COMMONWEALTH OF PENNSYLVANIA
BUREAU OF AIR QUALITY CONTROL

April 8, 1987

Mr. Al Cimorelli
Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107

Dear Al:

Attached is a discussion by Bob Simonson of a modeling approach that Pennsylvania believes represents a reasonable, yet still conservative, review for PSD ambient air quality maintenance. Please review this and inform us as to the acceptability of such by EPA.

Sincerely,

John F. Slade, Chief
Analysis Section
Bureau of Air Quality Control

cc:Joe Pezze

AIR QUALITY MODELING AND SIGNIFICANT IMPACT AREAS

This summary is written as a result of a discussion with Al Cimorelli, Group Meteorologist, EPA Region III, Philadelphia on March 28, 1988 on the subject of CORESTAR; i.e., the relationship of major emission sources to the significant impact areas of proposed PSD sources. Two recent specific plant applications have triggered a need for a review and interpretation of the concept.

As stated in the Workshop Guidelines for PSD of 1980 a significant impact area is established for applicable pollutants for each averaging time for which NAAQS exists. The Significant Impact Area is defined as a circular area where the radius is equal to the greatest distance from the source to which approved dispersion modeling shows the proposed emissions will have a significant impact according to the tabular values. The values for sulfur dioxide are 1, 5, and 25 ug/m**3 for the annual, 24-hour, and 3-hour averaging times, respectively.

Our understanding of the CORESTAR approach in an analysis is as follows: A proposed source is modeled alone for the appropriate number of analysis years. All the modeling results for each receptor for all averaging times are placed in a data set. These data are processed in order to identify the time periods when each receptor for the proposed source is greater than the significance values for the pollutant-- for example, 5 and 25 ug/m**3 for sulfur dioxide for 24-hour and 3-hour averaging periods, respectively. In the next phase of the analysis all major sources considered significant in the impact area of the proposed source are modeled for these receptors and time periods only. In this way it is very possible for exceedances of the NAAQS due to these major sources to escape detection if these exceedances occur at receptors or time periods other than those subject to this " selective" analysis.

The consultant that produced the air quality modeling study to support a PSD application for the proposed Ebensburg Generating Plant did not use the CORESTAR concept described in the paragraph above. A brief summary of this application is given to support of our review and concurrence in their conclusion that the proposed source was not a significant contributor to the receptors at the times of modeled exceedances from Penelec sources 25 or 30 kms to the west of the proposed Ebensburg plant. Screening modeling showed that sulfur dioxide monitoring deminimis values could not be met. Screening also showed ISCST to be the controlling model for the analysis. Therefore the applicant monitored sulfur dioxide at the site for four winter months in order to meet the significant monitoring requirements. The monitored sulfur dioxide data were used to develop a regional background sulfur dioxide value that could be applied to the assessment of short-term standards. An accepted technique was used to derive background due to uninventoried, non-modeled sulfur dioxide sources.

In addition they collected meteorological data at this site in order to compare meteorological characteristics of the site region to concurrent meteorological obserations from the National Weather Service Dubois airport. Significant positive correlation between these two observation sites indicated that use of 5 years of Dubois data could be considered representative of the site for ISCST modeling. (These data were not available on tape from the National Climatic Center so the consultant prepared the hourly input for the preprocessor from hardcopy records. The period of record covered five years from 1980 through 1984.) The applicant decided to continue meteorological monitoring for a full year in order the qualify these data as "site representative" for any future modeling.

The PSD increment portion of their analysis was routine. Predicted values of the PSD pollutants were well within the sulfur dioxide and TSP increment limitations. Maximum groundlevel concentrations occurred at receptors within 7 kms of the proposed source.

Significant impact areas for sulfur dioxide were defined to 15 km, 25 km, and 35 km for the annual, 24-hour, and 3-hour averaging periods, respectively. Among the major sources of sulfur dioxide impacting receptors in the Ebensburg SIAs were the Penelec plants at Seward, Conemaugh, Homer City, and Williamsburg.

The ISCST model was rerun for the NAAQS analysis. The proposed facility emissions plus all major sources sited above were modeled for the appropriate averaging periods. Because of the terrain "cut-off" restrictions of ISCST and the significant terrain ridges to the west and southwest, these same input data were used in Complex I with the hourly Dubois data even though ISCST had been shown to be "controlling".(See Note 1 below) Numerous receptors in the westerly and southwesterly sectors at a distance of 20-25 kms from the proposed source showed exceedances of the 3-hour and 24-hour sulfur dioxide ambient air quality standards. Subsequent refined analysis showed that the proposed facility had zero impact or less than significant impact at these receptors during these averaging periods when exceedances were modeled. (Ideally zero impact would present a stronger case, but it is possible that the source could contribute less than significance levels, but greater than zero, during a 24-hour averaging period under rapidly changing meteorological conditions accompanying, for example, a cold front passage through the analysis area.) Essentially the Seward, Conemaugh, and Homer City plants, singly or together, were responsible for the exceedances with westerly component wind directions.

We recommend approval of this approach. When it is physically impossible for a proposed plant to contribute to a modeled exceedance at the extremities of its significant impact area, it is our opinion that it should be permitted to construct. In this case there is a study in progress whose goal it is to set emission limits for the major sources cited in this air quality modeling study. At the conclusion of this study

in Indiana County there will be no modeled exceedances. We do not feel that projects to reduce the quantity of waste coal, with a subseqsuent environmental improvement, should be so penalized.

*NOTE 1: According to modeling guidance the use of ISC with meteorological data representative of a site is permitted. The use of Complex 1 for terrain modeling is only permitted with site data. With no site data available Complex may be applied in the Valley mode; i.e., Stability 6 and 2.5 meters per second. In this application we feel this "mix" of models would have diluted the modeling results. The exceedances have been identified. The sources apparently responsible for these violations have been identified.