thermometers or a reliable thermocouple system to achieve adequate accuracy.

f. Siting, probe placement, and operation of  $\Delta T$  systems should be based on guidance found in Chapter 3 of reference 66, and such guidance should be followed when obtaining vertical temperature gradient data for use in plume rise estimates or in determining the critical dividing streamline height.

g. Wind Measurements. For refined modeling applications in simple terrain situations, if a source has a stack below 100m, select the stack top height as the wind measurement height for characterization of plume dilution and transport. For sources with stacks extending above 100m, a 100m tower is suggested unless the stack top is significantly above 100m (i.e.,  $\geq$ 200m). In cases with stack tops  $\geq$ 200m, remote sensing may be a feasible alternative. In some cases, collection of stack top wind speed may be impractical or incompatible with the input requirements of the model to be used. In such cases, the Regional Office should be consulted to determine the appropriate measurement height.

h. For refined modeling applications in complex terrain, multiple level (typically three or more) measurements of wind speed and direction, temperature and turbulence (wind fluctuation statistics) are required. Such measurements should be obtained up to the representative plume height(s) of interest (i.e., the plume height(s) under those conditions important to the determination of the design concentration). The representative plume height(s) of interest should be determined using an appropriate complex terrain screening procedure (e.g., CTSCREEN) and should be documented in the monitoring/ modeling protocol. The necessary meteorological measurements should be obtained from an appropriately sited meteorological tower augmented by SODAR if the representative plume height(s) of interest exceed 100m. The meteorological tower need not exceed the lesser of the representative plume height of interest (the highest plume height if there is more than one plume height of interest) or 100m.

i. In general, the wind speed used in determining plume height is defined as the wind speed at stack top.

j. Specifications for wind measuring instruments and systems are contained in the "On-Site Meteorological Program Guidance for Regulatory Modeling Applications".<sup>66</sup>

k. *Stability Categories.* The P–G stability categories, as originally defined, couple near-surface

measurements of wind speed with subjectively determined insolation assessments based on hourly cloud cover and ceiling height observations. The wind speed measurements are made at or near 10m. The insolation rate is typically assessed using observations of cloud cover and ceiling height based on criteria outlined by Turner.<sup>50</sup> It is recommended that the P-G stability category be estimated using the Turner method with site-specific wind speed measured at or near 10m and representative cloud cover and ceiling height. Implementation of the Turner method, as well as considerations in determining representativeness of cloud cover and ceiling height in cases for which site-specific cloud observations are unavailable, may be found in section 6 of reference 66. In the absence of requisite data to implement the Turner method, the SRDT method or wind fluctuation statistics (i.e., the  $\sigma_E$  and  $\sigma_A$ methods) may be used.

l. The SRDT method, described in section 6.4.4.2 of reference 66, is modified slightly from that published by Bowen et al. (1983) <sup>136</sup> and has been evaluated with three on-site data bases.<sup>137</sup> The two methods of stability classification which use wind fluctuation statistics, the  $\sigma_E$  and  $\sigma_A$  methods, are also described in detail in section 6.4.4 of reference 66 (note applicable tables in section 6). For additional information on the wind fluctuation methods, see references 68–72.

m. Hours in the record having missing data should be treated according to an established data substitution protocol and after valid data retrieval requirements have been met. Such protocols are usually part of the approved monitoring program plan. Data substitution guidance is provided in section 5.3 of reference 66.

n. Meteorological Data Processors. The following meteorological preprocessors are recommended by EPA: RAMMET, PCRAMMET, STAR, PCSTAR, MPRM,135 and METPRO.24 RAMMET is the recommended meteorological preprocessor for use in applications employing hourly NWS data. The RAMMET format is the standard data input format used in sequential Gaussian models recommended by EPA. PCRAMMET 138 is the PC equivalent of the mainframe version (RAMMET). STAR is the recommended preprocessor for use in applications employing joint frequency distributions (wind direction and wind speed by stability class) based on NWS data. PCSTAR is the PC equivalent of the mainframe version (STAR). MPRM is the recommended preprocessor for

use in applications employing on-site meteorological data. The latest version (MPRM 1.3) has been configured to implement the SRDT method for estimating P-G stability categories. MPRM is a general purpose meteorological data preprocessor which supports regulatory models requiring RAMMET formatted data and STAR formatted data. In addition to on-site data, MPRM provides equivalent processing of NWS data. METPRO is the required meteorological data preprocessor for use with CTDMPLUS. All of the above mentioned data preprocessors are available for downloading from the SCRAM BBS.<sup>19</sup>

17. Appendix W to Part 51, section 12.0, is amended by:

a. Revising references 20, 36, 58 and 90; and

b. Adding references 136 through 138. The revisions and additions read as follows:

Appendix W to Part 51—Guideline on Air Quality Models

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12.0 \* \* \*

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- 20. Environmental Protection Agency, 1995. SCREEN3 User's Guide. EPA Publication No. EPA-454/B-95-004. U.S. Environmental Protection Agency, Research Triangle Park, NC. (NTIS No. PB 95-222766)
- Chu, S. H. and E. L.Meyer, 1991. Use of Ambient Ratios to Estimate Impact of NO<sub>x</sub> Sources on Annual NO<sub>2</sub> Concentrations. Proceedings, 84th Annual Meeting & Exhibition of the Air & Waste Management Association, Vancouver, B.C.; 16–21 June 1991. (16 pp.) (Docket No. A– 92–65, II–A–7)
- 58. Environmental Protection Agency, 1995. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models, Volumes 1 and 2. EPA Publication Nos. EPA-454/ B-95-003a & b. U.S. Environmental Protection Agency, Research Triangle Park, NC. (NTIS Nos. PB-95-222741 and PB 95-222758, respectively)

 Environmental Research and Technology, 1987. User's Guide to the Rough Terrain Diffusion Model (RTDM), Rev. 3.20. ERT document No. PD535–585. Environmental Research and Technology, Inc.,