

in the *Guideline*. An ASTM reference<sup>24</sup> provides a general philosophy for developing and implementing advanced statistical evaluations of atmospheric dispersion models, and provides an example statistical technique to illustrate the application of this philosophy. An EPA reference<sup>25</sup> provides a statistical technique for evaluating model performance for predicting peak concentration values, as might be observed at individual monitoring locations. In many cases, this protocol should be considered preferentially to the material in Chapter 3 of reference 22. The procedures in these documents provide a general framework for objective decision-making on the acceptability of an alternative model for a given regulatory application. The documents contain procedures for conducting both the technical evaluation of the model and the field test or performance evaluation.

b. This section discusses the use of alternate modeling techniques and defines three situations when alternative models may be used.

### 3.2.2 Recommendations

a. Determination of acceptability of a model is a Regional Office responsibility. Where the Regional Administrator finds that an alternative model is more appropriate than a preferred model, that model may be used subject to the recommendations of this subsection. This finding will normally result from a determination that (1) a preferred air quality model is not appropriate for the particular application; or (2) a more appropriate model or analytical procedure is available and applicable.

b. An alternative model should be evaluated from both a theoretical and a performance perspective before it is selected for use. There are three separate conditions under which such a model may normally be approved for use: (1) If a demonstration can be made that the model produces concentration estimates equivalent to the estimates obtained using a preferred model; (2) if a statistical performance evaluation has been conducted using measured air quality data and the results of that evaluation indicate the alternative model performs better for the given application than a comparable model in Appendix A; or (3) if the preferred model is less appropriate for the specific application, or there is no preferred model. Any one of these three separate conditions may make use of an alternative model acceptable. Some known alternative models that are applicable for selected situations are listed on EPA's SCRAM Internet Web site (subsection 2.3). However, inclusion there does not confer any unique status relative to other alternative models that are being or will be developed in the future.

c. Equivalency, condition (1) in paragraph (b) of this subsection, is established by demonstrating that the maximum or highest, second highest concentrations are within 2 percent of the estimates obtained from the preferred model. The option to show equivalency is intended as a simple demonstration of acceptability for an alternative model that is so nearly identical (or contains options that can make it identical) to a preferred model that it can be

treated for practical purposes as the preferred model. Two percent was selected as the basis for equivalency since it is a rough approximation of the fraction that PSD Class I increments are of the NAAQS for SO<sub>2</sub>, *i.e.*, the difference in concentrations that is judged to be significant. However, notwithstanding this demonstration, models that are not equivalent may be used when one of the two other conditions described in paragraphs (d) and (e) of this subsection are satisfied.

d. For condition (2) in paragraph (b) of this subsection, the procedures and techniques for determining the acceptability of a model for an individual case based on superior performance are contained in references 22–25 should be followed, as appropriate. Preparation and implementation of an evaluation protocol which is acceptable to both control agencies and regulated industry is an important element in such an evaluation.

e. Finally, for condition (3) in paragraph (b) of this subsection, an alternative refined model may be used provided that:

- i. The model has received a scientific peer review;
- ii. The model can be demonstrated to be applicable to the problem on a theoretical basis;
- iii. The data bases which are necessary to perform the analysis are available and adequate;
- iv. Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates; and
- v. A protocol on methods and procedures to be followed has been established.

### 3.3 Availability of Supplementary Modeling Guidance

a. The Regional Administrator has the authority to select models that are appropriate for use in a given situation. However, there is a need for assistance and guidance in the selection process so that fairness and consistency in modeling decisions is fostered among the various Regional Offices and the States. To satisfy that need, EPA established the Model Clearinghouse<sup>5</sup> and also holds periodic workshops with headquarters, Regional Office, State, and local agency modeling representatives.

b. The Regional Office should always be consulted for information and guidance concerning modeling methods and interpretations of modeling guidance, and to ensure that the air quality model user has available the latest most up-to-date policy and procedures. As appropriate, the Regional Office may request assistance from the Model Clearinghouse after an initial evaluation and decision has been reached concerning the application of a model, analytical technique or data base in a particular regulatory action.

### 4.0 Simple-Terrain Stationary Source Models

#### 4.1 Discussion

a. Simple terrain, as used here, is considered to be an area where terrain features are all lower in elevation than the top of the stack of the source(s) in question. The models recommended in this section are

generally used in the air quality impact analysis of stationary sources for most criteria pollutants. The averaging time of the concentration estimates produced by these models ranges from 1 hour to an annual average.

b. In the early 1980s, model evaluation exercises were conducted to determine the "best, most appropriate point source model" for use in simple terrain.<sup>8,17</sup> No one model was found to be clearly superior and, based on past use, public familiarity, and availability, ISC (predecessor to ISC3<sup>26</sup>) became the recommended model for a wide range of regulatory applications. Other refined models which also employed the basic Gaussian kernel, *i.e.*, BLP, CALINE3, OCD, and EDMS, were developed for specialized applications (Appendix A). Performance evaluations were also made for these models, which are identified in Appendix A.

### 4.2 Recommendations

#### 4.2.1 Screening Techniques

a. Where a preliminary or conservative estimate is desired, point source screening techniques are an acceptable approach to air quality analyses. EPA has published guidance for screening procedures,<sup>27</sup> and a computerized version of the recommended screening technique, SCREEN3, is available.<sup>28</sup>

b. All screening procedures should be adjusted to the site and problem at hand. Close attention should be paid to whether the area should be classified urban or rural in accordance with subsection 8.2.3. The climatology of the area should be studied to help define the worst-case meteorological conditions. Agreement should be reached between the model user and the appropriate reviewing authority (paragraph 3.0(b)) on the choice of the screening model for each analysis, and on the input data as well as the ultimate use of the results.

#### 4.2.2 Refined Analytical Techniques

a. A brief description of preferred models for refined applications is found in Appendix A. Also listed in that appendix are the model input requirements, the standard options that should be selected when running the program, and output options.

b. When modeling for compliance with short term NAAQS and PSD increments is of primary concern, a short term model may be used to provide long term concentration estimates. The conversion from long term to short term concentration averages by any transformation technique is not acceptable in regulatory applications.

c. The state-of-the-science for modeling atmospheric deposition is evolving and the best techniques are currently being assessed and their results are being compared with observations. Consequently, the approach taken for any purpose should be coordinated with the appropriate reviewing authority (paragraph 3.0(b)).

### 5.0 Model Use in Complex Terrain

#### 5.1 Discussion

a. For the purpose of the *Guideline*, complex terrain is defined as terrain exceeding the height of the stack being