Requirements and Guidance for Generating MACCS2 Meteorological Data Files

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At LANL, the MELCOR Accident Consequence Code System Version 2 (MACCS2) computer code is used in the atmospheric dispersion calculations to determine the 95th percentile X/Q value. MACCS2 is advantageous in that it is a DOE Toolbox code, readily available, and contains models for deposition, plume meander, and plume buoyancy. To calculate the 95th percentile X/Q, one or more data files of the annual local meteorological data are required by MACCS2. LANL Safety Basis analysts recently developed new MACCS2 data files from the data records of the four meteorological towers operated by the Environmental Data and Analysis group.

Appendix A of DOE Standard 3009 calls out NRC Regulatory Guide (RG) 1.23 as describing the acceptable means of generating the meteorological data upon which dispersion is based. Revision 1 (2007) of RG 1.23 identifies several requirements and methods for generating meteorological data files, but is insufficient by itself. Although not explicitly cited by DOE requirements and guidance, the following documents are appropriate, if not necessary, for generating the meteorological data files:

- EPA-454/R-99-005, Meteorological Monitoring Guidance for Regulatory Modeling Applications,
- ANSI/ANS-3.11-2005, Determining Meteorological Information at Nuclear Facilities, and
- NRC Regulatory Guide 1.145, Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants.

From these documents, this article will summarize the requirements and guidance regarding:

- Criteria for meteorological instruments,
- Data selection or averaging schemes,
- Completeness requirements for the original data,
- Data substitution to resolve omissions in the primary data,
- Treatments for calm conditions,
- Methods for determining the stability class, and
- Mixing layer heights.

Although LANL's work was specific to the MACCS2 computer code, the reported requirements and guidance will be applicable to creating meteorological data files for other computer codes using the Pasquill-Gifford dispersion model.

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