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

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MEMORANDUM

SUBJECT: Acceptability of a Modified Dispersion Modeling Technique for the St. Joe Lead Smelter

FROM: for Richard G. Rhoads, Director
Monitoring and Data Analysis Division

TO: William A. Spratlin, Director
Air and Toxics Division, Region VII

In response to your request my staff, primarily the Model Clearinghouse, has reviewed the modeling techniques proposed by the State of Missouri for revision of the lead SIP for the St. Joe Smelter. We have also coordinated our review with the Control Programs Operation Branch, CPDD. Our comments below are separated into four subject areas: (1) Acceptability of the Modified Dispersion Modeling Technique, (2) Data Inputs to the Model, (3) Role of Ambient Data When Upsets and Other Emission Variabilities May be Occurring, and (4) Grandfathering the Use of the UNAMAP5 Version of ISC.

Acceptability of the Modified Dispersion Modeling Technique

As we understand it the State wishes to apply results from a proportional model (rollback) using measured data from three monitors near the smelter to determine emission limitations. The results of dispersion modeling would be used indirectly to apportion the requisite emission reduction among several sources at the smelter.

Given this understanding, we believe that the proposed technique best fits in the category "Use of Measured Data in Lieu of Model Estimates" as described in Section 11.2.2 of the Guideline on Air Quality Models (Revised). Some of the criteria mentioned in Section 11.2.2 appear to be applicable to the problem, e.g. the source is located in complex terrain where existing models may not perform well and a monitoring network does exist. However, some very important criteria in Section 11.2.2 do not appear to be satisfied. For example, Table 1 of the State report, comparing monitored data and model estimates, suggests that the dispersion model is performing satisfactorily (See Item f, Section 11.2.2). In fact, the State believes that this is the case as indicated in their December 12, 1986, letter to Region VII. Also,

a monitor does not exist in the vicinity of the highest estimated concentration. This is important since the estimate at this location is considerably higher than at any of the three existing monitors. Because of these factors, we do not believe that the basis for an acceptable design concentration exists in the monitored data. We conclude that the design concentration derived from dispersion modeling should be used to set emission limits.

It should also be noted that the State's procedure to use dispersion modeling to apportion the emissions and then ambient data to determine emission limits is really opposite to EPA guidance. For lead SIP's the role of the ambient data is to resolve issues about the appropriate input data for the dispersion modeling but that the dispersion model must subsequently be used to develop control strategies. [See 40 CFR 51.117(a), (C)(2), and Updated Information on Approval and Promulgation of Lead Implementation Plans, July 1983]

Data Inputs to the Model

The State mentions several other difficulties/assumptions used in the smelter analysis. The problem of emissions variability and excessive emissions due to upsets is not unique to the St. Joe Smelter; it is common to all primary and secondary lead smelters. The problem is important when comparing model estimates with measured data, as the State has recognized in its analysis. However, when establishing the design concentration or testing the control strategy with a dispersion model the problem does not arise since constant hourly emissions are input to the model.

We note that in certain analyses the State has neglected the affects of building downwash. We do not believe this is appropriate. It has been our experience that downwash is a commonly occurring and very real phenonmena when stacks are below GEP. ISC model estimates for building downwash have been found to be realistic, if not sometimes providing underestimates, when compared to observed concentrations.

Other assumptions by the State involving density, reflection coefficients, particle size distributions, etc. should be investigated by Region VII before accepting them.

We note that the State used three years of meteorological data from the St. Louis, MO airport in the ISC model. If off-site data are used, however, five years of such data are required for determining the design concentration. We are not sure whether on-site data are available at the smelter. If such data do exist and at least one year is of acceptable quality, such data are preferable to the off-site data.

Role of Ambient Data When Upset and Other Emission Variabilities May Be Occurring

We note that the State, in determining the quarterly averages from historical ambient data, has discarded several high days on the premise that excessive emissions may be occurring. While this form of analysis may be useful to the State for diagnostic purposes, the data should not be

discarded, or even flagged, for purposes of determining whether an ambient standard has been violated. See Section II (5) of the Appendix to the Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events (EPA 450/4-86-007) for guidance on this situation.

Grandfathering the Use of UNAMAP5 Version of ISC

You asked whether EPA should require the use of the UNAMAP6 version of ISC in the analysis. We agree with your position that it is prudent and logical to require the use of UNAMAP6. It does not appear that the State is very far along with this modeling analysis since it has only modeled for the design concentration with three years of meteorological data and has yet to model for the control situation.

Summary

We recommend that the St. Joe Lead SIP be based on dispersion modeling rather than the State's proposal to use monitoring (rollback) data. Region VII should work with the State to ensure that the ISC model is operated correctly, e.g. downwash is included, and that the appropriate emissions and meteorological data are input. Ambient data should be analyzed in accordance with the guidance in the Exceptional Events Guideline for purposes of determining compliance with standards. We defer to Regional judgment in this case on the appropriate version of UNAMAP to be used.

If you have any questions contact Joseph Tikvart (629-5561) of my staff or feel free to call me.

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