attention. As a result, work has been underway to fix these coding errors, as well as, test for other problems; completion is expected at the end of FY-92.

In the Healy Project study, the applicant concluded that the PLUVUE-I model has a significant advantage in execution speed, and that the additional technical shortcomings can be fixed and overcome so that the results simulate as closely as possible those that would have been obtained if the model had performed as the authors of the code had intended. Many errors are reported in Section 5.2, but it is not entirely clear to me whether all of them were fixed. Among the errors identified and fixed, is one dealing with a numerical overflow in the vertical dispersion parameter (sigma z). The fix consisted of substituting the

stability class B sigma z parameter for Class A. It is not clear how many hours were influenced by this change, nor what effect it might have on the impact analysis; however, this change is arbitrary and there is no technical basis for it.

In addition to fixes to the code, the report discusses modifications to input data in Section 5.3.3. Among these are using the model for a portion of the data (using monitored data for the other portion), excluding the F stability class from model input, and decreasing the stability class by one unit to account for the effects of complex terrain. These changes are also arbitrary and contrary to EPA modeling guidance. The effects on modeled concentrations of some of the other changes mentioned in this section (e.g., adding 30 minutes to the time, substituting mean for maximum ozone data or using 75 percent relative humidity) is unclear.

In conclusion, then, the analysis went beyond the stated objective of fixing PLUVUE-I coding errors to simulate the PLUVUE-II model to include many technical changes as well. It is not clear to me what all the changes are, although some seem to be very arbitrary. Nor is it possible to tell how the sum total of these changes have affected the visibility impact analysis for this study. It would have been useful to report the performance of this model with all of its changes using an independent data set.

If I can be of any further assistance to you, please let me know.

cc: D. Wilson

bcc: Regional Modeling Contacts, Regions I-IX (with copy of incoming memo and list of FY-92 Clearinghouse memoranda)

FY-92 MODEL CLEARINGHOUSE MEMORANDA

Date	Region	Subject
10/16/91	IV	Dade County, Florida, Stack Height Increase
11/7/91	VI	Phelps Dodge--Hidalgo Modeling Protocol
11/15/91	VIII	ASARCO E. Helena Lead State Implementation Plan (SIP)
12/04/91	I	Proposal to Use a Non-Guideline Model to Satisfy Intermediate Terrain Policy in New Source Permitting (Pine State Power; Jay, Maine)
12/23/91	VIII	East Helena Lead SIP - Protocols for Design Value Determination, and Model "Verification"
12/26/91	VI	Information Copy of El Paso-Juarez PM-10 Modeling
01/13/92	I	NHARD Modeling Guideline
01/27/92	VIII	East Helena Lead SIP - Protocols for Design Value Determination and Model "Verification"; Clarification of Model Clearinghouse Memorandum of December 23, 1991
03/06/92	I	Modeling Credits for Stack Height Increases and Merging Flue Gases at Taunton Municipal Light Plant
04/06/92	V	Proposal for Resolving the SO_2 State Implementation Plan Revision for Rhinelander, Wisconsin
06/23/92	I	Ozone Modeling Requirements for the Lewiston-Auburn and Knox-Lincoln Counties' Moderate Ozone Nonattainment Areas in Maine
07/30/92	III	Transcontinental Gas Pipe Line Corporation's Use of a Nonguideline Approach for Estimating the Amount of NO that is Converted to NO_2

FY-92 MODEL CLEARINGHOUSE MEMORANDA (Cont'd)

08/03/92	X	Healy Clean Coal Visibility Analysis