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Ref: 8AT-AP

TO: Dean Wilson
Model Clearinghouse, SRAB

FROM: John Notar, Meteorologist
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SUBJECT: ASARCO East Helena Overall Modeling Protocol

Per Douglas Skie's July 11, 1990 letter to Joseph Tikvart, following are Region VIII's preliminary comments to the overall modeling protocol to be used for the East Helena Lead SIP. Please review and provide any additional comments you may have on the overall modeling protocol by July 26, 1990. Please contact John Notar at FTS 330-1755 or Laurie Ostrand at FTS 330-1814 if you have any questions.

Complex Terrain

1. Page 2 discusses the modeling in complex terrain. It is indicated that the Valley model screening technique will be used. Region VIII disagrees with this screening technique being applied for a quarterly average. Complex I would be the better technique for evaluating complex terrain impacts. If ASARCO still wishes to apply the Valley model, they must use a quarterly STAR deck as opposed to the Valley model screening technique.

   Page 2 also indicates that sources with release points less than 35 meters (m) above ground will not be modeled. All sources, including those less than 35 m release height, must be modeled for complex terrain impacts. The Valley model does allow area sources to be modeled. Since Complex I does not address area and volume sources, a technique using ISC would have to be employed. This would require modeling area and volume sources with Industrial Source Complex Short Term (ISCST) model at the critical distances indicated by Complex I.

2. Page 3 discusses the grid system for Complex I, note that Complex I requires the grid system to be polar and not rectilinear.

3. On page 3, the paragraph that starts "should the complex terrain..." and continues onto to page 4 is not clear. How will the Complex Terrain Model be reconciled with the CMB results since detailed chemical analysis will not be performed at the Microwave site.

Simple Terrain

1. On page 4, the last paragraph indicates what is intended to be done should the CMB and ISCST models not reconcile. The measures defined are inconsistent with the PM10 SIP Development Guidelines. If the models do not reconcile then the use of dispersion modeling is not appropriate. CMB and rollback, using a detailed emission inventory, should be relied upon in developing and demonstrating the adequacy of the control strategy.

2. Page 4 discusses features of the ISCST model including the applicability to rural environments. Please provide the Auer Land Use calculations to document that the East Helena area is rural, as ASARCO proposes.

Emission Inventory

1. On page 5, the footnote discusses the amount of samples to be taken. Note that 5 days per site per quarter is the minimum.

Meteorological Inputs

1. Page 6 discusses the use of two meteorological stations for inputs into the model to address impacts from low level sources. Before EPA can approve this concept (using two ten meter towers for input into the model), the final criteria for defining downslope conditions, which will then determine which meteorological station will be used, needs to be reviewed by EPA.

2. Page 7 discusses the scaling down of meteorological data from the top of the zinc stack to address those stack heights greater than 76 m. EPA policy requires that wind speed and direction be scaled up from the 35 m level of the zinc stack.

3. Page 8 discusses the heat island effect and the changing of dispersion coefficients. EPA is still considering this concept and will be prepared to discuss the concept at the August 1, 1990 meeting.

4. In defining a possible heat island effect, ASARCO must review the vertical temperature profile on the zinc stack to determine the height of the proposed heat island bubble and for the comparison with the temperatures measured at Old Railroad, Kennedy Park and Firehall.

5. If the heat island effect is proven, then the top of the heat island bubble should be the minimum mixing height as opposed to the proposed 20 m value discussed on page 9. If the heat island effect is not proven, the 20 m value will be acceptable.

6. Page 8 also discussed mixing heights. As indicated in the July 17, 1990 memo from Doug Skie to Jeff Chaffee, mixing heights must be generated with upper and lower level data collected from the same location which, in this case, is Great Falls.

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GEP Stack Heights

1. All stacks should be modeled at the GEP stack height or the actual stack height, whichever is lower. EPA is still reviewing the GEP stack height analysis of the blast furnace stack and zinc stack.

Air Quality Data Base for Model Reconciliation

1. On page 10, it is indicated that the Dartman site had been moved to be co-located with the Kennedy Park meteorological site. EPA does not recall that the State requested approval to move this site.

2. On page 10, the third paragraph discusses a procedure for ranking days. EPA believes that the intent of this discussion is to select days for modeling and statistical analysis to reflect adverse meteorological conditions. However, it appears that these extra days will be evaluated in conjunction with the top 25 highest concentration days and from this evaluation 25 days will be chosen for modeling and statistical analysis. EPA believes that the top 25 highest concentration days, as well as, days representing adverse meteorological conditions should be modeled and included in the statistical analysis. The method for selecting adverse meteorological days is incorrect. The lowest value obtained from the products of concentrations and emissions would have the worse meteorology (poorest dispersion conditions). Therefore, the lowest values should be selected for additional modeling and statistical analysis.

3. On page 11, the third paragraph discusses the scaling factor to be used to convert the 24-hour complex terrain screening concentrations. EPA does not approve of the scaling factor method presented and prefers that the complex terrain impacts be calculated either from the Valley model using a quarter STAR deck or Complex I and hourly meteorology.

CMB Modeling

1. Page 11 discusses that the dispersion model and CMB will be reconciled with the 3rd and 4th quarters of FY90 data. It should also be noted that the reconciled model will be confirmed with 1st and 2nd quarter FY91 data.

Date 4.9.5

Initial Modeling and Model Evaluation

1. The third paragraph on page 13 discusses the 10 highest concentration days per quarter and how these days will be analyzed. Although it is not stated, EPA assumes that these are the 10 highest days in the 1st and 2nd quarters of FY91. This should be clarified.

2. The fourth paragraph on page 13 discusses the model performance. EPA does not understand how "not significantly different at the 10% confidence level" is being applied. EPA will work with the State and ASARCO to develop the proper statistical methods to determine whether the difference between model predictions and observations are acceptable.

3. In regards to the proposed use of an artificial building discussed on page 14, EPA policy does not allow modeling analysis to assume artificial/non-existent structures to account for complex atmospheric flow.

Model Reconciliation

1. Page 15 discusses model reconciliation. The second paragraph indicates that in case of difference greater that +/- 20% between the dispersion and CMB models, several procedures will be considered for improving their agreement. Plus or minus 20 percent is not within the procedures outlined in the Protocol for Reconciling Difference Among Receptor and Dispersion Models. These procedures should be followed for reconciling the models.

Additional Comments

1. The overall modeling protocol should include:

   a. which meteorological data will be used for American Chemet facility and the East Helena area sources;

   b. the modeling receptor grid dimensions for the 1993 attainment demonstration (overall grid density should be a minimum of 1 km, the City of East Helena and the highest concentration sites should have a grid density of a 100 m); and

   c. the dimensions used for the area source emissions grid.