ISSUES IN NONREACTIVE MODELS

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In assessing transportation-related air quality impacts, we are aware of the numerous changes that have recently occurred and continue to take place. Within the past few years, many new analysis techniques, methodologies, and models have been introduced. Older models have been refined or enhanced. Field validation studies have been performed. Users and researchers have had the opportunity to gain additional experiences with the implementation of these techniques. During this 2-day workshop, it was possible to cover in depth only a limited number of the models and methodologies that are currently available for microscale and regional analysis.

The principal objective of Workshop 2 was to provide the latest information on nonreactive models and methodology to those persons responsible for carrying out air quality impact assessments at both the microscale and mesoscale levels. Models for reactive pollutants were discussed in Workshop 1.

Gaussian line source models have played an important part in assessing air quality impacts of proposed highway projects in connection with the preparation of environmental impact statements. Many are familiar with or have used the line source model developed several years ago by the California Department of Transportation. Ward and Ranzieri provide an update on the modifications and additional field validation that have resulted in a new version of this model called CALINE2.

Microscale numerical models, sometimes referred to as conservation-of-mass models, are probably not so familiar to the average user, nor have they been so extensively used as have the Gaussian models. Sontowski presents the theoretical basis of numerical models and discusses how they differ from the Gaussian formulation. His discussion includes the proprietary and nonproprietary models that are currently used.

Downey describes results of a statistical comparison of 13 models using synthetic data samples. The lack of a reliable air quality data base did not permit the validation of the accuracy of these models, but these comparisons may assist potential users in the selection of models for their work.

Patterson discusses a relatively new methodology for estimating concentrations of carbon monoxide near signalized intersections. This procedure takes into account differences in emissions resulting from motor vehicles operating in various modes on a street or highway.

Ellis, Dabberdt, Kozlowski and Caruso, and Nash are all concerned with models that have been used for urban regional analysis. Ellis relates the experiences of one state highway agency in implementing the APRAC-1A urban diffusion model. Several modifications that have been made are described. Dabberdt, a representative of the firm that originally developed the model, comments on this paper. A regional emissions model called SAPOLLUT was sponsored by the Federal Highway Administration, and Kozlowski and Caruso describe recent improvements and modifications to this model. Nash, a user of SAPOLLUT, comments on this methodology and relates experiences with it in Virginia.

Williams explains EPA's program for measuring motor vehicle emissions and describes the new methodology and the reasons behind it. The important topic of

monitoring ambient air quality is discussed by Palmieri, who gives practical advice based on the experience gained in setting up a monitoring program by one state transportation agency.

The following questions were posed at the beginning of the workshop, and were addressed in the discussions during the 2-day period.

1. What accuracy can be reasonably expected from available microscale Gaussian and numerical models under optimal conditions?
2. Are microscale models sufficiently validated so that users can apply them with reasonable confidence in most situations? How can we judge whether a model is adequately validated?
3. Are microscale models available that can be applied in areas of rough topography, in city environments, and to highway interchanges?
4. Under what circumstances will users need to validate models they plan to use? What would this entail?
5. Have microscale models been challenged either by air quality control agencies or in litigation? If so, how do we avoid such challenges?
6. What can we really find out from model comparisons? Can we use a properly validated model to determine the accuracy of another model?
7. Should some group or agency compile a list of "acceptable" or "approved" microscale models? Would this be feasible or desirable? Do we have an adequate air quality data base to do this?
8. Where should future research and development efforts be concentrated in microscale model development? Do we need to concentrate on improving either existing Gaussian or numerical models or both?
9. Have we reached a stage in microscale model development in which the potential accuracy of the models exceeds the reliability and accuracy of the best available input data such as estimates of future traffic volumes, speeds, emission factors, and meteorological parameters? If the reliability of input data is the weakest link, are we not faced with a basic dilemma?
10. What methodologies are currently available for estimating present and future carbon monoxide emissions and concentrations near signalized intersections? How reliable are the estimates using these methods?
11. What mesoscale models are available that can be used for estimating the urban distribution of carbon monoxide levels for future years? Do these models provide sufficient spatial resolution so that they provide reasonable estimates of the 1-hour and 8-hour maximum background concentrations needed for individual project analysis? Do these models need to be validated? If so, can data from existing monitoring networks be used for validating background levels?
12. When can we expect EPA to officially promulgate supplement 5 of AP-42? How will this be done and by whom? How often can we expect AP-42 revisions to be made? Will contemplated revisions to supplement 5 be based on the same methodology? Can users expect from EPA documented computer programs to assist in implementing supplement 5 and subsequent revisions? Will transportation agencies be able to provide the detailed data required by supplement 5 to compute composite emissions?