

resolution. The horizontal and vertical resolutions in the model affect the dispersion and transport of emission plumes. Artificially large grid cells (too few vertical layers and horizontal grids) may dilute concentrations and may not properly consider impacts of complex terrain, complex meteorology, and land/water interfaces. Fifth, the state needs to generate meteorological data that describe atmospheric conditions and emissions inputs. Finally, the state needs to verify that the model is properly simulating the chemistry and atmospheric conditions through diagnostic analyses and model performance tests. Once these steps are satisfactorily completed, the model is ready to be used to generate air quality estimates to support an attainment demonstration.

The modeled attainment test compares model-predicted one-hour daily maximum concentrations in all grid cells for the attainment year to the level of the NAAQS. A predicted concentration above 0.124 ppm ozone indicates that the area is expected to exceed the standard in the attainment year and a prediction at or below 0.124 ppm indicates that the area is expected to attain the standard. This type of test is often referred to as an exceedance test. The EPA's guidance recommends that states use either of two modeled attainment or exceedance tests for the one-hour ozone NAAQS: a deterministic test or a statistical test.

The deterministic test requires the state to compare predicted one-hour daily maximum ozone concentrations for each modeled day⁹ to the attainment level of 0.124 ppm. If none of the predictions exceed 0.124 ppm, the test is passed.

The statistical test takes into account the fact that the form of the one-hour ozone standard allows exceedances. If, over a three-year period, the area has an average of one or fewer exceedances per year, the area is not violating the standard. Thus, if the state models a very extreme day, the statistical test provides that a prediction above 0.124 ppm up to a certain upper limit may be consistent with attainment of the standard. (The form of the one-hour ozone standard allows for up to three readings above the standard over a three-year period before an area is considered to be in violation.)

The acceptable upper limit above 0.124 ppm is determined by examining the size of exceedances at monitoring sites which meet the one-hour NAAQS. For example, a monitoring site for

which the four highest one-hour average concentrations over a three-year period are 0.136 ppm, 0.130 ppm, 0.128 ppm and 0.122 ppm is attaining the standard. To identify an acceptable upper limit, the statistical likelihood of observing ozone air quality exceedances of the standard of various concentrations is equated to the severity of the modeled day. The upper limit generally represents the maximum ozone concentration observed at a location on a single day and it would be the only reading above the standard that would be expected to occur no more than an average of once a year over a three-year period. Therefore, if the maximum ozone concentration predicted by the model is below the acceptable upper limit, in this case 0.136 ppm, then EPA might conclude that the modeled attainment test is passed. Generally, exceedances well above 0.124 ppm are very unusual at monitoring sites meeting the NAAQS. Thus, these upper limits are rarely substantially higher than the attainment level of 0.124 ppm.

B. Additional Analyses Where Modeling Fails To Show Attainment

As with other predictive tools, there are inherent uncertainties associated with modeling and its results. For example, there are uncertainties in some of the modeling inputs, such as the meteorological and emissions data bases for individual days and in the methodology used to assess the severity of an exceedance at individual sites. The EPA's guidance recognizes these limitations, and provides a means for considering other evidence to help assess whether attainment of the NAAQS is likely. The process by which this is done is called a weight-of-evidence determination.

Under a WOE determination, the state can rely on and EPA will consider factors such as: other modeled attainment tests, e.g., a rollback analysis; other modeled outputs, e.g., changes in the predicted frequency and pervasiveness of exceedances and predicted changes in the design value; actual observed air quality trends; estimated emissions trends; analyses of air quality monitored data; the responsiveness of the model predictions to further controls; and, whether there are additional control measures that are or will be approved into the SIP but were not included in the modeling analysis. This list is not an exclusive list of factors that may be considered and these factors could vary from case to case. For example, the EPA's guidance contains no limit on how close a modeled attainment test must be to passing to conclude that other evidence

besides an attainment test is sufficiently compelling to suggest attainment. However, the further a modeled attainment test is from being passed, the more compelling the WOE needs to be.

The EPA's modeling guidance also recognizes a need to perform a mid-course review as a means for addressing uncertainty in the modeling results. Because of the uncertainty in long term projections, EPA believes a viable attainment demonstration that relies on WOE needs to contain provisions for periodic review of monitoring, emissions, and modeling data to assess the extent to which refinements to emission control measures are needed. The mid-course review is discussed below.

V. What Is the Framework for Proposing Action on the Attainment Demonstration SIPs?

In addition to the modeling analysis and WOE support demonstrating attainment, the EPA has identified the following key elements which generally must be present in order for EPA to approve the one-hour attainment demonstration SIPs. These elements are: measures required by the CAA and measures relied on in the modeled attainment demonstration SIP; NO_x reductions affecting boundary conditions; motor vehicle emissions budgets; any additional measures needed for attainment¹⁰; and a Mid-Course Review (MCR).

A. CAA Measures and Measures Relied on in the Modeled Attainment Demonstration SIP

The states should have adopted the control measures already required under the CAA for the area classification. In addition, a state may have included control measures in its attainment strategy that are in addition to measures required in the CAA. For purposes of fully approving the state's SIP, the state needs to adopt and submit all VOC and NO_x controls within the local modeling domain that were relied on for purposes of the modeled attainment demonstration.

The information in Table 1 is a summary of the CAA requirements that should be met for a serious area for the one-hour ozone NAAQS. These requirements are specified in section 182 of the CAA. EPA must have taken final action approving all measures

⁹ The initial, "ramp-up" days for each episode are excluded from this determination.

¹⁰ As discussed in detail below, the Rhode Island attainment demonstration shows attainment without the need for additional measures beyond what has been adopted into the SIP or will be required by federal regulations. Therefore additional measures are not required for Rhode Island.