

example of applying those techniques are found in several references^{71, 72, 73, 74}, which provide a great deal of additional information for evaluating and describing building cavity and wake effects.

b. If stacks for new or existing major sources are found to be less than the height defined by EPA's refined formula for determining GEP height, then air quality impacts associated with cavity or wake effects due to the nearby building structures should be determined. The EPA refined formula height is defined as $H + 1.5L$ (see reference 73). Detailed downwash screening procedures²⁷ for both the cavity and wake regions should be followed. If more refined concentration estimates are required, the recommended steady-state plume dispersion model in subsection 4.2.2 contains algorithms for building wake calculations and should be used.

7.2.3 Long Range Transport (LRT) (*i.e.*, Beyond 50km)

a. Section 165(d) of the Clean Air Act requires that suspected adverse impacts on PSD Class I areas be determined. However, 50km is the useful distance to which most steady-state Gaussian plume models are considered accurate for setting emission limits. Since in many cases PSD analyses show that Class I areas may be threatened at distances greater than 50km from new sources, some procedure is needed to (1) determine if an adverse impact will occur, and (2) identify the model to be used in setting an emission limit if the Class I increments are threatened. In addition to the situations just described, there are certain applications containing a mixture of both long range and short range source-receptor relationships in a large modeled domain (*e.g.*, several industrialized areas located along a river or valley). Historically, these applications have presented considerable difficulty to an analyst if impacts from sources having transport distances greater than 50km significantly contributed to the design concentrations. To properly analyze applications of this type, a modeling approach is needed which has the capability of combining, in a consistent manner, impacts involving both short and long range transport. The CALPUFF modeling system, listed in Appendix A, has been designed to accommodate both the Class I area LRT situation and the large modeling domain situation. Given the judgement and refinement involved, conducting a LRT modeling assessment will require significant consultation with the appropriate reviewing authority (paragraph 3.0(b)) and the affected FLM(s). The FLM has an affirmative responsibility to protect air quality related values (AQRVs) that may be affected, and to provide the appropriate procedures and analysis techniques. Where there is no increment violation, the ultimate decision on whether a Class I area is adversely affected is the responsibility of the appropriate reviewing authority (Section 165(d)(2)(C)(ii) of the Clean Air Act), taking into consideration any information on the impacts on AQRVs provided by the FLM. According to Section 165(d)(2)(C)(iii) of the Clean Air Act, if there is a Class I increment violation, the *source* must demonstrate to the

satisfaction of the FLM that the emissions from the source will have no adverse impact on the AQRVs.

b. If LRT is determined to be important, then refined estimates utilizing the CALPUFF modeling system should be obtained. A screening approach^{67, 75} is also available for use on a case-by-case basis that generally provides concentrations that are higher than those obtained using refined characterizations of the meteorological conditions. The meteorological input data requirements for developing the time and space varying three-dimensional winds and dispersion meteorology for refined analyses are discussed in paragraph 9.3.1.2(d). Additional information on applying this model is contained in Appendix A. To facilitate use of complex air quality and meteorological modeling systems, a written protocol approved by the appropriate reviewing authority (paragraph 3.0(b)) and the affected FLM(s) may be considered for developing consensus in the methods and procedures to be followed.

7.2.4 Modeling Guidance for Other Governmental Programs

a. When using the models recommended or discussed in the *Guideline* in support of programmatic requirements not specifically covered by EPA regulations, the model user should consult the appropriate Federal or State agency to ensure the proper application and use of the models. For modeling associated with PSD permit applications that involve a Class I area, the appropriate Federal Land Manager should be consulted on all modeling questions.

b. The Offshore and Coastal Dispersion (OCD) model, described in Appendix A, was developed by the Minerals Management Service and is recommended for estimating air quality impact from offshore sources on onshore, flat terrain areas. The OCD model is not recommended for use in air quality impact assessments for onshore sources. Sources located on or just inland of a shoreline where fumigation is expected should be treated in accordance with subsection 8.2.8.

c. The Emissions and Dispersion Modeling System (EDMS), described in Appendix A, was developed by the Federal Aviation Administration and the United States Air Force and is recommended for air quality assessment of primary pollutant impacts at airports or air bases. Regulatory application of EDMS is intended for estimating the cumulative effect of changes in aircraft operations, point source, and mobile source emissions on pollutant concentrations. It is not intended for PSD, SIP, or other regulatory air quality analyses of point or mobile sources at or peripheral to airport property that are independent of changes in aircraft operations. If changes in other than aircraft operations are associated with analyses, a model recommended in Chapter 4 or 5 should be used.

8.0 General Modeling Considerations

8.1 Discussion

a. This section contains recommendations concerning a number of different issues not explicitly covered in other sections of this

guide. The topics covered here are not specific to any one program or modeling area but are common to nearly all modeling analyses for criteria pollutants.

8.2 Recommendations

8.2.1 Design Concentrations (see also subsection 11.2.3.1)

8.2.1.1 Design Concentrations for SO₂, PM-10, CO, Pb, and NO₂

a. An air quality analysis for SO₂, PM-10, CO, Pb, and NO₂ is required to determine if the source will (1) cause a violation of the NAAQS, or (2) cause or contribute to air quality deterioration greater than the specified allowable PSD increment. For the former, background concentration (subsection 9.2) should be added to the estimated impact of the source to determine the design concentration. For the latter, the design concentration includes impact from all increment consuming sources.

b. If the air quality analyses are conducted using the period of meteorological input data recommended in subsection 9.3.1.2 (*e.g.*, 5 years of National Weather Service (NWS) data or at least 1 year of site specific data; subsection 9.3.3), then the design concentration based on the highest, second-highest short term concentration or the highest long term average, whichever is controlling, should be used to determine emission limitations to assess compliance with the NAAQS and PSD increments.

c. When sufficient and representative data exist for less than a 5-year period from a nearby NWS site, or when site specific data have been collected for less than a full continuous year, or when it has been determined that the site specific data may not be temporally representative (subsection 9.3.3), then the highest concentration estimate should be considered the design value. This is because the length of the data record may be too short to assure that the conditions producing worst-case estimates have been adequately sampled. The highest value is then a surrogate for the concentration that is not to be exceeded more than once per year (the wording of the deterministic standards). Also, the highest concentration should be used whenever selected worst-case conditions are input to a screening technique, as described in EPA guidance.²⁷

d. If the controlling concentration is an annual average value and multiple years of data (site specific or NWS) are used, then the design value is the highest of the annual averages calculated for the individual years. If the controlling concentration is a quarterly average and multiple years are used, then the highest individual quarterly average should be considered the design value.

e. As long a period of record as possible should be used in making estimates to determine design values and PSD increments. If more than 1 year of site specific data is available, it should be used.

8.2.1.2 Design Concentrations for O₃ and PM-2.5

a. Guidance and specific instructions for the determination of the 1-hr and 8-hr design concentrations for ozone are provided in Appendix H and I (respectively) of reference